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GERMAN DEVELOPMENT  
COOPERATION in the  
WATER SECTOR



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Water — a scarce resource in any event — is today subject to diverse threats. These include population growth, the stepped-up consumption of natural resources this prompts, and steadily worsening pollution of groundwater. The result: increasingly frequent water shortages and crises. To make matters worse, water resources are unevenly distributed among regions. Water shortages can even ignite conflicts between countries. Obtaining an adequate supply of clean freshwater is fast becoming a problem of serious proportions for much of humanity. The World Health Organization (WHO) estimates that 80% of all diseases occurring in developing countries are related to water. Despite considerable efforts to remedy these ills, today some 40% of the world's population — living in 80 or so developing countries — lacks access to clean drinking water and adequate sanitation.

Without water, no life can exist on earth. Water is the basis for every kind of development. Unless enough drinking water of sufficient quality is available to people and animals, and unless there is water to meet the needs of agriculture, trade and industry, both life and economic activity are an impossibility. Solutions beckon, however. Conflicts can be overcome if those involved agree to share scarce resources in an economically sensible, environmentally sound, and socially compatible manner.

The Federal Republic of Germany, in its role as a responsible member of the international community and an active partner in development efforts, is confronting this challenge. In recent years, Germany has substantially intensified its endeavors in the water sector. With ongoing projects backed by total funding of about DM 7 billion, today Germany ranks among the world's largest donors. Germany also regularly contributes its experience in this field to international discussions and conferences.

This brochure is intended to introduce both interested members of the public and experts to the current state of the discussion and give them an overview of Germany's development-policy accomplishments and services in the water sector.

Chapter 1 discusses global trends in the water sector, issues related to water quality and wastewater disposal and treatment, and growth in the demand for water. It then analyses the framework conditions affecting the principal areas of German development-cooperation activity in this field.

Chapter 2 portrays the German Government's development policy on integrated management of water resources. The concept reprinted here (2.1) serves as the basis for planning and implementing development-cooperation projects in the field of water supply and sanitation. This concept takes into account that water, as a scarce resource, has a price users must pay; and that social, economic and environmental-policy aspects must be respected.

Section 2.2 depicts the types of development cooperation engaged in by the German Government, and how funds are deployed. Typical projects are described in Section 2.3 to illustrate the diverse aspects addressed by German development cooperation in the water sector.

## 1 WATER: A SCARCE, VITAL RESOURCE

### **Resources Are Limited**

The terms "water regime" and "water cycle" are used to describe the overall system that is dynamically driven by the processes of precipitation, evaporation, and runoff. The total amount of water on the earth remains constant. But it is continuously in motion. Water cannot escape the relentlessly churning cycle for long; eventually, it returns to it by way of evaporation and rainfall.

It is primarily on the basis of local differences in the water regime that the earth's surface is classified, for instance distinguishing among areas with a moist, dry, or nival climate (this last term refers to environments in which water is bound up in snow and ice). Water is one of the main climatic components — although the water cycle itself is in turn influenced by climate changes and fluctuations. By helping to erode and weather the landscape, water also plays a pivotal role in geologically and geomorphologically shaping and sculpting the earth's crust.

It would seem that the earth is blessed with water in excess. And, in fact, the lion's share of the earth's surface is covered with water — 1.4 billion km<sup>3</sup> in all. However, 97.5% of this total consists of seawater and brackish water. And most of the rest is trapped in ice and glaciers or stored in the form of groundwater, of which only a very small fraction (a mere 0.014%) is available for drinking and irrigation.

Especially in areas where water is a scarce commodity, it holds considerable potential for stoking conflicts. In North Africa and the Middle East, for example, people must make do with less and less water, owing to the steady increase in overall consumption. It is plain that this must lead to conflicts of interest. These conflicts can take place between individuals who need the water for drinking, for animals, for industry, or for irrigation. But strife can also break out at the regional or international level, particularly when rivers cross national boundaries.

### **The Elixir of Life Is Growing Scarcer**

*Without water, there is no life. Water is the most essential resource. Water is the basis and the principal component of all living organisms, indispensable for the existence and survival of human beings, animals, and plants. All biological processes depend on the water cycle.*

Two thousand years ago, only about 200 to 300 million people worldwide had to share the available water resources. Today this figure has already grown to over 5.8 billion persons. There is theoretically still enough to supply all of them — that is, if water were evenly distributed among regions and over time. But 15 countries in North and West Africa and Western Asia must already get by on an available per-capita water supply of

less than 500 m<sup>3</sup> annually. Another twelve countries are in the range between 500 and 1,000 m<sup>3</sup>, and 22 countries have a per-capita supply between 1,000 and 2,000 m<sup>3</sup>. Acute shortages must be expected whenever the annual water supply falls below 500 m<sup>3</sup> per member of the population. But as a result of demographic trends and worsening pollution, it must be anticipated that the number of countries with water supply problems will continue to increase unless effective action is taken to remedy the situation.

A handful of countries, such as Libya, Qatar, Saudi Arabia, the United Arab Emirates and Yemen, already consume more water than their rivers carry or than accumulates in the form of groundwater. Water consumption is also critically high in Egypt, Tunisia, Barbados, Afghanistan, Cyprus, Israel and Malta, where it fluctuates between 50 and 100 percent of the replenishment rate.

In many cases, however, the available figures on the water supply are only estimates. It is difficult to reliably assess the situation, owing to a lack of adequate, precise data on precipitation, evaporation rates, groundwater, and surface water runoff.

Average values can also often be misleading, since both very dry regions and zones with abundant water can occur within one and the same country. All phenomena associated with water — such as scarcity, flooding, pollution and precipitation — can occur regionally or even locally within individual catchments. It is essential to solve these problems at the regional level, because it is either impracticable or inordinately expensive to transport water across large distances.

### **Demand Is Growing with the World's Population**

According to one forecast by the United Nations, the world's population will swell by about 61 percent between 1990 and the year 2025: from 5.3 billion to 8.5 billion people. Four out of five children will be born in developing countries, whose share of the earth's total population will rise from 77 to 84 percent. This will accelerate the shift of population from rural to urban areas. Some 1.5 billion people lived in cities in 1990, but by 2025 the figure will reach 4.4 billion. In the developing countries, urbanites' share of the overall population will skyrocket from 37 to 61 percent.

The demand for water will also surge, particularly in towns and cities. It will then be necessary to meet the demand in urban centres primarily by transporting water from ever-more-distant sources at great cost, or by overusing nearby water resources, unless water consumption can be placed on a more efficient basis.

Moreover, rising standards of living inevitably go hand in hand with greater expectations regarding the quality and availability of water. Per-capita consumption levels rapidly approach those typical of industrialized countries as soon as people have running water in their homes, especially since in many developing countries water either costs nothing at all or is too cheap to cover costs, thus encouraging wasteful use of it.

The water supply situation is already critical in most developing countries. About two billion people have no access to clean water today. But water scarcity in absolute terms is not the only reason for this. Owing to a lack of money and/or inefficiently operating administrations and utilities, poor people in particular are simply unable to gain access to what there is.

Worldwide, only about five percent of sewage is treated. In metropolitan areas in particular, severe pollution of available freshwater resources additionally aggravates the supply situation. It also poses health hazards. The World Health Organization estimates that 80% of all diseases are related to water. Here again, the poor are hardest hit.

### **Consumption and Pollution Reduce the Supply**

Increasing water consumption is one side of the coin. Mounting water pollution is the other. Both lead to greater scarcity. In Latin America, Asia and Africa, the quickening pace of industrialization almost automatically boosts the demand for water and the extent of pollution.

Relatively little is done to utilize available opportunities to foster economic growth without causing water pollution. The pollution of surface water and groundwater is exacerbated by industrial and domestic wastewater, which are all too often "disposed of" by simply being released directly into nature in unpurified form, by contaminated water seeping out of "wild" rubbish dumps, and by widespread improper use of pesticides and fertilizers. The consequences: increasing bacteriological and organic pollution, accumulation of sediment, and rising heavy-metal and nitrate levels.

Increasing salt concentrations are also problematic. This can occur when, for example, groundwater is heavily exploited in coastal areas, thus eventually permitting saltwater to penetrate into freshwater horizons. However, we often know even less about water quality than about available water quantities.

Looking ahead, it is indispensable to learn more about the nature of pollution to enable effective countermeasures. Governments must conduct a dialog with industry with the aim of introducing greater incentives to reduce pollution. Germany's Law on Wastewater Fees has demonstrated a feasible approach that other countries might be able to derive inspiration from.

### **Financial Resources Are Limited**

Lack of funds, inadequately trained personnel, and poorly maintained water supply and wastewater treatment systems are among the most common causes of inadequate water supply in the developing countries. Defective systems — according to WHO estimates, between 40 and 60% of all facilities in rural regions are non-functional — cannot be repaired, and additional water resources cannot be developed.

Supply systems cannot be sustainably operated and extended unless their operators are able to finance themselves by selling water. This is possible if they boost their efficiency, practice cost-conscious business management, and utilize appropriate technologies.

In connection with rural water supplies, water consumers themselves can perform some of the work themselves, such as digging ditches and forming self-help groups to operate and service pumps, thus lowering costs.

Many countries keep water prices low because, it is argued, poor people are unable to afford cost-driven rates. Yet more diligent analyses reveal that the bulk of this inexpensive water benefits the middle classes and the rich. Meanwhile, because of the low prices charged, the waterworks have no money to uphold the supply to poorer residential areas, especially since these are virtually unable to exert any kind of political pressure for this to be done. The poor are thus obliged to purchase water from traveling merchants, whose prices are far above the costs that a good public supply system must bear.

International development cooperation will continue to provide important support here — as "help for self-help". Development cooperation can provide "seed money" and advice on developing new ideas, and possibly also provide long-term assistance for mitigating particularly acute social problems, such as in urban slums.

### **Water Must Be Used More Frugally in Irrigated Agriculture**

Many countries, including some in arid regions, have significantly expanded water-intensive, irrigated farming to produce food both for their own populations and as cash crops for export. But when large volumes of water are channeled into these applications, other consumers can be placed at a serious disadvantage. This applies in particular to cases in which rivers cross national borders. When the water these rivers carry is reduced and/or polluted, this can have grave consequences for the economies of other countries downriver.

It is common for irrigated farms to actually utilize considerably less than 50% of the water they receive, especially with open, gravity-driven systems, which are most commonly used to irrigate fields. When water is sold at rates too low to cover costs — or is even distributed free of charge — this additionally encourages farmers to waste water.

By far the largest water consumers in developing countries are agricultural operations, accounting on average for over 85% of the total. Each year, farmers in Asia alone consume about 40% of all water utilized worldwide to irrigate their rice paddies.

In countries such as India, China, Pakistan, Indonesia, Iran, Mexico and Turkey, irrigated agriculture enjoys high economic-policy status. In most cases, however, there is no cross-sectoral management concept that does justice to this high status by taking all



relevant aspects into account. The only chance for water-intensive irrigated farming to survive is to strike a balance between food security for one's own population and agricultural production for the world market, in order to free up water resources to meet basic human needs and supply industry. This may make it necessary to abandon current ideas of achieving food security through self-sufficiency, and to purchase food on the world markets instead.

### **Environmental Technologies for Industry**

Compared to the industrialized nations, most developing countries still use a relatively small share of the available water for manufacturing. Industry accounts for between 10 and 30% of overall consumption in the South, contrasted with 50 to 70% in the industrialized world.

Industrial consumption levels can be counted on to substantially increase in the developing countries, swelling to volumes between three and five times as high as current levels. Modern technologies, such as recovery systems and water-saving production facilities like those now employed in the industrialized countries, will then gain in attractiveness there as well. All too often, however, there is a lack of incentives to save water. The cost of water typically hardly makes a dent in the budget compared to that of other raw materials. And when an operation extracts and manages its own water, the costs incurred are usually negligible.

### **The Water Requirements of Nature**

Low priority is attached to the interests of nature, as compared to economic uses and a supply of drinking water. As a consequence, wetlands are shrinking and lakes and rivers are being overused. This in turn is causing water quality to decline.

Water possesses special importance in connection with nature conservation and environmental protection. As the land areas utilized for agriculture expand, and as a result of increasing water pollution, the habitats of plants and animals are coming under threat. In Asia, for example, 60% of the original expanse of natural habitats had been lost by the mid-1980s. To make matters worse, in many cases such areas are not effectively protected. Only a few developing countries have signed the Ramsar Treaty on the Protection of Wetlands.

But in many countries, realization is now growing that nature constitutes a legitimate consumer of water. Wetlands can also be regarded as an economic resource, for example as a tourist attraction. And increasing importance is also being attached to conserving nature areas for the sake of future generations. The goal must be to strike a structural balance between the interests of nature and people.

### **Lack of Incentives to Use Water Frugally**

In many places, water scarcity is aggravated by prices that do not cover costs. In particular, many countries subsidize irrigated agriculture.

Although the natural resource of water is scarce, it is nevertheless squandered. On the way to the consumer, between 30 and 50% of extracted and processed drinking water is lost — in some urban areas, the figure is even estimated at over 50%. This careless management of valuable water is mainly encouraged by rates that are too low to permit recovery of the costs incurred.

### **National Framework Conditions, Institutions and Responsibilities Play a Crucial Role**

Despite the growing scarcity of water and the mounting problems it brings, many developing countries fail to implement water management measures on the required scale. Precisely because water is so economically, politically and culturally important, it often proves hard to find satisfactory solutions to resolve conflicting interests. In many cases, there are neither clear policies nor suitable framework conditions. The responsible authorities are not endowed with adequate powers, and they lack personnel and funding. Moreover, their responsibilities are only rarely clearly defined to prevent overlap.

These problems must be addressed by multisectoral project planning and, ultimately, coordinated management of all relevant aspects. Water consumers themselves are either not involved in the planning efforts at all, or else not until it is too late. This weakens the sustainability of water supply and irrigation projects. Many decisions on projects are taken by national decision-makers and donors who are relatively unfamiliar with local conditions.

### **Economic Conditions**

Throughout the history of humankind, water has been regarded as an inexhaustible, freely available resource. But in recent decades, population growth has reached a level that rules out a reliable supply of safe freshwater to all people everywhere. Consequently, it is necessary to attach a monetary value to water. It must be bought and sold just like any other scarce commodity.

Even in regions that, relatively speaking, have a surplus of water, the idea is gaining sway that water consumption — and water pollution — must be paid for, because it costs money to treat and transport water. Clean water is in short supply because many consumers compete for it (e.g., cities, industry and agriculture), because water quality is diminishing as a result of human-induced pollution, and because there is a lack of funds for extraction, transport and treatment.

Like other basic needs, water has a price that must be paid. Experience has shown that a water supply system is most likely to be sustainable if consumers must directly bear the associated costs. Experience has also shown that it seldom makes sense to keep the price of water low for political reasons, because the responsible utilities are then too strapped for cash to supply poor residential areas, in particular.

### **Areas of German Development-Cooperation Activity in the Water Sector**

Against the background of the described problems, how can German development cooperation help sustainable, integrated water management achieve a breakthrough in partner countries? Or to put it another way: what are the priority areas for development-cooperation action?

To begin with, it should be stressed that the principle of subsidiarity applies to development cooperation. Development cooperation can supplement partner countries' own efforts, but never replace them. Where the political will to create conducive framework conditions is lacking, development cooperation can achieve very little.

It is therefore especially important to strive to improve framework conditions and bolster institutional capabilities by conducting a political dialog, concluding funding agreements, and providing advice. In doing so, German development cooperation is guided above all by the following tenets:

- Water must be regarded as a scarce commodity.
- Water-supplying utilities should charge rates that cover costs; to protect the poorest, socially compatible solutions must be applied.
- The state should limit itself to creating a basic, favorable environment, and to planning the sectoral framework. As far as possible, operative water management should take place locally, although under state supervision.
- The state should work together with industry to develop instruments for protecting water resources from pollution and overuse.
- Water management should take place within the catchments of rivers and aquifers, and not on the basis of the usual administrative districts.
- In the event of conflicts between upstream and downstream consumers, mechanisms must be created to reconcile their interests (river commissions, utilization agreements, etc.).
- The operators of water supply and sewage treatment facilities must enjoy autonomy with respect to their funding and staff, and they must be held accountable to their customers (commercialization of operations). Greater involvement of private businesses in the operation and funding of infrastructure must be promoted.

- The state should use fees to control demand. To back this up, it is advisable to reduce pipelines, measure consumption, get illegal withdrawal and unpaid consumption under control, engage in awareness-raising activities, and provide advice.
- Before there can be a political willingness to create suitable framework conditions, and before these can be accepted, there must be a corresponding awareness of problems and environmental issues both among politicians and administrators and in the general public. Development cooperation strives to encourage this by providing information, raising awareness, providing advice, training and upgrading, and defining appropriate sectoral focuses.

Against this background, practical German development-cooperation work concentrates on the following aspects:

- Development cooperation supports partner countries in strengthening their public institutions, also in the sense of commercializing their tasks. Development cooperation fosters greater collaboration between the public and private sectors (private-public partnership) and advises public institutions in connection with their regulatory and monitoring functions.
- Development cooperation promotes an integrated approach to water management. It promotes water projects in catchments that straddle national borders, concentrates supply and disposal programs in catchments and river drainage areas, and funds projects for the integrated management of water resources. This goal is also served by projects devoted to surveying groundwater resources and to protecting bodies of water.
- In view of the environmental and infrastructural problems of metropolitan areas and the impacts these have on water resources, development cooperation intensively addresses the aspects of urban water supply and sewage treatment. This includes ensuring an adequate and reliable supply of drinking water, as well as collecting and purifying wastewater. This is also necessary in connection with the priority task of poverty alleviation, because increasing numbers of poor people live in the peripheral zones of these metropolitan areas.
- Repairing, restoring and boosting the efficiency of existing supply and disposal systems take priority over creating new capacities.
- In rural areas, the focus must be on appropriate, decentralized water supply and sewage systems involving pumps, taps and latrines; water consumers themselves must be involved to a major extent in funding and operating these, organizing themselves for this purpose.

- Where irrigated agriculture is concerned, the focus is on promoting measures to restore and upgrade existing irrigation systems and user-operated, small-scale irrigation facilities to increase their efficiency. Incentives must be provided for more frugal use of water by calling for the introduction of cost-oriented water rates in irrigated agriculture and for drinking water. In addition, organizations of users are advised to get them involved in sustainable management of water resources.
- Through active participation in institutions such as the Global Water Partnership and the World Water Council, German development cooperation contributes to sharing information at the international level and to coordinating the promotional policies of different institutions active in this sector. Donors should discuss and coordinate their activities with one another while working to achieve coordination of institutions within specific recipient countries.

## **2 GERMAN DEVELOPMENT POLICY ON INTEGRATED MANAGEMENT OF WATER RESOURCES**

### **2.1. SECTOR CONCEPT "DRINKING WATER SUPPLY AND SANITATION"**

General Principles for Planning and Implementing Development-Policy Cooperation Projects in the Drinking Water Supply and Sanitation Sector, April 25, 1996.

#### **2.1.1. Function of the concept and delimitation of the sector**

##### **Function of the concept**

This sector concept is a decision-making tool for use in selecting, appraising, planning, implementing, monitoring and evaluating German Development Cooperation projects in the drinking water supply and sanitation sector and is intended to help improve their quality. It is also intended for use in the design of multilateral and bilateral cooperation and as a source of information for the partners in cooperation and the general public. It serves German non governmental organisations as an orientation aid.

Building on experience gained over the past 15 years, this concept supersedes the sector paper "Water Supply and Sanitation in Developing Countries" dated May 22, 1984. It also takes account of Agenda 21 of the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, in particular Chapter 18: Protection of the Quality and Supply of Freshwater Resources; and the Results of the 1995 World Summit on Social Development in Copenhagen, which it supplements with several additional positions maintained by the government of the Federal Republic of Germany.

##### **Delimitation of the Sector**

This sector concept covers measures geared to:

- the protection and sustainable management of water resources (within the scope of qualitative and quantitative water management)
- the extraction, treatment, storage and distribution of potable and usable water
- improvement of the hygiene situation (sanitation)

Sanitation includes all activities devoted to the safeguarding of municipal, household and personal hygiene, most notably regarding hygiene education and the disposal of sewage and faecal matter.

All drinking water supply and sanitation management subsectors are parts of a systematic interdependence that demands attention in the design of individual projects.

Moreover, there is a suprasectoral link between the drinking water supply and sanitation and irrigated agriculture, health care, waste management and municipal/urban development, though all these sectors are also covered by their own specific concepts.

## **2.1.2. Sectoral significance and context in the emerging nations**

### **Sectoral Significance**

Water is vitally important for all life on earth. Without water, no food would grow and no economic development could take place. Access to hygienically safe drinking water as an essential component of any healthy diet is one of the most basic human needs. Thus, drinking water supply and sanitation projects are important contributions toward the improvement of people's social and economic situations. Consequently, this sector enjoys high priority within key areas of the development policy of the government of the Federal Republic of Germany (poverty reduction, environmental protection and conservation of resources).

### **Context in the Emerging Nations**

Water, especially of a quality suitable for use as drinking water, has become a scarce commodity:

- Some one billion people in emerging nations - about 850 million of them in rural regions - still have no adequate access to hygienically safe drinking water, and approximately 1.7 billion people have no suitable sanitation facilities.
- According to conservative estimates, the number of people living in countries afflicted by a lack of water (i.e., annual per-capita renewable freshwater resources of 1000 m<sup>3</sup> or less) will increase from roughly 130 million at present to about 820 - 1080 million by the year 2025. Most of those people are and will be living in northern Africa, sub-Saharan Africa, the Near East and western Asia.
- The overuse of groundwater and surface water, coupled with inadequate disposal facilities for household, municipal, commercial and industrial wastewater, is seriously impairing the quality of water. Prominent pollutants include human and animal faeces and refuse (households), heavy metals and halogenated hydrocarbons (trade and industry), along with fertilisers and pesticides (agriculture). Inappropriate soil usage and mining activities also pose a hazard for water resources.

The situation is having alarming effects on the health of those concerned. Water shortages, both in quantity and quality, together with a lack of sanitation and hygiene

awareness, cause the death of some 3 million children each year from diarrhoea, while 200 million people suffer from schistosomiasis / bilharziosis, and 900 million people are wasting away due to worm infestation (verminosis). Hit hardest of all, of course, are poor people who have to fetch their drinking water directly out of soiled surface-water sources and/or improperly operated wells. Many are unable to afford the cost of such simple preventive measures as boiling the water. Their situation is often worsened economically by their having to purchase poor-quality drinking water from private vendors at excessive prices. Thus, diseases caused by unclean water are basically, and typically, poverty-induced. According to WHO estimates, some 80 % of all diseases occurring in many emerging countries, and one-third of all deaths, are attributable to polluted water and hygiene deficiencies.

The impaired health and functional capacities of people suffering from water-borne diseases are very expensive in the macroeconomic sense, as are the relevant curative measures and the time spent fetching water. Especially in rural areas, women are mainly responsible for obtaining water for drinking and other uses. As a rule, the work involved is both strenuous and time-consuming (possibly taking up 15 % or more of a typical day's work).

### **2.1.3. Goals**

The promotional goals of sectoral cooperation deriving from poverty reduction, environmental protection and conservation of resources as focal points of development policy are to improve the health situation through adequate supplies of hygienically safe drinking water and relevant sanitation, and to encourage the qualitatively and quantitatively appropriate use of water resources and the preservation of aquatic ecosystems. Further objectives are to liberate human-resource capacities by reducing the work involved in water extraction, to enhance people's vitality, and to improve their quality of life.

The main requirement for all Development Cooperation (DC) projects is sustainability, i.e., the projects must be not only socially and environmentally appropriate, but also capable of sustainable, self reliant and successful continuation by the project partner following termination of external assistance.

Water supply and sanitation projects for the poor fall within the "basic social services" category and are part of the inputs within the 20/20 initiative.

The functionality, the permanence and, as far as possible, the recovery of relevant investments should be warranted by break-even tariffs for the supply of water and the provision of disposal services. This should be based on enforcement of the consumer/polluter-pays principle. Water wastage should be avoided by progressive tariff



systems (based on consumption quantities and consumer categories). With a view to extending water and sanitation services to poor sections of the population - whose consumption is known to be modest for economic and socio-economic reasons - the tariff structure can include a horizontal subsidisation component for the benefit of low-income households.

In case of conflict with other sectors (irrigated agriculture, trade & industry, power generation) regarding the use of water, guaranteeing people's access to drinking water must always take priority.

#### **2.1.4. Experience to date - opportunities and limitations**

##### **Overall Multilateral and Bilateral Cooperation**

The industrialised countries' commitments for "Water and Sanitation" have been rising steadily and are now situated at an average of 4.5 %. Japan is the foremost bilateral donor, followed by the USA and Germany. The World Bank, with a development-promotion volume of some US\$ 1 billion per annum (4.5 % of all commitments), is the world's leading multilateral donor.

##### **German Bilateral Cooperation**

Between 1981 and 1990, i.e., during the "United Nations International Drinking Water Supply and Sanitation Decade", Germany doubled its commitments for DC projects with impacts on water resources. At present, some 8 % of all bilateral project funds provided by Germany are used for water supply and sanitation projects. Large-scale projects in the irrigated agriculture, hydropower and industrial sectors have declined sharply during that same period, while the wastewater-disposal component has risen to approximately 30 %.

Since the beginning of the Drinking Water Decade (1981) and through to the end of 1995, FC funds totalling some DM 4.5 billion were pledged for drinking water supply and sanitation projects; during that same time, approximately DM 600 million were invested in TC projects. An estimated 8 % (and rising) of all drinking water supply and sanitation management projects are being carried out by non-governmental organizations (including church-run welfare organizations).

The following conclusions concerning project concepts can be drawn from long years of German DC experience in the field of drinking water supply and sanitation:

- The governmental and certain sectoral framework conditions (e.g., the general development-policy orientation of governmental investment policy and the institutional, legal and technical requirements of the water sector) need to be

thoroughly analysed. If the analysis should reveal that certain essential sectoral requirements for assuring the sustainability of projects are not being fulfilled, assistance in establishing appropriate sectoral framework conditions by means of sectoral reforms and/or adjustment programs, including appropriate advisory services for the institutions responsible for sectoral policy, should be given priority over assisting individual projects.

- Systematic attention must be paid to the interdependencies of resource conservation and management, water extraction and distribution, sewage/faeces disposal and consumers' hygiene.
- The requisite conceptual embedment of individual projects within higher-level water resource management planning and within an appropriate management strategy for the watershed in question is often lacking. Water-resource planning should not be fettered by administrative limitations but should instead take place within a natural-environment frame of reference.
- As a rule, past and present partners are normally and mainly government agencies and public utilities, which, due to institutional shortcomings as well as economic and financial deficits, frequently have been unable to properly execute their supply functions. Politically-dictated, submarginal prices have often led to water wastage on the one hand, and to operational deficits for the utilities on the other - without provision of adequate compensatory funds. More professionalism, commercialism, decentralisation and privatisation are needed to the extent that suitable social-policy and regulative framework conditions can be assured.
- The support extended to decentralised, local utilities for reasons of user orientation must provide broad-scale opportunities for participation, especially with regard to rights of co-determination and co-responsibility for women.
- More emphasis must be placed on efficient, user-oriented management, appropriate technologies and the sustainable utilisation of resources.
- Higher priority must be attached to disposal projects and public-education campaigns aimed at changing people's behaviour regarding household and personal hygiene. Behavioural-modification campaigns call for long-term planning and accompanying horizons.
- Rather than develop new water resources, more importance must be attached to using existing water supplies more efficiently by reducing supply-side losses, introducing economy measures and multiple-use/recycling. Water supply system losses are often rooted more in administrative and operational problems than in the technical issues.
- Until now it has not always been possible to achieve cost-covering water rates. Consequently, operators and/or user groups should have the opportunity to

periodically adjust their tariffs themselves within a framework of contractual or legal provisions. To that end it will be necessary to conduct analyses of the customers'/users' willingness and ability to pay.

- Project planning and execution must pay more attention to user preferences and target-group inputs.
- User-oriented concepts for the operation of public stand pipe water distribution systems need to be improved and enforced (choice of technology, forms of user organisation, methods of water delivery, and determination/collection of water rates, hygiene-maintenance measures for tapping areas, and consumer hygiene education).

### **Potentials and Limitations**

The reform and structural adjustment programs that have been introduced in many emerging nations have the effect of focusing government intervention on key public functions, thus expanding the available latitude for commercialisation and privatisation of utilities. And as the process of democratisation gains ground, so do the various organisational options for private, autonomous self-help and user groups - presupposing that these options are rooted in a legislative framework.

The need for "good governance" and its implicit call for a fundamental orientation of the government's actions along development-policy lines - in the sense of affording priority to the satisfaction of basic human needs - is a pivotal element of political dialogue between industrialised and emerging countries. Accordingly drinking water supply and sanitation now have a higher political significance.

In contrast to the positive framework conditions outlined above, there are also certain distinct limitations to be contended with:

- Rapid population growth coupled with increasing degrees of urbanisation in emerging countries is impeding the realisation of full-coverage access to hygienically safe drinking water and adequate sanitation.
- Due to a lack of regional and general development planning, particularly in urban areas, the framework conditions for watershed protection are still inadequate.
- Due to a lack of appreciation for the hazard to groundwater quality, damage attributable to the misuse of soil is being recognised too late.
- Exaggerated standards can prevent appropriate solutions.
- Increasing international competition for dwindling water resources is burdening intergovernmental relations and, hence, constraining the drafting and implementation of trans-boundary forms of water/resource management.

- The economic situation in numerous emerging countries, particularly in sub-Saharan Africa has deteriorated to such an extent since the 1980s that financial and human-resource limitations are making it increasingly difficult to maintain core government functions in the social sector.
- Many utility companies lack competent, motivated managerial personnel and employees with the capacity to provide quantitatively and qualitatively acceptable supplies.
- The problems afflicting the rural supply and disposal situation include a frequent lack of decentralised decision-making and the government's failure to attach adequate priority to rural development. In addition, the users are often expected to meet very stringent requirements regarding the collection and safekeeping of reserves and the systems' operation and maintenance (village-level operation and management [VLOM]).
- In urban agglomerations and growth centres, central sewage disposal is usually characterised by high specific prime costs of wastewater collection and treatment, a tendency on the part of decision makers to attach low priority to investments in environmental protection, and little willingness to pay on the part of the general population. Most executing organizations have little experience and are poorly organised. Many plants and systems are planned and built by central-governmental institutions. Not having been sufficiently involved in those stages, the consumer communities then find themselves unable to provide the personnel, skills and funds needed to keep the equipment operating properly. Economic interests often give rise to inappropriate solutions unsuitable for the locations.

#### **2.1.5. Notes on project selection and design**

##### **Subsectors and Target Groups**

The primary target groups are economically and socially disadvantaged sections of the population with insufficient access to water supplies and sewage disposal services, both in rural and in urban areas. As a target group, women are of particular relevance in the drinking water supply and sanitation sector. All assistance measures must allow for the social, cultural and economic roles of men and women within society as a whole.

In German bilateral cooperation, special importance is attached to the following fields of assistance:

- Support for water-sector reforms, particularly in the form of consultancy services and the funding of investments and material inputs in connection with sectoral

adjustment measures, sector investment programs and/or reform-oriented projects and programs.

- Establishment of suitable institutions and the enhancement/maintenance of their functionality and competence
- Provision of human and financial resources for individual projects in the fields of
  - protection/management of resources,
  - extraction, treatment, storage and distribution of water,
  - reduction of losses and conservation of water,
  - centralised and decentralised distribution systems, including house or yard connections and public stand pipes,
  - centralised and decentralised disposal systems,
  - hygiene education and awareness-raising concerning the dangers of water-induced diseases,
  - exploration of groundwater resources, and water-protection measures
  - drafting of realistic standards.

### **Project Selection and Design**

Only projects whose concept adequately allows for the interplay of resource protection, water extraction/utilisation and sanitation can be promoted.

#### *- Institutional framework conditions*

Governmental intervention in the sector should be limited to central areas, i.e., there should be clear-cut differentiation between regulative and supervisory functions on the one hand, and implementational and operational competencies on the other. Other areas of government responsibility include formulating goals to be achieved in environmental protection and resource conservation, in that quality standards are defined; framework conditions conducive to the thrifty use of water are assumed; socially acceptable structuring of the tariff system is monitored; the allocation of resources is controlled in conflict and other special situations (e.g., irrigation vs. drinking water supply); the principle that water is an economic commodity is anchored in legislation; water-management framework plans for different watersheds are adopted.

#### *- Decentralisation and private-sector integration*

From the viewpoint of being closer to users and appropriate for local conditions, decentralisation per se is advantageous, particularly as applied to community-level operations and water-supervisory authority with responsibilities centring on watersheds. However, limitations are imposed by, say, a shortage of adequately

trained personnel and/or inadequate municipal structures. As a rule, it is advantageous to involve private enterprises in some operational functions, but it can also be beneficial in certain circumstances to engage the services of a private operator or to privatise a public-sector operation. The operational capabilities of supply and/or disposal utilities can be judged on the basis of such factors as achieved degree of demand satisfaction, technical (supply-side) water losses and pumping efficiency, the quality of the supplied drinking water, the incidence of water-induced diseases, the operating data of existing systems, personnel qualifications, managerial and planning capacities.

- *Cost coverage*

Consumption-oriented water rates are indispensable for ensuring sustainable operation of plant and equipment, for financing replacements and expansions, for avoiding water wastage, and for conserving resources. Full cost coverage is the goal and any divergence must be substantiated via project assessments and project progress reviews. Social compatibility must be assured. To the extent that the operator does not have to service an existing debt, the short-term minimum requirement is that the revenues realised by the project partner cover the operating costs.

- *Tariff system, rates level*

To the extent deemed economically advantageous, the tariff system should be progressive, with a minimum consumption quantity provided at a low, socially compatible base rate to satisfy the basic needs of the poorer sections of the population. The general rates level should be checked and adjusted at regular intervals. Even at public stand pipes and wells, the users must be required to pay for their water, either in cash or in the form of appropriate material contributions (payment in kind). In cases where drinking water used to be provided free of charge, the first phase should at least introduce and enforce a flat-rate water fee, e.g., a fixed fee per user or connection as a form of cost sharing.

- *Public demand*

It is essential that public facilities with basic-needs relevance - hospitals and schools, for example - receive an assured supply of potable water. With a view to preventing uncontrolled, excessive consumption, the systems and equipment must be designed to include technical arrangements that promote both the thrifty use of water and, hence, a lower cost of operation. Backlogs of public-institution payments

to utility companies must be avoided by suitable budget mechanisms, e.g. by the direct transfer of appropriations to the utilities.

– *Agricultural, commercial and industrial demand*

The planning of drinking water supply projects must consider the supply of water to commercial and industrial operations. To the extent that alternative sources of supply are available, and considering the relatively high cost of providing potable-quality water, only part of the overall commercial and industrial water requirement should be covered by the public drinking water supply system, which can and should provide only potable water (food processing, water for the workforce). As far as possible, production water without such quality requirements should be supplied by the companies' own means. However, it must be ensured that even private water supplies are subject to charges and to the supervision and control of an independent water-resource authority.

– *Sewage/faeces disposal*

Every water supply project must carefully investigate the sewage and faeces disposal situation with due regard for resultant ecological and sanitation problems and their relevant impacts. If new water supply projects (and their induced wastewater incidence) were to aggravate existing disposal problems or result in unwarrantable disposal deficits, measures for achieving orderly disposal of sewage and faeces must be planned and financed where possible. Any exclusion or deferment of disposal facilities (for projects with low per-capita consumption in regions with specific climatic and hydrogeological conditions) must be well-substantiated. The choice of disposal technology is essentially determined by the overall drinking water consumption volume and resultant wastewater volume, as well as by the composition of all incidental wastewaters and the applicable environmental/resource-protection criteria.

To the extent that the nature and quantity of wastewater and the local circumstances in general are conducive to decentralised forms of disposal with no detriment to humans or the environment, such solutions tend to offer cost advantages over centralised alternatives. With deference to the high cost of construction and operation, sewers are only justifiable in densely populated urban areas where large quantities of sewage accrue or for groundwater protection reasons. Unless some other safe alternative is available for discharging wastewater, each sewer system will require its own sewage treatment plant. Periodical toxicity testing must prove that sewage sludge is suitable for use. Adequately sized storage areas for dry sludge must be provided as necessary. One good alternative to the

conventional sewer system is the installation of smaller, less expensive intercepting sewers for correspondingly small service areas. Wastewater treatment should be based on appropriate-technology, environmentally correct purification processes (e.g., clarifying ponds). Decentralised disposal facilities (e.g., latrines) demand targeted parallel public-awareness campaigns dealing with acceptance, operation, maintenance and hygiene-education aspects.

- *Hygiene education*

All drinking water supply and sanitation projects must ascertain whether education measures on household and personal hygiene will have to be implemented in connection with the extraction, transportation, storage and disposal of water, particularly in the case of decentralised systems in urban and rural areas. Such activities may be conducted as independent components, preferably in advance of the supply/disposal project in question. They should always, however, be integrated into the primary health care sector in order to use - or establish - sustainable institutional structures. Approaches via schools and youth organizations are particularly effective. Public-education campaigns in the relevant catchment areas should always include appropriate follow-up measures.

- *Peculiarities of decentralised supply facilities*

The environmental situation allowing, the technology employed for decentralised systems should always be oriented along the lines of the users' wants, needs and capabilities - not only for reasons of cost containment, but also in consideration of difficulties encountered in the proper operation and maintenance of the equipment. Depending on the local circumstances, this may necessitate the sinking of wells and the construction of rainwater tanks or the tapping of springs (preferably with gravity-feed lines to the area of supply), although it could then become necessary to accept a quality of drinking water that does not satisfy WHO standards. In any such case, parallel measures designed to improve water quality must be adopted, and a hygiene-education campaign conducted. The use of motor-driven pumps should be investigated with regard to reliability of operation and maintenance, environmental protection and resource conservation. The distance between tapping points and the households depends not only on the population density but also on the prevailing sociocultural needs.

- *Target-group orientation*

Target-group participation, particularly on the part of women, must be assured by the planning, implementation and evaluation of projects. The same applies to the



design, construction and operation of plant and equipment. Self-help measures, traditional supply structures and local-level initiatives must be taken into account and encouraged. This is particularly important in the case of investments that user groups are to operate on their own; their own potential contribution to project implementation, their legal status and their sector-specific user-group responsibility for the future operation all need to be defined. The self-help concept and the sociocultural criteria employed by BMZ are crucial points of departure for the planning of target-group-oriented concepts.

– *Environmental protection and resource conservation*

The reduction of technical losses, the rehabilitation of existing equipment, and the avoidance of water wastage should be investigated in advance of any new investments. Potential impacts on existing aquatic ecosystems must be investigated as part of the environmental impact assessment. Pollution-control and wastewater-disposal projects are eligible for promotion as independent projects devoted to environmental protection and/or conservation of resources. It should be examined in all projects whether it is necessary to integrate awareness-raising measures for project partners and beneficiaries regarding the appropriate use of water as a natural resource.

– *Wastewater treatment criteria*

Numerous emerging nations already have adopted their own legal foundations to protect water resources from pollution ("clean water statutes"). The minimum requirements for wastewater treatment in sewage works will still have to be defined in most cases. The use of partially clarified wastewater for agricultural purposes is an effective means of countering water shortages in areas with little water while avoiding water pollution in ecologically sensitive areas. The WHO guidelines on agricultural recycling of wastewater must be adhered to. Consequently, urban sanitation in water-protection zones and scarce-water areas should, as a rule, follow an integral concept of wastewater collection, purification and re-utilisation.

– *Use of asbestos cement*

The use of asbestos cement is ruled out in principle. In special, justified cases (low hazard potential and appropriate protection measures in the light of economic/social constraints), however, exceptions may be made. As deemed suitable and appropriate, financial assistance can be offered to the emerging countries to help defray the cost of alternative materials in DC projects.

– *Protection of waters*

Water pollution control measures include such institutional activities as drafting pollution control conventions, stipulating immission limits, monitoring waters and introducing wastewater/sewage into recipient waters, establishing water protection zones and formulating restrictions on water use, and also investment measures for the protection and/or rehabilitation of drinking water resources. The use of non-renewable groundwater can only be promoted in cases of legitimate need for a limited length of time, and exclusively for purposes of obtaining drinking water. The planned rate of extraction must guarantee the long-term availability of the resource.

– *Consumption quantities*

The following recommended values are regarded as appropriate consumption rates for promotable drinking water supply projects:

- up to 40 liters per person and day for public taps,
- up to 60 liters per person and day for yard connections,
- up to 120 liters per person and day for house connections.

Appropriate consumption depends concretely on the level of demand by the target group, their willingness and ability to pay the relevant cost-coverage rates, and prevalent water scarcity. Assuming long-term availability of the water resource in combination with achievable cost-recovering water rates, even projects characterised by higher consumption rates may still be eligible for promotion.

### **Instruments and Partners**

Partner organizations eligible for promotion include government agencies and administrative units, public undertakings, non-governmental organizations, operator associations and watershed organizations, quality control institutions and technoscientific associations at national and regional levels, self-help groups and self-help promotion institutions, user groups and networks. No potential partner organisation is ruled out a priori. Network systems by public-sector executing organizations are, as a rule, the focal point of intergovernmental cooperation, while the promotion of decentralised systems is chiefly the domain of German non-governmental organizations.

The integration of the private sector is becoming more significant, and TC must therefore react by providing advisory assistance for converting past public institutions into future private structures. FC must - without replacing commercial financing models by FC funds - integrate instruments of private-sector cooperation more strongly within the fields of investment financing and plant operation; such as, for example, operator, Build-Operate-Transfer (BOT) and cooperation models, and management, service and leasing contracts.

### 2.1.6. Catalogue of criteria

- In the interest of protecting scarce water resources, all projects must allow for the interdependencies of resource conservation and water extraction, distribution and sanitation.
- In case of a conflict of use, the supply of safe drinking water for humans shall enjoy general precedence.
- Governmental intervention should be limited to central areas, most notably the realisation of institutional framework conditions conducive to enhance building the performance capacities of the various actors in securing an appropriate supply of water accessible to poor people.
- Increased use should be made of potentials for decentralisation, commercialisation and privatisation of supply functions in order to raise operational efficiency, but only to the extent that suitable socio-political and regulative framework conditions can also be assured.
- To ensure project sustainability the users should pay consumption linked cost-covering tariffs or - for rural water supplies - equivalent payments in kind. The minimum efficiency requirement in the short term is that income from water tariffs cover the project executing agency's operating costs.
- If advantageous, tariff systems should be progressive and socially compatible (horizontal subsidisation) and designed to allow for the accumulation of adequate reserves for repairs and new investments.
- Suitable budgetary measures should be taken for avoiding high payment arrears from public institutions to utility companies.
- Securing long-term development-policy impact of projects includes proper disposal of wastewater and faeces and hygiene-education and awareness-raising measures.
- Especially in the case of decentralised supply facilities, the users - women in particular - should be actively and decisively involved.
- The long-term availability of resources must be established to secure sustainability. The use of non-renewable resources must be subject to stringent conditions, e.g., confined to emergency cases, to limited periods of time and, exclusively for the supply of drinking water.
- Damage to water resources must be avoided, and measures designed to protect the resources and/or water-extraction areas must be taken. The legal and administrative measures must be either be established or available. Water-resource planning and management strategies should be adopted as far as possible with an environmental link, i.e., within a natural-environment frame of reference.

## **2.2. TYPES OF COOPERATION AND USE OF BILATERAL FUNDS**

Bilateral state cooperation with developing countries financed from the German federal budget takes two forms: Technical Cooperation (TC) and Financial Cooperation (FC).

### **2.2.1. Financial Cooperation**

Financial Cooperation (FC) serves to promote new investments in developing countries and improve the use of existing facilities. Its aim is to enhance production capabilities and economic and social infrastructures and/or to improve their usability. FC is conducted on behalf of the German Government by the Kreditanstalt für Wiederaufbau (KfW), which is based in Frankfurt am Main, Germany.

Investment projects are promoted in the agricultural sector, in trade and industry, for expanding economic and social infrastructure, and for environmental protection and resource conservation. Small and mid-sized investment projects in trade, industry and agriculture are supported by way of local development banks. Project-independent loans and grants are also extended for importing goods to meet the immediate needs of populations (e.g., commodity aid) and to improve macroeconomic or sectoral framework conditions in developing countries, in the form of structural assistance.

Within the scope of FC, the KfW extends long-term, low-interest loans as well as — to the poorest developing countries (LDCs) — grants for funding projects and programs. In addition, as a development bank, it seconded personnel to support its partners in preparing for and implementing co-financed projects by providing a broad range of advisory services and other types of assistance. Finally, it makes available funds of its own together with FC funds, in the form of FC funding and mixed funding.

### **2.2.2. Technical Cooperation**

Technical Cooperation (TC) is the instrument that the German Government uses to support development processes in partner countries. The goal of TC is to cooperate in a spirit of partnership to enable people and organizations in these countries to improve their living conditions through their own efforts. For this purpose, technical, economic and organizational knowledge and skills are conveyed.

TC normally involves providing German services and goods. These are furnished to a developing country free of charge in the form of direct contributions. When expedient and cost-effective, however, goods and services are also purchased in other industrialized countries and — to an increasing extent — in developing countries as well.

TC comprises, in particular, the following types of contributions:

- Assignment of advisers, trainers, experts, appraisers, and other specialists
- Supply of equipment and materials for promoted facilities
- Training and upgrading of national experts and managers in the developing country itself, in other developing countries, or in the Federal Republic of Germany
- Financial contributions to projects and programs conducted by capable institutions in developing countries

These contributions primarily go for supporting projects that directly address the basic needs of poor and poorest population groups. Special attention is paid to environmental aspects and to improving the social situation of women. Projects to promote democratic structures may also be promoted within the scope of TC. The projects concentrate on fields and regions that have been identified in the respective country concepts as focuses of bilateral development cooperation (DC). They are planned and implemented in close cooperation with bilateral FC measures and the other instruments of German DC.

The German Government primarily commissions the federally owned Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH to plan and execute TC projects and programs with developing countries, and to a lesser extent the Federal Institute for Geosciences and Natural Resource (BGR) and the Federal Institute of Physics and Meteorology (PTB).

### **2.2.3. Use of Funds in the Water Sector**

The bilateral funding contributions by the Federal Republic of Germany in the water sector are described below. The contributions to international organizations such as the World Bank Group, regional banks, the development program of the United Nations, and the European Union are not reflected.

#### **Annual bilateral pledges for official development cooperation**

The following table 1 depicts the official development aid (ODA) for the areas of water supply and sanitation, agricultural irrigation and hydrogeological studies for the years 1992, 1994 and 1996.

**Table 1** Annual bilateral pledges for official development cooperation by the Federal Republic of Germany in the water sector

All figures DM million *)	1992		1994		1996	
	FC	TC	FC	TC	FC	TC
Promoted areas						
Water supply and sanitation **)	394.5	35.6	692.0	57.9	491.3	79.3
Agricultural irrigation	24.5	5.8	13.7	9.3	201.8	10.5
Hydrogeological studies	11.0	1.9	2.4	40.4	0.0	33.8
<b>Total (FC + TC)</b>	<b>473.3</b>		<b>815.7</b>		<b>816.7</b>	

\*) These figures may differ from those published elsewhere, since the methods applied for calculation and capture have changed.

\*\*\*) Water supply and sanitation covers measures in the areas of drinking water supply, wastewater disposal and waste management.

This table does not include either the considerable efforts by German nongovernmental organizations to promote projects, or activities falling under the heading of Personnel Cooperation; this applies in particular to training of experts and management personnel of developing countries. The funding involved is however included in the overall inputs of German bilateral development cooperation as described below.

### Overall inputs of German bilateral development cooperation

In all, 881 bilateral water and sanitation projects (57 research, 25 research & development, 420 technical cooperation and 379 financial cooperation projects) were in the implementation stage in 1997.

Within the field of research the projects are spread over a large variety of universities and institutes whereas most of the project activities in technical cooperation are executed by Misereor and the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). In the sector of financial cooperation all projects are under the responsibility of the Kreditanstalt für Wiederaufbau (KfW).

The investments in water research & development are summarized in Table 2. The amount of investment totalled DM 7,639.229 million whereas the research projects with about DM 20 million constituted the smallest, and projects of financial cooperation with almost 7,000 million DM made up by far the largest proportion of the development investments in this sector.

**Table 2** Total funding of bilateral projects in the implementation stage

Type of Project	DM (million)	Number of Projects
Research	21.536	57
R & D	32.331	25
Technical Cooperation	668.526	420
Financial Cooperation	6,916.906	379
<b>Total</b>	<b>7,639.229</b>	<b>881</b>

The average duration of all projects is 4.9 years. In general, research projects are of shortest duration (3.6 years), followed by technical cooperation projects (4.1 years) and research & development projects (4.5 years). The financial cooperation projects are the longest in duration (7.4 years).

The different project areas (in number of projects) are listed in Table 3. In the research domain most projects focus on modelling, water quality, socioeconomics, policy issues and farm irrigation systems with 15, 13, 11 and 10 projects respectively. However, in a lot of cases, it is difficult to classify research projects under one certain topic only, as many of them cover different topics in their research agenda.

In technical cooperation emphasis is laid on water supply, institutional organisation, watershed development, and farm irrigation systems with 258, 68, 39 and 35 projects respectively. In the field of technical cooperation it is again difficult to classify certain projects under one main topic. However, the field of water quality is usually integrated into the topic "water supply and sanitation". The topic "personnel support" is in most cases not a primary development target, but almost every development project aims at supporting the self-help capacities of the target groups. In summary, it is noteworthy that the point of greatest effort of technical cooperation projects in the water sector is to assist in providing better water supply and sanitation conditions for the rural and urban population in developing countries.

In financial cooperation the main emphasis is given to "water supply and sanitation" (297 projects), followed by "farm irrigation systems" (80 projects). The topics "engineering" and "institutional organisation and development" are represented by only 1 project each, which might mainly be due to the division of work between the German technical and financial cooperation, but also to the fact that capacity building and

institutional development are compulsory elements of all projects in development cooperation.

**Table 3** Project areas (in number of bilateral projects in the implementation stage)

<b>Project areas</b>	<b>Research (incl. R &amp; D)</b>	<b>Technical Cooperation</b>	<b>Financial Cooperation</b>	<b>Total</b>
Farm Irrigation Systems	10	35	80	125
Engineering	5	5	1	11
Water Supply and Sanitation	8	258	297	563
Planning, Models	15	-	-	15
Geology, Climatology, Ecology	6	-	-	6
Water Quality	13	-	-	13
Plant Physiology	6	-	-	6
Institutional Organisation + Development	8	68	1	77
Rural (Watershed) Development	-	39	-	39
Personnel Support	-	13	-	13
Socio-Economics and Policy	11	2	-	13
<b>Total</b>	<b>82</b>	<b>420</b>	<b>379</b>	<b>881</b>

Table 4 shows the regional distribution of research and development aid activities. In the research and research & development domain most projects are executed in Latin America followed by Asia and Africa with 32, 28 and 12 projects, respectively. 10 projects are global or without regional specification. Technical cooperation activities are mainly concentrated on Africa (236 projects), followed by Asia (105) and Latin America (74). Two projects of economic cooperation are based in Europe and three projects have no regional specification. Within the frame of financial cooperation, there are 226 projects in Africa, 80 in Asia, 65 in Latin America and 8 projects are based in Europe. In summary, one can state that with regard to both technical and financial cooperation, Africa is favoured by this sector of development cooperation.



**Table 4** Regional distribution of projects

<b>Region</b>	<b>Research (incl. R &amp; D)</b>	<b>Technical Cooperation</b>	<b>Financial Cooperation</b>	<b>Total</b>
Africa	12	236	226	474
Asia	28	105	80	213
Latin America	32	74	65	171
Europe	-	2	8	10
Global (unspecified)	10	3	-	13
<b>Total</b>	<b>82</b>	<b>420</b>	<b>379</b>	<b>881</b>

## 2.3. PROJECT EXAMPLES

This section describes selected projects of various organizations that are active on behalf of the German Government (Kreditanstalt für Wiederaufbau, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, Federal Institute for Geosciences and Natural Resources, Carl Duisberg Society, Misereor, Protestant Central Agency for Development Aid). These examples are intended to illustrate the breadth of support provided on behalf of the German Ministry for Economic Cooperation and Development (BMZ) in the field of integrated management of water resources.

### 2.3.1. India

#### **Project: Support for the Ministry of Agriculture in the Field of Integrated Watershed Management**

German TC contribution: DM 18 million

#### **Brief description**

Nature of the problem: Owing to the enormous rate of population growth in recent decades, there is extreme pressure to utilize India's agriculturally usable lands (about 170 million hectares in all). This has led to intensive and, in many cases, inappropriate exploitation of water and soil resources. The vegetation has been extensively degraded as a result, and this — in conjunction with the heavy monsoon rains — has in turn caused widespread erosion. The loss of fertile soils has increased the pressure to utilize the remaining areas and significantly disrupted the water regime. As a result, their ability to meet the population's basic needs is endangered.

In order to break out of this vicious circle of degradation and reliably supply the population with food and water, the Indian Central Government and the governments of nearly all Indian states long ago began promoting *Watershed Management* programs. The *River Valley Projects* (RVPs) and *Flood Prone Rivers* (FPR) programs, which are promoted by the Central Government with a yearly budget of about DM 40 million and are distributed across the entire subcontinent, address all catchments of rivers that have large, important reservoirs along their course. In terms of surface area, they therefore cover most of India's erosion-prone agricultural regions. Whereas the programs were originally intended primarily to protect the just-mentioned reservoirs against sedimentation, today the focus is on conserving natural resources, achieving food security, and alleviating poverty in the affected regions.

Project goal: To plan and implement *watershed management* measures in the RVP/FPR catchments (for the most part, erosion- and flood-control measures) to a

greater extent with an integrated, participatory approach, yielding sustainably positive results in management of natural resources, improvement of the living conditions of the population of the catchments, and a measurable decline in soil erosion and sedimentation of reservoirs.

Achievement of this goal will entail the following results:

- In *representative watersheds* (RWSs), integrated, participatory *watershed management* (WSM) is ensured by establishment and strengthening local self-administration organizations.
- The population of the RWS regions, staff of the *Government of India* (GOI) and the *State Departments* (SGDs), and nongovernmental organizations are familiar with integrated WSM measures and are cooperating with one another.
- Monitoring procedures have been developed and implemented to supply reliable data that can be taken as the basis for evaluating and influencing the impacts of the WSM activities and planning their application elsewhere.

**Impacts:** The project comprises the components of pilot implementation of resource-conserving forms of land and water use on privately owned land, the implementation of erosion- and flood-control measures on state-owned land to supplement them, and the introduction of energy-efficient and other resource-conserving technologies. As such, the project is directly geared to conserving and sustainably developing water and soil resources in ecologically fragile regions of India. It is thus making a substantial contribution to stabilizing ecosystems and combating desertification.

Its positive effects (e.g., greater yields, also on marginal lands as a result of the increased availability of water) help stabilize the population's living conditions, which in turn promotes the economic recovery of the affected regions. In combination with other programs, this helps prevent the overuse and preserve the productivity of the resources of water, soil and vegetation. Ultimately, it thus helps to improve India's overall economic situation. Project executing institutions: the *Ministry of Agriculture* (MoA) and the *State Government Departments* (SGDs). The project has so far been implemented in five *Representative Watersheds* (RWSs) in different agroclimatic zones. Plans call for this number to be raised to eight. The project has also initiated a three-way cooperation among the SGDs, NGOs and *Gram Panchayats* (local bodies elected by residents), which has proven to be suitable for enabling local residents to take the initiative and practice self-help to the extent required for sustainable resource management.

In nearly all cases, a crucial role is played by the intensive participation of women in *mahila mandals* (the Indian term for "women's groups"). Back-up measures are also conducted to ensure that planning and implementation take the interests and needs of

marginalized social groups and casteless population groups into account. These take the form of income-generating measures, improvements to livestock raising practices, and activities to raise awareness.

**Project status:** The project began in 1990 with the capture of important hydrological and other parameters. In a second five-year phase between 1992 and 1997, it conducted pilot efforts in five *Representative Watersheds* (RWSs) with the approaches described above, achieving recognizable impacts. In the current, third phase lasting until the middle of the year 2000, it will be replicating all of the models in three additional RWSs under the conditions prevailing in other states; it will also be intensively involved in reformulating the *Government Guidelines for Watershed Management*.

### **2.3.2 Jordan**

#### **Project: Water Supply in Amman and Promotion of Business Management in the Water Authority of Jordan**

German contribution in Financial Cooperation funds DM 65 million plus another DM 2 million for a backup-measure; DM 18.5 million in Technical Cooperation funds

#### **Brief description**

Forty percent of Jordan's population lives in the metropolitan area in and around the capital city of Amman, which is home to about 1.6 million people. By the year 2010, Greater Amman is expected to have an estimated 2.8 million inhabitants. Even now, the state Water Authority of Jordan (WAJ), which is responsible for water supply and wastewater nationwide, no longer succeeds in consistently supplying the population of Amman with enough drinking water. The situation is particularly problematic in the summer, when large parts of the city typically only receive water two days a week. The reasons for this inadequate supply are, besides the city's rapid growth and the general scarcity of available water resources in Jordan, on the one hand the poor condition of the supply network (in which over 30% of the water is lost), and on the other hand significant management problems within WAJ in conjunction with a highly regulated, bureaucratic water sector. The FC and TC projects are addressing both of these problem areas.

The FC program, which began at the beginning of 1994 and comprises two phases, is aimed at reducing the technically induced water losses in the supply network, thus helping to continually supply Amman with water and save scarce resources. The measures planned for this, some of which have already been implemented, involve technically redesigning, repairing and extending the supply network. In particularly loss-prone districts, old pipes and house mains are being replaced, and pressure breakers installed. A German-Jordanian consulting consortium is supporting WAJ for drawing up

the detailed plans, issuing invitations to bid, and supervising the construction work. Within the scope of a back-up measure, a German long-term expert is also supporting WAJ in its role as builder-owner. In order to meet the prerequisites for the second phase of the FC program by ensuring long-term operation of the water-supply system, a five-year program was agreed upon with WAJ for improving its economic situation. As the first step in this direction, in 1997 WAJ modified its rates to substantially increase its revenues.

The TC project is also aimed at improving the supply of water to the population. The first two-year promotional phase, which began in 1994, concentrated on sustainably improving operation in greater Amman. The second promotional phase, lasting three years, is focusing on transforming WAJ into a legally independent and economically self-sufficient organization. Support is being provided for these main measures:

- Activities to meet the legal, political, technical and business-management requirements for independent operation of WAJ in Amman
- Improvement of the operating results of WAJ
- Improvements of operation of the pipe network
- Improvement of the technical skills and capabilities of the staff of WAJ

The TC project involves commissioning a German consulting firm and international and national experts in fields including management and organization, financial management and accounting, technical management, and network operation, in addition to providing materials and equipment and organizing training activities.

Past project experience had shown that technical measures and advice by themselves are not enough to lastingly solve Amman's supply problems. The water rates charged were, for political reasons, not high enough to provide an incentive to save water or to generate enough in the way of revenues to enable WAJ to meet its running costs and accumulate reserves for replacing equipment. At the same time, WAJ — as a state-owned enterprise — did not operate efficiently enough and employed far more staff than it actually required, mainly for political reasons. Against this background, at the initiative of the World Bank, the major development-cooperation institutions active in Amman reached an agreement with the Jordanian side to take a fresh approach by involving the private sector and reorganizing operation of the water-supply system for greater cost-effectiveness and a more pronounced customer focus. A foreign operator is now being contracted to manage Amman's water supply.

### **2.3.3. Zambia**

#### **Project: Water Supply and Wastewater Disposal in Chipata II**

German contribution from Financial Cooperation funds for Chipata II: DM 8.0 million

#### **Brief description**

The approximately 50,000 inhabitants of the capital of Zambia's eastern province are supplied with drinking water from two dams. The city's water distribution network, however, was originally (like in nearly all of Zambia's towns and cities) in such a poor condition that entire districts received water either not at all or only sporadically. About 60% of the water was lost in the network. It was operated by the city government, which allocated the revenues from the water fees — too low in any case, and only incompletely collected — to the general community budget. As a result, both proper operation and maintenance were neglected, and there was also a lack of funds for buying chemicals to treat and disinfect the water.

In connection with a training and upgrading program, it was possible to persuade the city that it was a good idea to reorganize by shifting responsibility for the water supply out of the municipal administration to an economically independent water company that is largely free of political influences: the Chipata Water and Sewerage Company (CWSC). The city still completely owns the CWSC, but its role is limited to appointing a legally responsible six-member board of directors. The board's members include representatives of the city and one representative each of the central government, industry and consumers. Based on the British corporate model, it supervises an independent operative management.

When the CWSC was established, a new team of Zambian managers was hired, the employees retained received training in operation and maintenance, and a commercial department was set up. To cover running costs, the water rates were raised to a level many times what they had been before. Also new is that they are now rigorously collected. At the same time, the service provided to the city's residents has greatly improved: water of drinking-water quality is available 24 hours a day, and a number of kiosks have been installed to sell water in poor parts of the city.

These improvements laid the groundwork for the current investment phase. In order to maintain and improve operation while reducing the enormous water losses to below 25%, funding is being provided for the complete renovation of the water-supply network and its extension to previously unsupplied parts of the city, as well as repairs to the wastewater treatment facilities.

The goals of these activities are: a continuous, adequate supply of drinking water for Chipata's residents, institutions, businesses and industry; a financially secure,

autonomous water company; and hygienically and ecologically unobjectionable collection and purification of wastewater.

The required construction work began in early 1997. The costs of the project run to DM 8.8 million, 90% of which is being financed from FC funds in the form of a grant. These costs include DM 1.3 million for on-the-job instruction of operating personal in finding and repairing leaks, and advice for the water company on the establishment of a small PR department. A motivation campaign is planned to familiarize the residents of the poor suburbs, who will constitute the majority of CWSC's customers after the work to expand the system has been completed, with the concept of the water kiosks and the need for appropriate water fees.

The project is promoting the commercialization of the water supply through an economically and politically autonomous water company, the CWSC, to ensure consistent maintenance of the water supply system and thus its sustainability. The approach taken is already serving as the model for reorganizing the water sector throughout Zambia. A new water law calling for the establishment of regional water companies along similar lines was passed in late 1997.

#### **2.3.4. Turkey**

##### **Project: Central Sewage Treatment and Biogas Power Plant in Ankara**

German contribution from Financial Cooperation funds: DM 254 million for a central sewage treatment plant, DM 20 million for a biogas power plant, DM 9 million for back-up measures, and DM 0.3 million for training and upgrading. The large volume of German Financial Cooperation funding was made possible by combining budgetary funds of the BMZ with capital-market funds of the KfW (mixed financing).

##### **Brief description**

Starting in the second half of the 1980s, large-scale investment programs were conducted to significantly improve the drinking water supply situation in the Turkish capital city of Ankara. The municipal water supply and sewage company, ASKI, then shifted its attention more strongly to the environmental and health problems caused by inadequate disposal of wastewater.

The city currently has a population of about 2.9 million people. Until recently, all of its household and industrial wastewater was released untreated into the Ankara River, which flows right through the middle of the city. As a result, large stretches of it resembled an open sewage ditch. Some 800,000 people live along the Ankara River below the city and the dam reservoir that it flows into. Because they use the river's water for irrigation and drinking, they are subject to an elevated health risk. Ankara's residents are also at

risk from vegetables that have been irrigated with this water and are therefore contaminated with disease-causing germs.

The sewage treatment project, which is being promoted within the scope of German Financial Cooperation, therefore has the goal of adequately purifying the wastewater generated by the city of Ankara. This will protect the natural environment and once again make it possible to use the river's water in agriculture. At the same time, a major contribution will be made to safeguarding the health of the people living along the lower course of the Ankara River and in Ankara itself.

In connection with the project, a consortium of German and Turkish companies has built a mechanical-biological treatment plant, which began operation in August 1996. Parallel to construction of the treatment plant, Ankara's sewerage network is being extended with support from the World Bank and the European Investment Bank to ensure that the wastewater gets to the treatment plant. The biogas generated by digestion of the sewage sludge constitutes a renewable energy source that is utilized in a specially constructed biogas power plant to produce both heat and electric power, which are required for purifying the wastewater. Because the alternative of generating electricity in conventional fossil-fueled power plants causes severe air pollution in Turkey, this represents an innovative contribution to environmental protection there. The German Government has supported the overall project — both the central treatment plant and the biogas power plant in Ankara — with loans amounting to a total of DM 194.5 million. Another DM 79.5 million have been provided by the Kreditanstalt für Wiederaufbau, also in the form of a loan. The overall cost of the project runs to DM 360 million.

In order to prepare the municipal water supply and wastewater disposal company, ASKI, for operating the facilities, parallel to the project it has received advice from German experts on aspects including the organization of operation, recruitment and training of operating personal, and monitoring of water quality. At the same time, a special fund for training and upgrading to support the project has been deployed to promote a partnership between ASKI and the Technical Works, the Civil Engineering Office and the Chemical Institute of the city of Stuttgart in Germany. This partnership serves to promote the sharing of information and transfer of knowledge by way of regular mutual visits and internships for ASKI staff in Stuttgart. Only the costs of travel and accommodations are funded; the city of Stuttgart is making all of its contributions without expecting anything in return.



### **2.3.5. Peru**

#### **Project: Irrigation Program in the Southern Andean Zone I, II, III**

German contribution from Financial Cooperation funds: DM 50 million; German contribution from Technical Cooperation funds: approx. DM 22 million

#### **Brief description**

The natural conditions prevailing in the Andes of southern Peru make it particularly challenging to produce staple foods. The mountainous landscape, with its steep slopes, scarce water resources, and poor accessibility, makes it hard for the smallholder farmers to pull themselves up out of poverty by their own efforts, although they have succeeded in finding appropriate forms of agriculture based on traditional irrigation practices dating back centuries. Improving and expanding the existing traditional irrigation facilities are the key to using the scarce water resources more effectively for agricultural production, increasing the productivity of the smallholder farms, and thus both alleviating rural poverty and curbing emigration to urban centers.

Since the beginning of the 1980s, the German Government has provided financial assistance to support, in several phases, the renewal and extension of existing irrigation systems. In particular, advice provided within the scope of German TC has enabled the executing institution of Plan Meriss Inka to reorganize itself for greater effectiveness and to better address the needs and wishes of the target group.

Thus far, two project phases have been successfully completed. With FC funds amounting to DM 35 million, 24 individual programs comprising a total irrigated land area of about 11,000 ha in the Vilcanota Valley have been financed. About 13,000 very small farms, which feed some 65,000 people, have benefited from this. As was shown by an evaluation recently carried out by independent experts on behalf of the German Government, in just a few years since completion of the construction measures the smallholder farmers have succeeded in parlaying the improved availability of water into yields two to three times those they had obtained before. The study also revealed that emigration out of the areas promoted by the project has significantly declined. These encouraging results have motivated the Peruvian Government and the German Government to continue the project. The third phase of this FC project is now getting started on the upper course of the Apurímac River with a funding volume of DM 15 million. It is estimated that some 26,000 people will benefit from the planned measures.

As in the first two phases, the following individual activities are being funded:

- Preparation of studies to identify individual programs
- Planning with the participation of farmers who practice irrigated agriculture

- Renewal and/or extension of the simple irrigation infrastructure (tapping of water sources, supply, simple distribution structures, ditches and, where necessary, drainage systems)
- Training and instruction of users in servicing and maintaining the systems
- Advice for users on water distribution, optimizing water use on the fields, and improving growing methods

After the irrigation systems are completed, they are operated and maintained by the smallholder farmers themselves. Consequently, simple technology consistent with the users' means and skills is used for the infrastructure. Training of the users also occupies an important place in the project. The new phase incorporates what had been learned in the preceding phases, which includes recognition of the fact that the conditions for sustainable operation can be improved by intensively involving users in preparing for, planning and implementing the construction measures.

### **2.3.6. Paraguay**

#### **Project: Surveying and Development of the Groundwater Resources of the Western Region (Chaco)**

German contribution from Technical Cooperation funds: DM 8.9 million

#### **Brief description**

The declared development goal of the Government of Paraguay is to integrate the Chaco to a greater extent into the country's economic system. Before it can be developed economically, however, the existence of sufficient water resources must be demonstrated.

The settlements of the poor population groups (Indians, campesinos) have lacked a year-round supply of water. This has the following reasons:

- The seasonal distribution of precipitation is unfavorable.
- There are virtually no streams or rivers.
- The groundwater in much of the Chaco is too salty.
- Virtually nothing is known about groundwater conditions in the west and north.
- The groundwater in the urban centers is, increasingly, contaminated.
- The *Dirección de Recursos Hídricos (DRH)*, which is responsible for developing water resources and supplying water to the population, is not yet adequately equipped for its tasks.

The project is aimed at working together with the partner agency (DRH) to learn about the usable groundwater resources, survey how they are distributed and renewed, and make recommendations for their optimal use and protection. At the same time, the operative capabilities and performance of this institution are to be lastingly strengthened. The results obtained are to be applied to improving the drinking water supply in settlements of the poorest population groups. The project began in 1992. It is planned to be completed in 2000.

The following main results have been achieved to date:

- Establishment of a capable drilling department and a functioning water quality laboratory
- Strengthening of the capabilities of DRH for surveying and assessing groundwater resources, for implementing measures to artificially increase the groundwater, and for measuring and evaluating human-induced groundwater contamination
- An improved supply of drinking water in 22 settlements occupied by Indians and *campesinos* (about 6000 people in all) by building bore wells, water-storage basins, cisterns, and water-pumping facilities

The following observations indicate that the project is having a lasting impact:

- The DRH is applying what it has learned about well-building to the services it provides. It is using its income to fund part of its operating costs. Both state institutions and private individuals are taking advantage of the services of its water laboratory.
- Several municipal governments have adopted and put into practice the recommendations for protecting the groundwater and building systems to artificially increase groundwater volumes. The DRH has concluded cooperation agreements with the Paraguayan water supply company CORPOSANA and IAEA, and its increased technical competence has also lent it greater political weight.

Water-supply systems in rural settlements are planned and built along participatory lines: the project conveys technical knowledge and provides building materials; local residents do the actual work, and thus also get an opportunity to learn how to maintain the water-supply systems.

### **2.3.7. Palestinian Administration Areas**

#### **Project: Water Resource Management in Palestine**

German contribution: approx. DM 1.9 million (1995-1997) and DM 1.5 million (1998-2000).

#### **Brief description**

Nature of the problem: The water supply situation in the Palestinian areas is wholly inadequate. In some, no Palestinian institutions at all are responsible for the water sector, and those in place elsewhere lack adequate resources. No more than 50% of households are connected to the drinking water supply network. Only ten cities have a sewerage system. Virtually no wastewater treatment takes place.

In the Gaza Strip in particular, the quality of the water is extremely questionable. Because the groundwater reserves are exploited to an excessive extent, the groundwater horizon sinks each year by 20-25 cm. This permits seawater to penetrate into the groundwater reserves, increasingly rendering them unusable as a source of drinking water.

Some of the Palestinian institutions responsible for the water sector are still not performing adequately. Technical and non-technical problems cause the loss of up to 60% of the water. The main causes are the outmoded and dilapidated pipe network, damaged water meters, and mistakes in calculating consumed quantities.

The main obstacle to raising the performance of the waterworks are rates that do not cover costs. In the towns of Nablus and Al Biereh, for example, the revenues from water fees only recover 20-40% of the costs incurred for operation and maintenance. A positive example is the Jerusalem Water Undertaking (JWU) in Ramallah, which charges prices high enough to cover operating and maintenance costs.

A Palestinian water agency was not established until recently (in early 1996). But its responsibilities, experience and personnel are still quite limited.

**Project goal:** To promote effective management of Palestine's waterworks.

**Executing institution:** The water departments of municipal administrations, as well as the Jerusalem Water Undertaking (JWU), a privately owned water utility. JWU was the partner of the Carl Duisberg Society in implementing the first project phase.

**Target groups:** Hydraulic engineers belonging to the middle management of municipal administrations, institutions of higher learning, NGOs and JWU.

**Implementation:** Between 1995 and 1997, twelve different training courses were held in the West Bank and Gaza to achieve the project's goals. They were attended by about 400 engineers, accounting for 20-25% of the personnel in the Palestinian water sector. Parallel to this, two five-month English-language courses for "training the trainers"

were held in Germany in 1996 and 1997. The vast majority of those who participated (approx. 84%) belonged to the middle management of Palestinian operations. About ten percent of them were women.

Planning: Implementation of this project is to resume in 1998 for three more years, with a funding volume of about DM 1.5 million. Nine short-term measures (lasting between two and four weeks each) are planned for this.

The training courses focus on water supply management (institutional and financial management in particular) and technologies for treatment of water, wastewater and waste. A new feature of this project is that two of the courses are being held in Arab countries (in Tunisia on wastewater treatment, and in Morocco on drinking water supply). This project is also being executed with a new partner, the "Palestinian Water Agency", during the time period from 1998 to 2000.

### **2.3.8. Peru**

#### **Project: Water Supply Program for the Hualgayoc-Bambamarca Region, Cajamarca Diocese**

This project is being promoted with a total of about DM 2 million in funds, of which about DM 1.2 million is contributed by Miserior and DM 1.8 million by the German Ministry for Economic Cooperation and Development and, via the Catholic Central Agency for Development Aid (KZE), by the EU.

#### **Brief description**

The project region comprises 18 villages in Hualgayoc Province with about 13,000 residents (planned: 26,000), situated in Cajamarca Diocese in the Andes of northern Peru. Cajamarca Diocese is one of Peru's poorest areas. The people living there mainly subsist on what they manage to grow on their small fields. Yields are low, providing barely enough to survive on. A large part of the local population suffers from malnutrition.

The region's biggest problem is a lack of clean drinking water, however. Most of the water is drawn from holes in the ground, and is frequently contaminated with bacteria, making it the cause of many diseases. The region's chronic water shortage also rules out any possibility of irrigating the fields during dry periods.

The organization D.A.S. (Departamento de Acción Social), an institution of the diocese, is working together with Miserior to promote a major water supply program. For this purpose, six springs in the nearby mountains that carry water year round are being tapped, supply pipes laid over a distance of 23 km, and water distribution networks built for the 18 communities. The system is capable of supplying about 2350 families with water. A total of about 100 km of pipe is being laid, in addition to building required artificial

structures such as spring frames, pressure chambers, pressure-relief structures, water reservoirs, and surge tanks. The project funds are being spent on pipe, cement, construction equipment, technical systems for regulating the water, and expert advice. The actual labor involved is done by the local residents, as their contribution to the project. Because of the long distances that the pipes must traverse through very difficult terrain, those participating are making an admirable contribution in terms of stamina and time.

Once the work is completed (presumably at the end of 1998), it is hoped that the system will help solve the local population's problems that are associated with the lack of drinking water. These are, in addition to the high incidence of diseases, high child mortality, malnutrition, low productivity, accelerating soil erosion, inadequate sanitary facilities, and diseases of domestic animals.

The completely inadequate water supply situation of those living in the project region constitutes a continuous impediment to implementing other development measures. Securing a reliable supply of water can make an important contribution to improving the health situation and increasing agricultural production. Local residents are performing all of the unskilled labor required by the project, and are demonstrating enormous enthusiasm and motivation. The communally performed work also helps foster a sense of community and encourage the local residents to take the initiative and assume responsibility, which in turn enhances their self-confidence.

### **2.3.9. Uganda**

#### **Project: Rural Water Supply in Kabale District, Uganda**

Of the total project costs amounting to DM 0.8 million, DM 0.26 million is being contributed by the BMZ via the Protestant Central Agency for Development Aid (EZE). UNICEF and the Tear Fund in the United Kingdom are also involved.

#### **Brief description**

Kabale District, which has a population of 450,000, is a mountainous area with only moderate precipitation (1000 mm/a). The local residents primarily support themselves by farming. Owing to the area's proximity to Rwanda, where a civil war has raged, its economic development has suffered major setbacks in recent years.

Only about 20% of the residents of this densely populated district have access to clean drinking water. Most of the women and children must go on long and difficult walks through the hilly countryside to find water. Moreover, most residents take their drinking water from contaminated springs, water holes, and polluted streams and rivers. Contaminated drinking water, which is rarely sterilized by boiling owing to a lack of

fuelwood, is the cause of three-quarters of the diseases recorded by the district's health care facilities.

The Kigezi Diocese of the Anglican Church of Uganda therefore wants to lastingly upgrade the living situation of the people in Kabale District by improving the supply and quality of drinking water there. A better supply of drinking water will ease the burden of work on the women, leading to a significant decline in water-induced diseases and mortality among infants and small children and tangibly improving the quality of life. The project will thus primarily benefit women and children, who have traditionally been responsible for supplying their families with water for drinking and other uses.

The Kigezi Diocese of the Anglican Church of Uganda has therefore been involved in hydraulic engineering activities in Kabale District for over ten years, as part of its diverse development activities. The three engineers of the diocese's hydraulic engineering department cooperate closely with its department of health and hygiene.

The project is conducting the following activities to improve the supply of drinking water:

- Approx. 210 well frames (some with collecting tanks) are being built.
- Approx. 20 communal and 900 household tanks are being installed to capture rain water.
- Three pipe systems up to 6 km in length are being laid.

The Kigezi Diocese has been very thorough in planning and preparing for this project. At the beginning of the project, baseline surveys were carried out in the villages, and the individual measures were planned in cooperation with their residents. Water committees were set up, and voluntary technical assistants recruited. Advisory and educational work was performed to give the locals a better understanding of the connection between water and health, and the necessity of and possibilities for locally funding the operating and maintenance costs were discussed. Special attention was also paid to ensuring the ecological compatibility of the measures.

The program, which has been ongoing since mid-1995, will presumably have been successfully completed by some time in 1998. A decrease in water-related diseases can already be observed today, particularly among women and small children. By implementing this project, the Anglican Church is making an important contribution to the development of southwestern Uganda.