WATER POLICY AND IMPLEMENTATION STRATEGIES

CHAPTER 3

1 WATER POLICY

The Integrated Plan for Water Development and Management includes provision for a national water policy in order to achieve the main goals set by the Chadian Government.

The relevant strategies state how the specific goals of the water subsectors are to be reached taking into account the main principles set out in the water policy. These strategies may be broken down into five subsector levels: drinking water, pastoral and agricultural water, water resources and, lastly, sanitation. The subsector strategies will be complemented by a transverse fund mobilisation strategy that will be compatible with the major macroeconomic equilibria and the ability of users to pay. It also proposes an organisational framework for water governance and for national capacity-building.

1.1 Objectives

To contribute to reducing poverty and to economic growth, firstly by improving access to drinking water and sanitation in a sustainable manner and, secondly, by participating in the rational and equitable exploitation of pastoral and agricultural resources while protecting and preserving ecosystems.

1.2 Principles of the water policy

The water policy consists of twelve major founding principles, which govern all actions carried out concerning the sustainable development of water resources and services throughout the period covered by the Integrated Plan for Water Development and Management up to 2020. These principles are listed below.

Principle 1 **Water in the nation's public domain:**

"All water resources within the boundaries of the national territory are in the public domain. In this capacity, they form an integral part of the State's public domain, which is inalienable and imprescriptible" (Article 1, Water Code).

Principle 2 **Human health and access to water and sanitation:**

The priority that has been defined for the Chadian population's health requires that they have extensive, reliable access to drinking water, hygienic conditions, sanitation, and sufficient, nutritionally balanced food. Water mobilisation must contribute to this priority, while ensuring that no subsectors, notably sanitation and food production, are neglected.

Principle 3 **Integrated management and use of water resources to promote sustainable socio-economic development:**

Water is a vital resource for the population, the country's socio-economic development and for biodiversity. It must be known, protected and managed in an integrated manner, in terms of both quality and quantity. The State services must continuously improve knowledge of both the water resource (which must be considered to be unitary) and its uses.

Principle 4 **Gradual refocusing of the State's role:**

The State's services must gradually withdraw from construction and maintenance operations and refocus on their role as a public utility responsible for monitoring and inspection, as well as for promoting best practices. This must take place gradually, as a national private sector emerges and becomes capable of running these operations on a long-term basis. Nevertheless, "regardless of the method used for managing the drinking water utility, the State (or the Decentralised Local Authority in the event of delegation) shall guarantee smooth operation" (Article 41, Water Code).

Principle 5 **Water governance as close as possible to the user:**

An integrated system for managing water as close as possible to the end user will gradually be set up as decentralisation progresses, notably based on delegation of the public drinking water, pastoral water and sanitation service to the Decentralised Local Authorities and of the future devolved government structures.

Principle 6 **Institutional framework strengthening:**

The functions and obligations of the public and private stakeholders and operators and associations concerning local water development measures must be clearly identified in a legislatory and regulatory context. Any development action involving the control of water, whether national or carried out by an external partner, must fall within the institutional and regulatory context of the water sector.

Principle 7 **Participation of stakeholders and integration of water subsector policies:**

On all territorial levels there must be an institutional consultative mechanism enabling the main stakeholders, and notably the users, to participate in the design, planning and monitoring of development measures and the management of hydraulic equipment, water resources and their uses.

Principle 8 **A fair, transparent water price:**

The water transfer and distribution equipment and the water operation service have a cost, which must be known to the users. The proportion of any subsidies must be transparent and known. The real-cost tariff of the public drinking water service must, as a minimum, cover all operating charges and renewal costs for equipment with a service life of less than twenty years. Equity must be the rule when fixing the price of the drinking water service within a homogeneous area. Thus, at a lower level of service, the unit cost of the water service **must not exceed** that of a higher level of service.

Principle 9 **Collecting and sharing information:**

The public manager responsible for water shall be obliged to collect and publish information on water resources, all their uses and all discharges into the environment. Information on management data subject to control by the public service for drinking water, productive water (for agriculture, pasture-land, industry) and sanitation is collected in the context of a compulsory declaration system, laid down by law. In this context, the public service responsible for water must ensure that this information is collected, organised and processed to make it accessible, subject to conditions, to as many users as possible, with help from new technologies.

Principle 10 **Water management and environmental protection:**

The impacts of economic activity in the water sector and of developing the mobilisation and use of water as a natural resource, must be examined and dealt with from the perspective of protecting the aquatic ecosystems of Chad and the environment in general. The polluter-pays principle must be applied.

Principle 11 **Strengthening subregional cooperation on shared water:**

Water must be a source of regional economic integration. Managing the use of shared water resources and protecting their quality must be agreed through subregional consultation and carried out in accordance with the agreements signed with the existing basin authorities.

Principle 12 **National capacity-building is necessary to promote the sustainable management of water:**

Capacity-building at national, regional and local levels is necessary in order to promote the sustainable use of water resources. Each project implemented in one of the subsectors must include a significant proportion of capacity-building at national, regional and local levels. In addition, partnerships between regional and international training institutes and Chadian institutes will be encouraged.

1.3 Specific objectives

On the basis of the assessment-diagnosis and previous experience and in accordance with the Millennium Declaration, a number of objectives specific to the issue of water in Chad are listed in the paragraphs below.

Water resources and the environment

- Preserve and protect water resources and the environment by implementing study programmes covering several years in order to obtain, by 2020, in-depth knowledge of the mechanisms through which the aquifer systems and basins of Chad function and interrelate.

Access to drinking water and sanitation

- Halve the proportion of people in Chad without access to drinking water by 2015. This involves reaching or exceeding, by 2015, a sustainable access rate of 60% in village areas, 60% in towns of more than 2000 inhabitants located in the non-concessionary area, and 70% in the urban area of the concessionary sector.
- By 2020, to have provided a level of access to sanitation and application of environmental health measures compatible with progress made in terms of access to drinking water for at least 50% of the population.

Pastoral water supply

- Double the number of permanent pastoral water points in order, firstly, to rationalise the exploitation of pastoral resources and promote development of pastureland and, secondly, to improve stock-rearers' standard of living.

Agricultural water supply

- Promote and improve food security through the sustained development of natural resources, with the objective of developing 100 000 additional hectares of irrigated land by 2020.

1.4 Subsectoral strategies

1.4.1 Strategic components of drinking water

In the drinking water field, five strategic components for reaching the objectives have been formulated. They are:

Strategic component 1: Improving drinking water supplies to village and semi-urban populations by constructing water supply systems

To improve drinking water supplies in village areas, the following strategy will be implemented: for the period 2000-2010, the notion of equity of access to water will be promoted by giving priority to equipping villages of 300 people or more, whereas between 2011 and 2020 the number of water points will be increased by building tapping structures in villages with less than 300 inhabitants. In semi-urban water supplies, in the non-concessionary area, equipment requiring investments which are modest yet tangible and feasible in the short term will be favoured.

Strategic component 2: Strengthening the legal and regulatory framework

Strengthening the legal and regulatory framework involves passing the various decrees of application of the Water Code on one hand, and setting up a regulatory framework encouraging the creation of Water Point Management Committees, user associations (populations), and small-scale provider associations (mechanics, hand pump repair men, etc.), regional and national federations of users and small-scale providers and private companies on the other hand. This regulatory context will be defined on the basis of existing laws governing the right to form associations and create private companies. It could be improved if necessary by passing new laws specific to the water sector.

Strategic component 3: Capacity-building to promote the efficient monitoring and management of drinking water supply equipment

Implementing this strategy consists in developing and disseminating information, education and training programmes aimed at populations, Water Point Management Committee members, users' associations, small-scale provider associations and any other village associations, notably womens' associations and national consultants, NGOs, and other associations of social facilitators working in the field of drinking water. In addition, specific training programmes will be developed to strengthen small private companies such as national engineering consultants, small-scale provider associations and cooperatives working to build wells and boreholes and manufacture local pumping equipment and companies involved in distributing, maintaining and servicing pumping equipment and components. Management programmes will also be developed and dispensed to the managers of the various users' associations.

Strategic component 4: Supporting the emergence of an organisational framework promoting local management and maintenance of drinking water supply systems

This strategic approach consists in creating and strengthening local water point and pumping equipment management structures, encouraging private initiative, supporting stakeholders in the field and, lastly, promoting access to various funding sources.

Strategic component 5: Supporting the public water service delegation process

In all towns, reforms aimed at decentralising administrative services are underway. The water services should be among the first responsibilities to be taken on by Decentralised Local Authorities (DLA). "Mini-DWS", embryonic drinking water supply networks, are being or to be created in the non-concessionary area and even in the concessionary area. The administration responsible for water will have to help the DLAs with this promising work. They must be prepared in order to perpetuate the investments and ensure infrastructure sustainability.

1.4.2 Strategic components of pastoral water supply

In the pastoral water supply field, five strategic components have been formulated to reach the objectives. These are:

Strategic component 1: Distribution of pastoral water supply structures in accordance with livestock water needs, taking into account the carrying capacities of the pastures

Water supply structures for pastoral use are mainly concentrated in the western part of the country along a strip running north to south, with the density of pastoral water points decreasing towards the east. Therefore, the aim of this strategy is to distribute the structures evenly throughout the administrative units of Chad. However, before this strategy can be implemented, significant input is required to update the existing inventories, or else create new ones, in order to assess the availability of fodder resources and livestock numbers more accurately. This knowledge will be used to increase the density of the modern water point network for pastoral use according to the criteria that best reflect the actual situation and needs of the agropastoral community.

Strategic component 2: Equipping stock-rearers' migratory routes and traditional trading routes with water points

The present strategy only concerns migrating stock-rearers as they are moving around. It mainly aims to equip the stock-rearers' migratory routes and trading routes with sufficient water points to guarantee water supplies to all annual and exceptional pastoral movements.

Strategic component 3: Strengthening the legal and regulatory framework by adding laws governing the various pastoral and agropastoral uses to the Water Code

The notion of the migratory stock-rearer, an age-old tradition that still lives on today in the extensive stock-rearing systems of Chad, is completely overlooked in the Water Code. Therefore, to the notion of water user with rights and duties in relation to a particular place and at well-defined periods of time, it is necessary to add the notions of **water access points and temporary user-operator,** claiming large volumes of water for his family and animals. The aim is therefore to improve the Water Code so as to take the needs of the agropastoral community into account.

Strategic component 4: Strengthening the institutional framework by clarifying the responsibilities of the various services involved in developing and managing pastoral resources

The aim is to clarify responsibilities, through suitable laws and by setting up a "consultative mechanism" grouping together not just the different institutional stakeholders but also the donors and all other stakeholders, to harmonise each person's actions in the field of pastoral water supply.

Strategic component 5: National capacity-building

The aim is to strengthen the various services involved in managing and monitoring pastoralism and water resources, as well as the stock-rearers and national operators involved in pastoral water supply (NGOs, associations, private structures, etc.).

1.4.3 Strategic components of agricultural water supply

Four subsectoral strategies have been developed for agricultural water supply. These are:

Strategic component 1: Developing and exploiting in a rational and sustainable manner the soil potential that is currently under- or unexploited

There is a great deal of soil potential remaining to be developed, especially on the great flood spreading plains of the river Salamat, the flood plains of the rivers Chari and Logone, and around the many lowlands of the Sudanian zone and the mountain catchment basins. The aim is to carry out the studies required to develop this soil potential, which is as yet under- or unexploited.

Strategic component 2: Rehabilitating or bringing back into operation existing irrigation areas

The aim is to make certain existing irrigation schemes operational, on the basis of economic and profitability criteria.

Strategic component 3: Drawing up and implementing a policy of training and support for peasant organisations and the different stakeholders

It is urgent to train and organise the farmers across the entire country. Special attention will be paid to strengthening and managing the peasant organisations. Training and support programmes to organise the production chains are also essential if the subsector is to function correctly. Programmes will have to be drawn up and dispensed to the main participants: producers, farmers, transporters, traders, etc. Support and strengthening programmes for institutional and parapublic stakeholders will also be developed and implemented through technical assistance and external training geared to their requirements.

Strategic component 4: Strengthening the legislatory and regulatory framework

Strengthening the legislatory and regulatory framework involves promulgating the Water Code decrees and drawing up new laws concerning land-related aspects, geared to the current agricultural water supply context. These new laws will have to fall within the wider perspective of regional development if they are to reduce conflicts between land farmers and stock-rearers as well as promoting sustainable development of rural areas.

1.4.4 Strategic components in the water resources field

Three major strategies have been formulated in the water resources field. These are:

Strategic component 1: Improving knowledge of resources by performing studies and setting up monitoring and forecasting systems

The aim is to acquire the basic data that are essential for sustainable development of water resources, in order to derive maximum social and economic benefit from these resources. The aim is also to set up reliable forecasting systems that will contribute to improving food production and provide a means of preventing and guarding against water-induced damage.

Strategic component 2: National capacity-building

The aim is to develop national capacities at central, regional and local levels, to promote the integrated management and sustainable development of water resources while protecting the environment.

Strategic component 3: Strengthening the legislatory and regulatory framework

The aim is to promulgate the decrees of the Water Code, notably concerning declaratory aspects, discharges into the environment, abstraction and uses.

1.4.5 Strategic components in sanitation

Five strategies have been developed in sanitation. These are:

Strategic component 1: Gradual implementation of individual sanitation in urban and semi-urban areas

Given that the situation with regard to sanitation is mediocre and, taking account of existing resources, both human and financial, the proposed strategy consists in the gradual and realistic implementation of individual sanitation in urban and semi-urban areas by calling on small firms, building latrines that are adapted to the different contexts, recommending incentives, setting up community excreta collection systems and training populations in basic health measures.

Strategic component 2: Gradual installation of urban and semi-urban sanitation facilities in the main towns of Chad

Urban sanitation facilities (stormwater sewerage, wastewater collection and treatment network, waste disposal systems, etc.) are practically non-existent in the largest towns of Chad, and totally non-existent in the other urban centres. The aim is therefore gradually to equip the urban centres of Chad with this infrastructure, placing priority on starting with the four largest towns (N'Djaména, Moundou, Sarh and Abéché).

Strategic component 3: Promoting basic village sanitation measures by disseminating health education programmes and building low-cost basic sanitation facilities

Health education programmes will be developed and disseminated among the village populations as well as in schools and health centres. These programmes will focus on faeces-related hazards, personal hygiene, environmental health, proper use of water, simple water disinfection and traditional water point sanitation techniques, and drinking water conservation techniques (transport and storage).

Basic sanitary infrastructure, such as traditional pit latrines *(sandplat),* ventilated improved pit latrines, filtering wells for wastewater, and areas for dumping household and other waste will be developed in villages. The future village water supply programmes will be used as a framework for building this infrastructure and for disseminating the health education programmes.

Strategic component 4: National capacity-building

The aim is to develop capacities at all levels: national, regional and local. In particular, it is necessary to strengthen and encourage **district organisations to take charge of managing and promoting** the subsector. This is accompanied by the desire to develop an economy of small private entrepreneurs, which may be modest but is perfectly suited to the actual nature of the resources that can be mobilised.

Strategic component 5: Strengthening the legislatory and regulatory framework

A large number of institutional stakeholders are involved in sanitation, carrying out actions in a non-concerted manner. In addition, there are few, if any regulations concerning the different aspects of sanitation. These solutions are relieving the stakeholders of responsibility and leading to chronic under-funding of the sector. The aim is therefore to define the roles and responsibilities of each stakeholder within a suitable regulatory framework.

2 MACROECONOMIC ANALYSIS AND ANALYSIS OF THE WATER SECTOR DEVELOPMENT STRATEGY IN LIGHT OF THE IDENTIFIED NEEDS

This macroeconomic analysis is aimed at determining the place of water in the national economy. It is also aimed at outlining the requirements and the financial conditions necessary to meet the Millennium Development Goals (MDGs). Finally, it assesses the State's ability to fund the sector in light of its oil revenue.

The SDEA carried out a macroeconomic analysis in 2001. The results of this analysis showed that the State's annual income from oil revenue would be between FCFA 40 billion and 80 billion for the period 2003-2015, i.e., an average FCFA 60 billion per year. This study was carried out on the basis of a sale price of US$20.00 per barrel of crude oil.

Moreover, in order to remain consistent with the Poverty Reduction Strategy Paper (PRSP) and at the Government's request, the present economic analysis is mainly based on the report on the macroeconomic framework of the National Poverty Reduction Strategy. This is given in appendix 2.

2.1 Economic forecasts

2.1.1 Analysis of the long-term performance of the Chadian economy

GDP growth

Oil exports, expected to start in 2004, will cause a short-term leap in GDP growth. In 2004, initial production will represent 36 percent of the total GDP growth rate, increasing GDP by 42.4%. In the current scenario, oil exploitation should decrease from the initial 2004 peak by 0.7% per year between 2005 and 2009, before falling more sharply by 14% per year thereafter. This means that the share of oil in GDP will decrease rapidly, by 31% between 2004 and 2009, and then 11% between 2010 and 2015. This growth is not evenly spread across all sectors of activity.

Primary sector GDP is expected to grow by 4.2% per year between 2003 and 2015. During the period of review, the added value of the food crop sector should increase by 5.6%. Cash crop production should grow by an average 4.6% per year, while the stock-rearing subsector should record average growth of 2.9% per year.

In the secondary sector, GDP is expected to increase by 11% per year between 2003 and 2015 (oil exploitation falls within this sector). Excluding oil production, this sector should grow by 8% per year.

Lastly, in the tertiary sector, GDP is forecast to grow by 6.5% between 2003 and 2015. During the same period, it is assumed that income per inhabitant will increase by 5% per year.

Balance between savings and investments

On the basis of these GDP growth forecasts, investments should increase by 18% of GDP on average between 2003 and 2015 and should be divided almost equally between the private and public sectors. At the same time, national savings will increase from 9.5% of GDP in 2003 to 13.3% in 2015, i.e., an annual average of 11%.

Debt

Within the macroeconomic context of the poverty reduction strategy, the debt sustainability indicators should improve substantially in the medium term thanks to oil exploitation and exports and to debt relief under the HIPC initiative.

Total foreign loans will decrease gradually from 172 million dollars in 2003 to 90 million dollars in 2015. During the same period, the ratio of net discounted value of debts to exports will decrease from 266% to nearly 50% between 2005 and 2009 before gradually increasing again to 120% in 2015, and then 137% around 2020. The ratio of debt service to exports will fall from 15.3% in 2003 to nearly 2.6% between 2004 and 2009, and then to 7.2% in 2015.

Balance of payments

The current balance of payments deficit is expected to fall from its present high level of 46.7% of GDP in 2002-2003 to 8.6% in 2004 with the start of oil exploitation. The deficit will amount to an average 3.4% of GDP from 2005 to 2009 and increase with the drop in oil exports to around 5.2% in 2015.

Poverty reduction

With an annual growth forecast of about 3.5%, poverty in Chad could be halved by 2015.

2.1.2 The oil economy

Oil revenue

The State's revenue from oil exploitation is expected to amount to some **FCFA 118 billion** per year. The structure of this State oil revenue is as follows:

- royalties;
- extraction tax;
- pipeline tax;
- COTCO dividends;
- TOTCO dividends.

However, the depreciation expenses taken on by the consortium and TOTCO will largely exceed taxable income during the first few years of production. The proportion of revenue granted to the State will consist mainly of production royalties. In this context, the total budget deficit (excluding donations) is expected to plunge from 14.1% of GDP in 2002-2003 to 3.5% of GDP during the period 2004-2015. Between 2015 and 2020, this deficit will remain below 3% of GDP, in spite of the reduction in oil revenues. During the same period, this basic primary budget balance should also improve, rising from a deficit of 2.7% of GDP in 2002-2003 to an excess of 1.6% of GDP during the period 2004-2015.

Law 001/PR/99 of 11 January 1999 governing oil revenue management orders all oil revenue to be placed under the general budget and all direct revenues (royalties and dividends) to be allocated to the following expenditure:

- 10% to the fund for future generations;
- remaining 90% broken down as follows:
  - 72% to operating expenditure and equipment in priority sectors (health, education, infrastructure and rural development, including water);
  - 13.5% to general operating expenditure;
  - 4.5% to expenses relating to the Doba basin oil project.

There are currently no programmes allocating this revenue to one sector or another. Hence the importance of the proposals that can be made now for using oil revenue in one sector rather than another. However, an attempt can be made to estimate the approximate share of state revenue to be devoted to water, for example.

Table 28 indicates the structure of the Public Investment Programme (PIP) by main sector, as a percentage of the donor total or the State total. Table 29 indicates the amounts in millions of FCFA.

Table 28: Public Investment Programme as a % of the donor and State totals

	2001		2002		2003		2004	
Sectors	Donor	State	Donor	State	Donor	State	Donor	State
Agro-Sylvo-Pastoral	**25.7**	**31.2**	**19.6**	**27.0**	**15.4**	**28.2**	**16.3**	**30.3**
Agriculture	11.0	25.6	9.2	23.7	7.0	24.7	8.2	24.8
Stock-rearing	1.2	2.0	1.9	0.0	2.2	0.0	1.5	0.0
Environment	13.5	3.6	8.5	3.3	6.2	3.5	6.5	5.4
Mines, Industry, Energy	**28.8**	**3.9**	**21.5**	**1.1**	**18.0**	**1.4**	**14.8**	**1.7**
Infrastructure/transport	**29.5**	**38.0**	**32.1**	**39.3**	**43.5**	**31.3**	**44.0**	**26.5**
Roads/airports	27.3	30.8	30.6	34.7	42.0	30.6	42.5	25.1
Telecommunications	0.1	1.1	0.1	2.3	0.1	0.6	0.4	1.4
Town planning	2.1	6.1	1.4	2.3	1.4	0.0	1.1	0.0
Human resources	**10.9**	**12.7**	**18.6**	**22.3**	**17.6**	**27.3**	**18.3**	**25.0**
Education	1.6	5.5	7.0	3.1	7.4	6.4	9.3	5.5
Health	8.0	6.4	10.0	18.6	9.7	19.6	8.4	19.5
Social affairs	1.2	0.9	1.7	0.6	0.5	1.3	0.6	0.0
Youth and sport	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Integrated development	**3.8**	**6.6**	**4.2**	**6.7**	**3.9**	**8.4**	**5.1**	**7.1**
Development assistance	**1.4**	**7.6**	**4.0**	**3.6**	**1.5**	**3.6**	**1.6**	**9.5**
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
T.DON./T.DON.+T.STATE	92.4		94.9		95.6		95.9	
T.STATE./T.DON.+T.STATE		7.6		5.1		4.4		4.1

Source: PIP

Table 29: Public Investment Programme in millions of FCFA

Year	2001		2002		2003		2004	
Source	Donor	State	Donor	State	Donor	State	Donor	State
TOTAL	78 278	6 432	196 262	10 500	166 728	7 724	116 607	5 047

Source :PIP

The following observations may be made concerning these tables:

- The Ministry of Environment and Water is responsible for water. In 2002, the MEE's investment budget was 8.5% from donors and 3.3% from the State;
- between 2002 and 2004, investments from donors are set to fall (6.5% in 2004) and State investments are set to rise (5.4%);
- it should be noted that the MEE manages other sectors in addition to water, which also have investment needs.

The first question to be answered is by how much the Public Investment Programme (PIP) will increase following the rise in State revenues. The structure of the State budget is currently as follows (2002, in millions of FCFA):

Operation	123 154	31.7%
Total investment	264 804	68.2%
Total	**387 958**	**100%**
Counterpart funds	10 500	2.7%
Other	6 747	1.7%
External resources	196 262	50.6%

The proportion of State-funded investment (counterpart funds) is less than 3% of the total budget, which amounts to about FCFA 400 billion, including foreign aid. For about 15 years, **the State will receive** about **FCFA 118 billion more** per year **compared to current levels of expenditure: operation, i.e., FCFA 123 billion, and investment excluding aid, i.e., FCFA 10 billion.**

The proportion of oil revenue (royalties and dividends alone) devoted to **priority expenditure** is about 55% of total revenue (or, applied to FCFA 118 billion per year, about FCFA 65 billion). Part of this amount will be devoted to priority operating costs (e.g., healthcare workers' salaries). Assuming a 70/30 distribution of oil revenues between operating costs and investment excluding aid, which would be a major shift in favour of investment, there would be **about FCFA 20 billion per year to be shared out between the sectors. The proportion for the environment (in large part for water) will be 5.4% in 2004. Doubling it would take it to FCFA 2 billion per year.** The proportion of oil revenues destined for other sectors (agriculture and stock-rearing) to be used for water supply structures **must be added**. These amounts are difficult to evaluate. **One billion per year seems to be a reasonable guess, i.e., FCFA 3 billion in total.**

Spin-offs

The spin-offs of oil exploitation for the Chadian economy, excluding those passing through the public finances, are difficult to evaluate. Oil production costs (cumulated over the period 2004-2033) are an estimated 3.768 million US dollars, including 1.537 for the pipeline to Cameroon. The remaining 2.231 million dollars are therefore payable by Chad, i.e., the equivalent of about FCFA 1.561 billion over about 30 years (contrary to the tonnages extracted, operating costs are spread fairly evenly over the period, so the reduction in quantities extracted will not significantly reduce costs). Roughly speaking, operating costs are about FCFA 50 billion per year. These are the costs that are likely to bring about a spin-off effect, given that the revenues are distributed to the Chadian government (the effect of which is analysed elsewhere), to the consortium or to the Cameroonian government. Consortium revenues will not necessarily be spent in Chad.

It is therefore through operating costs that spin-offs are likely to be produced for the Chadian economy. Imported intermediate consumption and expatriates' salaries probably represent a large proportion. Goods and services and Chadian salaries are not likely to exceed 20%, or about FCFA 2.5 billion per year.

In a good year for oil exploitation, oil GDP may represent 30% of total GDP. Oil GDP is the sum of the following factors:

- consortium profits, which do not remain in Chad;
- salaries of expatriates, few of whom remain for very long in Chad;
- Chadians' salaries, which are low;
- the State's oil revenues, which are discussed elsewhere.

Therefore, oil resources should not be expected to have a significant effect other than on public revenue. **Public investment is the essential lever for development of the non-oil sector during the period of oil exploitation.**

To conclude, on the current basis of oil revenue distribution, the State will only invest FCFA 3 billion[1] in the water sector over the next few years.

Therefore, to fund the priority water sector, it is urgent to define a new key for distributing oil revenues on one hand, and for the minister responsible for water to obtain the means and resources that will enable him to manage and monitor the budgets required to fund the sector on the other hand.

[1] The economic study carried out by the SDEA concluded that the State could only invest FCFA 1.5 billion per year in the water sector. In any case, the two studies make it quite clear that external resources are necessary to fund the water sector, which needs an estimated FCFA 23 billion per year for the period 2000-2020.

2.2 Strategy for mobilising funds

The two main funding sources to supplement State investments will be international aid and users. Taking a longer-term perspective, the private sector is also a potential source of funds for the water sector.

In its role as supporter and main mobiliser of investments, it is the duty of the State to create a framework which will be conducive to national consultation, coordination and regulation in order to strengthen a dynamic partnership with the various donors.

There are a number of decrees and orders concerning users: decree 249/PR/MEE/02 defining the terms and conditions for temporarily transferring the State's powers in terms of delegating the public drinking water service to the Decentralised Local Authorities; order no. 029/MEE/DG/2002 defining the standard framework of the special contract for delegating the Public Drinking Water Service to a Users' Association or Private Farmer, and order no. 030/MEE/DG/02 governing the conditions for setting up, organising and operating Drinking Water Users' Associations (DWUA). In addition to clarifying the regulatory and institutional context, they make it possible to begin taking action in terms of local management of the equipment and funds from selling drinking water and (indirectly) productive water. The following sections analyse the ability of the population to pay for both "social" water and "productive" water.

2.2.1 Ability of the population to pay the cost of water

In theory, users' incomes increase in line with GDP, which represents distributed income (salaries, profits and taxes). If GDP triples by 2020 this will be truly reflected in the Chadians' incomes since, by then, the proportion of oil GDP (mainly oil companies' income) in total GDP is low. This is sufficient to be able to envisage developing the water sector with partial funding from the users.

Users' ability to pay for water can be measured by comparing the cost of water with their income and what they already pay (for example, FCFA 10 per 20-litre container). The following calculations are performed in constant francs, i.e. in real terms. Discounting is not taken into consideration, given the current low interest rates. These calculations are cost calculations. The price billed depends on the price policy implemented by the Users' Association management committee or the water company.

2.2.1.1 Village water supply

A borehole fitted with a hand pump serves 400 inhabitants on average. The investment cost and depreciation of this equipment is presented below:

Description	Cost	Service life	Depreciation
Borehole	FCFA 7 million	30 years	FCFA 230 000/year
Pump (HP)	FCFA 1 million	10 years	FCFA 100 000/year

Considering personnel costs (stand-pipe managers, keepers: FCFA 240 000/year) and servicing and maintenance costs (FCFA 100 000/year), the estimated total cost of the borehole excluding depreciation is FCFA 350 000/year, or FCFA 580 000/year including depreciation.

On this basis, it is then possible to calculate the cost per inhabitant, per household and per m^3 of water. Thus, the cost per inhabitant, for a village of 400 people, excluding borehole depreciation, is FCFA 900/year, and FCFA 1500/year including depreciation.

The cost per household (7 people) is FCFA 6000/year excluding borehole depreciation, and FCFA 10 000/year including depreciation. The cost per m^3 is based on a drinking water consumption rate of 15 litres per day per inhabitant, which would appear to be a maximum figure given the fact that needs for non-drinking water can be met through access to least-cost traditional water points. This makes 5500 l/inhab./year or 2200 m^3 per year for 400 inhabitants; this leads to a cost of FCFA 160/m^3 excluding borehole depreciation and FCFA 260/m^3 including borehole depreciation.

Assessing the ability of the population to pay

Two different points of view may be taken, depending on whether the cost per m^3 or the total cost per inhabitant is used as a reference.

Cost per m^3

The cost per m^3 of water obtained above must be compared with the price per m^3 of water paid of FCFA 10 per 20 litre container, i.e., FCFA 500/m^3. This price, which the users seem to have accepted, easily covers the cost of water in village areas (borehole/HP). Therefore, the populations would be able to pay for water, even in the event that the State hands over its responsibility for funding the renewal of boreholes.

Total cost

The total cost is FCFA 6000 or 10 000/household/year, depending on whether the borehole is funded. This figure must be compared with income in rural areas, around FCFA 80 000/year per inhabitant, i.e., FCFA 550 000/year per household. Spending on water therefore represents 1% to 2% of the household income. Taking monetary income in rural areas, which is around 35% of total income, i.e., FCFA 190 000/year per household, **spending on water therefore represents 3% to 5% of the household's monetary income.**

The monetary proportion of rural populations' incomes is estimated on the basis of their spending structure. It is assumed that the populations are self-sufficient in terms of food and that non-food spending is paid for. The figures used are taken from an ECOSIT study.

Conclusion

Households appear to be able to pay for the cost of water. The problem with village water supplies probably lies elsewhere, i.e. in water management in the wider sense, including the creation of a spare parts sales network.

It should be noted that some of the projects being envisaged propose a water service of a better quality but also at a higher cost. In this case, the following are billed to the user:

- water quality inspection twice a year;
- after-sales service;
- a FCFA 40 fee which goes to the Water Development Fund;
- spare parts.

The cost of water is therefore higher than the figures proposed above. The question is whether the users are interested in a centralised service which is high-quality, but also cumbersome and costly.

Moreover, taking a long-term perspective, the creation of family drinking water points (each family funds its own drinking water point consisting of locally-manufactured equipment) could represent a relatively large source of private investment in the sector.

2.2.1.2 Water supplies in urban and semi-urban areas

Non-concessionary area

The estimated investment, operating, servicing and maintenance cost, as well as the depreciation costs of the basic supply units (BSUs), are given in the following table:

Table 30: Cost of a basic supply unit

Description	Investment cost	Service life	Depreciation
Solar BSU	FCFA 70 million	20 years	FCFA 3.5m/year
Thermal BSU	FCFA 50 million	20 years	FCFA 2.5m/year
Sundry expenses	Personnel: FCFA 850 000/year Repairs: FCFA 600 000/year Expenses specific to thermal BSUs: FCFA 2 million		

Source: SDEA 2001

[2] *BSU: basic supply unit consisting of a mini drinking water supply network with 2 to 3 stand-pipes, and no private connection.*

Using the figures in table 30 and considering that one BSU[2] supplies 2000 people on average, the cost per m^3 of water in the non-concessionary area **excluding depreciation** is around FCFA 130/year per inhabitant with a solar unit and FCFA 200/year with a thermal unit. Including depreciation, the cost per m^3 of water is therefore FCFA 580/year/inhab. for a solar unit and FCFA 560/year/inhab. for a thermal unit.

Concessionary area

In the concessionary area, the cost of extending a network in a suburban area (200 additional metres of network for 20 households) is about FCFA 400 000 per household. This must be compared with the investment cost of a thermal BSU (the network being thermal), which is 50 million for 300 households or FCFA 170 000 per household. However, the comparison cannot finish here since the network cannot be extended indefinitely. A rough estimate, based on STEE data, gives FCFA 600 000 per household, including the network and the water production associated with extending the network.

The average cost per m^3 of water delivered by STEE in N'Djaména was FCFA 180/m^3 in 1995. However, this figure is an underestimate since, according to STEE's trading account, depreciation and provisions are relatively low: about 13% of the total cost. A more reasonable estimate is therefore about FCFA 160/m^3, i.e., between that of the solar and thermal BSU.

The 30-year depreciation of a FCFA 600 000 investment for a household of 7 people each consuming 35 litres of water per day (the household consumes 90 m^3 per year) is about 200 FCFA/m^3.

The total cost of STEE water is therefore an estimated **FCFA 360/m^3.**

The price of STEE water

The current price of STEE is FCFA 105/m^3 for the first 15 m^3 bracket, which easily meets the needs of a large family consuming a large amount of water (excluding garden-watering). The price at the stand-pipe is about FCFA 300/m^3 and that of the water-carriers is about FCFA 4500/m^3.

Therefore, the water service provided by a connection (tap in the home) is by far the best and the cheapest. For example, a family of 7 people consuming 5 litres of water per day and per person, or about 1 m^3 of water per month, pays amounts that vary widely depending on whether it buys this water from a small water vendor, or obtains it from a stand-pipe or even a connection:

- purchased from carrier — FCFA 4500/month/household;
- purchased at stand-pipe — FCFA 300/month/household;
- connection — FCFA 105/month/household.

It may appear as though households that purchase water from a small vendor are willing to pay much more than FCFA 105 per m^3 to have tap water. However, less than 10% of the urban population is supplied via a connection.

For efficiency and fairness reasons, it is difficult to maintain the water price at its present level, while its total cost is around FCFA 400/m^3.

The policy combining a simultaneous gradual increase in the water price to its actual cost of FCFA 400/m^3 and an increase in the number of connections is realistic because it is profitable for STEE and advantageous for the poor, who still do not have access to a connection. Small consumers, those who buy water from a carrier, would benefit with this hypothesis.

For various reasons, if increasing the water price were not desirable, it could be possible to subsidise new connections. This would create an equitable situation with the rural sector, where new water point investments are subsidised in full.

To increase the water price to FCFA 260/m^3 instead of FCFA 400/m^3, half of the depreciation of the connections would have to be compensated, corresponding to a subsidy of about FCFA 300 000 per connection.

This will have to take place in stages. Moreover, increasing the water price to bring it into line with its cost means increasing the average water price using the different brackets, which will have to be kept. The lower bracket should be limited to a much smaller cubic volume than at present, since it leads to the resale of water to the detriment of STEE.

Conclusion

In the projects that allow for equipment adapted to the different contexts, checks are carried out to ensure that the end user is able to pay the "tariff at the apparent actual cost of the public drinking water service", as stipulated by the water policy. As a minimum, this tariff must cover all operating expenses and the costs of renewing equipment with a service life of less than twenty years. This principle is yet to be applied fairly in the urban and suburban areas and in small non-concessionary towns, as has been the case for a long time in the rural sector, where the tariffing principles of the water policy are applied.

2.2.1.3 Pastoral water supply

Building a sufficient number of wells to cover the entire territory that is of use to stock-rearers would cost FCFA 100 billion (see action plan). These installations require little in the way of servicing (cleaning, repairs to the edges) and this can be carried out by stock-rearers' associations. Each well costs about FCFA 20 million for a period of 20 years. Its annual renewal cost, for a 30-year service life, is about FCFA 650 000.

There are about 1500 modern pastoral wells. There are plans to build another 4500. It costs about FCFA 4 billion per year to renew the 6000 wells for livestock numbers of around 14 million TLU, representing 300 FCFA/TLU/year.

Therefore, the stock-rearers can afford to pay for their water. The problem lies in collecting payments, with practically the only means being through the tax system, in the form of a tax on sales.

The low cost of pastoral water supply per TLU (although the total figure of 100 billion seems high) means that priority must be placed on investments in this field as part of the diversification of the post-oil economy, provided that two problems have been studied: actual knowledge of livestock numbers and fodder resources, and competition with crop-growing.

2.2.1.4 Agricultural water supply

Private initiatives (small-scale irrigation and small private irrigation areas) manage to cover their costs.

The very high cost of large irrigation areas makes it impossible for users to pay for them.

It is not easy to assess the effects of other agricultural schemes (flood-recession farming and catchment areas). The estimated cost varies depending on the type of scheme between FCFA 300 000 and 1 500 000 per hectare for a yield of one tonne per hectare, i.e., FCFA 100 to 500 per kilo, representing an income of FCFA 100 000 per hectare before payment of any inputs.

If these schemes are assumed to have a service life of fifteen years, the renewal cost varies between FCFA 20 000 and 100 000/ha. If inputs and the uncertainty governing the actual yield of land given over to crops are taken into account, it is difficult for the beneficiaries to pay the total cost of water. Identifying the beneficiaries is a further difficulty.

2.2.2 Mobilising international aid

Cooperation between the Government and the donors hinges on the objectives defined in the framework of the Geneva-IV Round Table meeting (October 1998 - follow-up meeting in November 2000) and the Poverty Reduction Strategy Paper (PRSP). Nearly all of the external financial needs for the different sectors defined during the Geneva IV Round Table meeting were covered by commitments made by the different donors, notably 369 million US dollars for infrastructure. The donors have yet to be mobilised, to complement internal fund mobilisation (users and public finances) for the priority water sector on the basis of the SDEA document, its action plan and its joint performance-monitoring plan, presented below. The SDEA includes the creation of a coordination and monitoring mechanism after the donors' meeting. At institutional level, the creation of a host of

"steering committees" for each project will be avoided as far as possible. It is advisable to transform all steering committees into "operational management committees", in principle by sector, with participation from the donor(s) concerned depending on the administrative procedures to be defined case by case. On the other hand, as regards the strategic monitoring of major projects (generally intersectoral in the field of water), the intention is to use a single public consultative mechanism to be made common to all projects, in order to remain generally consistent with the country's water policy and national strategies. This consultative mechanism, **to be used right from the project inception stage,** is already defined and operational. At intersectoral technical level it is the CTIE, and for any project on a national scale and in the national interest it is the CNGE, as stipulated by Prime Minister's decree. This mechanism is flexible and light, because it includes a CTIE meeting every two months as well as the possibility, if necessary, of specific meetings of a smaller CTIE. In principle, the CNGE only meets twice per year.

On the basis of this consultation strategy for effective mobilisation, in addition to internal resources that can be mobilised, **a great deal of effort is therefore required and expected from international aid for the next twenty years**, as indicated below and in the detailed action plans.

2.3 Water sector funding strategy

In the following sections, the tables presenting "current and proposed projects" for the different subsectors are drawn from the compilation of action plans by major theme given in chapter 4 of the SDEA.

2.3.1 Urban water supply

A distinction must be made between the concessionary area (STEE) and the non-concessionary area. Planned new works will first have to involve improving the existing service, the quantity and regularity of supplies to users and extending the number of individuals supplied by connection and stand-pipe. After this, it will be possible to envisage improving water quality and extending networks on a sustainable basis. Table 31 below summarises the proposed urban water supply projects.

Concessionary area

Appendix 3 of the contract delegating management to the Vivendi/Dietsman manager is a long-term investment plan stipulating that the State and the concessionary operator (which are currently the same thing, given that the State is the sole owner of the STEE for the time being) shall provide some FCFA 13 billion over a ten-year period, broken down according to the table below:

	Investments in billion FCFA
WATER NETWORK	9.35
Upgrading and renewal	5.02
N'Djaména	3.95
Secondary centres	1.01
Extension	4.33
N'Djaména	3.55
Secondary centres	0.78
WATER PRODUCTION	3.87
N'Djaména	0.61
Secondary centres	3.26
TOTAL	13.2

Table 31: Ongoing and proposed urban water supply programmes

Type of project Period 2000-2010	No. of projects	Status	Investments FCFA billion
Projects being implemented or with funding obtained			
Improvement of supply, non-concessionary area	7	In progress	27.56
Improvement of supply, concessionary area	2	In progress	4.925
Period 2000-2010 (Funding obtained or being obtained)	9	Total	32.485
Projects to be defined and funding to be found for the period 2000-2010			
Improvement of supply in the concessionary area	6	Projects to be defined	48.93
Improvement of knowledge of the concessionary area	1	Projects to be defined	10
Strengthening of the institutional, legislatory and regulatory frameworks, national capacity-building	2	Projects to be defined	6.6
Period 2000-2010 (Funding to be found)	9	**Total**	**65.53**
Total funding obtained or to be found for urban water supply projects. Period 2000-2010.			**98.015**
Projects to be defined and funding to be found for the period 2011-2020			
Improvement of supply in the non-concessionary area	9	Projects to be defined	20.5
Improvement of supply in the concessionary area (mini-DWS hypothesis)		Projects to be defined	27
Total funding to be found. Period 2011-2020.			**47.5**
Grand total. Period 2000-2020.			145.515

Source: SDEA 2001

These figures must be compared with the total annual income of STEE of about a billion FCFA. Without external funding of 100% of the cost of the STEE works, this does not appear to be feasible with a constant tariff. This external funding looks likely to be obtained soon.

The investment plan stipulates that the FCFA 13 billion will be spread more or less evenly over the ten years, i.e., FCFA 1.3 billion per year. However, this funding is not sufficient to improve the supply rate in line with the objective.

Integrated plans are to be drawn up to study the 11 towns in the concessionary area. These are to specify the total costs in order to reach a drinking water access target of 70% in 2015. As estimated (and stated in the action plan), the total cost will exceed FCFA 76 billion since the cost of extending the network towards the suburban mini-DWS schemes will have to be added. This has not yet been specified by the eleven integrated plans for drinking water supply.

From table 31 and the projects to be implemented in the concessionary area, the following need for physical investments and studies can be deduced:

- FCFA 59 billion during the period 2000-2010, i.e., 5.9 billion per year;
- FCFA 30 billion during the period 2011-2020, i.e., 3 billion per year.

Non-concessionary area

It thus appears that the development to be reached between 2000 and 2010 will have to take place using small units, BSU or mini-DWS schemes, designed to be interconnected at a later date.

2000-2010 is set to be the decade during which as many embryonic networks as possible will be created in urban districts, based on the village and mini-DWS model. Over the next ten years, new projects should only concern construction of BSUs or mini-DWS schemes, even in the largest towns.

Given that 250 BSUs are already under construction, the remainder (300 BSUs) are going to be postponed to the period 2011-2020, together with the connection of the BSUs in the main centres to form a complete DWS network. The cost of this additional investment has not yet been calculated in relation to what has already been achieved. The cost of one BSU is about FCFA 60 million and the cost of connection at about FCFA 250 million which, if accompanying measures are included, would lead to the following amounts:

- FCFA 5 billion during the period 2000-2010, i.e., 0.5 billion per year;
- FCFA 19 billion during the period 2011-2020, i.e., 1.9 billion per year.

These figures must be viewed in light of the funding for non-concessionary towns that has been obtained over the past four years: 3.5 billion per year. It is therefore realistic to consider achieving the aim of meeting most drinking water needs in non-concessionary urban areas. The construction of mini-DWS schemes increases the investment cost, but remains financially feasible.

Accompanying measures include:

- implementation of organisational reforms;
- training of local operators;
- training of local entrepreneurs;
- training of microcredit entities;
- promotion of a local activity sector;
- implementation of administrative and legal reforms;
- training of trainers and awareness-raising.

The cost of these measures is included in the list of proposed projects.

It may also be assumed that, given the planned improvement in public revenue, **the State cannot withdraw completely from this part of the urban water supply subsector, which has been relatively neglected by donors**, especially since the State has devoted a great deal of effort to the concessionary area by funding the discharge of STEE's debt, amounting to almost FCFA 5 billion.

2.3.2 Urban sanitation

Urban sanitation hypothesis 1

This hypothesis corresponds to the needs identified above in a deliberate perspective of mobilising FCFA 88 billion in twenty years for the projects summarised in table 32 below.

The planned investments, FCFA 1.5 billion per year up to 2010 and FCFA 7.4 billion from 2011 to 2020, do not have any funding. However, relatively large amounts have been obtained in the past, most recently FCFA 5.5 billion for a main drain network in N'Djaména, Moundou and Sarh.

It may be assumed that donors are prepared to assist a strategy in which the populations pay for the tertiary networks. This refers back to the strategy of sanitation management by local committees.

Table 32: Ongoing and proposed urban sanitation projects

Type of project Period 2000-2010	No. of projects	Status	Investments FCFA billion
Projects being implemented or with funding obtained			
Stormwater drainage for three towns	1	In progress	4.5
Period 2000-2010 (Funding obtained or being obtained)	**1**	**Total**	**4.5**
Projects to be defined and funding to be found for the period 2000-2010			
Sanitation programme for the four largest towns		To be found	7.8
Sanitation programme for the other centres			1.2
Capacity-building and regulatory framework strengthening			5.58
Total funding to be found for urban sanitation. Period 2000-2010.			**14.58**
Projects to be defined and funding to be found for the period 2011-2020			
Sanitation programme for the four largest towns	10	Projects to be defined	64.6
Sanitation programme for the other centres			2.5
Capacity-building			6.5
Total funding to be found. Period 2011-2020.	**10**		**73.6**
Grand total. Period 2000-2020.			**92.68**

Source: SDEA 2001

Urban sanitation hypothesis 2

The project proposed here corresponds to a slightly lower hypothesis than hypothesis 1 in that it brings about a satisfactory level of sanitation in 2020 in certain fields, i.e. public latrines, and 50% participation in private latrines as well as the development of stormwater and wastewater collection and treatment from 2005 and, especially, 2010.

The small number of kilometres of drainage channels built each year may seem surprisingly low, but it must be borne in mind that the decision has been taken to build only a few tertiary drainage channels. Moreover, tertiary channels would be fitted at low points and by district organisations, who would only be provided with technical assistance.

Application of hypothesis 2 to the four main urban centres

Period	2000-2005	2005-2010	2010-2020
SW	Included in URP + NDJ east outfall	Included in URP	Included in URP
SW sec. & tert. networks.	None	4 km/year	20 km/year
WW collection	None	None	4 km/year
WW treatment	None	None	Capacity 1 200 000
Sanitation comb. DWS	5 in NDJ	None	None
Public latrines	1 for 3000 inhab.	Addition to 1	Increase with pop.
Dom. water, private tanks	1 for 10 inhab.	Increase with pop.	Increase with pop.
Sub-total per year	FCFA 1.4 billion	FCFA 1.1 billion	FCFA 6.5 billion

URP: Urban Reference Plan

SW: stormwater

WW: wastewater

The significant increase from 2010 is due to the fact that wastewater will not be treated until this date.

Application of hypothesis 2 to the other urban centres

Period	2000-2005	2005-2010	2010-2020
STEE concessionary towns			
SW Sec. and tert. networks	None	4 km/year	6 km/year
WW Collection	None	None	None
WW Treatment	None	None	None
Sanitation comb. DWS	1 per year	1 per year	3 per year
Public latrines	1 for 3000 inhab.	Addition to 1	Increase with pop.
Dom. water, private tanks	1 for 10 inhab.	Increase with pop.	200 per year
Other urban centres			
Public latrines	1 for 3000 inhab.	Addition to 1	Increase with pop.
Dom. water, private tanks	1 for 10 inhab.	Increase with pop.	200 per year
Sub-total per year	FCFA 78 million	FCFA 105 million	FCFA 94 million

Total

Period	2000-2005	2005-2010	2010-2020
Total per year	FCFA 1.5 billion	FCFA 1.2 billion	FCFA 6.6 billion

Private latrines (50%)

Period	2000-2005	2005-2010	2010-2020
Per year	FCFA 27 million	FCFA 27 million	FCFA 54 million

Accompanying measures

Period	2000-2005	2005-2010	2010-2020
Per year	FCFA 27 million	FCFA 27 million	FCFA 30 million

Accompanying measures include studies and training. The figures above do not include urban waste disposal.

The investments stipulated under hypothesis 2 require the mobilisation of FCFA 1.4 billion per year between now and 2010 and FCFA 6.7 billion per year from 2011 to 2020.

2.3.3 Village water supply

The funding that has been obtained more or less meets the needs in terms of "conventional projects". Second-generation projects are required to ensure installation sustainability. Table 33 summarises the funding that is required and that has already been obtained.

Overall, given the amount of funding already obtained, it may appear as though the Millennium goal, i.e., a 60% rate of access to drinking water, will be reached and exceeded in 2015. The goal of an 85% rate of access to drinking water could be reached in 2020 if this rate of investment is maintained.

In view of the funding obtained, the following funds remain to be found to supply the village sector (including accompanying measures):

according to hypothesis 1 (based on an 85% access rate in 2020) - FCFA 103 billion over twenty years, of which 3.2 billion per year during the period 2000-2010, then 7.1 billion per year from 2011 to 2020;

according to hypothesis 2 (based on the Millennium goal of a 60% access rate in 2015 and a rate increase from 17% to 70% by 2020) - FCFA 42 billion over twenty years, i.e.:

- FCFA 3.2 billion per year (2000-2010), with the goal achieved by 2010;
- FCFA 1 billion per year (2011-2020), with only rehabilitation and capacity-building.

Table 33: Ongoing and proposed village water supply programmes

Type of project Period 2000-2010	No. of projects	Status	Investments FCFA billion
Projects being implemented or with funding obtained			
Improvement of supply	10	In progress	71.95
Improvement of supply	1	In discussion	1
Period 2000-2010 (Funding obtained or being obtained)	**11**	**Total**	**72.95**
Projects to be defined and funding to be found for the period 2000-2010			
Improvement of supply	7	Projects to be defined	24
Strengthening of the institutional, legislatory and and regulatory frameworks and national capacity-building	2	Projects to be defined	8
Period 2000-2010 (Funding to be found)	**9**	**Total**	**32**
Total funding obtained or to be found for village water supply. Period 2000-2010.			**104.95**
Projects to be defined and funding to be found for the period 2011-2020			
Improvement of supply	10	Projects to be defined	60.77
Rehabilitation of water supply structures	6	Projects to be defined	7.27
Capacity-building	1	Projects to be defined	3
Total funding to be found. Period 2011-2020.	**16**		**71.04**
Grand total. Period 2000-2020.			**175.99**

Source: SDEA 2001

2.3.4 Village sanitation

Table 34 below summarises the village water supply projects and their costs. A sanitation section is to be added systematically to any new village water supply project, which should reduce some of the costs.

Table 34: Ongoing and proposed rural sanitation programmes

Type of project Period 2000-2010	No. of projects	Status	Investments FCFA billion
Projects being implemented or with funding obtained			
Rural sanitation	1	In progress	0.5
Period 2000-2010 (Funding obtained or being obtained)	**1**	**Total**	**0.5**
Projects to be defined and funding to be found for the period 2000-2010			
Development of basic rural sanitation infrastructure	10	Projects to be defined	5
Production and dissemination of campaigns on sanitation techniques in village areas and on the relationship between water, hygiene and health	10	Projects to be defined	1
Production of guides to sanitation techniques in rural areas	1	Projects to be defined	0.05
National capacity-building notably at small-scale provider level		Projects to be defined	0.5
Total funding to be found for rural sanitation. Period 2000-2010			**6.55**
Projects to be defined and funding to be found for the period 2011-2020			
Development of basic rural sanitation infrastructure	10	Projects to be defined	7.5
Capacity-building	1	Projects to be defined	1
Total funding to be found. Period 2011-2020.	**10**		**8.5**
Grand total. Period 2000-2020.			**15.55**

Source: SDEA 2001

The total funding to be found would amount to FCFA 6.55 billion from 2000 to 2010 and 8.5 billion from 2011 to 2020, i.e., about:

- FCFA 0.7 billion per year (2000-2010);
- FCFA 0.9 billion per year (2011-2020).

2.3.5 Pastoral water supply

Table 35 below summarises projects that are required and funding that has already been obtained.

Table 35: Ongoing and proposed pastoral water supply programmes

Type of project Period 2000-2010	No. of projects	Status	Investments FCFA billion
Projects being implemented or with funding obtained			
Construction of PWPs and guaranteed supplies for migration	2	In progress	8.5
Construction of PWPs and guaranteed supplies for migration	3	In discussion	19
Period 2000-2010 (Funding obtained or being obtained)	**5**	**Total**	**27.5**
Projects to be defined and funding to be found for the period 2000-2010			
Improvement of knowledge and basic data	6	Projects to be defined	1
Construction of PWPs and guaranteed supplies for migration	5	Projects to be defined	49
Strengthening of institutional, legislatory & regulatory frameworks	3	Projects to be defined	0.86
National capacity-building	1	Projects to be defined	0.7
Period 2000-2010 (Funding to be found)	**15**	**Total**	**51.56**
Total funding obtained or to be found for pastoral water supply. Period 2000-2010.			**79.06**
Projects to be defined and funding to be found for the period 2011-2020			
Construction of PWPs and guaranteed supplies for migration	3	Projects to be defined	32
National capacity-building	2	Projects to be defined	0.55
Total funding to be found. Period 2011-2020.	**5**		**32.55**
Grand total. Period 2000-2020.			**111.61**

Source: SDEA 2001

PWP: pastoral water point

The total funding to be found would amount to FCFA 52 billion from 2000 and 2010 and 32 billion from 2011 to 2020, i.e.:

- FCFA 5.2 billion per year (2000-2010);
- FCFA 3.2 billion per year (2011-2020).

2.3.6 Agricultural water supply

On the basis of the realistic hypothesis of developing an additional 100 000 hectares with a unit cost of FCFA1.5 million/ha for small irrigation areas (bearing in mind that, in view of past experience, no large irrigation areas are planned for the next five years), the proposed projects are summarised in table 36.

In Chad, the unit costs are as follows:

Small-scale modern irrigation with total control of local water (less than 10 ha): FCFA 500 000 per ha with hand pump, FCFA 700 000/ha with motor pump without any improvement attributable to the use of PVC pipes and FCFA 1 million/ha in the case of an improved network.

Small irrigation areas: these are extensions of small-scale irrigation. In fact, the distinction between small-scale irrigation and a small irrigation area is subtle and stems from the size of the scheme, between 10 and 30 hectares for a small area. A distinction is made between small village irrigation areas and small private irrigation areas. The average cost is FCFA 1.5 million/ha.

The projections above do not come within the scope of the Integrated Plan for Water Development and Management. This is more of an exercise with the aim of attempting to estimate a realistic order of magnitude for investments (which must be effective and for which funding must be obtained), given the absence of an integrated plan for this subsector. This exercise gives a total amount of funding to be found for agricultural water supply of **FCFA 5 billion per year during the period 2000-2020 including studies, accompanying measures and developments**.

At this point, it must be noted that the SDEA recommends setting up pilot projects, between 2003 and 2007, involving a wide range of development schemes focusing on small-scale village irrigation (flood-recession and flood-spreading), followed by a second phase of consolidated in-depth assessments (in 2008) within an integrated plan for village irrigation schemes. This five-year period of study and action would be accompanied by a moratorium on any new investment in large-scale irrigation schemes.

When the SDEA is updated again in 2008, this will provide an opportunity for making further refinements to the irrigation forecasts on the basis of an integrated plan for irrigation.

Tableau 36: Ongoing and proposed agricultural water supply programmes

Type of project Period 2000-2010	No. of projects	Status	Investments FCFA billion
Projects being implemented or with funding obtained			
Irrigation schemes Support for peasant organisations	5	In progress	58.22
Knowledge-improvement study	3	In progress	0.3
Irrigation schemes Support for peasant organisations	2	Starting up	40.87
Period 2000-2010 (Funding obtained or being obtained)	**10**	**Total**	**99.39**
Projects to be defined and funding to be found for the period 2000-2020			
Irrigation schemes Support for peasant organisations	4	Projects to be defined	93.57
Improvement of knowledge on the sector	3	Projects to be defined	3.72
Strengthening of the institutional, legislatory and regulatory frameworks	1	Projects to be defined	0.75
National capacity-building	1	Projects to be defined	2
Period 2000-2020 (Funding to be found)	**9**	**Total**	**100.04**
Total funding obtained or to be found for agricultural water supply. Period 2000-2020.			**199.43**

Source: SDEA 2001

2.3.7 Water resources

Investments in the field of water resources mainly revolve around studies to evaluate resources and initiatives aimed at improving the Chadian government's capacity to implement a water and environment policy as defined elsewhere. Table 37 presents the projects suggested in this field.

In total, the funding to be found amounts to FCFA 14.57 billion over twenty years, or about **FCFA 0.73 billion per year during the period 2000-2020 for all surface and groundwater resources**.

Tableau 37: Ongoing and proposed water resources programmes

Type of project Period 2000-2010	No. of projects	Status	Investments FCFA billion
Projects being implemented or with funding obtained			
Water resource studies	1	Ongoing	0.75
Capacity-building and strengthening of the institutional and regulatory framework in the field of water	2	Ongoing	2
Integrated plan for fisheries	1	Ongoing	0.75
Capacity-building and strengthening of the institutional and regulatory framework in the field of water	2	In discussion	2.87
Period 2000-2010 (Funding obtained or being obtained)	**6**	**Total**	**6.37**
Projects to be defined and funding to be found for the period 2000-2020			
Improvement of knowledge and monitoring of surface water and its relationship with groundwater	10	Projects to be defined	4.35
Improvement of knowledge and monitoring of groundwater	11	Projects to be defined	6.87
Strengthening of the institutional, legislatory and regulatory framework and national capacity-building	1	Projects to be defined	0.85
Design and implementation of an early warning system to detect pollution from oil spills	1	Projects to be defined	1
Capacity-building for monitoring oil exploitation and its impact on water resources	1	Projects to be defined	1.5
Period 2000-2020 (Funding to be found).	**22**	**Total**	**14.57**
Total funding obtained or to be found for water resources. Period 2000-2020			**20.94**

Source: SDEA 2001

2.4 Summary of investments to be found in the field of water

Table 38 summarises the investments to be found in the field of water in billions of FCFA, according to two scenarios.

Table 38: Summary of investments to be found in FCFA billion in the field of water (per year)

	2000-2010		2011-2020	
Subsector	Voluntarist scenario	Balanced scenario	Voluntarist scenario	Balanced scenario
Urban DWS / Concessionary area	5.9	5.9	3	3
Urban DWS / Non-concessionary area	0.5	0.5	1.9	1.9
Urban sanitation	1.5	1.4	7.4	6.7
Agricultural water supply	5	5	5	5
Pastoral water supply	5.2	5.2	3.2	3.2
Village water supply	3.2	3.2	7.1	1
Sanitation for rural areas	0.7	0.7	0.9	0.9
Water resources	0.73	0.73	0.73	0.73
Total[3]	23	23	30	23

Source: SDEA 2001

[3] The annual total investments for each period was rounded up to the next unit.

In the case of the **balanced scenario**, these investments to be found represent:

- **1.5% of GDP in 2003 and 0.6% of GDP in 2011**;
- **about 16% of public investment** throughout the period 2003-2015 (therefore, investments compatible with the country's major economic equilibria as analysed above).

According to the **voluntarist scenario,** these investments represent:

- **1.5% of GDP in 2003 and 0.8% of GDP in 2011**;
- **about 22% of public investment** throughout the period 2003-2015.

It is certain that these scenarios will have to be rebalanced after the first update of the SDEA scheduled for 2008, notably because of the concessionary urban DWS, over which a large amount of uncertainty still reigns. However, the projects proposed to donors remain relevant in that they represent a guideline integrated plan that will provide a basis for study and more detailed programming.

Investments are way behind schedule in the following areas:

- sanitation;
- DWS in the concessionary area;
- agricultural water supply to small village irrigation areas;
- accompanying measures.

The issue of accompanying measures is fundamental. These govern the efficiency and local suitability of management and maintenance, and hence the sustainability of the physical investments. Too many projects do not include sufficient strengthening of capacities to manage installations. Little effort is devoted to providing support for surface and groundwater management or for integrated water management.

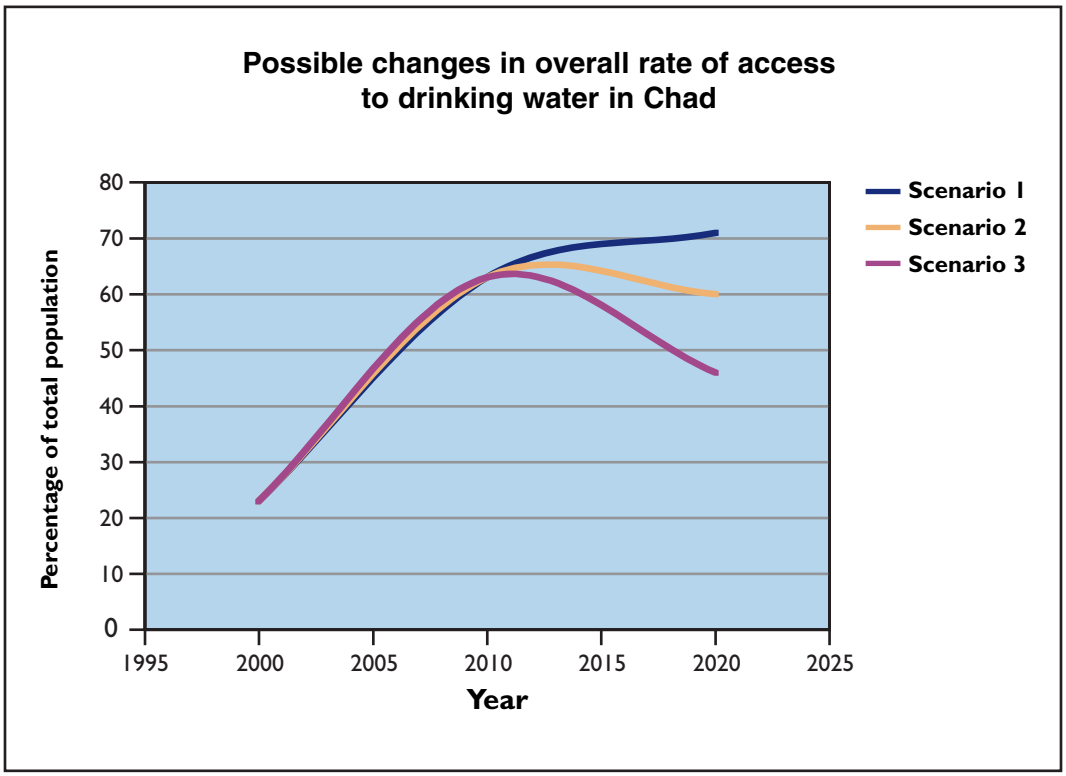
3 POSSIBLE EQUIPMENT AND MANAGEMENT SCENARIOS AND SCENARIO SELECTED

3.1 Scenarios of possible future changes in drinking water supply

The percentage of the Chadian population (rural, urban and semi-urban) with access to drinking water supply systems in 2000 was an estimated 23%.

This section analyses possible future changes in the rate of access to drinking water of the entire Chadian population during the period 2000-2020. This analysis is based on two parameters: prospects for growth in supply as expressed for each domain and the preparation of equipment maintenance and servicing scenarios.

As an indication, while remaining cautious in predicting future changes in supply and considering the investments planned and works in progress, in 2020 the drinking water supply percentage will be 70% in urban and semi-urban areas and 80% in rural areas. Using this hypothesis, **three maintenance scenarios** are formulated and illustrated in the graph below, illustrating the impact of each scenario on the drinking water supply rate.



Source: SDEA 2001

Scenario 1: equipment is maintained efficiently so as to ensure that 100% of drinking water supply systems in urban areas and 80% of equipment in rural areas are operational. The supply rate would thus be 71%.

Scenario 2: equipment is maintained moderately such that 90% of drinking water supply systems in urban areas are operational, with only 70% of equipment operating in rural areas. The supply rate would thus be just over 60%.

Scenario 3: equipment maintenance is very poor, such that 60% of urban equipment and 60% of urban equipment is operational. The supply rate would thus be 46%.

This graph shows that, with scenario 1, over 70% of the total population of Chad would have access to drinking water in 2020. The supply rate dips sharply to about 46% in the case of scenario 3.

Moreover, these different simulations **demonstrate the importance of setting up an environment conducive to equipment management and maintenance.** If a return is to be obtained on the investments and the Chadian population is to have guaranteed access to drinking water at all times, it is essential to start up a new generation of projects as soon as possible, focusing on building capacity and organising the drinking water sector, at both national and local level.

Reaching the Millennium goal (which, it must be remembered, constitutes a commitment on behalf of the international community) means that Chad must have an overall access rate of 60% in 2015 (an increase from 20% to 60%).

The graph above indicates the priority to be followed and the scenario to be selected. Scenario 1 is the best scenario, since it corresponds to both the national policy objective of efficiency in public investments and the Millennium goal. This scenario entails heavy investment between 2000 and 2010 in accompanying measures to foster sustainable management and make users responsible for maintenance wherever possible.

3.2 Sanitation scenario

Given that sanitation is lagging so far behind, and the low level of investment in this subsector, only one scenario is proposed and recommended.

In rural areas, we recommend combining each village water supply programme with sanitation works, including the construction of basic sanitary infrastructure. After reaching agreement with the villagers, this low-cost equipment could be their contribution in return for the development of a drinking water point in their community. Hygiene and sanitation education programmes will be continued and backed up by information campaigns through projects as well as via the media (radio, press, etc.).

In urban areas, pending the investments required to build major installations such as stormwater drainage networks, priority will be placed on developing basic sanitary infrastructure in each concession, such as latrines, "wastewater collection equipment" compliant with recognised standards, respecting stipulated distances between traditional latrines and wells, etc., while protecting the environment, notably aquifers, which populations often exploit for drinking water through traditional wells.

We also recommend developing a specific sanitation policy.

3.3 Pastoral water supply scenario

Several projects to construct pastoral water points (ponds with basic facilities, wells, pastoral pumping stations) are currently being implemented. New projects are due to start up over the next few years. These projects should create over 1100 new pastoral water points. This number must be seen in the light of the estimated number of pastoral water points needed (1150) based on a 25 km mesh between each point. Nevertheless, these new water points are concentrated in specific sectors, in eastern and western Chad. Very little work has been carried out in the southern part of the Sudanian zone or in the north Saharan zone. The potential for access to pastoral water supplies will be improved significantly over the next ten years.

However, to improve development of Chadian pastoral areas, optimise investments and guarantee their long-term profitability, projects focusing on improving knowledge in all areas (livestock numbers, migratory routes, fodder resources, conflict-solving mechanisms, etc.) must be undertaken as quickly as possible.

3.4 Agricultural water supply scenario

Chad has immense agricultural potential which is not yet being exploited to the full. Thus, to satisfy the priority goal of food security, it is first necessary to develop the soil potential which is being insufficiently exploited, if at all, i.e., **the vast flood plains of the Salamat, the difluence plains of the Chari-Logone, the extensive lowlands of the Sudanian zone and the mountain catchment areas of the Ouaddaï.** Achieving this objective also entails rehabilitating the existing irrigation areas or bringing them back into operation.

However, two major difficulties remain: scheme management and peasant organisation. According to the assessment-diagnosis, several constraints are hampering the development of irrigated agriculture in Chad: poor management and insufficient area maintenance, lack of organisation of the different channels, high investment costs, etc. Nevertheless, with the exception of some very specific sectors, water resources cannot be considered to be hindering development of the sector. On the contrary, the abundance of water resources and, in most cases, the ease with which they can be mobilised, are assets.

Therefore, the (surface and underground) water resources assessment shows that abstracting an additional 1.5 billion m^3 from these water resources for agricultural use does not pose any particular problems other than taking protective measures and setting up monitoring systems. As an indication, if the additional water abstracted is controlled perfectly, it could irrigate between 100 000 and 185 000 hectares.

The following scenario has been selected:

- placing a five-year moratorium on new large-scale irrigation schemes and focusing primarily on rehabilitating certain selected irrigation areas, with priority given to training and organising peasants on the basis of independent support structures and fostering the development of small village irrigation areas, in a clear legal and land tenure context. This provides a means of identifying solutions to the problems of large-scale irrigation schemes, while building capacities.

4 ORGANISATIONAL FRAMEWORK, DECENTRALISATION AND THE NEW WATER GOVERNANCE SYSTEM

4.1 Local level: locally-generated development and local stakeholder structuring with organised support

Future practices and local planning resources centred on rural development (agriculture, fisheries, stock-rearing, small-scale providers, etc.) must be studied. This process must include the sustainable development of natural resources.

The decentralisation process will be based mainly on adaptive local planning, which must take into account the relationship between use of village/communal land and the use of natural resources, which vary widely with seasonal rainfall. In this context, the effects relating to the location and development of water points and the allocation of water resources will have critical repercussions in the following areas: rural populations (subsistence, food, income), conflict prevention (between stock-rearers and farmers) and environment management (land, water, habitats).

For generations, the conditions in which poor rural populations survive have mainly been governed by uncertain access to natural resources. These populations have organised themselves so as to adapt to these variations by frequently changing occupation and moving from one place to another. So there is, in fact, a long history of local peasant planning.

The transition towards sustainable local development, which creates jobs and income and improves living and health conditions, now means integrating regional and infrastructure development into local planning. This larger dimension has remained beyond villagers' perceptions up to now. In Chad, notably in the Saharan and Sahelian zones, the water point is the essential pivotal element around which rural life is structured. It must now be considered in the planning and mobilisation of local resources, at as local an institutional level as possible.

Many aspects of the fight against poverty depend on solving the complex equation between local stakeholders, natural resources and infrastructure. As is the case with education, access to water (drinking or productive) plays a key role in this process.

The Integrated Plan for Water Development and Management states that support for this local stakeholder structuring is vital to the economic and social development of Chad, and to the efficient, sustainable management of the physical investments. Consequently, it stipulates that the State and donors will give priority to investing in the human capital of the sector through accompanying programmes tailored to the resources required by the subsector strategies defined above.

4.2 Intermediary and central levels: participation from public stakeholders and services

Decentralisation will be pursued for at least a decade. Because of its approaches based on local capacity-building and local stakeholder structuring, the SDEA will logically accompany this process and should help to ensure its success, given the transverse nature of the local issues related to water.

The intersectoral consultative mechanism set up and institutionalised in Chad within the framework of the MEE is fundamental to water governance in that country. Coordination of this flexible mechanism has to continue.

The graph below presents the functional relationships between the main central stakeholders in the water sector, in view of the new consultative mechanism that has been created. Over the next few years this mechanism is set to be extended, in accordance with the existing decree, to levels increasingly close to the end user, to ensure good governance of the water sector.

A reminder of how the consultative mechanism functions is given below:

The **High National Council for the Environment** (HCNE) is presided by the Prime Minister. The ministers in charge of the different bodies involved in or concerned by water resources and environmental protection are associated with it. The role of the HCNE is to decide on the main political options governing the water sector in Chad.

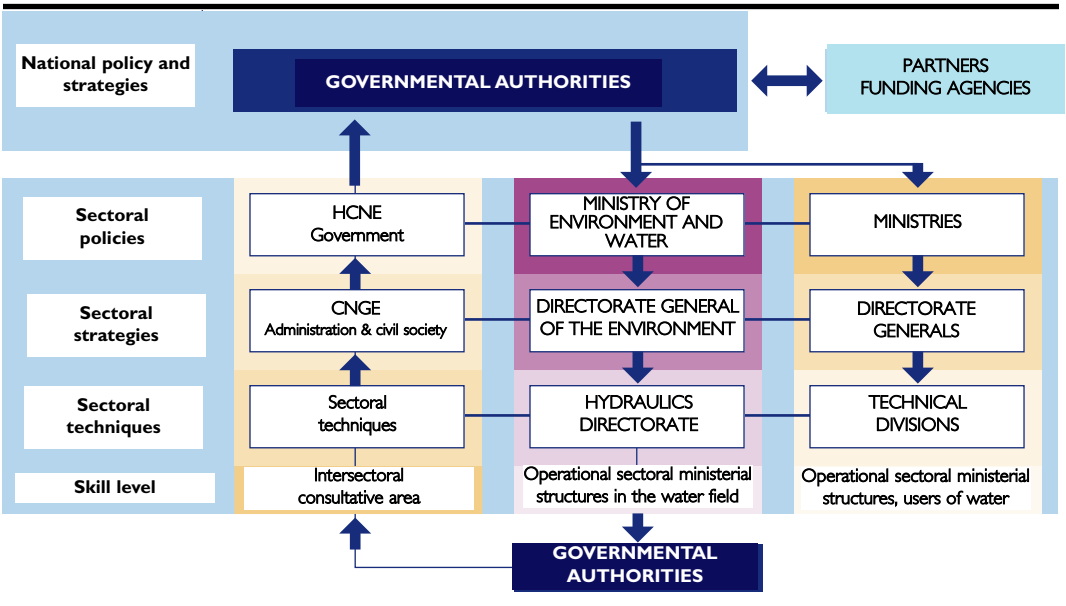
The **National Water Management Committee** (CNGE) is presided by the general secretary of the ministry responsible for water (Ministry of Environment and Water). It comprises general secretaries of the ministries represented at HCNE and representatives of civil society. Its role is to define and decide on sectoral strategies conveying the main national political options in the water sector.

The **Intersectoral Technical Committee for Water** (CTIE) is presided by the Technical Services Manager for hydraulic affairs (Director of Hydraulic Affairs) at the ministry responsible for water (MEE). It groups together the national technical services managers from the various ministries involved in or concerned by the exploitation and management of water resources. Representatives of elected officials, civil society and associations are also represented. The role of the CTIE is to decide on the national action plan to be implemented in accordance with the options and main lines of the water sector policy.

The Ministry of Environment and Water acts as both permanent secretary of HCNE and president of the CNGE and the CTIE. The Ministry of Economic Promotion and Development acts as vice-president of the HCNE and CNGE, thus guaranteeing that the processes are integrated and consistent, at all levels, with the sectoral policies, national economic targets and regional development. This flexible consultative mechanism, institutionalised by Prime Minister's decree[4], is also intended to be devolved at a later date, into smaller subsidiary mechanisms for local and regional intersectoral consultation.

[4] Decree no. 034/PM/MEE/99 signed by the Prime Minister on 3/9/99 concerning the creation and organisation of a National Water Management Committee

Figure 25: Consultative mechanism



Source: Integrated Plan for Chad's Water Development and Management, 2001

5 CONCLUSION

At the end of this section concerning water policy and strategies, the main difficulties that have come to light in implementing water strategies in Chad concern:

- supplies to towns (concessionary area) and sanitation;
- water for agriculture;
- human resources;
- installation sustainability.

The prospects of the general water strategy depend on the success of the diversification policy of the period of oil exploitation, the investments to be made and the extent to which the populations have acquired the ability to manage water and guarantee installation durability.

Supplies to towns

In the field of water (and sanitation), donors tend to pay less attention to towns in the concessionary area than to towns in the non-concessionary area or stock-rearers. This is understandable, given the important role that agriculture and stock-rearing play in the strategy of diversifying the economy during the period of oil exploitation.

Another feature of water in towns (concessionary area) is the reverse of what would be expected of a policy of equity intended to fight poverty: the price of water is higher for the poor than for the rich. This is worsened by the fact that some people with a connection sell water for more than the price that they pay.

The solution to this two-fold problem of insufficient international aid and inverted prices involves a policy which would be partly self-funded:

- increasing the price of water;
- extending the stand-pipe and connection networks.

Increasing the price of water in line with the price currently paid by stand-pipe users would finance connections for all those who wish to have one, without requiring them to pay any money on connection. Increasing the cost to less than that of stand-pipes would finance the extension of the stand-pipe networks, but not of the connection networks. Installing more stand-pipes would have the advantage of dissuading people from buying water from carriers at a prohibitive price.

Water for agriculture

As recalled above, failure to develop agriculture would probably result in the collapse of the economy as a whole. The limited mobilisation of water is undoubtedly one of the constraints hampering the development of agriculture. However, on one hand little is known about the nature of this constraint, and on the other hand it is intermingled with other constraints.

Little is known about the exact cost of water for agricultural production in Chad. This is why this report proposes to assess the current and future projects. Other constraints are evidently called into play and would undermine the effectiveness of agricultural water supply investments unless they are overcome. Numerous constraints have been identified, but many of them have not been studied in depth: transport infrastructure, irregular production, storage problems, peasants' behaviour patterns, etc.

The Integrated Plan for Water Development and Management is not aimed at dealing with all the problems of agriculture. Two ideas simply need to be restated at this point:

- the role and cost of water in agriculture have not been sufficiently assessed (excluding the large irrigation areas, which have proved to be inefficient on several occasions);
- irrigation schemes can only be efficient in the framework of a comprehensive agriculture policy.

Human resources

The need to build capacities at all levels is the main lesson of the SDEA and each subsector has a specific strategy with this aim in mind. Numerous action plan projects are to be implemented in line with these capacity-building strategies.

A general plan for training human resources in the sector will have to be drawn up as soon as possible, and will be defined in detail and modified in a few years' time, once the lessons have been learned from all the projects that are due to start up during the first five years of the SDEA. The results of this study will be included when the SDEA is updated in 2008.

Installation sustainability

Setting aside the uncertainty reigning over agriculture (which plays a crucial role in diversifying the economy), the prospects of access to water for the populations and livestock of Chad are relatively good. Funding has been obtained for some of the investments; and the prospects of STEE SA taking on the commercial management of water in accordance with the objectives of equity and poverty reduction are realistic, in as much that the public service defines and regularly follows up targeted results in accordance with the water policy and the subsector objective (increasing the rate of access to drinking water in the concessionary area from 40% to 70% by 2015).

On the other hand, there is no guarantee that the populations will take responsibility for the installations. Past experience in the field of access to water has shown that modern water points are soon abandoned as a result of a failure to maintain the installations. Therefore, the new investments in the water sector must place a much greater onus on populations taking responsibility for the water supply infrastructure. If projects are not drawn up bearing this aim in mind, there would be a high risk of a repeat of the scenario described above resulting from poor maintenance. It should be recalled that the supply rate forecasts are 77% or 46%, depending on whether or not there is an efficient maintenance programme.

Water and economic prospects

The economic prospects are apparently good. GDP by volume will triple between 2003 and 2020. In 2015, oil GDP will represent only 5.9% of total GDP, so this three-fold increase assumes that oil revenue will have been used to the full to diversify the economy.

However, as stated in the section on "The oil economy" (2.1.2), little may be expected of oil revenue in the field of water, unless the State decides to distribute this revenue in favour of this sector. If it does not, this revenue will mainly benefit other sectors. In the future, the two main sources of funding for investments in the water sector will be:

- international aid;
- users.

Users' incomes will increase by about 75% in real terms, but only if the predicted diversification of the economy into sectors not related to oil actually comes about. However, the Chadian economy is developing along a narrow road. Water has been clearly identified as being fundamental to several major development sectors:

- health;
- agriculture;
- stock-rearing.

Investments in the different hydraulics subsectors thus appear to be indispensable **to the diversification policy, without which the economy will not benefit from the short period of oil exploitation.** The effectiveness of these investments is totally dependent on the implementation of accompanying measures intended to give the population the capacity to manage water and guarantee installation durability.