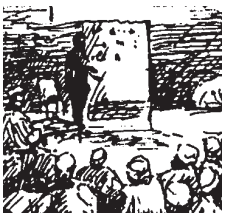
Agrodok-series No. 27

Establishing and managing waterpoints for village livestock

A guide for rural extension workers
in the sudano-sahelian zone



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Agrodok 27

Establishing and managing waterpoints for village livestock

A guide for rural extension workers in the sudano-sahelian zone

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Foreword

The purpose of this guide is to help farming communities in the sudano-sahelian zone to finance, install and manage waterpoints for their village herds. The guide is written particularly for extensionists working in livestock water projects in this zone. It outlines in detail a method being used by the Dpgt rural develpment and land use project in North Cameroon since 1994, with extensionists working under the auspices of the Cameroon Ministry of Agriculture and the cotton company Sodecoton. This is a programme sponsored by the French agencies *Agence française de développement* and *Fonds français d'aide et de coopération*.

The author would like to thank all those who have helped in this operation: Hamadou Ousman (Garoua), Hamadou Nouhou (Kaele), Boukar Toto and Ousmaïla Mohammadou (Guider), Abdourahmane Nassourou (Balaza), Elias Gondji (Zidim), Antoine Toukrou (Doukoula), Hamidou Mamat (Moulvoudaye), Yero Oumarou (Maroua), Gilbert Kakiang (Kaele) and Jean-Claude Bikoï (Maroua). The provincial delegation of the Ministry for Livestock, Fisheries and Animal Industries (Minepia) in the Extreme North province of Cameroon, under its director Mr Enock Maliki, as well as his Pastoral Hydraulics service under the guidance until 1998 of Mr Zakariou Boukar, gave the Dpgt project all the freedom it required to implement the programme. They are warmly thanked for the confidence they have shown.

Maroua, June 2000

The author

Contents

1 Introduction

In the sudano-sahelian zone, farmers and stockkeepers have to contest with difficult climatic conditions, ranging from floods and waterlogging in the rainy season to unreliable rains and heavy evaporation of surface water in the dry season.

Figure 1: Carrying water for family consumption.

The supply of water, be it for the family or its animals, is proving to be one of the heaviest burdens borne by rural populations in the region. Any village in this area today that can boast of year-round access to an adequate supply of good quality water can consider itself privileged.

Traditional practices in this domain are being severely tested. This is particularly the case when it comes to watering livestock, and livestock holders have so far come up with only partial solutions. These include the drawing of water by hand (figure 2), provisional wells offering only temporary respite, and seasonal migration. In addition, to take the example of North Cameroon often to be quoted in this Agrodok, there was considerable investment in village water supplies in the region in the course of the 1980's, including the excavation of ponds

by Minepia (the Ministry for Livestock, Fisheries and Animal Industry), the drilling and rehabilitation of 2000 boreholes by Vergnet/FORACO, and the installation of 700 retention systems in the Mandara mountains, by the diocese development committee and the Group of organisations working on catchment development. This investment certainly resulted in progress, but it has not been able to satisfy all of these villages' water requirements.

Figure 2: Traditional well with clay drinking trough at Kerawa (North Cameroon)

It is a fact that insecure water supplies encourage out-migration and pose major obstacles to development. Any organisation seeking to make sustainable improvements to local natural resources will have to address the question of water supplies for pastoralists.

If we pinpoint waterpoint management as a priority issue, it for two reasons:

- If there are no banking facilities in rural areas, producers will be obliged to invest their savings in their livestock. Unfortunately the lack of waterpoints for four or five months of the year forces them either to limit the size of their herds, or fall back on semi-nomadic strategies. The movement of stock is so laden with risk, with animals disappearing, falling prey to disease or racketeering, that some communities, including the Peuls, have given up their transhumance

strategies in the face of heavy losses. They now prefer simply to draw water for their animals at local wells; others have simply left their villages, to resettle in areas where water is less of a problem.
The difficulty of watering stock slows or prevents the expansion of herds, and this has a direct impact on stockkeepers' capacity to set aside savings or make "insurance provisions" against the different hazards they encounter: drought, famine, unforeseen costs... In the event of a drought the lack of water security can end in disaster, as happened in 1983–1984 in the Extreme North province of Cameroon, where a third of the livestock was lost.

- During the 1980s, again in North Cameroon, Minepia's water services and other agencies installed about a hundred different facilities for watering stock. Most of these projects (ponds, dams or boreholes) were technically well-designed, but no plans had been made to pursue the installation process beyond the construction stage. The continuing management of the facilities had not been considered.
  Today these facilities are no longer maintained, and gradually, as they silt up, their water storage capacity is falling. They dry up earlier every year. With few exceptions access to the water is uncontrolled; cattle, goats, sheep, donkeys and horses wade into the water, and the waterholes are becoming sources of infection. All the stockkeepers complain, but, given the high cost and the difficulty of rehabilitating such facilities, it is rare for any initiative to be taken by the community to improve matters. On the contrary, as water becomes scarce the conflicts between different groups of users increase (stockkeepers, fishermen, growers).

Technical investment is not sufficient. Users also need to be empowered to manage independently any facilities made available to them. In North Cameroon only 13% of the 210 ponds and water catchments in the cotton zone have user regulations, and only 11% of the water facilities have any form of management committee. In 86% of the cases the animals drink by wading into the water (figure 3).

Figure 3: Stock (cattle and sheep) with direct access to the water.

Artificial waterpoints are seen as everyone's property when it comes to watering animals – and nobody's when it comes to maintaining them.

It is therefore important, before contemplating any waterhole creation programme, to be able to prepare the users for the work of maintaining and managing the facility, and to train field workers in the appropriate extension techniques.

The method proposed here involves four stages, each of which are explained in the chapters which follow:

- The decision to establish a new, or renovate an existing waterpoint in the village;
- The organisation of the partnerships necessary to fund the project;
- The construction/installation of the waterpoint;
- Its management.

- The method presented in this guide should not be seen as a set of decisions "to be got across" in the village. It is rather a framework, which extensionists should adopt as a guide when helping the future users in their discussions and decision-making.

- All decisions should be given time, and be discussed and "matured" before finally being approved by users. Extensionists should never stand in their place and decide for them on the different management options available.

- Surface water is not generally drinkable. It is only underground water, and particularly water from the deeper aquifers, that is safe for human consumption. Waterholes can therefore only be recommended as a source of drinking water for livestock.

2 Reaching agreement on a waterpoint in the village

Villages typically request help with a waterpoint in the following circumstances: seasonal migration is creating too many problems; there are not enough sources of water; water drawing techniques can no longer satisfy local demand; because of watering difficulties, the herd cannot be expanded; this is encouraging families to leave the village; some of the waterpoints are drying up.

If it seems that the rehabilitation or creation of a waterpoint would be a good solution to the problems perceived by a large proportion of the inhabitants of one or several villages, the extensionist should carry out a simple five-part "feasibility exercise" with the potential users of the future waterpoint.

This should involve:

- understanding local livestock watering practices (§ 1);
- choosing the best site for the waterpoint (in the case of a new installation) (§ 2);
- assessing the scale and cost of the installation (§ 3);
- the financial implications of a new or rehabilitated waterpoint (§ 4);
- managing the waterpoint (§ 5).

2.1 Understanding local livestock watering practices

There is a crucial phase in the extensionist's approach: it is the period spent observing how agro-pastoralists organise and carry out the watering of their stock, by herd and by family, with respect to the seasons and their rights of access and passage.

Such information throws light on the constraints faced by stockkeepers in watering their animals, and it shows relatively easily who might be interested in a new artificial waterpoint and who would not.

Knowledge of local practices is also important in assessing the costs of watering stock, by head and by herd, and in ensuring that the cost of managing an artificial waterpoint does not work out higher than the practices currently in use.

Such a study should involve a representative sample of those agro-pastoralists in the village who are requesting a new waterpoint.

2.2 Choosing the best site for the waterpoint

"Where is the best place to dig a waterhole or a well?"

This is a question involving both human and technical issues. The future users of the waterpoint should propose a number of possible sites for excavation.

In the case of a waterhole, the extensionist must first check that the soil and topography of the site are suitable:

- It should be a basin site forming a temporary or year-round water catchment;
- There should be a clay soil;
- Test drilling will have to be carried out, to make sure that there is neither sand nor rock at lower levels. Tests with an auger cannot go beyond 4 metres, and local people will have to be asked what they know about the lower strata, as they will probably have experience of well-digging in the area. Be careful, as a village desperately hoping for a waterhole can invent all sorts of answers about the sub-soil – "Let them dig the waterhole; even if they hit rock, at least we'll get a hole out of it".
  Sand will result in seepage, whilst relatively solid rock may make excavation impossible;
- Any proposition to site the waterhole in a seasonal watercourse should be resisted – this would be a bad choice as any diggings in the bed of a *maayo* (watercourse) would be rapidly filled with sand and silt. Any waterhole should always be sited next to, but off, the course of flow.

The extensionist should next assess whether the site chosen for its technical qualities actually corresponds to people's needs:

- Is this to be a village or a rangeland waterpoint? A watering site right next to a village may be easy to control, but it can increase the risk of livestock straying onto cultivated land. A well or waterhole on rangeland, on the other hand, may not conflict with local cropping, but it may be much more difficult for its users to control – it will far less obviously belong to a particular community, supervision will be awkward, and it may be difficult to transport the pump every day.;
- Is the site on a busy livestock thoroughfare?
- Has approval been secured from the village and other chiefs, or from such as the "sarki saanu" (the traditional Peul headman responsible for livestock matters);
- What is the livestock department's or water service's view?

The siting of a waterpoint can lead to conflicts between different groups or sectors of a village. Everyone wants a well or waterpoint in front of their compound. There is much at stake here: the village or the individual controlling water has power over the people or villages in the vicinity.

Any pastoral water project must be wary of the inevitable possibility of political interference in the organisation and siting of waterpoints. As the electoral period approaches local politicians may be tempted to embellish their political programmes with promises of water. The institutional framework of the project should permit it to stand firm against such influences, which could undermine the long-term viability of the waterpoint.

It goes without saying that any waterhole "donated" by an MP or mayor should supply water free of charge. The discussion on the users' responsibilities as far as covering the running costs of the waterhole is concerned, should arm them against the inflated promises distributed on the election trail.

2.3 Assessing the size and cost of the installation

Counting the livestock

The extensionist should make a relatively uncomplicated assessment of how many animals will depend on the waterpoint. A livestock survey is never a simple matter. Stockkeepers always suspect that the herd will be taxed, and they are very suspicious of any attempt to count their animals.

The extensionist will therefore have to gain their confidence gradually and explain the reasons for the count:

- It is important to know how many animals are going to use the waterpoint, to avoid making a hole that is too big and too costly, or too small and therefore inadequate. In the case of a well we need to know if one or several will be needed;
- It is also important to know exactly how many people will use the waterpoint in the future, to know how many owners will be contributing towards the running costs.

No livestock survey will be exact. The extensionist will have to make do with an approximation. Project experience in Cameroon has shown that only 60% of cattle are actually recorded. The extensionist will have to rely on the herders' knowledge of their neighbours' herds and should encourage them to supervise each other. It would in any case be unacceptable for one stockkeeper to declare all his/her animals and then pay a full share of the investment costs, if neighbours only declare a part of their stock.

Once the number of animals is known, the rough size of a waterhole and its cost can be arrived at (see table 1).

Water volume

The water volume refers to the amount of water required to water all of the animals identified. In Cameroon it is calculated to allow for:

- The number of animals;
- A year-round minimum depth of 25 cm;

- The opening of the waterhole as late as possible in the dry season (waterhole in operation from 1st January to 1st June every year in North Cameroon; with the early rains in June animals are usually able to find water further afield);
- Evaporation rates (up to 0.6 mm/day across the sudano-sahelian zone).

This volume of water is calculated to allow the waterhole to be kept in water throughout the year, taking into account natural evaporation and the animals' consumption. As the sides of the waterhole slope inwards, its exact capacity will be less than the amount obtained by simply multiplying its surface dimensions (width by length) by its depth.

Cost

An estimation of the excavation costs is given in Table 2.1. It is based on an average cost of 1 750 F cfa for every cubic metre of water, which is the cost incurred by the Dpgt project in the 1996 and 1997 campaigns.

These costs also take into account the masonry work (weir, outlet...) and the use of the spoils (excavated earth etc.) to establish an earthen bank around the waterhole at least 15 metres from its edge.

This initial information is essential for opening up discussions with the water users. It can be used to get a dialogue started on the local contribution required for the project to begin.

Table 1: Waterhole excavation costs: estimates based on the Dppgt project in North Cameroon, 1996 and 1997.

Head of cattle	Volume of water (m^3)	Volume of water/ animal (m^3)	Percent-age of evapora-tion	Waterhole size (m)	Cost of the works (F cfa)	Local contribu-tion at 15% (F cfa)
350	7 500	21.4	54%	60 x 40 x 4	13 125 000	1 970 000
650	11 500	17.7	44%	70 x 45 x 5	20 125 000	3 000 000
1 000	16 000	16.0	38%	70 x 50 x 6	28 000 000	4 200 000

The figures will have to be improved on, however, by a surveyor, who should determine how much soil and rock will have to be dug out for the amount of water required. The sloping sides will have to be taken into account, as well as the slope of the land, and the surveyor should decide on the precise siting of the hole, to guarantee that it fills up as required.

This data will be used to draw up the specifications included in the call for tenders.

- In a waterhole rehabilitation project, the cost of the works will clearly depend on the existing state of the waterhole and its equipment, on how much it has silted, on the access facilities etc;
- It is not advisable to design waterholes for over 1 500 animals, given the damage caused to the pasture by the passage of the animals every day;
- If a pastoral well is being considered (140 to 160 cm in diameter), it should be noted that it will not be possible to water more than 400 animals throughout the dry season. This type of well has a maximum depth of 10 metres, because of the limited lifting capacity of the motorised pumps available on the market.

2.4 The financial implications of a new or rehabilitated waterpoint

Three types of project

A new waterhole

In this case, the development project covers 85% of the construction work; the rest must be paid by the users. On the basis, therefore, of a 15% share of the full costs, the local contribution towards the construction work would be somewhere between 2 and 4.2 million F cfa (see Table 2.1). Two years of project experience in Cameroon has shown that this level of local funding can effectively eliminate the risk of opportunistic waterhole requests and create the local dynamics required for organising such a “collective purchase”, without at the same time putting intolerable strain on local finances.

A waterhole rehabilitation project
The local contribution amounts to approximately 30% of the total costs, depending on the scale of work to be carried out.

A pastoral well
The local share represents 50% of the total costs, amounting to ca. 1.5 million F cfa.

Local discussion on the financial implications
Once future users have a clear idea of the financial implications, they will need to discuss among themselves the feasibility of meeting the costs, and whether such expenditure is justified.

The extensionist can help the discussion by pointing to the following issues:

- What will be the cost of maintaining the waterhole? Is it possible that using the waterhole to water the livestock will work out more expensive than the present system?
- Can they afford this expenditure? Are the present difficulties in supplying water severe enough to justify the expense? Are the funds available locally?
- Might it be better to involve other villages in the project, in order to spread the costs?
- Does the village have more urgent projects?
- Wouldn't it be better to use some of the other natural or man-made waterpoints near the village; or to take advantage of the project to set up a livestock corridor ("*burtol")* that would enable the herds to reach other waterpoints already established?
- If a waterhole isn't possible, perhaps a lower-cost project for a water catchment or pastoral wells could be planned?

2.5 Managing the waterpoint

The users' discussion guided by the extensionist

Before the waterhole or well is dug, the extensionist must encourage the users to work on the following questions:

Who will be the real users of the waterpoint?

- All of a village, or just part of it?
- Several villages? Which ones?
- Will the waterpoint be open to passing herds migratory herds or those on the way to market *("tchogge")*?
- Which villages are likely to be interested in using the waterpoint?
- Is there a risk that there will not be enough water for all the users?
- Will the livestock owners who contributed financially be the only ones allowed to use the water?

For what part of the year will the waterhole be used?

The extensionist should recommend that the new waterhole be used only when the natural waterpoints are dry, in order to save its water for when it is needed.

Which animals will be allowed to drink?

Will any animals be allowed to use the waterhole, or only cattle... with other livestock being watered at wells or boreholes?

Will the animals be allowed to enter the water to drink?

This question can be discussed more fully with the extensionist later; it is important for the time being that people are encouraged to think seriously about managing the waterhole in the future.

Establishing a project agreement

On the basis of the feedback obtained in the course of this exercise, the extensionist will have to assess the potential for establishing a project. This first stage should take four or five visits, at the end of which it should be possible to decide whether or not a project is feasible.

In any case, it is essential that the following conditions are met:

- The majority of land managers in the village must be in favour of the waterpoint project and of the site chosen for it;
- There must be a general commitment to contribute local funding of 15 – 50% of the construction costs;
- There must be general agreement on the principle that the waterpoint will be managed by its users.

These three pre-conditions, and the undertaking by the development project to support the activities, should be set out in a project agreement such as the one presented in Appendix 2. The agreement officially formalises a collective decision by the future waterhole users, and it determines the different responsibilities of the development project and local participants. Once the agreement has been signed by the project representatives and the various local organisations participating in the funding, the first stage of the extensionist's task is over.

3 Organising cost-sharing by the local community

The point of insisting on cost-sharing is to ensure that the water users assume the responsibility of management. This means that users must feel that they actually own the facilities. The idea of common ownership can only become a reality if every user of the water has made the effort to subscribe, however small his/her share may be.

This is the best way to encourage users to look after their common assets. In every language, proverbs can be found illustrating, in a variety of metaphors, how something that has been worked for is always put to better use than something obtained without any effort. Extensionists should make use of such traditional wisdom when encouraging people to take responsibility for their projects.

At this stage the extensionist's task is to help the future waterpoint users raise the funds required for the local contribution to the initial costs. There must be constant vigilance to ensure that the funds collected are properly accounted for, and that there is no possibility of the funds leaking away. The extensionist's role is not to supervise the funds, but to help the users set up an infallible system for managing them. The history of rural development is littered with unfortunate examples of fund-raising operations where certain individuals' profit has been society's loss. It is not surprising that most rural producers are legitimately suspicious of any talk of collecting contributions.
The extensionist can win people's confidence by organising visits to water projects already underway, and by encouraging meetings with others who have already taken part in cost-sharing operations.

There are three steps towards organising a cost-sharing operation:
- Identifying those who can afford to pay;
- Setting participants' subscription levels in proportion to the amount of water they will use;
- Organising the collection of funds.

3.1 Who can afford to contribute for the initial installation?

In the North Cameroon villages, four sources of local funding were identified:

Funding by the rural communes

The rural communes have budgets which, in theory, should allow them to make a financial contribution. At present, however, very few communes have funds available to contribute towards one or more waterpoints. Indeed there are years when their budgets do not even cover their own operating costs. Nevertheless this option should not be overlooked.

Some of the older and more dynamic rural communes in West Africa are more likely to be able to participate in such an investment.

Investment by the cotton producer unions

In North Cameroon, thanks to the revenue from the cotton crop, the various cotton unions ("autonomous village associations", "village producers associations" or "collective initiative groups") are often the only rural organisations with the capacity to make financial investments for the local community's benefit. They therefore receive a high number of requests for funding.

The funds held by these unions are not always seen as belonging to the producers, who sometimes believe, for example, that their union's funds are under the control of Sodecoton, the cotton company, and therefore out of their reach. The result is that these producers often ask the union to take on the entire local share of investment in the water project – and by so doing they avoid any personal commitment. For most of these producers it is more difficult to spend 1 000 F cfa of their own savings than 1 million from the union's coffers.

There is no doubt that the funding of a waterpoint could be a legitimate part of such a union's investment programme, since it is a project of general public interest, and which furthermore would help intensify

cotton production through improving the quality of the draft animals' water supply.

Unfortunately, if the union finances all of the local share, the users are highly unlikely to consider themselves the real owners of the waterpoint.

> On no account should a producers' union contribute all of the local share of the construction costs of a waterpoint.

The Dpgt project has set a ceiling of 40% for a cotton union's share of the local contribution to the costs.

Contributions from the wealthy, dignitaries and development committees

It is possible to approach the wealthier members of the community and those of the surrounding area for funding, especially if they play a role in village development committees. High-ranking dignitaries often feel a social obligation towards the village of their birth and willingly offer a contribution, either on the occasion of local festivities or at the annual general meeting of the development committee. In some cases the general mobilisation around a water project can redynamise a development committee.

Influential members of the community can also support extensionists in their fieldwork, by helping them gain local people's confidence and by convincing them of the need for everyone to make a contribution.

If however local people rely too heavily on one or two individuals to make up the financial contribution, there is a risk that those who have contributed the most take exclusive and illegitimate control of the waterpoint. This has been a problem in borehole projects, where the person who provided the initial capital is considered to be the sole owner of the waterpoint, and the only person responsible for it. Such a situation opens the way to all sorts of abuse of power, including in particular refusing people access to the water supply.

Personal subscriptions by future users of the waterpoint

Recourse to personal or family subscriptions cannot be avoided, even if this appears at first sight to be a difficult operation and unlikely to generate the sort of funding available through producer union or development committee grants. A successful subscription campaign is a sign of the community's genuine desire to establish a waterpoint in the village, and it gives grounds for hope that an efficient system of management will be installed and complied with.

By the same token, a meagre, unsuccessful collection of funds with conflicts and dissension is an early warning to the extensionist of arguments to come and conflicts over the management of the water. If the fund-raising campaign fails to raise any funds, the extensionist should break off activities and postpone the construction or rehabilitation work.

The organisation of this campaign is a delicate affair. It cannot be left entirely to the community and local organisations. Extensionists should not underplay their role at this stage, on the pretext that the local people should assume their responsibilities. On the contrary, extensionists have an absolutely essential role to play at this point, as organisers and independent arbiters.

Appendix 3 shows how the local contributions were put together for several waterpoint projects in North Cameroon in 1996, 1997 and 1998. In the three years in question, 318 million F cfa were invested by the Dpgt in hydro-pastoral facilities, 15% of which (49 million F cfa) was raised by the villages.

Until 1997, cotton producer unions were the principal local funders, providing 70% of the local contribution. This had changed by 1998, when all the potential sources of funding locally made a contribution (with the exception of the communes), each supplying about a third of the total (see figure 4).

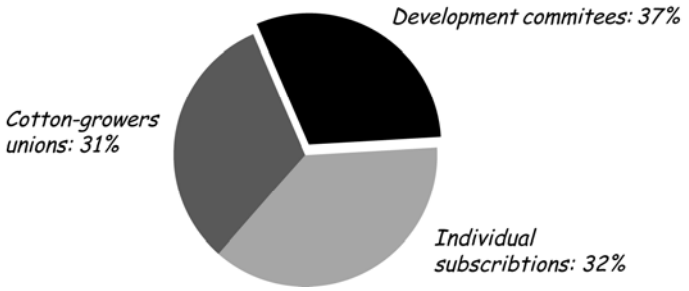

Figure 4: The sources and distribution of local funding for the establishment of a waterpoint: six sites in North Cameroon (1998).

In Cameroon's Mayo-Kani area, the cost of rehabilitating hydro-agricultural facilities in the Moulvoudaye "*yaere*" (depression) was estimated at 35 million F cfa.

Extension work over two years in 53 villages made it possible to achieve a local contribution of 10.5 million F cfa (30% of the total). This came from the following sources:

- moulvoudaye rural commune: 500 000 F cfa (5%);
- eight cotton unions: 6 875 000 F cfa (65%);
- individual subscriptions: 3 125 000 F cfa (30%).

3.2 How much should each user contribute towards the local funding?

The livestock survey

If cost-sharing is to be equitable, it must be proportional to the amount of water each user will consume. It must also be properly and honestly calculated. For this, all the people involved and the number of animals they are intending to water, will have to be identified. This work is essential. The extensionist could be helped by the local leaders or the *sari saanu* (livestock headman). It will be necessary to make a count in the village, section by section, family by family, of the number of animals that will use the waterpoint. The amount each user will have

to pay, both towards the initial costs and annually for access to the waterpoint, will depend on this operation.

Head counts generally fall short of the true figure, since all herders fear having to pay taxes on the livestock they keep. They may also be trying to avoid paying in full proportion to the size of their herd. In order to avoid false declarations, arrangements can be made with the livestock headmen that herders should pay double for every animal not declared in the census whenever that animal comes to drink at the waterpoint.

Assessing each user's needs

Water consumption units

The notion of water consumption units, or "WCUs", is useful as a way of indicating the amount of water required by different sets of animals. We have chosen a very simple system:

1 water consumption unit (or "WCU") = the amount of water considered necessary per day for either 1 bovine or 1 horse or 5 sheep or 5 goats. For our purposes this amount is fixed at 60 litres.

The figure of 60 litres of water per day is very high, but this figure has been chosen deliberately. An average-sized bovine (of about 250 kg), in dry tropical regions needs 30 litres of water per day in the hot season, and this figure will increase proportionately if the herd is on the move. But this does not explain why we fix the daily consumption requirement of a single bovine at 60 litres.

We have in fact also taken other factors into account:

- the low estimations of their herds by stockkeepers, as mentioned above, about 40% of animals will not be declared even if it is explained that the figures are needed for the waterpoint project;
- the possibility that herd sizes will increase, as a result of purchases or traditional customs, entire herds are sometimes "lodged" with family members living near a waterpoint;

- the possibility of unforeseen and accidental water loss, through heavy seepage, or higher than average evaporation rates;
- the inevitable bad payers, who will have to be provided for in the calculations.

This apparent overestimation can be justified by the need both to guarantee a reliable water supply throughout the dry season, and to encourage users to err on the high side when working out their running costs, so that they don't run into difficulty later when it comes to meeting the costs.

Calculation each user's subscription level

It should be remembered that the amount to be raised through personal subscriptions is the sum of money left over after the contributions from organisations such as producer unions, development committees, the commune etc. have been taken off the total amount to be provided from local funding.

Once this personal subscription target is known, it should be divided by the number of water units that all the users will need. This will reveal the amount to be contributed for every water unit in the waterhole. Each user's personal subscription can then be worked out – by multiplying the number of water units he or she intends to use by the value of the water unit. In this way each user's subscription towards the waterpoint is worked out in proportion to the number of animals he/she will water.

Example: The rehabilitation of Marbaï village waterhole (North Cameroon)

The Gisiga village of Marbaï in Diamare area can be used to illustrate the procedure. The village contributed to the rehabilitation of a waterhole which had been dug for it a few years previously by the Pastoral Hydraulics service.

All in all 550 water units are required for the 5 sections of Marbaï village. The Dpgt estimated the cost of rehabilitating the waterhole (excavating ca. 4 200 m^3) at 7.3 million F cfa. The Dpgt project requires local funding at 30%, i.e. approximately 2 million F cfa. At a general

assembly, the members of the Marbaï cotton union agree to contribute a sum of 1.5 million F cfa; 500 000 francs therefore remain to be found through personal subscriptions. This balance of 500 000 F cfa should be divided by the 550 village water units.

Table 2: Contribution table: Users' water units (WCUs) and their personal share (subscription) in the rehabilitation of the Marbaï village waterhole (North Cameroon).

Village section	User	WCUs required	Subscription towards the works (F cfa)
Dedeb	Bouba Elias	4	3 640 F
	Doubla Gouyouk	6	5 460 F
	Hirouitang Kaftara	9	8 190 F
	Kouli Makol	4	3 640 F
	Miding Godji	4	3 640 F
	Saïdi Kaftara	4	3 640 F
	Stapa Meding	4	3 640 F
	Wassou Mougoudoum	2	1 820 F
Moukoudwa	Allawadi Douboui	1	910 F
	Bouba Joseph	8	7 280 F
	Bouba Massiko	5	4 550 F
	Djakao Miding	1	910 F
	Jean Adamou	6	5 460 F
	Malloum Mokol	5	4 550 F
	Miding Mboussokoumdi	7	6 370 F
	Mozongo Enoc	1	910 F
	Mrassi Douboui	7	6 370 F
	Ndjobdi Kandoudou	4	3 640 F
	Sambo Bonako	3	2 730 F
	Sanda Ngoumoutch	2	1 820 F
	Si ddi Pierre	14	12 740 F
	Sinmiké Blou	3	2 730 F
	Woudatang Massiko	9	8 190 F
	Yakoubou Moutchaouni	13	11 830 F
Other sections of the village	65 users	434	394 940 F
Total	89 users	550	500 500 F

The result shows the amount to be contributed by users for every water unit they will use: 910 F cfa. A "Subscription table" should be

drawn up showing the number of water units required per user in each section of the village (see table 2).

When the cost of the water unit is known, each user's share towards the local contribution can be calculated and added to the table (the user's share is the user's requirement in water units multiplied by the value of one unit: 910 F cfa).

It could be argued that extensionists should not get involved in organising the subscriptions, and that this should be left to local people. In fact outside support of this kind can help lay the foundations for a system of management run entirely by the users themselves. Such a system must start off on a sound and equitable footing with no room for embezzlement or malpractice; this fully justifies the role of the extensionist.

Finally, it is only when the all the financing has been confirmed and the local contribution gathered in that the machines are given the go-ahead to start on the digging.

3.3 Organising the collection of subscriptions

When should the collection operation start?

In North Cameroon, the collection should be organised before the cotton crop is sold, so that subscriptions can be levied on the day that the cotton is paid for. The sale of cotton is one of the principal sources of income in the region; payment is made for all the growers of the village in one or two instalments. This means that all the future waterhole users have cash available at this time and it is the ideal moment for paying personal dues.

We insist on subscriptions being paid on the day that the cotton money arrives. Otherwise in the space of a few day the cash will be spent elsewhere and waterpoint subscriptions will rapidly be forgotten. Nevertheless one has to recognise that this subscription is only one of a number of bills to be settled when the cotton money arrives: there are

also debts to be paid, and cereals, livestock and all sorts of other items to be bought.

Who does the collecting?

If it is impossible to organise the collection of subscriptions on the day of payment, the village should appoint official collectors for each section. These people should be chosen for their honesty and commitment. Their task will be easier if they can hand over the funds they collect as often as possible. These must be recorded in a register by competent local people.

What will the local contribution be used for?

The Dpgt does not really need this money in order to finance the construction work. It is not a commercial organisation in need of a profit to be able to continue its activities. In fact the funds collected locally for the waterhole are never actually called in. They remain in the local community and can be used to pay for the rest of the work required for the site. This could include:

- the purchase of a pump and piping;
- the building of a fence;
- the installation of water troughs and concrete flooring to avoid the area becoming a mire;
- treating the water if necessary;
- the planting of trees and shrubs...

It can happen that more money is collected than is required for all this. The sum remaining can be used:

- Either to set up a waterpoint kitty, especially useful in the first year when the management system may not be fully functional;
- Or as a local investment fund to put “local money” into private or community projects proposed by waterpoint users. In this case a local committee would have to be formed to approve the projects, and also to manage the loans, the securities offered, and the repayments. This second possibility is only imaginable in the rare event that far more funds are collected than are finally needed by the waterpoint.

Where should the subscription money be kept?

This is a real problem, with no obvious solution.
There are a number of difficulties attached to keeping the funds in the locality: the risk of theft, the weight of responsibility to be carried by a single person, the temptation that will always exist of "borrowing" the money and the associated risks of irregular repayments.
Neither do banks inspire confidence: In Cameroon numerous borehole management committees have lost the funds deposited in certain banks. Banks are anyway only to be found in the larger provincial towns and are of little use to rural organisations.

The best solution would be to keep the funds in a local village safe, but there are few villages equipped with safes.

One possibility would be to place the funds in a post office account or with a local company such as Sodecoton. These possibilities have both advantages and disadvantages. In particular the company might draw on this money if the union's accounts go into the red.

> An account can only be opened if an officially recognised organisation has been formed, such as a legal association or cooperative. To avoid any last minute reallocation of funds, the grants from rural communes or development committees should be secured and banked at the earliest opportunity.

The extensionist could draw on the skills of field workers or agencies specialised in setting up farmer organisations. To avoid any last minute reallocation of funds, the grants from rural communes or development commitees should be secured and banked at the earliest opportunity.

Dealing with individuals who refuse to contribute

Any persons failing to make their initial contribution to the installation of the waterpoint, or pay their annual fees, should not be allowed to flout the rules and water their animals. If they happen to change their minds on the day the waterpoint opens, they should be obliged to pay a surcharge. Although this may appear very harsh, there should be no

exceptions to this rule, as it is the only way to ensure that the waterpoint can function properly. The amount of the surcharge should be decided by the users. Its imposition should only be possible by the local chiefs, and they could be entitled to a commission, based on the amount of the fine that is actually paid.

The imposition of such penalties is a matter to be arranged between the waterpoint users and the local chiefs. It is a particularly important matter, since, without such penalties, access to the water would gradually become free of charge and there would be no income available to maintain the waterpoint in good working order.

4 Planning a waterhole

Figure 5: Digging a waterhole using labour-intensive methods.

The requirement that the animals should not be allowed to enter the water to drink imposes a certain waterhole design. The extensionist could suggest a design based on figure 7, with a choice of options.

4.1 The waterhole from a to z: the main features

Attendant

The waterhole attendant must be chosen by the users. It is the attendant's job to transport, operate and maintain the pump. S/he has to check that the waterhole users have all paid their dues. S/he should inform the body responsible for managing the waterhole of any problems occurring: Conflicts with users forcing their way onto the site, fences being destroyed, banks eroding, etc.. S/he should be paid out of the waterhole budget, either at a fixed rate, or in proportion to the subscriptions actually collected.

Figure 6: Attendant

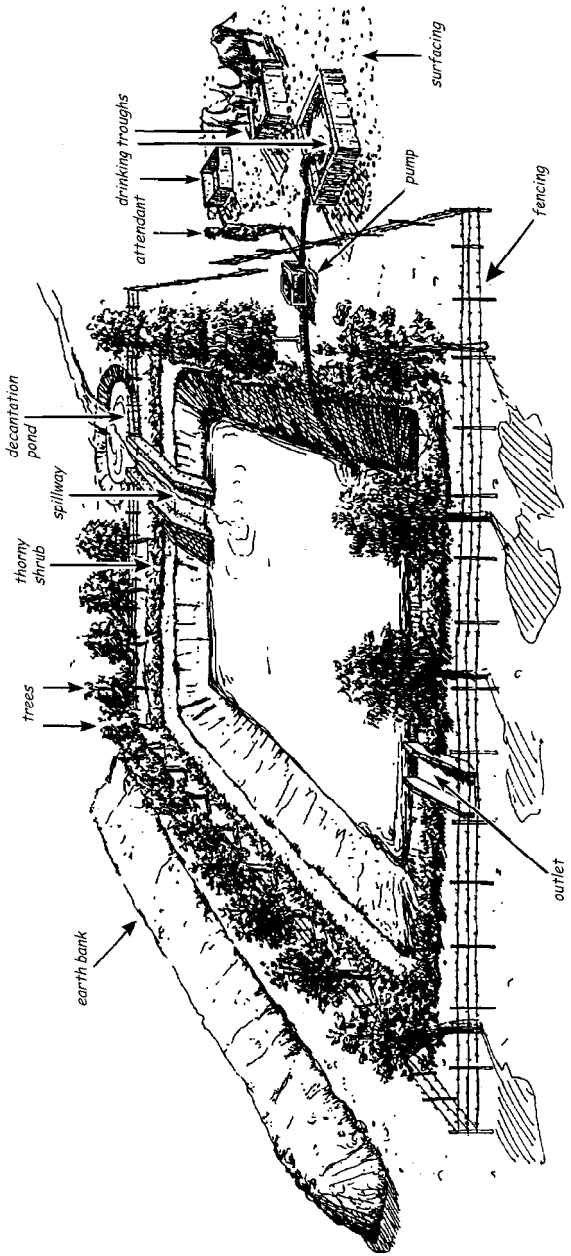

Figure 7: Plan of a waterhole

Decantation pond

This is a pond just upstream of the waterhole. It will slow down the flow and force silt and debris carried by the water to drop to the bottom before entering the waterhole. If this pond is regularly cleaned out, and it is recommended to do so once a year, the waterhole will not silt up too quickly. This can either be done by the users themselves or by a workforce paid out of the waterhole budget.

Figure 8: Decantation pond

Drinking troughs

These should be made of reinforced and sealed concrete. Their number depends on the number of animals to be watered at any one time. They should not be too high for the smaller ruminants and younger animals. To hold a maximum amount of water they should be set up on level ground. Ideally there should be a proper system for draining them (See figure 9).

Figure 9: Cattle at drinking troughs

Earth bank

20 metres from the edges of the waterhole an earthen bank should be erected, across the prevailing winds, using the spoils from the excavation work. This will help reduce evaporation rates. If there is a danger that the soil from the bank might erode towards the water, a ditch should be dug at the foot of the bank.

Figure 10: Earth bank

Fencing with barbed wire or thorns

Figure 11: Fence

Animals can be prevented from entering the waterhole by two sorts of fence: either a barbed-wire fence, or a barricade of thorny species. Barbed wire is expensive and reliable, but it will not stop the smaller animals getting near the water. Ideally a live hedge of thorny species should be established inside the fence. *Acacia nilotica* is a species recommended for North Cameroon. The hedge will be able to establish itself if it is protected by the wire or barricade. It should be cut back regularly to encourage it to branch and thicken out.

Manager

The waterhole manager should be chosen by the users. There may be several managers. The manager keeps the membership register, supervises the stock of fuel and oil and keeps a small kitty to cover general expenses. S/he should be paid out of the waterhole budget.

Outlet

This is a channel built to guide excess water out of the waterhole without eroding its lower banks. If the waterhole is operating normally, any overflow should leave the pond by this outlet. Whilst always desirable, it is not essential, especially if the pond normally fills up by floodwater entering from all directions.

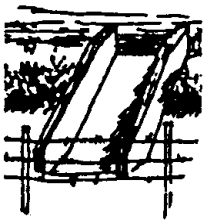

Figure 12: Outlet

Piping

The pipes can be rigid or flexible and should be buried. Flexible pipe is cheaper and easier to work with and is generally preferred by users.

Pump

The pump should not be kept at the waterhole. It should be stored in the attendant's house and be either carried or brought by bicycle to the waterhole every day. The attendant should be responsible for its main-

tenance. It should, if possible, be reserved uniquely for waterhole use. It may be that influential local people are tempted to use it to irrigate their crops or pump from their well, but this sort of use by individuals should be prohibited by the waterhole regulations, or a rental arrangement should be organised.

Figure 13: Pump

Spillway

A spillway is a masonry dam over which the water must flow to cross into the waterhole from the decantation pond. Without a spillway the water will erode the banks of the waterhole. All water entering the waterhole must do so across this spillway.

Figure 14: Spillway

Surfacing

It is essential that the areas around the troughs are prevented from turning into mud baths by concreting the surface. A good layer of gravel can be used instead of concrete but it will have to be renewed every two or three years.

Trees

Trees planted around the waterhole will serve as a windbreak (see figure 9). The shade they cast will help to reduce evaporation. Advantage should be taken of the fact that the area is fenced to make the most of these plantations. Fruit trees serve the purpose well and add to the value of the project, as will certain forage species. Very water-demanding species such as neem and eucalyptus should be avoided however. A belt of trees around the waterhole will create pleasant and cooler surroundings for the animals, and their herders, to relax in.

Figure 15: Trees for shadow

Water treatment

The water in the troughs can be treated with disinfectants purchased with funds from the waterhole account. The dose of disinfectant will have to be worked out and depends on the amount of water in the trough.

5 Managing the waterpoint

Waterpoint users will have to address three issues when considering how best to run the facility:

- who will be responsible for the waterpoint?
- how much will it cost to run – and who is going to pay?
- what regulations will be needed?

These questions will have to be raised by the extensionist; and answers will have to be provided by the users. Extensionists can give their opinion on the matter, to help the discussion (figure 16).

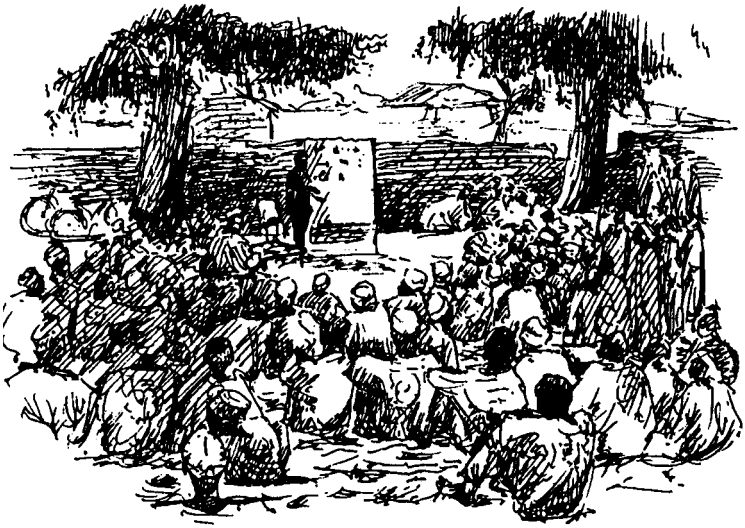

Figure 16: Meeting of waterpoint users.

5.1 Who will be responsible for the waterpoint?

Every one who has made a financial contribution to the waterpoint has a responsibility in its management. However, it is difficult for 100 or 200 people to be able to work together efficiently without setting up a

form of Management committee and including in it representatives who ensure that the interests of each major group are respected.

In the majority of cases it will be essential to set up an officially recognised body. Once established, this body should be put to work on the practical management of the waterpoint, overseeing the accounts and ensuring that the regulations are respected by all of the users.

There is no ideal model for this type of rural institution. Extensionists should explain what the formal possibilities are in the region (association, cooperative, union), outlining their advantages and disadvantages. The users can then decide which sort of organisation best suits them.

The Management committee should include not only the officials typically serving in such an organisation, but also the attendant and the manager, whose roles were explained in Chapter 4 and for whom posts will have to be created. The users will have to decide at a general assembly how to choose the members of the committee, how they should be remunerated, and for how long they should serve. In their follow-up work later, extensionists should look out for issues to raise with the community of users, to help them assess the honesty and efficiency of the Management committee.

5.2 How much will it cost to run – and who is going to pay?

Running a waterpoint with a motorised pump has its costs. These costs will have to be met by the users. Without this, the waterpoint would eventually run into debt, and money would have to be found from outside; in other words, the operation would not be economically viable. This undermines the whole purpose of the waterpoint, and it would have been better not to have started it at all.

At the same time it must be said that running a waterpoint can be more than viable economically, as it can generate income for the community managing it.

In principle, even if the income generated by the waterpoint remains only modest, it is essential that it is used first and foremost to cover the running costs. Cotton money must not be used to cover these costs, and it is better if the cotton union budgets are devoted to separate projects, with each of these projects being managed on its own independent budget.

It should not be forgotten that if the running costs of a waterpoint are paid for by a single family or individual there is a high risk of the waterpoint being taken over by this small élite. These "paymasters" could decide to prevent certain people using the water for family reasons or on ethnic or political grounds.

Estimating the budget

The extensionist should show the users a typical budget for running the waterhole, so that they can calculate the expenditure to come, and then calculate how much the users will have to pay each year.

Expenditure

Together with the users, a review of all the expenditure associated with the proper running of the waterhole will have to be carried out, and the actual costs will have to be listed.

These include:

- fuel, oil and spare parts for the pump;
- the purchase of a bicycle, cart or barrow for the pump;
- the attendant's wages;
- the manager's, and perhaps even the Management committee's, allowance;
- travel costs for those on waterpoint business (trips to the post office or bank, to see the extensionist, or chase up bad payers, etc.);

- annual maintenance of the channels, cleaning out the decantation pond, the purchase of tools (picks, shovels, barrows, etc.);
- spare piping (should the water level drop significantly), and new piping to replace old;
- production of membership cards;
- miscellaneous supplies (jerry cans, exercise books, ledgers, receipt books, pens, rubber stamps etc.);
- disinfectants etc.

It would not be very appropriate to include in this forecast a provision for re-excavating the waterhole in a few years' time. This involves particularly high expenditure and would result in a very high annual user fee.

In this way the running costs for the whole of the dry season are determined by the users. This total expenditure is then set against the number of water consumption units, just as was done for the initial subscription for the installation of the waterhole, so that the annual fee for each user (or family) can be calculated.

The users will also have to decide on how the fees are to be paid, on the period during which the waterhole will be open, on how the pump is to be used, and on whether a provision for unexpected contingencies should be set up.

In these circumstances, the users may feel that they are having to pay twice for the waterhole. To avoid any confusion, the difference will have to be explained very clearly between their first contribution and the subsequent annual payments:
- the initial contribution was a once-only subscription to buy the waterpoint;
- the annual fee is money used to keep it running.

Income

The budget forecast should also include incoming funds. These could consist of:

- the sale of membership cards (i.e. annual fees)
- the balance carried forward from the previous year
- the receipt of any fines or surcharges
- taxes levied on passing herds
- the hire of equipment (not recommended)
- miscellaneous gifts or grants.

It is essential that the total income to be made covers or exceeds the expenditure planned.

The case of Marbaï in North Cameroon

Let's take another look at Marbaï. At the start of the dry season, with the help of the Dpgt extension service, the users of Marbaï waterhole worked out the first year's operating budget. They decided that user fees based on individuals' water units would have to be paid by 1 January every year to cover all the eventual expenses.

These users envisage using the waterhole from 1 January each year to 15 June, i.e. about 165 days of operation. Their budget forecast is presented in table 3.

In order to balance this budget, 205 500 F cfa will have to be covered by the users. Between the first livestock survey and the day the waterhole opened for use, the Marbaï herd requirement rose from 550 to 560 WCUs. This results in a cost to users of about 370 F cfa per WCU for the coming dry season.

These operating costs are markedly lower than the cost of watering the animals before installing the waterhole (taking into account the regular or seasonal movements between water sources, the digging of wells, the manual drawing of water etc.).

Table 3: Operating budget for the Marbaï waterhole (North Cameroon).

Expenditure *	**Quantity**	**Unit cost (F cfa)**	**Total cost (F cfa)**
Fuel	300 litres	400 F	120 000 F
Oil	5 litres	1 300 F	6 500 F
Container for fuel	1 can	4 000 F	4 000 F
Provision for spare parts and repairs	Lump sum		15 000 F
Wheelbarrow	1	20 000 F	20 000 F
Allowance for Management committee	Lump sum		40 000 F
Payment to manager and attendant (each)	5½ months	4 000 F	44 000 F
Travel	Lump sum		10 000 F
Maintenance of decantation pond	Lump sum		20 000 F
Production of membership cards	10	500 F	5 000 F
Office supplies	Lump sum		1 000 F
Total			305 500 F
Income (F cfa)			
Balance of waterhole kitty			124 000 F
Personal subscriptions			181 500 F
Total			305 500 F

* This forecast of expenditure does not take into account the depreciation of the pump, which will almost certainly have to be replaced in under 5 years. Depreciation costs on a pump amount to approximately 60 000 F cfa per year over 5 years. This can be omitted from the budget if the users have guarantees of funding from an outside source (e.g. development committee).

Table 4 gives details of the initial subscription and then the annual fees paid by families in Marbaï

All fees paid should be noted in a register by the manager, treasurer or other person delegated to this by the users. A membership card (like an identity card without a photograph) could be issued to all those who have paid their fee, to make the site attendant's task a little easier.

The attendant is responsible for making sure that the animals brought to the drinking troughs all belong to stockkeepers who have paid their dues. If there are any offenders, fines will have to be imposed in consultation with the local chiefs.

Table 4: Annual fees by familys in Marbai village (North Cameroon).

Village section	Family	WCUs	Subscription (F cfa)	Annual fee (F cfa)
Dedeb	Bouba Elias	4	3 640 F	1 300 F
	Doubla Gouyouk	6	5 460 F	1 950 F
	Hirouitang Kaftara	9	8 190 F	2 925 F
	Kouli Makol	4	3 640 F	1 300 F
	Miding Godji	4	3 640 F	1300 F
	Saïdi Kaftara	4	3 640 F	1300 F
	Stapa Meding	4	3 640 F	1 300 F
	Wassou Mougoudoum	2	1 820 F	650 F
Moukoudwa	Allawadi Douboui	1	910 F	325 F
	Bouba Joseph	8	7 280 F	2 600 F
	Bouba Massiko	5	4 550 F	1 625 F
	Djakao Miding	1	910 F	325 F
	Jean Adamou	6	5 460 F	1 950 F
	Malloum Mokol	5	4 550 F	1 625 F
	Miding Mboussokoumdi	7	6 370 F	2 275 F
	Mozongo Enoc	1	910 F	325 F
	Mrassi Douboui	7	6 370 F	2 275 F
	Ndjobdi Kandoudou	4	3 640 F	1 300 F
	Sambo Bonako	3	2 730 F	975 F
	Sanda Ngoumoutch	2	1 820 F	650 F
	Siddi Pierre	14	1 2740 F	4 550 F
	Sinmiké Blou	3	2 730 F	975 F
	Woudatang Massiko	9	8 190 F	2 925 F
	Yakoubou Moutchaouni	13	11 830 F	4 225 F
Other sections of the village	65 users	434	394 940 F	141 050 F
Total	89 users	560	509 600 F	182 000 F

5.3 What regulations will be needed?

At an assembly of users extensionists should encourage discussion about how the waterhole should be used. They should raise issues that will provoke debate amongst the users (see figure 16). The following questions could be asked for example:

- Who has the right to use the troughs? Should herds be allowed on the site if their owners did not contribute to the installation costs? If the answer is yes, should the owners pay more, and how much?
- Will there be enough water for herds which were not counted at the beginning?
- How should “non-payers” be excluded? Should they be allowed to use the waterhole in the future?
- What will be the annual opening and closing dates? Who decides on this and how?
- What behaviour by users should be considered as being against the rules: using the pond or troughs to wash clothes or motorbikes, bathing in the water, letting animals wade into the pond...?
- Will there be different levels of fines, and for how much? Who will impose them – the group of users or the local chiefs? The users through the local chiefs? The Sub-prefect? Will those responsible for applying the fines need to be remunerated?
- Who will settle conflicts, and how?
- Which records or documents will need to be kept to manage the waterhole (accounts, registers etc.)? Who will make sure that they are kept up to date?

These questions were already raised in part 4 of the feasibility exercise, but time will probably have passed since the early discussions and the end of the construction work. The extensionist should check to see if what was decided at the beginning is still valid, or whether the users now feel that changes should be made.

6 Conclusion

By way of conclusion it is worth recalling some essential points:

1 The methods outlined here are in no way meant to be applied "to the letter", and they should never prevent local people examining for themselves whether there is a real need for a waterpoint, how it should be used in practice, and how to manage it.
2 To be able to discuss the economic viability of the waterpoint with the potential users, it is essential to know how much it costs to water the animals without it. If the cost of watering the animals is likely to be much higher than before, the project is unlikely to be sustainable in the long term.
3 A waterhole that is being allowed to silt up or be damaged by animals, or whose fences and water troughs are in bad condition, clearly reflects the relations between its users. There is little point in trying at all costs to rehabilitate a facility that a divided and distracted community will never be able to maintain.
4 The extensionist is for the most part dealing with people who neither read nor write. It is very important to prepare visual aids to help people understand the cost-sharing calculations and the other management questions. The value of visiting other waterhole projects has been proved time and time again, as people can see how cost-sharing and user-management is being put into practice in local conditions.
5 The waterhole option should be taken as a last resort. Pastoral wells are to be preferred, as they cost less to run and provide better quality water, especially if there is a series of small water catchments up-valley. They also present fewer management problems for users.
6 The sustainability of waterpoint management by users is directly affected by the quality of the technical installations. Particular attention must be paid to ensure that ponds or wells have a regular supply of incoming water. If for example, they fail to fill up properly or dry up early, or if troughs are not water-tight, conflicts will arise amongst the users and the management system will break down.

Appendix 1: Checklist for waterpoint project extensionists

1 First contacts

Report No. 1:

- Origins of the request (letter from a local dignitary, group, or chief, proposal by the extensionist, etc.)
- Villages concerned by the waterpoint and the key actors met
- Description of the existing waterpoint (if it is a case of rehabilitation)
- Study of existing watering practices. Estimation of the cost of watering, per water consumption unit (WCU) and per herd
- Observations on the need for a new waterpoint, or its rehabilitation. The extensionist should estimate how much water will be needed
- Decision on the type of waterpoint required: well with(out) catchment, new waterhole, rehabilitation of existing facilities, dam, etc.

2 Three principles

- Work with the users until a general agreement is reached on the best site for a waterpoint
- Obtain a general commitment to cost-sharing
- Obtain general agreement on a management system, including the principles that payment must be made for access to the water and that no animals will be allowed to enter the water.

Prepare Report No. 2 on the general attitude towards these decisions and on any future difficulties to be expected (the extensionist should give an assessment of the users' ability to manage their new waterpoint).

This report should also indicate what information the local administrations have received (livestock services, political authorities, chiefs etc.).

3 Technical preparations

- Identify the livestock involved and convert into water units, by sector and by herder (or family)
- Investigate the soil type by digging test holes, including drilling if necessary
- Once the topographic data has been collected, draw up two site plans: a plan of the situation before the waterpoint, and a plan after its creation (the dimensions of the installation should take the livestock survey into account and its siting should be coherent with the catchment topography)
- Obtain prices for the materials to be bought
- Choice of additional equipment (pump, type of fence, number of troughs etc.)
- Project agreement (see Appendix 2).

Prepare Report No. 3, including in it the Subscription table, the two plans, the price quotations, the project agreement, and a commentary on the difficulties encountered.

4 Finances

- Agree on a level for the local contribution: at least 15% for a new waterhole, at least 30% for a rehabilitation, up to 100% for a well.
- Identify the different sources of funds: personal subscriptions (in line with herd size), development committees, producer unions, rural communes, other sponsors.
- Allocate the various grants to cover different items of expenditure. Ensure that the personal subscriptions make up at least 40% of the total local contribution.
- Organise general assemblies to arrange the release of funds if local organisations like the cotton unions are contributing.
- Organise the collection of personal subscriptions (based on WCUs) and the appointment by the users of official collectors.
- Users' decision on payment deadlines and establishment of promissory certificates.
- Users' decision on where to deposit the funds.
- Users' decision on how to handle "non-payers".

Report No. 4 on this stage, with commentary on the difficulties encountered.

5 Deciding on the management system

- Make the users aware (if they are not so already) of the need for a body to manage the waterhole; decide on the form this body will take; appoint its members and one or more attendants.
- Definition of the regulations for using the waterhole.
- Production, with input from the users, of a written set of Waterhole regulations.
- Information to all users of the measures decided on.
- Consultation with local chiefs on the sanctions to be applied if the regulations are not respected.
- Preparation of a provisional operating budget and allocation of the costs to the users on the basis of their WCU requirements.

Report No. 5 on this stage, with commentary on the difficulties encountered.

6 Construction works

- Preparation of the technical specifications for the invitations to tender, including a description of the work to be performed;
- Examination of the tenders short-listed by the contract awards committee of the project's technical services;
- Preparation of instructions for the machine drivers and staking out of the site;
- Recording of the hours of work effectively carried out;
- Provisional acceptance;
- Final acceptance.

Report No. 6 on this stage, with commentary on the difficulties encountered.

7 Monitoring the management of the waterhole

- Train users in waterhole management;

- Identify practices differing from what was foreseen in the regulations, and modify the regulations if appropriate;
- Monitor the collection of annual user fees;
- Monitor the system of sanctions in practice;
- Monitor the way outside herds are given access to or excluded from the waterhole.

Report No. 7 giving a detailed account of the management of the waterhole and of any problems occurring.

Appendix 2: Example of a waterhole agreement

AGREEMENT ON THE CREATION OF THE
***..... [name of waterhole]* WATERHOLE**

We, the undersigned,

the *[name of waterhole]* Management committee, represented by its Chairman, Mr/Mrs.....,

and the *[name of implementing organisation]*, represented by Mr/Mrs ....., extension worker at ..... *[place of work]*,

have agreed upon the following:

1 Description of the project

This contract concerns the establishment of an artificial waterhole measuring m x m x m at .....

Taking into account the number of animals to be watered and natural evaporation, the water storage capacity of this waterhole should be ..... m^3, if all the animals concerned are to be supplied with water throughout the dry season. This volume has been calculated after a livestock survey carried out on the basis of the waterhole users' declarations. The survey resulted in ..... water consumption units (WCUs) being recorded, equivalent to ..... cattle, ... small ruminants, and ..... donkeys and horses.

The waterhole shall be rectangular in form, with slopes of between 1:3 and 2:3. The water will enter the waterhole by a spillway and exit through a purpose-built outlet. These two items will be made of reinforced concrete.

It shall be strictly forbidden for animals to enter the water. The water shall be pumped into one or several drinking troughs. When completed the waterhole shall be protected by a fence of three rows of barbed wire fixed to metal T-posts 3 cm thick and 1.5 m in length, driven 30 cm into the ground.

This fence shall be reinforced on its waterhole side by a living hedge of *Acacia nilotica* or similar thorny species.

2 Responsibilities of ..... [Name of implementing organisation]

The *[name of implementing organisation]* undertakes to:

- finance the installation work: excavation of the pond and fabrication of the concrete facilities. The cost of these works amounts to approximately..... F cfa;
- mark out the boundaries of the waterhole taking into account the dimensions specified and the nature of the watershed;
- excavate the waterhole using competent contractors chosen by an invitation to tender;
- supervise the proper execution of the work, i.e.:
  - achieve a total water storage capacity of ..... m^3;
  - install a decantation pond of approximately 300 m^3;
  - erect an earth bank 15 m from the edges of the waterhole using the spoils;
  - establish a slope around and away from the waterhole, to ensure that no surface run-off enters it;
  - install a purpose-built outlet and spillway in reinforced concrete;
- pay the contractor(s) the price agreed by contract;
- advise the waterhole users on the installation of ancillary facilities (fence, troughs, etc.);
- devise a waterhole management system with the users, based on a provisional operating budget and the implementation of a set of Waterhole regulations;
- help the Management committee draw up a provisional operating budget for the first year;

- advise the committee on the establishment of a thorn hedge around the waterhole;
- inform users on the costs of running the waterhole and, if necessary, advise them on how to improve the management of the waterhole.

3 Responsibilities of the Management committee

The waterhole's Management committee shall ensure that the following is performed:

- A location for the waterhole shall be chosen, on suitable terrain, along a normal livestock thoroughfare, and at a site acceptable to all the users.
- A list shall be drawn up, containing the names of all the future waterhole users (owners of herds of cattle, goats and sheep) and the number of animals in their possession.
- A local contribution of . ..... F cfa shall be made, being 15% of the total cost of the construction. This contribution shall be deposited on a *[name of the banking institution]* account which shall be opened specifically for the management of the waterhole. It will be opened before the installation of the ancillary facilities (troughs, fence etc.).
- The installation of the ancillary facilities shall be paid for locally.
- The materials necessary for installing the troughs and fencing shall be purchased.
- A mason or business shall be appointed to install the troughs and fencing.
- The pump and associated piping shall be purchased.
- Ground-cover plants shall be supplied, for plantation around the edges of the waterhole, as well as seedlings for a thorn hedge. These plants may be produced locally with the advice of technical staff from the *[name of the implementing organisation]*.
- A staggered double row of *Acacia nilotica* (or similar species) shall be planted along a ploughed furrow.
- Perennial plants shall be sown or transplanted between the edges of the waterhole and the earth bank.
- Shade trees shall be planted each side of the earth bank, if possible.

- A management system shall be set up, with a view to ensuring the sustainable use of the waterhole.
- One or several waterhole attendants shall be appointed and remunerated, and allowances shall be paid as necessary to the members of the Management committee.
- Proper maintenance of the pumping equipment and troughs shall be carried out and the decantation pond shall be cleaned regularly.
- A provisional operating budget shall be established at the beginning of every dry season.

4 Waterhole management

As soon as the works are completed the entire group of users who have contributed individually to the cost of the ..... waterhole shall be declared to be its owners.

By the same token they also become the only persons responsible for its maintenance and its management.

Final acceptance of the waterhole shall take place in the month of October or November 20.....*[complete the year]* by a committee composed of the parties to this contract, a representative of the *[name of implementing organisation]*, and the contractor.

Technical advice and support on maintenance and management of the waterhole will be supplied by the *[name of implementing organisation]* for a period of at least two years.

The waterhole management system shall be elaborated by the Management committee before the end of the construction works planned for the end of the 20...*[complete the year]* dry season.

The regulations on the use of the waterhole will specify:
- conditions for access to the pond
- the rights and the obligations of every waterhole user
- the procedures for deciding on the opening and closing of the waterhole

- the annual fees to be paid per water unit (WCU)
- how to manage the funds which are collected when the waterhole is in use
- the person or persons responsible for managing these funds
- the person or persons responsible for purchasing the materials required for operating the waterhole (fuel, oil, spare parts, planting material etc.)
- the level of the attendant's wage and of the allowances paid to the members of the Management committee
- the sanctions to be applied for any breach of waterhole regulations.

This management system shall be approved by a majority of the waterhole users. The Management committee shall establish in writing the waterhole Regulations. A copy of the Regulations shall be deposited with the traditional authorities and the *[insert title of the relevant state officials, e.g. Prefect and Sub-prefect]*, who may be called upon to settle any disputes.

The *[name of implementing organisation]* will monitor and support the waterhole management for a period of at least two years. The extensionist will therefore carry out two or three monthly visits as part of an annual assessment programme.

5 Special clauses

Each of the two parties reserves the right to terminate this contract if the commitments above are not respected.

The *[name of implementing organisation]* reserves the right to interrupt the construction works if it considers that the financial contribution of the future waterhole users towards the works is insufficient.

A copy of the present contract shall be deposited with *[insert title of the relevant regional authority, e.g. Prefect]* of *[name of region/province, e.g. Mayo-Kani]* and with the *[insert title of the relevant local authority, e.g. Sub-prefect]* of *[name of place, e.g. Marbaï]*.

(Place).....	(Place).....
(Date).....	(Date).....
For the Management committee,	For the .....
of the ..... *[name of waterhole]* waterhole.	..... *[implementing organisation]*
The Chairman:	The waterhole extensionist:
.....	.....

Appendix 3: Examples of cost-sharing from a number of waterpoint projects

Table 5: Dpgt waterpoint projects in North Cameroon, 1996 and 1997: the sources of the local contribution and their levels.

Waterpoint project	**Total cost of the works (F cfa)**	**Local contribution (F cfa)**					
		Com-munes	Cotton unions	Devel-opment commit-tees	Personal subscrip-tions	Total local contribution (F cfa)	Share of total cost (%)
Mindjil	16 723 918	0	1 200 000	600 000	200 000	2 000 000	12
Agoyo	24 735 654	0	2 000 000	0	1 100 000	3 100 000	13
Sirlawe	19 080 713	0	1 000 000	500 000	218 000	1 718 000	9
Boboyo	13 720 800	0	1 739 040	500 000	158 000	2 397 040	17
Dougje	21 107 100	250 000	2 250 000	0	510 000	3 010 000	14
Guibera	5 177 082	0	910 000	0	305 580	1 215 580	23
Hamaladde	18 806 000	0	1 949 000	0	438 900	2 387 900	13
Mada	4 980 600	0	1 250 000	0	500 000	1 750 000	35
Makassa	32 056 600	0	350 000	78 000	110 125	538 125	17
Marbaï	9 336 900	0	1 000 000	0	500 000	1 500 000	16
Zidim	23 781 880	0	1 000 000	0	838 250	1 838 250	8
Adumri	1 292 325	0	1 256 000	0	294 000	1 550 000	120
Gara	1 878 500	0	1 200 000	0	330 000	1 530 000	81
Total	163 827 132	250 000	17 104 040	1 678 000	5 502 000	24 534 895	15
Share of local contribu-tion, by source of funding, all projects combined (%)		1%	70%	7%	22%		100%

Appendix 4: Invitation to tender for the excavation of an artificial waterhole

..... *[Name of implementing organisation]*
..... *[Name of the Contracting Authority]*
..... WATERHOLE

1 Nature of the works

The ..... *[name of implementing organisation]* is considering financing the excavation of an artificial waterhole at..... , in .....region.

2 Technical specifications

The desired waterhole dimensions are as follows:

- depth:. .....m.
- length: .....m.
- width: .....m.

A total volume of ..... m^3 of water is required (calculated from the level of the outlet).

The excavation spoils are to be cleared and piled in such a manner as to create a bank situated at least 15 m from the edge of the waterhole. A slope of at least 1% should be maintained around the edges, to drain surface water away from the main waterhole.

A 300 m^3 decantation pond is to be dug upstream of the waterhole.

A reinforced concrete spillway (15 m^3) is to be built between the decantation pond and the waterhole. A reinforced concrete outlet (15 m^3) is to be built where the water leaves the waterhole.

The installation costs of the waterhole are borne by the ..... *[name of implementing organisation]*. Plans of the waterhole and of the concrete work are included in this invitation.

3 Closing dates

Work shall start in the month of ..... 20….. It must be completed within 60 days of notification of the award of the contract.

A site visit is planned on ..... . for firms entering tenders. Mr/Mrs ..... , project surveyor and Mr/Mrs ..... , project extensionist, will receive company representatives at ..... at 8 a.m. precisely.

Two copies of each tender should be sent, before noon on ..... 20....., in a sealed envelope, to the following address:

The Manager, ... *[name of implementing organisation]*
P.O. Box ……..; ..... *[Town]*

The tenders received will be opened by the project's contract awards committee on ..... 20... They will be examined from ..... 20... onwards.

4 Supervision of the work, and payment procedures

No advance payment is foreseen under this contract.

A first payment of 20% of the total award shall be made when excavation of 30% of the water storgage capacity required is complete.

This volume will be measured by the *[Name of implementing organisation]* surveyor when the contractor makes the request.

The second payment of 70% of the total will be made upon completion of the work, within one month of provisional acceptance by a committee composed of representatives of the *[name of implementing*

organisation], the waterhole Management committee, and the contractor.

The release of the bank guarantee, and of the remaining 10%, is conditional upon final acceptance of the work . This is planned for the end of the rainy season (October or November 20.....).

5 Submission and review of tenders

The official specifications may be obtained from the project offices at ..... and at ....., upon payment of an administrative fee of ...…….000 CFA francs.

The tender price must be quoted inclusive of tax. The tender must detail the methods to be used by the contractor and the length of time required for completion, whilst also confirming acceptance of the specifications given above.

Tenders must include a security deposit of …….000 CFA francs. The bank guarantee must be enclosed with the offer.

Conditions

Award of the contract will depend on the following conditions:

Availability of a bulldozer

At least one bulldozer, equipped with rippers and equivalent in power to a D7 Caterpillar, must be available.

- If property of the contractor : the contractor must enclose with the offer certified copies of the machine's registration certificate and insurance papers.
- If hired : the contractor must enclose with the offer certified copies of the machine's registration certificate and insurance papers, as well as a certificate by the owner authorising the hire of the machine to the contractor.

- In either case, the contractor shall indicate where the machine can be found and must be prepared to allow the project team to visit and inspect.

References of previous experience with artificial ponds

The contractor must include with the tender copies of documentation demonstrating experience of artificial pond excavation in the last three years. The location of this work and the technical specifications should be given. Photographs may be sent with the tender.

Cost per unit volume of water

This is not the cost for the volume of earth moved, but the cost per cubic metre of water actually stockable, calculated from the level of the outlet.

Tenders that do not include the first two points will not be considered. The offer will automatically be rejected if any required document is missing.

Appendix 5: Model contract for the excavation of a waterhole

Contracting Authority: .....
[Name of implementing organisation]

P.O. Box no. ……, *[town]*…….

CONTRACT FOR THE EXCAVATION OF THE WATERHOLE OF .....

Company: .....

Re: Excavation of an artificial waterhole with a water storage capacity of .....m^3

Place: .....

Amount: .....

Closing date for performance:

Signed on: .....

Notified on: .....

Registered on: .....

Financing: ..... *[Name of implementing organisation]*

The following contract has been agreed between the undersigned,

..... *[Name of implementing organisation]*
P.O. Box no. ……, ... *[town]*

represented by Mr/Mrs..... , Director, on the one hand,

and the company..... , represented by Mr/Mrs....., Director, referred to in this contract as **"**the Contractor", on the other hand.

GENERAL ADMINISTRATIVE CONDITIONS

1: General

Article 1. Object of the contract

The object of the present contract is the excavation of an artificial waterhole with a water-storage capacity of.....m^3.

Place:.....

Financing: ..... *[Name of implementing organisation]*

Article 2. Procedures for the award of contract

The contract shall be awarded by restricted procedure.

Article 3. Constituent parts of the contract

This contract is made up of written and drawn documents:

Written documents:

- the acceptance of the award by the Contractor
- the General Administrative Conditions
- the schedule of unit prices
- the estimated price offer, including quantities, and unit costs
- the technical specifications

Drawn documents:

- a perspective drawing of the waterhole

General texts: For all matters not specified or required by the present General Administrative Conditions and by the price offer, the Contractor shall comply with:

- decrees no ..... and ..... of *[date]* ..... concerning public works contracts
- the general administrative conditions governing public works contracts, as provided for by order no ..... of ..... . *[date]*

Article 4. Designation of the head of operations and engineer

For the implementation of the provisions of the present contract and of the General texts upon which it is based,

- the Director of the ..... *[Name of implementing organisation]* is designated Head of Operations;
- the ..... *[Name of implementing organisation]* manager at..... *[name of region/province/project area etc.]* is designated Engineer.

Given that the Director of the *[Name of implementing organisation]* is the Contracting Authority, all measures must be taken to ensure that s/he (or chosen representatives from his/her administration, duly declared to the Contractor) have free access to the construction site and to the technical files, in order to be able to carry out, on an intermittent basis, the supervision s/he feels is required, throughout the duration of the technical studies and construction work, in addition to the supervision carried out throughout the operation by the Engineer.

Article 5. Nature of the contract

This is a contract with an all-inclusive, non-renegotiable fixed price. The prices making up the total offer shall include labour, materials and consumables, the cost of installing and registering the worksite, studies, tests, incidentals and local obligations, overheads, profits, and all types of fees, taxes and charges.

Overheads include in particular any customs duties, quarry fees, and costs incurred in the satisfaction of labour laws and legislation on the health and safety of construction site workers.

It is taken for granted that, in fixing the tender price, the tenderer will have taken into account all the obligatory conditions and requirements specified in the invitation to tender which may in one way or another have an effect on the calculation of the total.

Article 6. Value of the contract

The value of the work to be performed under the present contract is set at ..... F cfa.

It is arrived at by applying to the estimated quantities the prices specified in the schedule of unit prices.

2: Performance of the work

Article 7. Documents to be provided by the Contractor

1 Within ten days of receiving the *[Name of implementing organisation]*'s approval of the construction project, the Contractor shall supply the Engineer with the plan of operations. This should include the following documents:

- the general plan of site installations;
- a detailed list of all equipment to be used on the site and its value;
- an estimate of the labour and the supervising staff required;
- a detailed schedule of work, providing for termination by the appointed delivery date.

Any significant changes to be made to the plan of operations shall require written approval by the *[Name of implementing organisation]*; this particularly concerns supervising staff and the movement of equipment. The Contractor shall make any modifications to the documents that may be required by the *[Name of implementing organisation]* within fifteen (15) days of notification to this effect. Approval of these documents shall be without prejudice to the Contractor's liability.

Plans, detailed drawings and calculations shall be returned to the Contractor within fifteen (15) days of reception, either having been approved by the *[Name of implementing organisation]* or with annotations. Should they not be returned within this period of time, they shall be held to have been approved. Approval of these documents shall be without prejudice to the Contractor's liability.

Any delay by the Contractor in furnishing the above-mentioned documentation shall result in the application without notice of a financial penalty of 10 000 F cfa per day.

Three copies of all plans and documents shall be supplied.

2 Throughout the construction period the schedule of work shall be kept up to date, in line with the state of progress. It shall be reviewed at the end of every week by, and at the expense of, the Contractor.

Article 8. Performance time limits

The general programme of work must be completed within forty (40) days of notification of the award of contract.

Article 9. "Force majeure"

Any modification, even by mutual accord of the parties, to the above-mentioned delivery times shall only be possible in cases of "force majeure" and following an assessment by the *[Name of implementing organisation]*.

Article 10. Supervision of the work

The work shall be under the supervision of the Engineer, who may appoint agents to represent him/her on the site.

Article 11. Operational orders

Orders concerning the start of work, and modifications, postponement or termination of operations must be signed by the Head of Operations.

Article 12. Acceptance

1 The Contractor shall notify the *[Name of implementing organisation]* of the delivery date at least ten (10) days before the appointed acceptance date.
2 Provisional acceptance will take place at the end of the works.
A statement of provisional acceptance will be issued, indicating, if necessary, any improvements required before final acceptance be possible.
3 Final acceptance will take place at the start of the dry season and before 15 November 20....

3: Financial provisions

Article 13. Payment

13.1. No initial advance is payable in this contract. The *[Name of implementing organisation]* will make out the payment orders.

Payment procedures are as follows:

1 An initial payment of an amount equal to 20% of the contract value (…… F cfa) shall be made when excavation of 30% of the water storage capacity is complete. This volume will be measured by the *[Name of implementing organisation]* surveyor.
2 At the end of the works, a second payment of an amount equal to 70% of the contract value (.....…… CFA francs) shall be made, within one month of provisional acceptance by a committee composed of representatives of the *[name of implementing organisation]*, the waterhole Management committee, and the contractor.
3 The balance outstanding (10%) will be paid at the end of the rainy season when final acceptance is made.

13.2. Payment will be made to account number .....……

Article 14. Guarantee of performance

The Contractor agrees to make a deposit of 10% of the value of the contract awarded, in guarantee of proper performance, within twenty

(20) days of being notified of the contract award In place of this deposit, personal collateral security by an nationally approved financial institution may be furnished. The deposit or security will be returned upon final acceptance of the work.

Article 15. Penalties for delay

If there is failure to deliver by the date quoted by the tenderer, and in the absence of any authorised extension, the Contractor shall be obliged to pay a penalty without notice, to be determined as follows:

- 1/2 000th of the contract price per calendar day of delay from the 1st to the 30th day;
- 1/1 000th of the contract price per calendar day of delay beyond the 30th day.

Note: The initial contract price is the price quoted in the tender.

The penalty for delay shall be calculated up to the date of provisional acceptance.

Any delay in the supply of contractual documentation shall be subject to a penalty of …… F cfa per day of delay.

4: Miscellaneous

Article 16. Making good

On completion of all operations, the Contractor shall remove from the premises all materials, tools and machines which are not the property of the Contracting Authority.

The Contractor shall see to the completion of the work in its totality.

It is the responsibility of the Contractor to remove all unrequired materials, and to clean and make good the site. This work is to be carried out within ten (10) days of provisional acceptance.

Article 17. Stamp and registration fees
The contract shall be stamped and registered by the Contractor in five (5) original copies.

Article 18. Disputes between the parties
Any disputes between the signing parties concerning the present contract shall be addressed directly by the parties with a view to an amicable settlement.

Should an amicable settlement not be feasible, the dispute shall be put before the competent tribunal.

Article 19. Subcontracting
Void.

Article 20. Termination
The present contract shall be automatically terminated in the event of circumstances specified in *[legal references.....]* of the legislation governing public works contracts.

Article 21. Licence agreements
Should the need arise, the Contractor shall reach agreement with the holders and owners of licences protecting processes used, or to be used, by the Contractor. S/he will pay the necessary fees and will protect the *[Name of implementing organisation]* against any related prosecution.

Article 22. Entry into force
The present contract enters into force on the day that the notice of award is made. That day will be taken as the first day for the calculation of time limits.

Signed at.....,
on .....

Signed at . .....,
on .....

For the ..... *of implementing organisation]*, ... The Director

For the Contractor ....., *[Name* ..... The Director

Further reading

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D.M; Stafford Smith.; J.F. Clewett. ; A.D.; Moore, Drought : **Building on Participation** : Full project report. 1996, pp. 143, Alice Springs; CSIRO.

Livestock water resources on-line

www.ext.nodak.edu/extpubs/ansci/livestoc/as954w.htm.

www.agric.gov.ab.ca/engineer/bg805-7a.html.

www.bright.net/~fwo/sub09.html.

Useful addresses

FAO, Food and Agricultural Organization of the
The Food and Agriculture Organization of the United Nations leads international efforts to defeat hunger. Serving both developed and developing countries, FAO acts as a neutral forum where all nations meet as equals to negotiate agreements and debate policy. FAO is also a source of knowledge and information. We help developing countries and countries in transition modernize and improve agriculture, forestry and fisheries practices and ensure good nutrition for all
Viale delle terme di carcalla 100, Rome, Italy
Telephone: (+39) 06 57051; Fax: (+39) 06 570 53152
E-mail:FAO-HQ@fao.org; web-site: www.fao.org

ILRI, International Livestock Research Institute
ILRI helps the world's poor people build and protect their livestock-based assets so that these, not poverty, are passed on to the next generation
P.BOX 5689, Addis Ababa, Ethiopia
Telephone: 251-1 463 215; Fax: 251-1461 252
E-mail:ILRI-Ethiopia@cgiar.org; web-site: www.ilri.cgiar.org

PTC+, Practical Training Centre
PTC+ is a leading, highly innovative international training centre with five training sites in the Netherlands, which focus on all the links in the production chain of plant and animal commodities, agricultural- and food technology and natural areas
PO.BOX 64, 3770 AB, Barnveld, The Netherlands
Telephone: +31 342 406500; Fax: +31 342 406 501
E-mail:barneveld@ptcplus.com; web-site: www.ptcplus.com

Zodiac, Animal science department, WUR
Zodiac; is the Animal science of the Wageningen University and research centre.The core-business of the department is scientific education and research in the area of animal sciences. The department aims to contribute to a sustainable animal husbandry, aquaculture and fisheries
Marijkeweg 40, 6700 PG, Wageningen,
Telephone: +31c 317 483952; Fax: +31 317 483962
E-mail:info@animalsciences.nl; web-site: http://www.zod.wau.nl/

ITDG, Intermediate Technology Development Group
ITDG helps people to use Technology in the fight against poverty.
Bourton Hall, Bourton on Dunsmore, CV23 9QZ, Rugby, Warwickshire, United Kingdom
E-mail:infoserv@itdg.org.uk; web-site: http://www.itdg.org/
CABI, Common wealth Agricultural Bureaux
P.O.Box 633, Icraf complex, Nairobi, Kenya
E-mail:cabi-arc@cabi.org; web-site: www.cabi.org

DIO, Foundation for veterinary Medicine for development cooperation.
The DIO foundation gives support and advice in the field of animal health and production to the poorer people of the world, irrespective of country of origin, beliefs or political interests. The main tool in our efforts is the Veterinairy Information Service (V.I.S.), which is free to our target group. Furthermore, we try to help by giving advice on animal diseases and other veterinary issues. Secondly we want to promote awareness in The Netherlands of the importance of animal health in development co-operation. Our motto is: healthy animals, healthy people!
Yalelaan 17, 3584 CL, De Uithof, , The Netherlands
E-mail:dio@dio@dio.nl; web-site: www.dio.nl

Glossary

Dpgt: The project “Développement paysannal et gestion de terroirs”, in Cameroon

Minepia: “Ministère de l’élevage, des pêches et des industries ani-males”, Cameroon

Sodecoton: “Société de développement de la culture cotonnière du Cameroun”

WCU: Water Consumption Unit, the amount of water consid-ered nec-essary for either 1 cow, or 1 horse, or 5 sheep, or 5 goats.