Small towns water supply

Summary of the Benin Case Study

The study, whose summary is presented below, was conducted in nine small towns in Benin by Messrs. Régis Taisne (Hydroconseil, France) and Mahamane Wanki Cissé (AGECO, Mali). Its aim was to identify the major advantages and constraints to the improvement of piped water supply management in rural areas in Benin. The conclusions of the study were addressed at a working seminar in Cotonou, organized to promote discussions among professionals of the water sector in Benin. This study also falls under the wider initiative of an overall research conducted by the Water and Sanitation Programme in all developing countries.

1. Institutional framework of drinking water supply in small towns

The Ministry of Mines, Energy and Water is responsible for the water supply sector and:

- Supervises the *Sociéte Béninoise de l'Electricité et de l'Eau* (SBEE) (public corporation), which is responsible for water supply to all the major towns of prefectures and sub-prefectures, regardless of their size. Some of these towns are very small, with less than 5,000 inhabitants, and the service there is not profitable. Debate is ongoing about whether to maintain them or not (under the privatisation programme) within the future concession area;

- It is the owner of water supply service to rural areas and other small towns, through the *Direction de l'Hydraulique* (DH) (Water Directorate). It is made up of three departments: DRE, DDCEP and DIH, and regional water departments, which are devolved offices.

The method of management of the water supply department in these small towns is defined by decree 96-317 of 2 August 1996 and the transfer and operation agreement model appended thereto. The decree provides for:

- The establishment of the **water users associations (AUE)**, with statutes, a legal status and an executive body, the Management Committee. The aim of the AUE is to promote and improve water supply systems, ensure public drinking water supply, operate, maintain, renew equipment and make extensions;

- **Transfer of ownership** of all or part of the installations and equipment to AUE (the list can be found in the transfer and operation agreement. Only boreholes are explicitly excluded from this transfer). This constitutes an important commitment by the State, which should further strengthen the AUEs. Benin is one of the few countries in Africa to have made this kind of transfer official. The **renewal** of equipment and accessories with a short or medium lifespan (under 10 years or so) should be funded from water sales. The system for the renewal of other equipment has not yet been agreed upon.

- An "**operator-in-charge**" position was created to handle the technical and commercial operation of the service. Generally, the AUE handles the entire financial management (incurring expenses, cash flow, etc.) and is of course owner of the service. It thus bears almost all the risks. Generally, the operator is an AUE employee, but the AUE may broaden this role by delegating responsibilities to him under a contract.

The implementing instrument for the water code (Law No. 87-016 of 21 September 1987) is not yet in force. It is still under review.

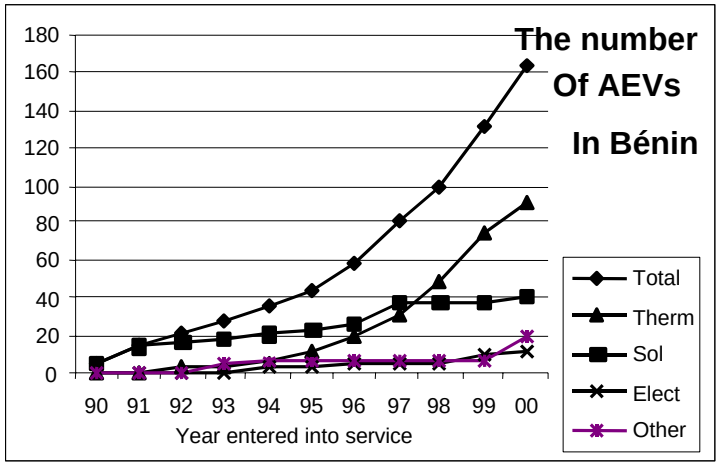
Under the **decentralization** policy, the current sub-prefectures should be turned into districts, having legal status and budgetary autonomy. The law (mainly law No. 97-029) confers on them most water supply responsibilities, such as resource management and protection, planning, building of infrastructures and services. Direct public management cannot therefore be ruled out. Furthermore, decentralization should be backed by transfer of assets and ownership of infrastructures and equipment. The implementation of a decentralization programme will bring about friction with the AUEs, which will "lose" most of their prerogatives, especially as this calls into question the transfer of ownership that has already taken place.

2. Status of small towns water supply

Since the beginning of 2000, SBEE has been supplying water to the principal towns of 71 of the 77 *prefectures* and sub-prefectures (this number was only 45 in 1990). These towns no longer have **standpipes**, with the water supplied mainly through individual connections. This is not very common practice in West Africa, since it bars about 80% of families, most of whom are poor, from direct access to public water supply.

Resale by neighbours is the most common practice, but the pricing policy is a deterrent since the "social" tariff of 138 CFA/m^3 covers only consumption below 5 m^3/month. Under such conditions, resellers inevitably exceed the ceiling and consumers who buy water from their neighbours are penalized, as they have to pay a much higher rate of 290 CFA/m^3 to SBEE.

For other small towns, the national policy is to provide water supply through small networks – rural pipe systems (AEVs). These were initiated in the early 90s and have been highly successful. 136 AEVs were built within 10 years. About 30 should be commissioned by the end of 2000, and several other projects are under preparation.



In 1991, the DH estimated that nearly 750 AEVs were needed to cover the needs of small towns with over 1500 inhabitants. Most of them,

however, have other modern water points, such as wells and boreholes fitted with hand-pumps (PMH). Increasingly, however, these sources have not been meeting the demand of the population for better service.

The average population supplied by AEVs is about 5,000 inhabitants, well above the ceiling of 1,500 habitants. This high figure is due to the fact that nearly half of AEVs are shared among several villages**.** This makes the venture more profitable in terms of the investments and service, although it can cause management dysfunction when procedures for allocation of resources for expenditure are not clear enough or have not been accepted by the towns concerned.

Thermal AEVs are much more common, making up 60 % of the AEVs. Solar energy hardly accounts for a quarter of AEVs (almost comparable to the total before 1995). This is mainly due to the limited power of solar installations (more adapted to towns with less than 2,500 inhabitants or in cases where the total dynamic head of water (HMT) is very low), higher investment costs and the difficulties encountered in renewing them (the amounts to be committed are much higher and are over a longer period, making it very difficult for the AUEs).

Where possible, connection to the SBEE power system is used, since this type of power supply is the most simple to manage and the least costly. Moreover, as rural electrification gained ground, some AEVs, which were on thermal, have switched over to the SBEE power supply.

Lastly, SBEE supplies water to some networks. These are **network extensions** that were not financed by SBEE and which should have been directly managed by an AUE. Despite this advantage, SBEE obviously does not consider such a solution as a development strategy, even when existing installations are over-designed to achieve a financial balance. This assumes, however, that SBEE adapts its marketing policy and agrees to **sell water in bulk to "local distributors"** such as AUEs and even small private operators. With lower management costs, they would be more efficient and competitive. SBEE has currently accepted this concept for only one extension out of 7 (Avlo). For the other extensions, SBEE is entering or will enter into customer service contracts directly with standpipe agents proposed by the AUE (as an individual). The AUE should also play a role in controlling tariffs, opening hours, requests for individual connections and extensions; otherwise, it may well be phased out, for being dormant.

3. Major challenges, constraints, innovative practices

3.1 Institutional aspects: Decentralization

The AEV'S are currently managed by the AUEs, which are true **local owners of the service**, delegated by the DH. With the implementation of decentralization, these duties will be passed over to the future districts, which may renew the AUEs' mission (the AUEs will then have to report to the district and no longer to the DH) or choose other options such as delegation, direct State-run service, by AEVs or for all AEVs within its territory. There is therefore a high risk of friction between the future

districts and the AUEs, especially in terms of handling the savings already made for renewals and extensions. This, without doubt, is one of the reasons why there is a total impasse over the legalization of the AUEs by the Ministry of Interior, Security and Territorial Administration (MISAT). The AUEs, however, must be legalized; and to our mind, this issue must be solved before new networks are built.

Serious discussions must therefore be carried out (these have been started by some projects, such as PAEDAR GTZ/KFW) during this current phase when implementing decrees on decentralization laws are being drafted, and also at the time of setting up the districts, in order to reconcile all the strengths of the districts (general interest, strengthen inter-village dynamics, etc.) and AUEs (proximity, direct interest in the operations …).

3.2 Organization and management: Better separation of roles and responsibilities

3.2.1 Operators could be made more involved in the performance of the service

The 1996 decree provides for "operators-in-charge". However, they are not directly involved in the performance of the service. At best, some of them are paid according to volumes sold (or bought). They are completely cut off from financial decisions pertaining maximization of expenditure (relevance of expenses, cost reduction, negotiating with suppliers, loss and leakage limitation etc.). They are not even involved in cost recovery when they are paid on a lump sum basis. The AUE therefore bears most of the operational risks (and profits, even though it is not its duty).

Following the So Zonko lease, we are witnessing the transfer of some responsibilities and the attendant profit-sharing scheme (the operator's remuneration partly comprises the net profit, after current expenditure). However, this is a solar system for which operational costs are highly reduced (mainly wages and allowances and a few management and network repair costs). Furthermore, the risk for the operator is limited, since he is not responsible for the maintenance and renewal of pumping equipment.

Such **management systems, which require more responsibility, coupled with the resultant shift of a greater portion of the risks and potential benefits to the operator,** (individual or small enterprise) are quite compatible with the method of community management provided by the decree (and decentralization laws). This assumes that responsibility sharing must be clearly defined so as to limit disputes.

3.2.2 Maintenance of pumping equipment: creation of monopolies should not be encouraged

All the projects favoured the introduction of maintenance contracts, under which the maintenance company will conduct four visits a year, which may be scheduled or upon request. These have nearly all been abandoned because they do not meet the needs of AUEs, being too costly, deadlines not being respected, etc. Also, they are

not a major challenge for the maintenance company, for which such contracts were rather a condition to meet in order to obtain the supply contract.

Since 1997, the DH has been planning to give approval for one maintenance company per department. It will propose several types of contracts to the AUEs, with or without systematic visits (but with a slip indicating the prices of parts, labour and transport). This should meet their expectations.

On the other hand, it seemed that approval will be given to only one company per department (exceptionally, 2), without competitive bidding for the prices, which will then be negotiated on a case-by-case basis with the AUEs. **This monopolistic system seems rather dangerous.**

3.2.3 Financial management often lacks transparency, with hardly any controls

Financial and cash management is handled entirely by the Management Committee (Management Committee). Many cases of embezzlement, including over-invoicing of spare parts, transport costs etc., have been observed. The current practice of using two signatures hardly deters these malpractices, more so as quite often, the duty of certifying officer, accountant and wages clerk are not separated. Finally, the weakness of the banking sector and habits have compelled AUEs to keep, at times, very large sums of money in cash, compounding the risk of embezzlement.

Controls and audits are almost inexistent (generally, the DH and SRH are incapable of mobilizing resources, once the projects have been completed) or inadequate (the skills of AUE auditors are very limited and their role is merely routine). The AUEs do not seem to be willing to release the funds needed to recruit technically competent and neutral auditors. This has probably never been suggested to them. In any case, it is never easy to hasten one's own audit when it is not in one's interest.

With regard to the So Zonko lease, 5% of the net earnings are paid back to the SRH for audit (but without specifications). The Sud-Benin AFD project took into account a tax of 15 CFA/m^3 to cover the operation of the AEV (DH) monitoring unit, but this has not yet started. **However, direct payment by the administration for the fulfilment of such a public service is not justified. It would be wiser to use a private institution or one that is separate from the DH.**

A delegation system would help to limit the risk of embezzlement (the operator will not be inclined to "steal from himself"), and facilitate audit (the AUE, which is the sponsor, does not have its own accounts audited).

3.2.4 Guarantee of selling price and defending the interest of users

Paradoxically, some AUE officers do not always turn out to be the best defenders of user interest. Sometimes they even take the stance of private operators, who are more concerned about the profitability of the service, and what they can gain from it, rather than ensure the best service at the least cost. Aside from possible embezzlement, the Management Committee's pricing policy is often directed to favour its preferred customers (those with individual connections).

Consumers thus lack the necessary will and/or means to control their representatives. But here again, **the idea of a Management Committee, which concurrently serves as representative of users and manager of the system, is ambiguous.** The volunteer status of its members, who, granted, receive some allowance of sorts, compounds this ambiguity.

3.3 The means for ensuring continuity of service are limited

The AUEs have very limited means to ensure uninterrupted service in the event of breakdowns. The pumps are the main causes of breakdowns and can cause interruption of service for several months if there is no liquidity (meanwhile, we know that it is difficult to maintain savings over long periods). Except in very rare cases, the AUEs do not provide for the purchase of a stand-by or renewal pump, **which would be an excellent means of sustaining monetary investments.**

Purchase of a stand-by generator will guarantee uninterrupted service, but is a large investment. To our knowledge, the only instances where generators are used are in case of solar installations with insufficient capacity, where they come in as an addition rather than for emergency use.

3.4 Access to the service and impact of pricing policy

3.4.1 Low and seasonal consumption - in line with what is observed in West Africa

The consumptions taken in the sample study (9 towns) are relatively low (2 to 11 litres/day/inhabitant). It is however in keeping with what has been observed for systems where water is indeed sold during some post-project follow-ups and in other countries in the region.

The graph “consumption/selling price” shows that the selling price seems to determine the choices of the population (note: *in towns with the lowest consumptions, the installations are largely under-utilized compared to their capacity).*

Furthermore, consumption is strongly influenced by the seasonal changes in alternative and “free” water resources (shallow wells, rain water, spring water). The ratio is 1: 3.5 between low and high consumption periods.

3.4.2 When pricing policy favours individual connections…

Some AUEs have (generally on the initiative of the projects) **opted to encourage individual connections** (tens and tens of connections). **The tariff for these connections is lower than that for the standpipe** (up to 30% lower). This is indeed more advantageous since the gaps are higher than the remuneration for standpipe agents, more so as the cost for managing connections are not accounted for. No AUE has established a monthly lump-sum payment, nor a minimum invoice for individual connections to "compensate" this advantage. "Connection fees" are also rare (subscribers however finance their own connections). **The meter system is not efficient.** Meters are usually the property of the subscriber, making control by the operator and the obligation to renew the meters difficult.

Price scale and distribution of volumes sold to Standpipe (SP) and individual connections (IC)

	Number		Rate CFA/m^3			% vol
	SP	IC	SP	IC	Gap	SP
Glo Djigbé	5	0	280			100%
Aïfa	3	1	420	420	0%	100%
H. Colli	19	64	420	290	-31%	50%
H. Aliho	5	24	560	400	-29%	51%
H. Agbotogon	10	26	560	400	-29%	55 %
Honton	8	7	280	280	0%	94%
Agamé	10	4	280	280	0%	99%
So zonko			250	-		100%
Houedo Gbadji	2		250	-		100%

Monthly volumes supplied for individual connections are relatively high (10-20 m^3/month/connection), and account for about 50% of volumes sold. A major portion of the population thus have access to water supply through resale by neighbours (with tariffs identical to that of standpipes). Consequently, monthly volumes distributed to standpipe s are low (lower than 100 m^3/month/stand-pipe), and therefore below the break-even point required to be profitable for a full-time professional pipe operator (generally estimated at 200 to 300 m^3/month).

3.5 Financial viability is accessible

3.5.1 Generally, operating and renewal expenses are covered by proceeds from water sales

The selling price of water should make it possible to cover the cost of:

- Workers (operators, pump-operators, watchmen, AUE members);
- Operations (power, upkeep, maintenance, management);
- Renewal of pumping equipment;
- Future extensions.

N.B.: Renewal and extension expenses are high but rare. In calculating the cost price for water therefore, these expenses are "spread" over the lifespan of equipment (this assumes making savings and/or repaying an equivalent amount of loan). We estimated the lifespan of the equipment at 15,000 hours or 7 years for electric pumps, 10,000 hours or 5 years for generators and 15 years for solar installations.

- **Breakdown of expenses, theoretical provisions and sales figure margins in % -**

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		Sales figure M of CFA	Actual exp		Oper mar	Theo prov ren	Th cost CFA/m^3	Theo net profit	Actual exp		Invest ment	Actual Exp. CFA/m^3
			Sal	Oper					Ren	Ext		
Glo Djigbé	Thermal	4,358	40%	24%	37%	28%	210	**8%**	0%	0%	37%	145
Aïfa	Thermal	1,426	30%	20%	50%	27%	305	**23%**	0%	0%	50%	205
H. Colli	SBEE power	11,528	21%	42%	37%	2%	322	**35%**	0%	10%	27%	314
H. Aliho	SBEE power	1,984	17%	56%	27%	4%	369	**23%**	33%	0%	-6%	508
H Agbotogon	SBEE power	3,243	25%	41%	34%	3%	260	**31%**	20%	0%	14%	323
Honton	SBEE power	6,076	18%	41%	41%	7%	210	**35%**	2%	0%	39%	198
Agamé	SBEE power	6,321	28%	35%	37%	6%	221	**32%**	4%	6%	27%	217
H. Gbadji	Solar	1,486	13%	25%	63%	72%	268	**-9%**	0%	0%	63%	92
Average		4,552	24%	36%	41%	19%	271	**22%**	7%	2%	32%	250

Sal = Wages and allowances
Oper. = Power, maintenance, management
Ren = Pump renewal
Ext = Extension
1 US$ = 7,00 FCFA
Theo = Theoretical

Readjustment and analysis of the operating costs of the eight systems studied show that:

(a) The cost price, including theoretical renewal costs (supplies) range from 200 to 400 CFA/m^3 (0.3 to 0.6 US$/$m^3$). These are therefore higher (138 to 290 CFA/m^3) than the rates charged by SBEE (subsidized public corporation);

(b) Cost prices are covered in nearly all cases by actual proceeds earned and additional profits are even made in 7 out of 8 cases (22% on average), which could then be used for extensions or other projects, or even to help reduce the selling price of water;

(c) The account balance depends very much on the pumping system. It is quite marginal (a small % of sales figure) when the system is connected to SBEE's power network (only the electro-pump is renewed), but accounts for about a quarter of the sales figure for thermal systems (there is a generator, in addition) and about three-quarters for solar energy systems;

(d) In a context where it is difficult to make long-term savings (low density banking system, embezzlements, great need for cash flow in villages and districts), it is clear that connection to the electrical power system is the most reliable;

(e) In practice, the AUEs do not have a savings plan, because they do not have a clear idea of the amounts and due dates of these renewals.

3.5.2 Modalities of remunerations could be more transparent and done in a more responsible manner

The distribution of expenses varies from one system to another, and depends on many factors (technical, level of consumption) and also on the choice of the AUEs and the Management Committee.

These are mainly personnel costs, which, on average, account for a quarter of turnover. From what we have seen in the field, there is no significant variation from one AUE to another in terms of how professional the management system is. On the other hand, the proportionality of remunerations (choice of some AUEs/Management Committee) is, without, doubt a better indicator; in such a case, operators and standpipe agents are more motivated to adapt service to demand.

Management Committee members are theoretically volunteers, although decree 96 stipulates that on the approval of the AUE, they may receive some allowances. This is rare though, due to the suspicion that this might cause. **However, volunteer work has its limitations, and it would certainly be better to make things official and clarify these practices (even supervise them) rather than try to prevent them.**

This is all the more important in that many cases of direct (cash flow "gaps") or indirect (over-invoicing, repayment of unjustified expenses, theft of parts and fuel, etc.) embezzlement have been reported. Without doubt, management must be sought which share responsibilities and promote more transparent forms of remuneration that cater for the interest of operators, the authorities and the population. The current arrangements can often be interpreted as real "pushers to crime".

3.6 Financing and investments

3.6.1 Contributions of users to initial investments: Identifying practices which could be used again later for renewals and extensions

All the projects have set up a fund for user contributions to investments. With PADEAR, the amount rose from 1 to 2%, with a target of 5%.

The general principle would be to mobilize the funds directly among the population. In practice, the communities often approach prominent people, migrants, etc. The lack of official recognition of these practices, and the need for transparency, may lead to appropriation by these heavy contributors. **It would therefore be interesting to see how such practices could be made official,** especially as these same practices would be used for future investments.

3.6.2 Renewals, extensions and other investments

The portion of sales figures used for renewals and extensions varies from one AEV to another, and from one year to another. It could be high, for renewal (20%, even 30% or 40% of sales figures for a mere pump, and potentially one year or several years of sales figures for a generator, UPS or several solar panels).

If there is no cash flow (inadequate or unavailable savings) AUEs often resort to borrowing, not from the banks (which do not lend to AUEs, or do so with too much red-tape), but from prominent people, traders or the townsfolk. Sometimes suppliers provide payment flexibility.

Some AUEs have mobilized part of their liquidity to finance expenses not related to the AEV. This is justified in cases of expenses made in the general interest such as

schools, health centers, contribution for the equipment of a neighbouring village, etc. However, the sustainability of the AEV should not be put at risk (renewals and extensions have priority), and **users must indeed be consulted** (it may also be possible to reduce rates, especially when consumption is low and rates are high).

Documents provided in the annexes section of the full report
(sent from request)

1. Village pipe systems counted.
2. Decree No. 96-317 of 2 August 1996 on the method of establishment, organization and operation of water users associations (AUE)
3. Excerpts of Law 97-029 of 15 January 1999 on the establishment of districts in the Republic of Benin
4. Example of contract of employed operator (AFD Sud-Benin project)
5. Transfer and operations agreement of water systems equipment (Example of AFD-Sud-Benin project)
6. Individual customer contract (Example of AFD-Sud-Benin project)
7. Example of thermal AEV (rural pipe systems) maintenance contract (Kilibo AUE with Sarl Guedou Tech)
8. Example of Solar AEV maintenance contract (Houedo-Gbadji with ENERDAS)
9. Lease contract with So Zonko AEV to BHVE
10. Convention between the Republic of Benin and EDF-ADEME-TOTAL France Telecom group for the establishment, supervision and private management control of the Houedo Gbadji and Towé Communication and Activities Centres
11. Contract for the establishment and monitoring of the 3 CCA delegated management, between the group and BHVE
12. Protocol between the Credit Agricole Mutuel and the Zones Lacustres project on the implementation of a guarantee fund
13. Settlement of Guarantee Fund (AFD-Zones Lacustres project)