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PERFORMANCE AUDIT REPORT

CÔTE D'IVOIRE

ABIDJAN ENVIRONMENTAL PROTECTION PROJECT
(LOAN 3155-IVC)

February 24 1999

Operations Evaluation Department

Currency Equivalents (annual averages)

Currency Unit = CF franc

1990	US$1.00	CFA franc 312
1991	US$1.00	CFA franc 282
1992	US$1.00	CFA franc 265
1993	US$1.00	CFA franc 283
1994	US$1.00	CFA franc 555
1995	US$1.00	CFA franc 490

Abbreviations and Acronyms

FNE	National Water Fund *(Fonds national de l'eau)*
ERR	Economic Rate of Return
ICR	Implementation Completion Report
MLCVE	Ministry of Housing and Environment
O&M	Operation and Maintenance
OED	Operations Evaluation Department
PAR	Performance Audit Report
SAR	Staff Appraisal Report
SODECI	Ivorian Water Supply Company *(Société de distribution d'eau de Côte d'Ivoire)*

Fiscal Year

Government: January 1 - December 31

Director-General, Operations Evaluation	:	Mr. Robert Picciotto
Director, Operations Evaluation Dept.	:	Ms. Elizabeth McAllister
Acting Manager, Sector and Thematic Evaluations Group	:	Mr. Alain Barbu
Task Manager	:	Mr. Ronald Parker

The World Bank
Washington, D.C. 20433
U.S.A.

Office of the Director-General
Operations Evaluation

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

SUBJECT: Performance Audit Report on Côte D'Ivoire
Abidjan Environmental Protection Project (Loan 3155-IVC)

Attached please find the Performance Audit Report (PAR) on the Abidjan Environment Protection Project (Loan 3155-IVC) in Côte d'Ivoire, for which US$21.9 million was approved on January 9, 1990, and made effective on June 11, 1990. The loan was closed on December 31, 1995, after a delay of two years. Final disbursement took place on May 15, 1996, at which time a balance of US$2,157,881 was canceled. Cofinancing for the project was provided by the European Investment Bank (US$17.93 million equivalent).

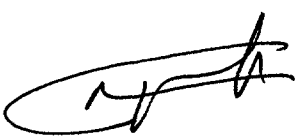
The primary objective of the project was to reverse the degradation of the Abidjan urban aquatic environment caused by the dumping of urban wastes and industrial effluents into the Ebrié lagoon. This was to be achieved by constructing and using an ocean outfall (a large pipe which runs out to sea, and releases treated sewage into favorable ocean currents so that it dilutes and disperses without impacts to the coastal zone). The project included four major components: (a) building waste water disposal facilities; (b) establishing sound environmental regulations; (c) monitoring pollution; and (d) ensuring the financial and operational sustainability of the sewerage system. Physical works included the construction of an ocean sewerage outfall (with the necessary diffuser, traps and screening plant); and construction of sewer lines/conduits for connecting industrial zones and residential areas to the main culvert and the outfall.

Technical and institutional problems constrained the achievement of the project objectives in the period following loan closing. The outfall and interceptor, the key parts of the infrastructure constructed with the proceeds of the loan, malfunctioned during early months of operation and then were shut off. In addition, the lease contract for sanitation (for the private operator, SODECI) has never been issued, even though a draft agreement was ready at loan closing. Pollution monitoring has been suspended.

The aquatic environment in 1998 is worse than the pre-project situation. When the outfall is off, sewage is concentrated by the infrastructure and dumped directly into the lagoon. The achievement of the institutional development objectives was also incomplete because the Master Plan was not actualized, the pilot on-site sanitation component was not executed as expected, and sector coordination did not occur entirely as planned.

The audit rates project outcome as marginally unsatisfactory (because modifications made to the sewerage system during the audit mission may correct its deficiencies), sustainability as uncertain (pending uninterrupted functioning of the outfall and approval of the waste water surcharge), and institutional development impact as modest (there is as yet no contract for the private operator). This differs from the ICR, which rated outcome as satisfactory and sustainability as likely. The ICR rated institutional development as partial, which is largely equivalent to the PAR rating.

Attachment



Contents

This report was prepared by Ronald Parker, Task Manager. William Hurlbut edited the report. Pilar Barquero provided administrative support.

Principal Ratings

	Loan 3155-IVC
OUTCOME	Marginally Unsatisfactory
SUSTAINABILITY	Uncertain
INSTITUTIONAL DEVELOPMENT	Modest
BORROWER PERFORMANCE	Unsatisfactory
BANK PERFORMANCE	Unsatisfactory

Key Staff Responsible

	Task Manager	*Division Chief*	*Country Director*
APPRAISAL	Sergio Kalegari	Alfredo Soto	Ismael Serageldin
COMPLETION	Richard Verspyck	Cynthia Cook	Oliver Lafourcade

Preface

This is a Performance Audit Report (PAR) on the Abidjan Environment Protection Project in Côte d'Ivoire, for which Loan 3155-IVC in the amount of US$21.9 million was approved on January 9, 1990, and made effective on June 11, 1990. The loan was closed on December 31, 1995, after a delay of two years. Final disbursement took place on May 15, 1996, at which time a balance of US$2,157,881 was canceled. Cofinancing for the project was provided by the European Investment Bank (US$17.93 million equivalent).

The PAR was prepared by the Operations Evaluation Department (OED). It is based on the President's Report, Staff Appraisal Report, sector and economic reports, special studies, Country Strategy and Policy Framework Papers, loan documents, review of the project files, and discussions with Bank staff. An Implementation Completion Report (ICR, Report No. 15736, dated June 17, 1996) was prepared by the West Central Africa Department, Africa Region. An OED mission visited Côte d'Ivoire in June 1998 and discussed the effectiveness of the Bank's assistance with government officials, other development organizations, beneficiaries, and stakeholders. Their kind cooperation and invaluable assistance in the preparation of this report are gratefully acknowledged.

The ICR provides an account of the project experience and covers project design, the role of the Bank, achievements, and sustainability. The PAR focuses on the impacts of the project in the Abidjan urban area, discusses a number of institutional, social, and technical problems that have surfaced themselves since loan closing, catalogues development progress under the water and sanitation lease contract since the November 1995 ICR mission. It assesses the quality of the design of the intervention approach, including its consistency with the problems identified. It considers the effectiveness of the Bank and borrower dialogue; reflects on the borrower's ownership, consensus, and commitment; and determines the effectiveness of the various project subcomponents.

Following customary procedures, copies of the draft audit report were sent to the relevant government officials and agencies for their review and comment but none were received.

1. Project Background

Country and Sector Context

1.1 Abidjan is located along the banks of the beautiful Ebrié lagoon, a salt water estuary bordered by coconut palms and flowering plants. The lagoon is the city's greatest amenity: it has a shoreline about 120 kilometers long, countless scenic views, and a significant potential for tourism. Modern hotels and luxury homes can be found in several zones. Water pollution caused by untreated organic sewage, septage, and industrial wastes threatens to turn this asset into a liability, however.

1.2 Before the project, the city's aquatic environment had been deteriorating because effluents made their way from numerous outlets into the lagoon. Scientific research commissioned to assess the extent of the pollution in the vast lagoon confirmed that it far exceeded the natural regenerative capacity: neither the annual floods nor the existing channel connecting the lagoon to the sea could ever restore the natural environment in the central (urban) part of the lagoon. The confined waters had reached exceptionally high levels of eutrophication[1] and bacterial contamination, and sediment samples (taken 15 years ago during project preparation) showed that the silt generated by organic wastes covered more than 50 percent of the lagoon bottom. Although credible current data are not available (for reasons discussed below), the pollution situation has worsened since then.

Bank's Role

1.3 Despite the Bank's support (since 1975) for the development of a sanitation system for Abidjan, the environmental situation of the lagoon has steadily deteriorated. Early efforts focused on bringing sewage out of the neighborhoods, shutting off outlets of untreated waste water, and improving the quality of the effluent that found its way to the lagoon. The sewerage and drainage master plan developed for Abidjan (with Bank/UNDP assistance) in the 1970s proposed that work be undertaken in seven phases. The first two phases were executed between 1978 and 1986. During this eight-year period major extensions of the city's sewerage and drainage networks were constructed and put into operation. When these became operational, sewage disposal was planned to be accomplished by means of an outfall.[2]

1.4 Before the third master plan phase (Loan 3155-IVC), consultants were hired to evaluate whether the proposed ocean outfall was an appropriate solution for the discharge of liquid wastes. They recommended its construction, which took place during this project. Two factors constrained the potential positive impact of the Bank-financed investments in sanitary infrastructure under this loan: extensive tracts of land beyond the sewerage system have been

1. Especially of Cocody Bay, Bietri Bay and Banco Bay, as well as Koumassi and Marcory—the water is over-rich in dissolved nutrients and deficient in oxygen.

2. An outfall is an underwater pipe that dumps screened and pretreated sewage off shore. Outfalls are designed to convey sewage into the sea at places where prevailing ocean currents flow away from land. Studies during the design phase identify places that will allow natural decomposition to take place without negative impacts on the environment of the coastal zone.

urbanized, and few if any neighborhoods within the system's perimeter were ever fully connected to the network in the places and manner intended by system designers.

1.5 A group of sanitary infrastructure investments (including the outfall) was originally appraised in July 1987, but Bank lending for infrastructure in Côte d'Ivoire was suspended until a comprehensive package of sectoral adjustment operations (including one for the water and sanitation sector) could be put together. Negotiations eventually took place in July 1989 and the project was approved by the Board in January 1990.

The Project Objectives

1.6 The primary objective of the project was to reverse deterioration in the Abidjan environment due to the dumping of urban wastes and industrial effluents into the Ebrié lagoon. This was to be done by building waste water disposal facilities, establishing sound environmental regulations, monitoring pollution, and ensuring the financial and operational sustainability of the sewerage system.

Components

1.7 The project had five major components:

- Policy reform
  - Enactment and enforcement of new environmental regulations ensuring appropriate disposal of domestic and industrial waste water
- Institutional development
  - Privatization: assignment of responsibility for maintaining and operating Abidjan sewerage facilities to the Ivorian Water Distribution Company SODECI (which was selected in 1988 through competitive bidding)
  - Strengthening monitoring capacity: enhancing the capability of the Ministry of Defense and Marine (MDM) and the Center for Oceanographic Research (CRO) to monitor lagoon and coastal ocean pollution
- Physical works
  - Construction of a 1.2 km ocean outfall-diffuser
  - Construction of a pumping station
  - Construction of a pretreatment plant consisting of sand and grease traps and screening to remove floatables
  - Completion over 6.5 km of the existing north-south sewer interceptor to collect waste water and septage

- Construction of 26 km of secondary sewers for connecting industrial zones and residential areas already equipped with tertiary sewers to the interceptor

– Enforcement of satisfactory cost recovery mechanisms including charges on domestic and industrial water consumption to cover full cost of operation and maintenance (O&M) expenditures as well as debt service of sewerage facilities.

– Development of a comprehensive Environmental Master Plan for Abidjan that would stipulate protective actions including systemic measures to improve drainage and promote on-site sanitation in low-income areas.

Potential Environmental Benefits

1.8 Project documents estimated that following construction of the infrastructure, the organic pollution of the lagoon would be reduced by 80 percent from its pre-project level. About 67 percent of the waste water generated by 82,000 households (and household-equivalent water users) was supposed to be discharged into the main interceptor, from which it would be pumped into the outfall. However, as will be explained further below, no environmental benefits have yet been achieved.

Proposed Institutional Framework

1.9 The project vested operational responsibilities in two agencies: (1) SODECI was supposed to collect revenue and be issued a lease contract to manage sewerage and drainage operations (in addition to the contract it already had for water); and (2) the Directorate of Environment of the Ministry of Housing and Environment (MLCVE) was responsible for supervising SODECI and enforcing the regulatory framework. Two additional agencies had financial responsibilities under the project. The National Water Fund (FNE), under the National Public Debt Agency (CAA) was responsible, *inter alia*, for the debt service of the sanitation sector and for paying SODECI's maintenance contract. Resources generated by the user fees also covered the costs of the pollution monitoring program.

2. Implementation and Results

Project Experience

2.1 The project was completed on December 31, 1995, two and a half years after the estimated date (June 30, 1993). The construction of the ocean outfall was completed as scheduled, but other physical components faced long procurement delays and construction generally began 18 to 22 months late because of processing delays due to ministerial reshuffling. The construction of the interceptor, secondary sewers, and pumping stations was completed two years after the original completion date. This was due in part to the contractor's lack of experience with waste water facilities.

ICR Findings

2.2 The ICR found that sector policy objectives had not been achieved, nor had the new regulatory framework been developed. While draft environmental regulations were transmitted to the Bank in 1993 and found satisfactory, frequent reshuffles of responsibilities between the ministries in charge of the environment and sanitation sectors impeded passage of the package and the draft regulations were not enacted. Project conditionalities requiring enactment of the regulations by completion could not be enforced because the conditionalities had not been assigned a deadline date. As completion slipped two years beyond the target date without progress on the regulatory front, the borrower stayed technically in compliance. The participatory, on-site sanitation component was never carried out by the project. In terms of physical works the ICR noted minor differences between what was planned and what was constructed: it mentions variances in the length of the interceptor and number of secondary pumping stations and a 15 percent increase of the length of primary and secondary sewers. The final cost of facilities was 5 percent below SAR estimates, but the completion of the works required the two one-year extensions of the closing date already mentioned. The ICR highlighted the achievements of the pollution monitoring program, noting that it collects data (bacteriological and chemical parameters for waters, sediments, and fauna) at 29 sampling stations. The effluents of 17 large industrial plants are also monitored by the National Laboratory of Quality Control, Metrology and Pollution Analyses (LANEMA). The ICR noted that the Borrower had not submitted the plan for future operations, and it suggested that the Bank should follow-up project operations in two respects:

- the actual environment impact of the ocean outfall should be closely monitored; and
- the execution of the lease contract should generate important lessons learned.

OED undertook this audit of the project in response to this ICR request.

2.3 The ICR rated outcome, Bank and borrower performance as satisfactory, sustainability as likely, and institutional development as partial. The ICR gives the following four-point justification for its outcome rating:

1. The project provides an environmentally sound solution for the disposal of industrial and domestic waste water and that is expected to reduce the pollution load of lagoon waters by a measurable 80 percent.

2. The project supported the establishment of an adequate pollution monitoring program.

3. The net present value (NPV)—calculated with a discount rate of 10 percent on the whole of project investments is CFA franc 2.5 billion with an economic rate of return (ERR) of 12 percent (benefits were enhanced property values near the lagoon and increased fisheries output).

4. Because of privatization, the project is likely to maintain its achievements: facilities will be operated and maintained by a private contractor which ensures the financial sustainability of the sanitation facilities.

PAR Findings

2.4 Although OED rated the ICR quite similarly to self-evaluation ratings,[3] observations in Côte d'Ivoire during the audit mission in June 1998 failed to confirm the four points made above. For these reasons, the Audit ratings are lower than those of the ICR. The change in observed conditions is mainly due to the three-year time lapse between the ICR mission and OED's audit. At the time of the ICR mission in 1995 there was every indication that the project plans would yield all that it promised. As will be seen, technical and institutional problems caused the project to go awry in the period following loan closing.

2.5 Since the ICR mission in 1995, the outfall had operated for a combined total of no more than six months,[4] and this total is cumulative in that it has only been in operation sporadically. In addition, the lease contract for sanitation (for SODECI) had never been issued, even though a draft agreement was ready at loan closing. The key part of the infrastructure constructed with the proceeds of the loan had malfunctioned during early months of operation and then (essentially) the system had been shut off.

2.6 An estimated one quarter of the city's population lives close enough to the project infrastructure to smell sewer gas on hot days. By all accounts, the obnoxious odors produced by fermenting sewage in the interceptor were unendurable. Voters made their displeasure with the stench known to their elected officials, who, understandably, have shown little inclination to start the system again. The chimney[5] that accommodates pressure changes in the system and vents the system gases (known colloquially as the *Château de la Mort*) was constructed right next to the mayoralty of Port Bouet—a significant public relations error.

2.7 Not using the infrastructure has serious implications. When the outfall is off, sewage is dumped directly into the Ebrié lagoon—only dumping is now concentrated by the project-built network in just one spot, the pretreatment plant, whereas before waste water entered at numerous sites. Where the untreated sewage now flows, it *greatly* exceeds the local purifying capacity of the ecosystem. Under the best of circumstances the area suffers from poor water circulation. A fishing village near where the effluent flows into the lagoon has lost its means of support because all the fish in the vicinity have died. Standing at the pumping station, as far as can be seen, black, anaerobic water churns and bubbles, a ghastly witch's brew. The audit attempted to quantify the continuing degradation, but found that the monitoring of the ocean near the outfall, and measurements of the lagoon water quality improvement mentioned above (para. 2.2) have been discontinued. Staff (involved with water quality research) interviewed noted that, in the absence of a lease contract, there were no funds to pay for the monitoring, nothing is changing out at sea, and the water quality in the lagoon is getting worse. Unquestionably, the environmental situation in 1998 is substantially more serious than the pre-project situation. We now turn to the question what went wrong?

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3. The OED review of the ICR rated the project's outcome as satisfactory, its sustainability as likely, its institutional development impact as substantial, and Bank performance as satisfactory. These ratings are consistent with those in the ICR with the exception of the institutional development impact rating, which the ICR rated as partial.

4. As of June 1998.

5. Technically, a surge tower.

2.8 The outfall and interceptor were built on the scale necessary to handle the waste water produced by the entire urban area. Additionally, according to good engineering practice, a certain amount of over-capacity was designed into the system to handle projected urban growth. Under the project, about half the city (the more prosperous city center and west side) was connected to the outfall. It was anticipated that the other side of the city (the industrial area and the lower-income neighborhoods [Yopougon], including extensive areas served by sewers that run into the lagoon) would connect to the project-built system for disposal at sea as finances permitted. Since there is no lease contract, no sewerage surcharge has been imposed, and the government has other investment priorities, this has not happened. When the western half of the city was actually connected to the system, only a fraction of the volume expected materialized. It turned out that the existing sewerage system was in worse condition than anticipated: it was less complete than was thought; it suffered from numerous unrepaired ruptures; and many homes and neighborhoods had opted to economize by connecting (illegally) to the storm sewers instead of the sanitary sewers.

2.9 When the system began operating, the effluents did not arrive in sufficient quantity to allow the pumps to operate for more than brief periods, so the liquid sat fermenting in the interceptor for days (and sometimes weeks) instead of the two hours anticipated by the designers. Hydrogen sulfide (sewer gas) reached 140 PPM, seven times higher than normal (a maximum of 20 PPM was anticipated). When this concentration of sewer gas was vented from the system through the chimney, the public and political pressures were sufficient to cause project staff to cover the top of the chimney with steel-reinforced concrete, symbolically closing it forever. This was, of course, not a technically advisable solution, and it only caused gas to escape in unintended areas over an even wider geographic area. Expatriate consultants were brought in to solve the odor problem. They designed and built an air scrubber that used 1.4 tons of activated carbon per charge. The cost of filling the scrubber with the activated carbon (which is not available in Côte d'Ivoire) is CFA6 million.[6] After less than a month's use—the consultants predicted that the useful life of carbon in the scrubber would be two years—the odor situation was much the same as before, but acquiring fresh carbon and shipping it from France took several months. At a usage rate of one recharge a month, carbon cost alone would be over US$130,000 per year. (A Bank-financed project[7] evaluated by OED in the Philippines produced activated carbon from coconuts—project staff might want to explore the suitability of this type of activated carbon for removing hydrogen sulfide). Delaying the recharge of the scrubber had a high political and social cost, and public discontent obligated the project staff to shut down the outfall once again.

2.10 In early 1998, SODECI engineers, acting largely on their own initiative, designed and built a make-shift fix. They decided that the only way in which the system was going to operate in a politically acceptable manner was to ensure that whenever waste water entered the system at the pumping station exited into the sea in under two hours. Since there was not enough sewage to do the job, they constructed a gravity-fed intake from the lagoon to the pumping station. Their idea was to mix lagoon water as needed with whatever quantity of sewage is flowing through the system;[8] intake from the lagoon would gradually be reduced as more households connect to the system. The pump capacity is 200 cubic meters and the capacity of the connector is about 400

6. About US$11,111 at the prevailing exchange rate.

7. Coconut Farms Development (Loan 2430).

8. The flow as of June 1998 was estimated at 22,000 cubic meters/day.

cubic meters, so theoretically this would work until the volume of effluent arriving at the station allows the pumps to function frequently enough. It had not been tried, however, in part because no one wanted to be the one to give the order to turn the system on, given the public outcry that would occur if the modification failed to function as was hoped and the city was overwhelmed with hydrogen sulfide yet again.

2.11 OED missions can sometimes be catalysts that influence project outcomes (in addition to the important role they play in accountability). In this case, rather than allow the audit to report to the Board that the infrastructure constructed with the loan proceeds had been a total failure, the Office for the Management and Control of Major Works and SODECI agreed to turn on the system, so that it could be seen whether mixing the effluent with polluted water from the lagoon to supplement the flow would finally make the sewerage system operable. Following two days of technical difficulties, on June 20, 1998, the system was put back into use, pumping lagoon water for the first time. On that day the modifications functioned as intended, the system worked as designed, and the odor problem seemed to be solved. (The chimney is still covered, so sewer gas has to be vented from the system by fans connected to the air scrubber). The cost of pumping lagoon water out to sea has yet to be determined (since the lift is minimal, pumping costs cannot be very high) and there is no cost recovery for the energy used. An important unanticipated benefit is that by removing anaerobic water from the most polluted part of the lagoon, the modified outfall will increase water circulation and allow more clean water from the sea to enter the most polluted coves. On August 11, 1998, the UNDP/Bank Rural Water and Sanitation Group for West Africa reported that the outfall was still in operation.

Unresolved Issues

2.12 *Safe disposal of solids.* Other residual problems also deserve mention. Adequate provisions have not been made for the disposal of sewage sludge. Although a private contractor is paid to handle this activity, informed sources claim that (when the system is actually operating) the sludge and grease are mixed indiscriminately with refuse in the city dump. Sand settled out during pretreatment is just dumped on site at the pumping station.

2.13 *Financial viability.* The institutional framework proved unworkable: the accumulation of unpaid government water bills paralyzed the financial relations between the Treasury, SODECI, FNE, and CAA. Additionally, the two sources of financial resources for the sector, namely the sanitation tax (collected by the Treasury as part of the property tax) and the water surcharge (collected by SODECI as part of the water rate) are not sufficient to cover the O&M expenditures of the sewerage and drainage system in the manner anticipated by the project, while still servicing the debt of the sector. The water surcharge currently funds higher than expected water system and water supply costs; SODECI expects that a separate sewerage charge will be authorized following the signing of the lease contract. Even the old water system maintenance contract is now expired, although SODECI collects month-to-month at the old rates while negotiations on renewing that contract continue.

2.14 *Status of the lease contract.* In January 1992, SODECI and FNE agreed to prepare a lease contract for the sanitation system, under which SODECI (a) would charge a user fee applied exclusively to those water users connected to the sewerage system and (b) would maintain and operate the sanitation systems at its own risk. Sporadic talks regarding the provisions of the agreement took place over a five-year period. The additional user fee (in effect a sewerage surcharge) to cover the costs of operating the sewerage system, including the outfall and other

new infrastructure, was never imposed. The negotiations over the terms of the lease contract for SODECI have been hampered *inter alia* by the numerous and highly visible problems associated with the early use of the outfall; a change in interlocutor on the government side; changes in the scope of work (the estimated number of new sewer connections to be installed by SODECI increased when it became apparent how many homes were not really connected to the correct system); and O&M responsibilities expanded (in addition to the underground network O&M is now supposed to cover the above-ground network [pumping stations, scrubber] as well). A draft lease contract was reviewed during the ICR mission and SODECI submitted a financial proposal at the end of May 1996. Little progress has occurred since then, and project staff are at a loss to explain the continuing impasse.

2.15 *Expansion and rehabilitation of the network.* There is currently no effort underway to increase the number of connections to the sewer system and to repair the numerous illegal connections, leaks, and ruptures discovered. Should the lease contract come into force, SODECI will have a financial incentive to undertake this work. If the contract remains unsigned, the sewerage system will continue to receive insufficient quantities of effluent and local pollution and contamination of the lagoon will continue, even when the outfall is in operation.

2.16 *Damage to private property.* Apartment owners complained that during the construction phase, the use of heavy equipment (especially the pile-drivers used to anchor the outfall) created strong vibrations and shifted earth, which resulted in damage. A government study identified property owners in 52 steel-reinforced concrete structures that were entitled to compensation, and CFA15 million for restitution was allocated. Informants disagreed over whether compensation had ever been paid, and whether the damage to the buildings pre-dated the construction of the outfall. The audit mission was asked not to discuss these matters during site visits as there were enough contentious issues surrounding the functioning of the outfall in the Port Bouet area already, and raising expectations that (some or more) compensation could still be attained (which could be a result of having someone from Washington reopen the issue) would not be productive.

3. Assessment of Performance

PAR Ratings

3.1 The audit rates project outcome as marginally unsatisfactory, sustainability as uncertain, and institutional development impact as modest. This differs from the ICR (para. 22), which rated outcome as satisfactory and sustainability as likely. The ICR rated institutional development as partial, which is largely equivalent to the PAR rating.

3.2 The project-built infrastructure was designed to function as a system. Yet, while individual components each function, the various components working together failed to perform as designed up to the time of the audit mission. While there is now a real possibility that the system will operate without interruptions and begin to improve the environment as intended, it remains to be seen if this will actually happen.

3.3 Given the fact that there is still neither a lease contract nor a sewerage surcharge, and it has yet to be adequately demonstrated that the project infrastructure can function over an

extended period, the sustainability of this project will be determined by events that will take place in the future.

3.4 The project relied on Ivorian institutions to implement the project components, carry out the studies, prepare the regulatory framework, and design and supervise the physical components. Had the project-built infrastructure functioned as planned, and been operated as intended, institutional achievements would have been considerable, given the local character of key implementers. The lack of institutional coordination and communication led to deadlocked negotiations, however. And in the absence of fully functioning and financed institutions, the project was technically too complex for SODECI's skeleton staff, especially considering that there are only two functioning sewer systems in all of West Africa (Abidjan and Dakar), and no other outfall. Given the situation with the lease contract, the fact that the pollution monitoring program is not functioning because there is no money to pay for it and the outfall has been turned off, there are hardly any institutional achievements worth noting at this stage.

Economic Impact

3.5 The ERR and the NPV of the project were recalculated for the ICR using the SAR methodology. At that time (June 1996) the present value of actual project costs (capital costs and incremental operating costs) was 24 percent lower than expected at appraisal, and the ERR was re-estimated at 12 percent (versus 15.4 percent expected in the SAR). No further work was conducted by the audit as there were no observable benefits and the impact of the project-built infrastructure has been negative. External benefits accruing from increased fisheries output to lagoon fisheries mentioned in the ICR appear to the audit mission to be negative (para. 2.7), and any increase in real estate values near the lagoon has not been due to improvements in water quality.

Actual Environmental Impact

3.6 Serious weaknesses in the design and execution of the project produced negative environmental effects that have yet to be corrected. Concentrating pollutants to send them into the outfall was the correct course of action and results should have been beneficial, but shutting off the pumps and directly discharging the effluent into the lagoon instead has had a strongly negative environmental impact. There are still numerous illegal and unauthorized connections into the storm water system that bypass the sewerage system and flow untreated into the lagoon. The project financed the identification of illegal service connections into storm drains, but little has been done about them. This creates an incentive for others to attempt to avoid paying for sewerage.

Performance of the Bank

3.7 Bank performance is rated as unsatisfactory. The sole project risk mentioned in the SAR was associated with possible delays in completing the financial restructuring of the FNE. Establishing surcharges on water tariffs for further remittance to other entities, particularly for financing operating expenditures, was risky, but this short risk assessment was clearly over-optimistic. The dismal record of this project to date, and the fact that there is no other outfall in Francophone Africa, argues persuasively that a stronger technical presence was needed on the Bank team—it should have been apparent to Bank staff during project preparation that the initial

flow of sewage would not be sufficient to permit the operation of the outfall as designed. Similarly, the appraisal process should have discovered that the actual sewerage system of Abidjan was greatly different from the Bank's expectations, but this too did not happen. Quality at entry was poor: there was little readiness for implementation, institutions were weak and the institutional situation was fluid, there was no sewerage connection program, and arrangements for a lease contract were not complete.

3.8 Bank staff were not successful in convincing the borrower to promote stakeholder participation. The successive extensions of the closing date should have been used to press the borrower to take action in the more participatory subcomponents. Although there was a continuous lack of compliance with two financial covenants, the Bank recognized that it was a macroeconomic issue which could only be addressed by an adjustment of the exchange rate, and opted not to use formal remedies.

3.9 The Bank team made many good decisions during this loan. It was the Bank that first insisted that something be done to suppress the odors coming from the network. The task manager's decision to change the name of the project from "Third Abidjan Sewerage Project" to "Abidjan Environmental Protection Project" was a shrewd public relations move that renewed interest in the project on both Bank's and borrower's side. The original design studies had recommended treating the waste water more thoroughly before pumping it to the outfall. While experience to date makes the idea of more elaborate treatment look prescient, in the longer term it should become more apparent that the decision was the correct one: an additional treatment facility would have involved a significant unnecessary expense. The ocean outfall should ultimately prove to be the best environmental solution as well as the least-cost solution.

Borrower Performance

3.10 The borrower's greatest achievement, the rapid completion of the outfall, is far overshadowed by the fact that it is not operating. For this reason, and the inexplicable delays in signing the already agreed-upon draft lease contract, Borrower performance is rated unsatisfactory. Project preparation was almost entirely carried out by the borrower, but the quality of the technical preparation was inadequate. Even if the Bank was unaware of the true state of the sewerage network constructed under earlier loans, the borrower should have known what condition things were in. The borrower's project team was reduced from five engineers to three at a time when the workload was increasing. The incorrect use of storm drains is also an example of poor borrower performance. Compliance with financial covenants was deficient over most of the implementation period, critical decisions were delayed and sensitivity to popular participation was minimal until it became impossible to ignore the scale of public discontent with the odor problem. On the institutional side, sectoral responsibilities were repeatedly reshuffled between the ministries in charge. Each change in the institutional framework led to new delays, new priorities, and a renewed consensus-building process. The quality of project monitoring and reporting was good, however.

3.11 *Compliance with Covenants and Operational Directives.* Apart from the standard covenants of a typical credit agreement, the covenants that applied to the credit fell into the following categories:

- Covenants regarding the terms and conditions of local bodies' participation in credit-funded activities (credit terms, bylaws, selection criteria) were complied with

- Covenants on progress monitoring, audits, and reporting were complied with, although audit reports were often late

- The covenant on establishing the monitoring program were complied with, but its activities were suspended after six months

- Covenants regarding the collected revenues were not complied with. The sanitation tax and SODECI water surcharge proceeds were never transferred to FNE in a timely manner, contrary to the loan agreement

- The covenant regarding the register of fixed assets of the sewerage and drainage system was not complied with.

4. Conclusions, Recommendations, and Lessons

Conclusions

4.1 This project still has the potential to deliver the environmental benefits it was designed for. The fact that it has hardly ever been in uninterrupted use has technical and institutional causes. The team that designed the fresh water intake deserves commendation. Without their modification, an enormous sunk cost would have produced no benefits. And the air scrubber was an ill-conceived solution that failed to work as designed because, under tropical conditions, the effluent stayed for too long in the system. Stated differently, it was an air pollution solution to a hydraulic problem. Pumping effluent mixed with lagoon water rapidly through the outfall will solve this technical problem over the short term, but it involves unrecoverable costs. Clearly the long-term solution is to increase the number of connections and ensure that all neighborhoods are connected to the city system. This will not happen until the institutional problems are solved: once a lease contract is signed, SODECI will have a strong incentive to increase the level of service. The inability of the involved parties to arrive at a lease contract should motivate the government to re-evaluate the operation of its institutions. The current month-to-month arrangement is excessively bureaucratic, and maintenance in the absence of a lease contract (under which fewer problems leads to more profit) is slow, technically suboptimal, and inefficient.

4.2 The Bank has not balanced its dual role of *development advisor* and *banker* very well in this project. This experience also illustrates one of the weaknesses of the project cycle. The infrastructure is built, the loan is closed, the sanitation system does not work, but the borrower is left to sort things out as best it can. In fact, the Bank is no longer working with the water and sanitation sector in Côte d'Ivoire. In a region where there are just two urban sewer systems and there is so much that needs to be done in sewerage, the Bank needs to recognize its catalytic role. Extra effort needs to go into ensuring that first sector efforts overcome their teething problems. There would certainly have been fewer problems with this project had previous investments in sewerage come out as designed. Success in Côte d'Ivoire would build a highly visible model for

the region; a strong utility in Abidjan would provide human resources and training to neighboring countries. A stronger technical presence on the supervision teams would have been helpful.

Recommendations

1) *If negotiations with MLCVE, which are taking place at the highest level, make no progress the government should re-evaluate the institutional context.* SODECI should be contractually empowered and given incentives to increase the number of connections to the sewer system so that the outfall can function as designed and the non-recoverable costs of pumping lagoon water can be gradually eliminated. The borrower's contribution to the ICR (dated March 1996) recognizes that the lease contract for SODECI and the approval of the sanitation surcharge are urgent priorities, yet years have passed since then.

2) *Monitoring of water quality should begin again.* This project still has the potential to make dramatic environmental improvements. The opportunity to document impact on this scale should not be lost. Even if the outfall were to cease functioning again, the protracted negotiations over the lease contract would be accelerated if hard data on the measurable continuing degradation of city's aquatic environment was available to the local press.

3) *If the functioning of the outfall ceases once again or there is no progress on the lease contract, the Bank should facilitate further assistance for this sector in Côte d'Ivoire rather than allow the project-built infrastructure to pass several more years unused.*

4) *OED should conduct an Impact Evaluation in Abidjan after the outfall has been in continuous operation for an appropriate period of time.* Such an evaluation of necessity would be based largely on the data gathered by Ivorian institutions that are monitoring ocean and lagoon as anticipated under the project.

Lessons

- Don't disburse on infrastructure destined for use by a private operator in the absence of the necessary agreements.

- Mechanisms to deal with post-closing crises are lacking.

- The purpose of monitoring is to document change over time. Significant effort needs to be dedicated to developing in implementing borrower agencies an understanding of the importance of monitoring and to enhancing a sense of commitment so that they do not discontinue monitoring just because changes are negative.

- When technical problems become apparent, expensive decreases in project benefits can be avoided by bringing in timely technical help.

Basic Data Sheet

ABIDJAN ENVIRONMENTAL PROTECTION PROJECT (LOAN 3155-IVC)

Key Project Data *(amounts in US$ million)*

	Appraisal estimate	*Actual or current estimate*	*Actual as % of appraisal estimate*
Total project costs	49.90	42.38	84.9
Loan amount	21.97	19.74	89.8
Cofinancing	18.0	17.93	99.6
Cancellation		2,157,881	
Date physical components completed	6/30/93	12/31/95	
Economic rate of return	15.4	12	77.9

Cumulative Estimated and Actual Disbursements

	FY90	*FY91*	*FY92*	*FY93*	*FY94*	*FY95*	*FY96*
Appraisal estimate (US$M)	2.00	9.00	19.80	21.90	21.90	21.90	21.90
Actual (US$M)	0	0	6.23	14.54	16.72	18.57	19.74
Actual as % of appraisal	0	0	31.5	66.4	76.3	84.8	90.0

Date of final disbursement: May 15, 1996

Project Dates

	Original	*Actual*
Initial Project Brief		4/82
Negotiations	6/89	6/23/89
Board approval		1/9/90
Signing	9/89	1/16/90
Effectiveness	11/89	6/11/90
Closing date	12/31/93	12/31/95

Staff Inputs (staff weeks)

	Planned	*Revised*	*Actual*	*Total*
Through Appraisal	61.7	62.7	62.7	188.1
Appraisal -- Board	21.7	22.7	22.7	68.1
Board -- Effectiveness	17.9	18.9	18.9	56.7
Supervision	66.0	67.0	60.8	194.8
Completion	06.0	06.0	04.0	16.0
Total	173.3	177.3	169.1	523.7

Mission Data

	Date (month/year)	No. of persons	Staff days in field	Specializations represented[b]	Performance Ratings[a]		Types of problems[d]
					Performance rating[c]	Rating trend	
Through Appraisal	3/87	4	13	SSE, FA, ENV, ENVCONS			
Appraisal through Board approval	6/87	3	20	SSE, FA, EC			
Appraisal through Board approval	10/87	2	4	SSE, EC			
Appraisal through Board approval	7/88	2	4	SSE, EC			
Supervision 1	6/90	1	7	SSE	1	1	
Supervision 2	1/91	2	3	SE, SEC	1	1	
Supervision 3	11/91	1	5	SEC	2	2	PP, PMP
Supervision 4	3/92	2	6	SEC, SE	2	2	CLC
Supervision 5	4/93	1	9	SE	2	2	CLC, FP
Supervision 6	11/93	1	6	SE	2	1	FP
Supervision 7	3/94	1	6	SE	2	1	CLC, FP
Supervision 8	7/94	2	7	SE, PWS	S	S	FP, ENVP
Supervision 9	11/94	2	4	SE, PWS	S	S	FP
Supervision 10	7/95	1	9	PWS	S	S	ENVP, FP
Completion	11/95	2	10	PWS, FACONS	S	S	

a. 1 = Problem Free; 2 = Moderate Problems; 3 = Major problems; U = Unsatisfactory; S = Satisfactory; HS = Highly Satisfactory
b. SSE = Senior Sanitary engineer; SE = Sanitary Engineer; EC = Economist; SEC = Senior Economist; PWS = Principal Water Specialist; FA = Financial Analyst; FACONS = Financial Consultant; ENV = Environmental Specialist; ENVCONS = Environmental Consultant
c. 1. = Problem Free; 2 = Moderate Problems, 3 = Major Problems, U = Unsatisfactory;
d. CLC = Compliance with Legal Covenants; PMP = Project Management Performance; AF = Availability of Funds; TP = Training progress; PP = Procurement Progress; SP = Studies Progress; FP = Financial Performance; ENVP = Environmental Performance

Other Project Data

Borrower/Executing Agency:

FOLLOW-ON OPERATIONS

Operation	*Loan no.*	*Amount (US$ million)*	*Board date*
Water Supply and Sanitation Sector Adjustment Loan	3240	80	1990