Mali: Office du Niger II, Sector N'Débougou, Irrigation N'Débougou II

Ex-post evaluation

OECD sector	31140 / Agricultural water resources	
BMZ project ID	1a) 1988 66 626 Office du Niger II, Inv. 1b) 1989 70 337 Office du Niger II, BM 2a) 1998 66 856 Irrigation N'Débougou, Inv. 2b) 1998 70 486 Irrigation N'Débougou, BM	
Project-executing agency	(all) Office du Niger	
Consultant	(1a,b) Agrar- und Hydrotechnik GmbH, Essen (2 a,b) AHT/Betico/SOCEPI	
Year of ex-post evaluation	**2005**	
	Project appraisal (planned)	**Ex-post evaluation (actual)**
Start of implementation	1a) 01/1990 1b) 07/1990 2a) 12/2000 2b) 07/2001	1a) 02/1990 1b) 08/1996 2a) 07/2000 2b) 06/2000
Period of implementation	1a) up to 96 months 1b) 60 months 2a) 48 months 2b) 36 months	1a) 90 months 1b) 60 months 2a) 48 months* 2b) 43 months
Commissioning*	1a) gradually from 12/91 2a) gradually from 06/2001	1a) gradually from 06/95 2a) gradually from 06/2002
Total cost	1a) EUR 14.1 million** 1b) EUR 3.8 million** 2a) EUR 12.8 million 2b) EUR 0.5 million	1a) EUR 19.3 million 1b) EUR 0.9 million 2a) EUR 12.6 million 2b) EUR 0.5 million
Counterpart contribution	1a) EUR 0.0 million 1b) EUR 0.0 million 2a) EUR 1.4 million 2b) EUR 0.5 million	1a) EUR 0.0 million 1b) EUR 0.0 million 2a) EUR 0.7 million 2b) EUR 0.0 million
Financing, of which Financial Cooperation (FC) funds	1a) EUR 14.1 million 1b) EUR 3.8 million 2a) EUR 11.4 million 2b) EUR 0.5 million	1a) EUR 19.5 million*** 1b) EUR 0.9 million**** 2a) EUR 11.9 million****** 2b) EUR 0.5 million
Other institutions/donors involved	None	None
Performance rating	1) 2 2) 1	
• Significance / relevance	2	
• Effectiveness	1	
• Efficiency	1) 2 2) 1	

* Investment measure

** In the project appraisal report a complementary measure was planned; the committed funds were not allocated to the investment and the complementary measures until the contract was concluded.

*** After more funds had been added in 1994, residual funds were used for Project 2.
**** The funds for the complementary measure were reduced by EUR 2.9 million.
****** Including the additional funds and residual funds from (1) and the Office Niger I project, BMZ project ID 1988 66 626. Residual funds of approx. KEUR 68 are being used for project 2003 65 577.

Brief description, overall objectives and project objectives with indicators

In both project (1) Office du Niger II and project (2) Irrigation N'Débougou sections of the N'Débougou irrigation perimeter were rehabilitated. The programme dealt with independent parts of an overall rehabilitation plan supported by various donor for the approximately 50,000 ha of irrigation areas of the Office du Niger.

(1) The project covered repairing the irrigation and drainage channels, leveling and the new division of irrigation areas (2,300 hectares originally planned) within the N'Débougou perimeter. As part of the complementary measure, both the executing agency Office du Niger (ON) and the farmers' organisations were given the support of advisory services in the fields of irrigation management, maintenance, monitoring and organisational development.

Overall objective: A long-term improvement in the nutrition situation in the country using its own resources.
Indicators to measure the achievement of the overall objective: The nutrition situation in the project area (without further measurement details) and the sale of rice to other parts of the country.

Project objective: To secure the subsistence of approx. 430 farming families. Indicators to measure the achievement of the project objective: An increase in the yields of rice from 1.8 t/ha to 5.0 t/ha (was changed in the progress check made in January 1993 to 6.5 t/ha) and an increase in family income from FCFA 1,300 to FCFA 123,000.

The target group consists of the farming families deriving a living from the perimeter (approximately 5,700 residents in the five villages in the project area).

(2) The project objective was to increase agricultural production, principally in rice-growing, in an irrigation area originally planned to cover 2,860 ha (basic variant) or 3,100 ha (extended variant) in the N'Débougou perimeter by repairing and extending the irrigation and drainage networks, including rehabilitating the main conduit over 13.5 kilometres and digging main drainage channels over 34 kilometres. As part of the complementary measures, advisory measures for the farmers' organisations and ad hoc basic and further training measures for ON staff were carried out.

The overall objective of the project is to improve the living conditions of the families in the project region. Indicator for the achievement of the overall objective: Increase in the income per hectare devined from rice-growing in the rainy season from FCFA 150,000 to FCFA 250,000 with project.

Project objective: To increase agricultural production.

Indicators for the achievement of the project objectives: Increase in yields from the rice growing areas in the rainy season from 3.4 t/ha (without project) to 4.9 t/ha (with project), increase in cultivation intensity from 1.0 to 1.2.

The target group consists of approximately 700 farming families, or approximately 11,000 residents, in the project region with usage rights for the irrigation areas.

With regard to the overall objectives it is noticeable that in the case of the Office du Niger II project (to improve the nutrition situation in the country) they are far more demanding than in the N'Débougou project, where the focus is on regional nutritional effects. Given the size of the irrigation area in the FC project, the national impact is comparatively small so that it appears to make more sense to gear the overall objective for the Office du Niger II project to the targets set for the regional improvement in the nutrition situation. There are also striking differences in the target indicators for income and yields per hectare although parts of the same perimeter are concerned. The very large increase in income in the case of Office du Niger II can be explained by the fact that in the without project case it was assumed that nearly the entire production

would be consumed by the producers, meaning that virtually no financial income would be generated.

Programme design / major deviations from the original programme planning and their main causes

The FC projects on two sections of the N'Débougou perimeter were independent parts of an overall rehabilitation plan for repairs and to increase agricultural production in irrigation areas with gravity irrigation (a total of approximately 50,000 ha) in the sphere of influence of the Office du Niger (ON). The overall rehabilitation place was supported by various donors (including the World Bank, the EU, the Netherlands and France).

(1a and b) On the basis of the detailed plan drawn up by the consultant, the construction work was put out to international tender. Participation by the farmers in the construction work through physical or financial contributions planned during the project appraisal was not implemented (they were originally intended to participate in the detailed planning) as the relatively high technical extension standards made it necessary to make more use of machines. The delays in preparing the detailed plan and the tender documents resulted in considerable delays in implementation. The measures carried out were more extensive than planned in the project appraisal and covered the rehabilitation of 2,648 ha of irrigation areas (including 2,544 ha for growing rice and 104 ha for growing vegetables).

The investment costs were considerably higher than planned in the project appraisal. This was caused by the increase in the estimate of quantities, a higher rehabilitation standard and more extensive rehabilitation measures arising from the fact that the irrigation and drainage system had deteriorated substantially in the meantime.

(2a and 2b) The final design, the preparation of the tender documents and the supervision of construction were carried out with the support of the FC consultant. The construction work on the second and third category channels was carried out by construction companies. As planned, the rehabilitation or the extension of third category channels and the planning of irrigation areas was carried out by the farmers themselves. In particular, the farmers who did not previously have land use rights, showed great willingness to carry out the work and the lower technical standard was compatible with the low-cost design. Substantial changes to the construction measures are connected with the more extensive rehabilitation of the main conduit over its entire length (project appraisal: 13.5 km; actual: 15.3 km). This resulted in an improvement in the water supply for the entire irrigation area within the perimeter. With regard to drainage, the 9.3 km of the Drain de N'Débouhou were dredged but the planned dredging of the Siengo (14 km) and Dina (10 km) drainage receivers, which are not used directly to drain the project areas, was not carried out as it had been since carried out independently by ON. As noted in the project appraisal, the technical design consistently took care to keep the costs of the rehabilitation and extension measures to a minimum. Existing structures that were in an acceptable condition were not replaced. Altogether, the value of 3,639 ha of irrigation land was raised – 2,892 ha as part of rehabilitation and 747 ha by adding new land. This exceeded the plans in the project appraisal (basic variant: 2,858 ha; extended variant: 3,108 ha). Under the complementary measures, ON and the farmers were given the support of specialist advice in the fields of water management, maintaining the irrigation infrastructure, agronomy and measures to strengthen the institutional structure of farmers' organisations.

In neither project was there any indication that funds were misused. The residual amount of roughly KEUR 17 in the N'Débougou project will be used for other projects. KfW will provide separate information on this matter.

Key results of the impact analysis and performance rating

(1a) The rehabilitated irrigation areas are managed by the farmers and used in their entirety during the rainy season. In the dry season, the land use is considerably less. One cause is an insufficiently developed agricultural banking system for loans. This means that farmers do not have funds in time for them to be used for the second cultivation period, allowing them to

acquire the necessary inputs (seed, fertiliser). In addition, given the limited availability of water in the dry season, it is only possible to use the entire area for crops that require less water than rice (e.g. vegetables). In the individual parts of the perimeter, the cultivation intensity is between 1.3 and 1.6. The rice yield is 6 t/ha. The income of a farming enterprise (average 2.8 ha) computed on the basis of a model calculation is approximately FCFA 2,000,000. Without project an income of approximately FCFA 1.2 million would have been achieved.

(2) Whereas the rehabilitated areas were allotted to 957 families who already had land use rights in the perimeter, the 747 ha of new irrigation areas were allotted to farmers (1,360) who had previously had no land use rights in the perimeter. In 109 cases women were given land use rights as the heads of households. The yields per hectare and the cultivation intensity matched those of the Office du Niger II project (rice yield 6 t/ha; cultivation intensity 1.3); at 1.6 ha, the average size of farming operations is smaller than in the Office du Niger project. The income computed on the basis of a model calculation was around FCFA 1.2 million and would have been FCFA 0.7 million without project.

The operating situation is identical for both projects. An overall agreement (Contrat-Plan) clearly stipulates the tasks of the state, the ON and the farmers with regard to maintaining the perimeter. The primary and secondary irrigation and drainage system is operated and maintained by ON, although private enterprises are mainly engaged for this work. The responsibility for the tertiary system is borne solely by the users and they do most of the maintenance work. Maintaining the primary system is partly financed by state subsidies. The cost of maintaining the primary and secondary irrigation and drainage systems is financed by water tariffs paid by the users. Tariffs of FCFA 65,300 per hectare are charged in the main cultivation period and FCFA 6,530 per hectare in the dry season, covering roughly 80% of the operating and maintenance costs. The collection of the tariffs functions relatively well (collection efficiency: 80 to 90%), which is helped by the fact that usage rights can be withdrawn from people who default on their payments.

The farmers are organised in “associations villageoises” (village level associations). Within the “Comité paritaire des gestions des fonds d’entretien du réseau secondaire”, on which they have equal representation with ON, they participate in decisions about the level of the tariffs and about the implementation and supervision of maintenance measures at the level of the secondary networks. For the organisation and implementation of maintenance work in the tertiary system, they have formed “organisations de l’entretien du réseau tertiaire” (organisations for the maintenance of the tertiary network).

The maintenance of the irrigation and drainage systems is satisfactory. The channels and structures in the primary and secondary systems are in a good condition. In the tertiary system there is some damage to the structures channelling water to the fields. In the tertiary system work is not always carried out to the extent required because the holders of land use rights who do not live in the project region and who have the work done by paid external workers are less willing to carry out maintenance work than the local holders of land use rights, who mainly do the work themselves.

When assessing the income effects, it should be noted that the details in the project appraisal were based on a yield of 1.8 t/ha, which was too low. According to ON figures, in 1996-97, i.e. before the first project measures took effect, the rice yield was 4.4 t/ha. If this level is assumed in the without project case, project-related income growth is around 70%. After deductions have been made for rice used by the rice-growing families in the project (some 35,000 persons), there has been a distinct increase in the amounts of marketable rice (Office du Niger: 3,500 t per annum; N’Débougou: 8,749 t per annum; total 12,240 t). This corresponds to 2.3% of the national production of rice (the equivalent of the amount of rice needed by roughly 61,000 people per annum). The economic rate of return is positive for both projects (Office du Niger: 5%, N’Débougou: 19%). The lower investment costs per hectare and the larger share of new areas led to a very high rate of return in the case of N’Débougou.

We rate the developmental effectiveness of the project as follows:

The programme objectives with regard to increasing the surface yield were achieved in both projects. In both projects far more cultivation areas were rehabilitated/extended than originally planned. Although in the Office du Niger project the relative increase in income was below the target indicators, too low yields were assumed from the outset in the without project situation and income was therefore underestimated. The increase in income of around 70% resulting from the project can be assessed as good. The sustainability risks for the long-term operation of the perimeter are relatively small. The irrigation and drainage systems are in a good overall condition. We classify the effectiveness of the project as good (sub-rating 1).

The assumption that rehabilitating or expanding irrigation areas would lead to a marked increase in agricultural yield and income and hence an improvement of living conditions for the families living in the project region was correct (relevance). The impact on the families living in the project region was considerable, as the increase in income and rice yields clearly shows. Therefore, we classify the significance/relevance of both projects as satisfactory (sub-rating: 2).

The rehabilitation costs for the Office du Niger project were appropriate and for the N'Débougou project low (production efficiency). The economic rate of return of the Office du Niger project is, at 5%, above the minimum level of 3% promoted for LDC countries. In the case of the N'Débougou project, a very high economic rate of return of 19% was achieved (allocation efficiency). We assess the efficiency of the Office du Niger project as satisfactory (sub-rating 2) and of the N'Débougou project as good (sub-rating 1).

Overall we assess the developmental impact of the Office du Niger project as satisfactory (rating 2) and of the N'Débougou project as good (sub-rating 1).

In both projects direct poverty reduction was targeted and was strengthened by the high degree of organisation of the target group in user groups. By setting up user groups which have substantial co-determination rights regarding the operation of the Perimeter, the projects helped to improve participation. Although improving gender equality was not an explicit project objective, the projects displayed potential for improving the gender situation. Positive impacts occurred in the case of the N'Débougou project by land use rights being distributed to women heads of households. In the Office du Niger II project no specific impacts improving gender equality were detected. The projects did not pursue the goal of improving the environment. They were mainly concerned with rehabilitation, through which positive environmental impacts resulting from improvements to the drainage system offset possible negative environmental repercussions (increase in the use of pesticides and fertilisers, salinisation, health risks).

Conclusions and recommendations

In order to achieve the full potential of irrigation perimeters in terms of increasing the cultivation intensity, the farming enterprises also need secure and sufficient liquidity. Socio-economic analyses in the planning stage should include checking whether these conditions are met in the initial situation. Otherwise the project design should be supplemented by measures to improve marketing and credit supply, which can be part of other projects in the project region.

The projects show that fairly complex agricultural irrigation projects in large perimeters, which require a large amount of coordination and organisation, can be implemented and run successfully. In addition to a sufficiently effective executing agency, key success factors also include underlying sector conditions that make it possible to achieve sufficient profitability in the irrigation area, particularly regarding rice-growing. In this respect, landlocked countries such as Mali have natural advantages as the high costs associated with transporting imported rice form a natural hedge around domestic production, while countries with efficient ports are subject to more international competitive pressure.

Assessment criteria

Developmentally successful: Ratings 1 to 3	
Rating 1	Very high or high degree of developmental efficacy
Rating 2	Satisfactory developmental efficacy
Rating 3	Overall sufficient degree of developmental efficacy
Developmental failures: Ratings 4 to 6	
Rating 4	Overall slightly insufficient degree of developmental efficacy
Rating 5	Clearly insufficient degree of developmental efficacy
Rating 6	The project is a total failure.

Criteria for the evaluation of project success

The evaluation of the "developmental effectiveness" of a project and its classification during the ex-post evaluation into one of the various levels of success described in more detail below concentrate on the following fundamental questions:

- Have the **project objectives** been achieved to a sufficient degree (project **effectiveness**)?
- Does the programme generate sufficient **significant development effects** (programme **relevance** and **significance** measured in terms of the achievement of the overall developmental policy objective defined beforehand and its effects in political, institutional, socio-economic and socio-cultural as well as ecological terms)?
- Are the **funds/expenses** that were and are being employed/incurred **appropriate** with a view to achieving the objectives and how can the programme's microeconomic and macroeconomic impact be measured (**efficiency** of the programme design)?
- To the extent that undesired **(side) effects** occur, can these be tolerated?

We do not treat **sustainability**, a key aspect to consider when a project is evaluated, as a separate evaluation category, but rather as an element common to all four fundamental questions on project success. A project is sustainable if the project-executing agency and/or the target group are able to continue to use the project facilities that have been built for a period of time that is, overall, adequate in economic terms, or to carry on with the project activities independently and generate positive results after the financial, organisational and/or technical support has come to an end.