

Ex post evaluation – Peru



Sector: Drinking water, water management, waste water/solid waste (1403000)
Project: Cajamarca drinking water supply/waste water disposal cooperative programme (1996 66 181)*
Implementing agency: Empresa Prestadora de Servicios de Saneamiento de Cajamarca S.A.



Ex post evaluation report: 2017

		Project (planned)	Project (actual)
Investment costs (total)	EUR million	14.01	10.54
Counterpart contribution	EUR million	3.78	2.29
Funding	EUR million	10.23	8.25
of which BMZ budget funds	EUR million	10.23	8.25

*) Random sample 2016

Summary: The drinking water supply and sewage disposal systems in the city of Cajamarca were rehabilitated and extended within the cooperative programme with GIZ (Technical Cooperation measure to professionalise administrative structures, work-flows and target group awareness efforts). Empresa Prestadora de Servicios de Saneamiento de Cajamarca S.A. (SEDACAJ), the local public utilities services provider, was the project executing agency.

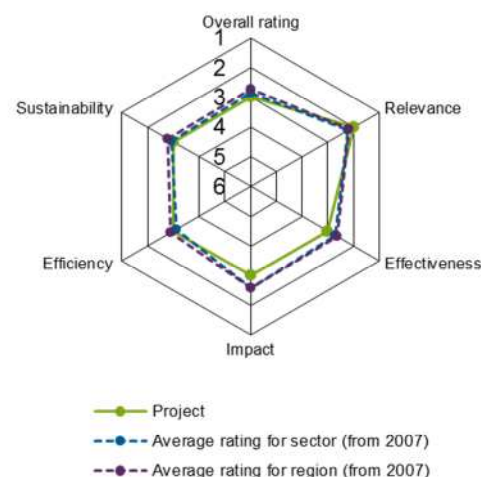
Development objectives: Development policy objective (impact): decreasing the health hazard to Cajamarca residents caused by deficiencies in the water supply and sewage disposal systems, along with improving the living conditions of the project area’s inhabitants. Project objectives (outcome): a) year-round, continuous supply of an appropriate amount of quality drinking water to the population in the entire project area; b) guaranteeing central collection and treatment of sewage for the narrower project area, to be accomplished safely in terms of community hygiene and ecology.

Target group: 88,000 residents of the city of Cajamarca (forecast during programme appraisal). In fact, due to the sharp population growth, around 170,000 residents were reached (2016).

Overall rating: 3

Rationale: The treatment plant construction component resulted in a failure; albeit in a context where the project’s set drinking water-related targets were significantly surpassed and the project’s financial focus area was on the water supply and sewage collection (only around 10% of project funds were allocated to sewage treatment). The number of residents supplied, which was far higher than plans envisaged, still produces a satisfactory project outcome in this regard.

Highlights: The contamination from the introduction of untreated sewage – which has not been significantly diluted – is currently rated as critical for the catchment area of the receiving body of water located downstream from the city. However, in the medium term, an improvement can be expected in this respect from the implementation of a planned treatment plant located outside the city. The planning was initiated on a national level with support from the ministry responsible, MVCS, in 2014. The associated feasibility study is due to be completed in the near future.



Rating according to DAC criteria

Overall rating: 3

Ratings:

Relevance	2
Effectiveness	3
Efficiency	3
Impact	3
Sustainability	3

Relevance

The project aims to make a contribution to the global development agenda (Millennium Development Goal 7 and Sustainable Development Goal 6) by guaranteeing access to hygienic drinking water for 88,000 people (planned). This is also a stated development goal for Peru. The 2021 development plan (Plan Estratégico de Desarrollo Nacional, Peru hacia el 2021) aims for a national drinking water and sewage supply coverage rate of 90 % by 2021. In addition, the project's focus on one of the poorest regions in the country made it a suitable and important means of contributing to poverty reduction.

Before the project started, only around half (58 %) of Cajamarca's inhabitants were connected to the drinking water network. Around 27 % of inhabitants obtained their drinking water from neighborhood connections or were supplied from tank trucks by the executing agency. Another 10 % were supplied from small, isolated systems whose supply standards were classified as qualitatively and quantitatively inadequate at the project's outset. A small portion of the population (5 %) gained their supply from 33 public standpipes belonging to the project executing agency. Around 53 % of the population was connected to a sewage system, which was designed as a separation system (sewage only). This system's wastewater flowed to a two-stage lake sewage treatment plant. Before the project started, the unhygienic nature of the water resources available and the inadequate situation in terms of disposal presented a latent health hazard to the population. The surrounding area was contaminated with insufficiently treated wastewater.

The project design was fundamentally suitable for achieving the desired effects. Improving the quality (higher water quality) and quantity (higher connection rate, regular supply) of the water supply makes it plausible for the health hazard to the population to be reduced and for their living conditions to be advanced. This is also true for the treatment of wastewater, which would have enabled environmental and health hazards to be reduced on the receiving body of water's lower reaches. We consider the planned (not yet implemented) conversion of the treatment plant, or construction of a treatment plant at another suitable location, to be immediately necessary and critical.

The project was undertaken as a cooperative programme with GIZ. However, similar to other cooperative programmes, the concurrent Technical Cooperation (TC) project start combined with a shorter preliminary period (compared with the FC measure) meant that the TC measures (professionalisation of administrative structures, process flows and target group information) had already been completed once the FC measures were carried through to implementation.

We rate the relevance as good overall.

Relevance rating: 2

Effectiveness

The following were defined as project objectives (outcome) at the appraisal: a) year-round, continuous supply of an appropriate amount of quality drinking water to the population of the project area (city of Cajamarca), and b) collection and treatment of sewage, to be accomplished safely in terms of community hygiene and ecology.

The project funds were used to carry out an expansion and rehabilitation of the water production facilities as well as the transfer and distribution networks. In terms of sewage, measures were taken to expand and rehabilitate the sewage collection network – including creating 6,000 new service connections – in addition to measures to improve rainwater drainage.

The connection rates for drinking water and sewage intended during the programme appraisal were achieved, although the population has approximately doubled in comparison with the indicator value.

However, the expansion of the existing lake sewage treatment plant to include an anaerobic pre-treatment stage (which had been planned within the project) was discontinued without being carried out to completion. This was due to the original location no longer being classified as suitable by the municipality during the course of the implementation. The treatment plant has not been in operation since 2005, meaning that the collected sewage is fed untreated into the receiving body of water downstream of the project area, which accordingly has the potential to create health and environmental hazards (refer to “Impact” section).

The internal quality monitoring of the drinking water produced and continual monitoring of the raw water at the three river intakes were credibly documented with extensive laboratory protocols. The raw water quality measurements show that in particular the aluminium concentration due to nearby gold mining operations does predominantly comply with the applicable limits, but there is an increased need for treatment in order to meet the standard drinking water values. This entails higher operating costs for the operator. After the treatment process, the permitted standard values were consistently reached according to the measurement reports submitted.

We can now note that the targets developed and set for the project are incomplete, as only technical indicators were defined and there were no economic-institutional indicators; these would have been able to illustrate the project executing agency’s performance capacity. In addition, the technical targets set at the time of the appraisal have been far surpassed due to the rapid population development in the project area. In view of this situation, for the purposes of the evaluation, the following indicator is also applied: “the operating revenues cover the ongoing operating costs per cubic metre of water produced.”

The continuous water supply desired during the programme appraisal can be regarded as available in the local context (periodic water shortages and population growth), despite not being a full 24-hour supply (in this case, water unavailability at night). The supplier has been able to maintain the availability at >16 hours per day in recent years.

The achievement of the project objectives can be summarised as follows:

Indicator	Status PA	Ex post evaluation
(1) At least 88,000 inhabitants of the programme region (80 % of the population forecast during the programme appraisal for 2003) continuously received a sufficient amount of quality drinking water (120L/c/d)	55,000 / 58% / – (1996)	173,250 / 86.1 % / 123.34L/c/d Continuous: 18.4h/d, can be regarded as achieved; Quality: achieved according to physicochemical and microbiological measured values in line with the Peruvian standard*
(2) The sewage was centrally collected from at least 83,600 inhabitants (76 % of the population forecast during the programme appraisal for 2003) and directed to the treatment plants.	50,000 / 53% (1996)	172,725 / 85.8% No treatment, so only achieved in part
(3) Lake sewage treatment plant discharge values of 30mg/L BOD5 achieved in the 24-hour composite sample; values in excess of 60mg/L only in exceptional cases.	–	Not achieved

(4) The operating revenues cover the ongoing operating costs	N/A	Achieved.
--	-----	-----------

* We recognise the Peruvian standard as sufficiently stringent. The Peruvian standards are in alignment with the international standards.

The measures were completed by 2007.¹ Rehabilitating the existing water supply and constructing new components (river extraction, drinking water treatment plants, pipelines, supply water reservoir, service connections with water meters, or sewage system with service connections) contributed significantly towards achieving the targets.

However, the sewage has not been treated to date (refer to “Sustainability” section). The planned expansion of the treatment plant that existed at the start of the project (but was not in operation) was aborted in 2006, following disagreements between the project executing agency, consultant, and building contractor. It was then around 50 % implemented. Consequently, improving and expanding the sewerage system enabled the achievement of the central sewage collection objective, though not that of sewage treatment. Since SEDACAJ Cajamarca has since found a new, acceptable location in the course of a feasibility study, completion of a treatment plant is not impossible in the future.

From today’s perspective, although two out of four indicators have not been completely achieved, we still rate the project’s effectiveness as satisfactory based on the positive trends and the planned construction of a treatment plant.

Effectiveness rating: 3

Efficiency

In volume terms, the operating costs (excluding depreciation) for the water supply and sewage disposal systems are PEN 1.8 (Peruvian sol; around EUR 0.48) per cubic metre of drinking water produced. The tariff is currently PEN 2.7 per m³ (equivalent to EUR 0.72 per m³).

The unit cost for water supply was EUR 85 per resident (population equivalent; PE) at the time of the final review in 2008 in terms of the beneficiary population. This means that the specific costs were around 30 % below those projected in the programme appraisal (around EUR 120 per PE without treatment plant). The growth in the beneficiary population over the last eight years (plants were commissioned in 2008 after competitive bidding delays) has helped to reduce this figure further to around EUR 60 per PE in terms of the investments from that time. We consider the unit costs acceptable in light of the special project implementation conditions in the region (altitude, topography, high population growth). From the allocation efficiency point of view, the project investments are appropriate, considering the improved drinking water supply to the city of Cajamarca’s population, which has grown strongly (more than doubling since the programme appraisal in 1996).

The capacity of the El Milagro river water treatment plant is at full utilisation, while only <50 % of Apollona’s capacity can be utilised at present due to a lack of raw water inflow volumes (March to September 2016 – total inflow in accordance with the permit: 380L/s, around 275L/s in March 2016). This guarantees an almost continuous water supply (>17 h/d in Cajamarca, 2015; 18.4 hours in September 2016) with a water consumption of >120 litres per resident per day (123 litres per resident per day in September 2016). However, the capacity utilisation (and operating costs thereby incurred) would be significantly lower if the unaccounted for water rate could be decreased further (stabilised at a level around 25 % in recent years). The fact that water meters are installed at the customers’ locations (88 % of connections) has facilitated almost comprehensive billing by consumption. The collection rate is around 95 %, based on business figures from 2014. The operator’s revenues are sufficient to cover the operating costs.

The funds used for the treatment plant construction (EUR 1.3 million) have an adverse effect on the efficiency level, as this component was aborted and there is no benefit to offset this cost.

¹ Until the final review (June 2015), further research only continued to be carried out on the treatment plant that was not ultimately realised.

In summary, we still rate the project's efficiency as satisfactory.

Efficiency rating: 3

Impact

The development policy objective was to reduce the health hazards to Cajamarca residents and decrease damage to the urban environment. From today's perspective, this goal is expanded to include the improvement of living conditions for the target group. Some indicators in this area were not set in the programme appraisal.

At present, around 173,250 residents (around 118,250 more than in the programme appraisal and around 85,250 more than planned) are supplied by means of access to the central water network (service connection).

More than 172,725 residents (around 122,725 more than in the programme appraisal and around 89,125 more than planned) have been connected to a functioning sewerage system in the meantime. This significantly reduces the risk of waterborne diseases inside the Cajamarca urban area.

The quality of the drinking water available in the urban network (86.1 % of the water supply) increased considerably as a result of the project's measures, according to information provided by SEDACAJ. Laboratory figures confirm that the drinking water quality complies with national standards. It also appears plausible based on the conversations held on site that there was a drop in diseases spread through contaminated drinking water. From today's perspective, however, it is no longer possible to identify whether the drop in gastrointestinal illnesses in the urban area is attributable to the improved drinking water quality or lower use of unsafe drinking water sources (which are still being used but to a very limited extent).

Sewage is discharged below Cajamarca's city centre and the National University of Cajamarca into the Rio Mashcon (6.276 million m³ for Cajamarca, 2015), guaranteeing the positive environmental impacts (when viewing the urban area in isolation). The sewage is not significantly diluted by the small river during the dry season (the sewage to river water ratio was approximately 1:1 on the day of inspection). The next largest settlement directly on the receiving body of water (the Rio Mashcon) is Jesus. It is located around 9 miles (15km) downstream. Along these reaches, three other bodies of water enter the Rio Mashcon from the adjacent mountains. The two districts located downstream of Cajamarca – Llacanora and Jesus – have populations totalling around 5,000 and 15,000, respectively (Census 2005, no significant growth presumed to have occurred since). The result downstream of the Cajamarca project area is below expectations due to the lack of treatment performed on the wastewater (predominantly sullage, but with some proportion coming from industry) and the associated potential risks to people² and the environment. On the whole, however, the positive results of the project's development policy impacts take precedence due to the improvement of the situation in the urban area, especially the water supply.

Impact rating: 3

Sustainability

The overall maintenance condition of the facilities examined in the drinking water area is satisfactory. The ecological sustainability of the project with regard to the water supply is genuine. The water catchment area does not contain any permanent glaciers. SEDACAJ is allowed to extract a total of 380L/s from three rivers in accordance with the existing permits. SEDACAJ notes that the volumes of water at the raw water intakes on the three upper reaches (Rio Grande, Rio Parcón and Rio Ronquillo) have decreased as a result of more water extraction by third parties on the upper reaches, falling significantly below 380L/s across several months for the first time during the dry season in 2016 (March 2016: 275L/s). Upstream of the three extraction stations, there are sporadic farms and smaller settlements that graze livestock, grow flowers (roses) and farm fish (trout). Altogether, this is not anticipated to endanger the water quality at all, though this does result in substantial water consumption upstream of the raw water intake, e.g. on the Rio Grande.

² However, we can assume that the Rio Mashcon is not used to obtain drinking water in these districts, with other tributaries in the mountainous region used to this end. On the other hand, this could not be verified on site.

As explained above, the receiving body of water's insufficient year-round water volume fails to ensure that the discharged sewage is adequately diluted. This creates potential environmental hazards for the nearest settlements on the lower reaches (though there are other tributaries available as a drinking water supply). There is no ecological sustainability when it comes to the sewage component.

There is currently institutional-political sustainability, albeit subject to risks. Indeed, there is presently no alternative to the model of local public water utilities in mid-sized cities such as Cajamarca. However, efforts both to privatise and centralise can be observed among national actors. In 2013, an "insolvency prevention law" was introduced for local water suppliers in Peru, aimed at averting financial imbalances at an early stage. A first application of the law is currently being prepared for six water suppliers and is due to be supported by bodies including GIZ. The law provides the option of temporarily placing local water suppliers under national administration. At the same time, by establishing the Programa Nacional de Saneamiento Urbano (PNSU), the line ministry has created an instrument for centralising local water suppliers' previously decentralised investment activity. Since then, it has conducted around 50 % of nationwide investment activity in the sector. However, these tendencies of re-centralisation are faced with strong local political interests to keep water suppliers in municipal hands.

SEDACAJ enjoys relatively high acceptance among the population (around 62 % of users were satisfied with the service according to the latest survey). SEDACAJ's staff is stable under the politically-appointed Management Board, and gives the impression of expertise, which is also evident in the satisfactory maintenance condition of the systems that have been financed.

SEDACAJ generates enough revenue to cover running costs. However, the financial scope for investments and new acquisitions is too narrow to be able to absorb unexpected shocks in the short term. Higher maintenance and expansion investments are largely financed by means of third-party grants. Consequently, the risks to operations appear to be tolerable. In addition, the TC organised information efforts among the target groups in order to increase acceptance of the new water supply and related costs. We still consider the sustainability risks in terms of economic efficiency to be tolerable overall.

The health hazards have decreased with regard to the project region of Cajamarca. The contamination from the introduction of untreated sewage – which has not been significantly diluted – by around 172,000 people and industry actors (e.g. Gloria milk production), is currently rated as potentially hazardous to health for the catchment area of the receiving body of water (Rio Mashcon) located downstream from the city.

However in the medium term, an improvement can be expected in this respect from the implementation of a planned treatment plant located outside the city. The planning was initiated on a national level with support from the ministry responsible, MVCS, in 2014. The associated feasibility study is due to be completed in the near future.

Overall, taking account of the limitations mentioned above, we classify the sustainability of the project impacts as only just satisfactory.

Sustainability rating: 3

Notes on the methods used to evaluate project success (project rating)

Projects (and programmes) are evaluated on a six-point scale, the criteria being **relevance, effectiveness, efficiency** and **overarching developmental impact**. The ratings are also used to arrive at a **final assessment** of a project's overall developmental efficacy. The scale is as follows:

Level 1	Very good result that clearly exceeds expectations
Level 2	Good result, fully in line with expectations and without any significant shortcomings
Level 3	Satisfactory result – project falls short of expectations but the positive results dominate
Level 4	Unsatisfactory result – significantly below expectations, with negative results dominating despite discernible positive results
Level 5	Clearly inadequate result – despite some positive partial results, the negative results clearly dominate
Level 6	The project has no impact or the situation has actually deteriorated

Rating levels 1-3 denote a positive assessment or successful project while rating levels 4-6 denote a negative assessment.

Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability): The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability): The developmental efficacy of the project (positive to date) is very likely to decline only minimally but remain positive overall. (This is what can normally be expected).

Sustainability level 3 (satisfactory sustainability): The developmental efficacy of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive developmental efficacy.

Sustainability level 4 (inadequate sustainability): The developmental efficacy of the project is inadequate up to the time of the ex post evaluation and is very unlikely to improve. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and no longer meet the level 3 criteria.

The **overall rating** on the six-point scale is compiled from a weighting of all five individual criteria as appropriate to the project in question. Rating levels 1-3 of the overall rating denote a "successful" project while rating levels 4-6 denote an "unsuccessful" project. It should be noted that a project can generally be considered developmentally "successful" only if the achievement of the project objective ("effectiveness"), the impact on the overall objective ("overarching developmental impact") and the sustainability are rated at least "satisfactory" (level 3).