Ex post evaluation – Jordan

Sector: Basic drinking water supply and basic sanitation (CRS code 14030)
Project: Immediate Measures to Increase the Water Supply for Syrian Refugees - IMWS BMZ No. 2012 66 832 (Phase I), BMZ No. 2013 66 814 (Phase II)*
Implementing agency: Water Authority of Jordan (WAJ)

Ex post evaluation report: 2018

in EUR million	Phase I (Planned)	Phase I (Actual)	Phase II (Planned)	Phase II (Actual)
Investment costs	8.50	8.37	10.00	9.88
Counterpart contribution	0.00	0.00	0.00	0.00
Funding	8.50	8.37	10.00	9.88
of which BMZ budget funds	8.50	8.37	10.00	9.88

*) Random sample 2018

Summary: Over the course of the strong influx of Syrian refugees from civil war regions in the neighbouring country, the Jordanian water facility Yarmouk Water Company (YWC) was no longer able to adequately ensure the water supply for the local population in northern Jordan. As most of the Syrian refugees (80%) lived outside of the refugee camps, the already precarious water supply situation intensified. The objective of both projects was to increase water production by rehabilitating and building new wells and to alleviate supply bottlenecks by improving and maintaining the distribution infrastructure.

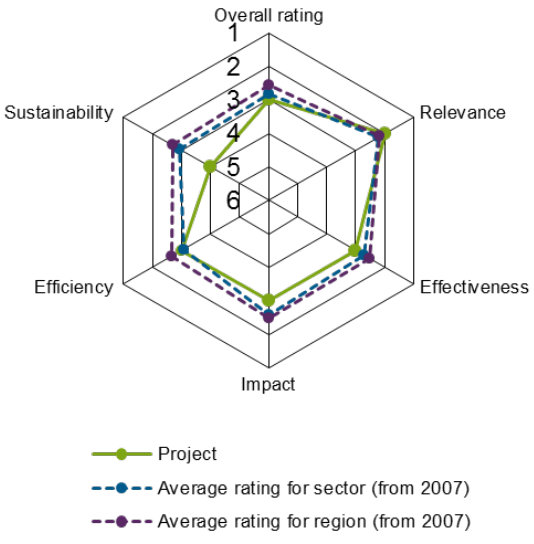
Objectives: FC programme objective (impact): the programme objective was implicitly formulated as a reduction or alleviation of political tension due to water related crises.
FC module objective (outcome): improving the water supply for the domestic population and the Syrian refugees in northern Jordan with clean drinking water (PP I + II).

Target group: Syrian refugees outside of refugee camps and the host population in Jordan in areas with a particularly large refugee presence (Irbid, Ar-Ramtha and Mafraq).

Overall rating: 3 (both projects)

Rationale: The project responded quickly and effectively to the local water crisis. Unfortunately, the positive results during the impact period were very limited and jeopardised due to increasing structural risks. However, the unsatisfactory sustainability rating does not determine the overall rating as this was an emergency assistance measure.

Highlights: The project demonstrates the major significance and the equally major challenges that arise from fast project planning and execution in a fragility and crisis context. On the one hand, many project participants expressly praised the political commitment and reliability of German cooperation to respond quickly and flexibly to the crisis. On the other hand, the funds were in part used inefficiently and allocated in ways that were not sustainable, which can also be traced back to lower appraisal requirements (TC-47) due to expedited procedures. Despite the crisis mode, it was also possible to achieve exemplary planning improvements through technical cooperation measures at the implementation level.



Rating according to DAC criteria

Overall rating: 3 (both projects)

Ratings:

Relevance	2
Effectiveness	3
Efficiency	3
Impact	3
Sustainability	4

General conditions and classification of the project

When the project concept was created in 2012, the sharp increase in Syrian refugee numbers was identified as a major risk to the functionality of an already precarious water supply in northern Jordan, as well as to the political stability associated with this. Because the influx of refugees progressed so quickly and it was necessary to assume that the situation would escalate in the future, Phase I of the project was designed as an “emergency project for natural catastrophes, crises and conflicts” with a limited appraisal process (TC-47). To accelerate planning and achieve impacts as quickly as possible, we neither a target group and stakeholder analysis, nor an environmental and social impact assessment (ESIA) was realized. There was furthermore no analysis of the impelementing agency done and no call for international competitive bidding for the construction projects took place.

Relevance

The violent suppression of a peaceful protest in the southern Syrian city of Daraa in March 2011 is considered the starting point of the civil war in Syria. Over the course of the increasingly violent conflicts, many Syrian families crossed the border into Jordan in search of short-term protection among friends and relatives. The number of internally and externally displaced persons increased when the conflicts further intensified. The United Nations first spoke of a state of civil war state in Syria in June 2012, in response to which the international community mobilised refugee aid. At that time, there were already 37,000 registered refugees in Jordan and a large number of unregistered Syrians living with Jordanian host families. The number of registered refugees increased to 430,000 people by Phase II and was estimated at around 672,000 people at the time of ex post evaluation. Jordanian estimates, which also include unregistered persons, assume there are around 1.3 million Syrians in Jordan. The majority (around 80%) of Syrian refugees live outside of refugee camps in what are known as hosting communities.

Due to the increasing number of refugees, private demand for water also increased dramatically, which was already difficult to meet before the refugee crisis reached a critical state. In summer 2012, water was only supplied for a maximum of six hours every two weeks in several regions within the greater Irbid area. Many private homes were thus forced to rely on expensive water from private supply companies in times of crisis. Furthermore, protests carried out by the Jordanian population against their local government continued to increase in the course of the Arab Spring. Against this background, plans for the “Immediate Measures for Improvement of Water Supply in Northern Jordan directed to Syrian Refugees – IMWS” project were expedited starting in July 2012. The project pursued a dual purpose. By increasing water production (outcome level), the project was intended to quickly improve the water supply for Syrians and Jordanians in the hosting communities so as to promote political stability within the country and avoid conflicts due to the distribution of scarce water resources (impact level).

Due to the extreme urgency, increasing refugee numbers and inadequate water supply for the target group, the project can be classified as particularly relevant. The same applies for the selection of the project region in northern Jordan, where a particularly large number of refugees were located due to the proximity of the Syrian border. The fact that the project is not only addressed towards the needs of the refugees, but also towards Jordanian citizens from the hosting communities is particularly important to its intent to contribute to Jordan’s political stability. At the same time, it is fair to mention that other problems

also arose due to increasing numbers of refugees. These issues had sometimes an even higher priority from the target group's perspective. Further problems included increasing rents and a housing shortage, high unemployment, increasing competition in the low-wage labor market and heavily overloaded health stations due to refugees. However, German development cooperation's prioritisation of the water supply seems plausible because existing capacities and structures could be quickly mobilised and effectively used based on the long-term cooperation in the water sector. Also, in the spirit of labor division, other problems were being addressed by other donors.

Rehabilitation and new construction of wells was the only effective intervention option to quickly increase water production at the time of the project. Furthermore, increasing the production capacity and selective reduction of water losses are generally an important prerequisite for sufficient water provision at household level. However, no specific mechanisms were implemented to make targeted improvements to the conditions in places where the most precarious situations were at the time of the crisis. Because no target group and stakeholder analysis was performed, no detailed or verifiable criteria could be defined for selecting the location for infrastructure improvements. Furthermore, precise distribution of the scarce water resources is and was dependent on many social factors that were not addressed in the project design. These included factors like the specific allocation of water to specific districts by YWC (the operator) and the installation of water tanks and possibly (illegal) pumps at the household level.

Close coordination with the partner country was taking place at the time the project was planned. However, a more comprehensive coordination process with other donors was only initiated during project implementation and in the subsequent phases. This can be attributed to factors such as other donors only being able to define their project portfolios in the sector at a later date while IMWS I & II stand out today due to their speed in implementation. The first results in terms of increasing water production were thus able to be achieved just a few months after the project began.

Relevance rating: 2 (both projects)

Effectiveness

The projects success indicator at outcome level was defined in the planning phase as the additional amount of water supplied to the water network from the wells that were to be rehabilitated. The indicator could only be ascertained and given a value after the selection process of specific wells and the allocation of funds. The target for additional production from rehabilitated and new wells was than fixed at 400m^3/h in Phase I and at least 1000m^3/h in Phase II.

However, this indicator poorly reflects the utilization of project outputs at the outcome level. Therefore, indicator (2) was defined as a supplement during ex post evaluation.

Achievement of the defined outcome indicators can be summarised as follows:

Indicator	Status PA, target PA	Ex post evaluation
(1) Additional amount of water supplied to the network	PA IMWS I: - PA IMWS II: - Target PA I: 400m^3/h Target PA II: 1000m^3/h	Final follow-up IMWS I: 764m^3/h Final follow-up IMWS II: 1162m^3/h EPE IMWS I: 428m^3/h EPE IMWS II: 687m^3/h
(2) Water consumption rose at least 20% by project completion in at least 80% of all households with limited water supply. [1]	PA IMWS I: not available. PA IMWS II: not available. Target value: 80%	58%

1) Limited water consumption is defined as 60 litres per person per day with an average household size of 6 people. The indicator was defined during ex post evaluation.

The pumping capacity of the financed wells fell 44% from the time of the final follow-up for IMWS I (June 2016) until ex post evaluation (August 2018) and in the case of IMWS II (November 2017) it fell 41%. The objective for IMWS I was therefore exceeded by 7%, whereas the objective for IMWS II is already 31% below target. An important factor for the downturn in overall production is the loss of 13 of the 37 financed wells at the time of ex post evaluation. The main reasons for the losses were technical problems and reduction in water quality and water amounts due to over-utilisation of the groundwater ressources. Furthermore, if we add to this estimation an average rate of technical non-revenue water losses of 23% for the northern governorate, only 886m^3/h of the additionally produced water reaches the final customers.[1] On average, this would at least be sufficient for close to 94,000 additional customers with a water supply of 80 litres per capita and day. But this figure is much lower than the estimates in the final reports of both projects (190,000 for IMWS I & 343,500 for IMWS II). The differences primarily result from technical water-losses and production losses that were not taken into account in the official reporting.

To measure whether production increases really translated into an increase in private water consumption, a sample of water meter measurements of close to 110,000 customers from YWC were compared in 2013 and 2017. The sample comprised 30% of all customers in the northern governorates. The results suggest, that overall, the increased production from IMWS II (2014–2017) did not result in an aggregated increase in water consumption at the household level in 2017.The total private water consumption in the random sample remained relatively stable with a slight increase of 0.56%. This suggests that the additional production from IMWS I & II was most probably neutralised by reductions in other wells' production in the project region. As a consequence, for the most part, it was not possible to compensate for the additional refugee water demand with production increases from IMWS I and II. However, it is plausible to assume that water consumption would have decreased without the project measures.

Our analysis was also able to measure a redistribution of private water consumption from very high water consumers to groups with very low consumption. The redistribution (figures 1 & 2) is the reason for the positive development of indicator 2 and was able to compensate for a portion of refugee demand. However, our allocation efficiency analyses (see below) suggest that this redistribution was not the result of the production increase or of the infrastructure measures from IMWS I and II but was rather due to private measures to improve water supply at household level (procurement of larger water tanks and pumps).

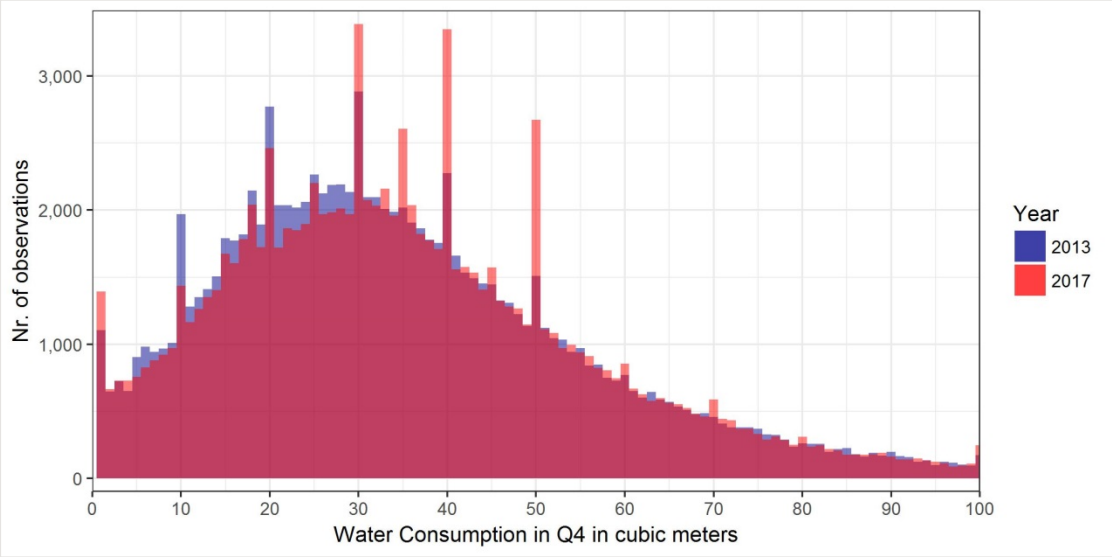


Figure 1: histogram of the overall water consumption in 2013 and 2014 for a random sample of 110,000 customers (information in cubic metres for the fourth quarter)

[1] The unaccounted for water (non-revenue water) in the northern governorates was 46% in 2016. Here it is unclear how much of the losses are due to technical or administrative issues. Rough estimates assume around 50% are technical losses, which would comprise a total of 23% of the water produced.

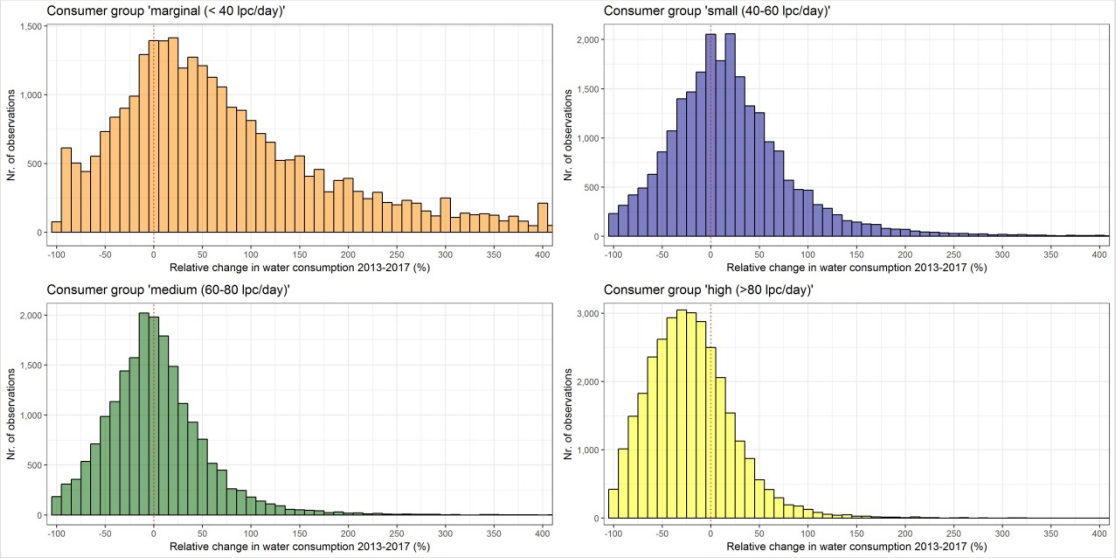


Figure 2: histogram for relative changes in water consumption of select consumer groups between 2013 and 2017 (Q4) for a sample of 110,000 customers

Notes: the four consumer groups in Figure 2 were defined as “marginal” with daily water consumption of 40 litres per capita per day and with an estimated household size of six persons per connection; the “small” group had water consumption rates between 40 and 60 litres per capita per day; the “medium” group had consumption rates of 60 to 80 litres per capita per day and the “high” group had consumption rates of over 80 litres per capita per day. High increases in consumption are plainly evident for the marginal consumer group. In the “small” and “medium” groups, the increases and decreases appear to be fairly balanced, and the decrease clearly dominates in the “high” consumer group.

If we look at the development of both indicators together, we are able to see that the measures from IMWS I & II took effect very quickly, increasing water production in the short term and stabilising it in the long term. However, reductions in production occurred just as quickly and, with regard to the overall number of refugees, the measures were only able to compensate for a small portion of the additional water demand. The additional water quantity produced by IMWS I & II accounted for a total of around 10% of the overall production quantity in the northern governorates.

Effectiveness rating: 3 (both projects)

Efficiency

A quantitative estimate of the costs in the project is difficult due to a lack of comparative figures and widely varying geo-hydrological in-situ conditions in well construction. However, information from several project participants suggests that the production efficiency of the adopted measures was relatively low. Factors that negatively affected production efficiency include: (1) Procurement of materials that were not directly used in the project. These included well equipment that was not suitable for the rehabilitated wells; (2) The short service life of financed wells; (3) Limited competitive bidding for construction measures for which only few bidders could be found. However, it should be noted here that the low number of suitable construction companies is a general problem in Jordan; (4) Problems coordinating rehabilitation measures between YWC and commercial developers. Due to acute water demand on the part of YWC, rehabilitation measures for specific wells were repeatedly interrupted, which led to increased costs. Ultimately, these coordination problems were also one of the reasons why the strategy for well rehabilitation was changed to the construction of new wells. Nonetheless, there were also factors that positively affected the production efficiency. These include: (1) The selection of well locations using geo-hydrological know-how, which reduced suboptimal investment decisions. Due to the estimation of current and/or forecasted water availabilities, BGR reduced the original locations selected by YWC by around 65%; (2) Use of innovative techniques for cabling ascending pipes in the wells, which promise lower maintenance costs and a longer ser-

vice life, at least from a technical perspective; (3) changing the strategy from rehabilitation to new construction ultimately reduced transaction costs and extended the service-life of the wells.

Due to the limited control over water distribution in the Jordanian network, we estimate low allocation efficiencies for the measures. The project did not contain a specific mechanism for providing water in those locations where it was most urgently needed once the refugee crisis happened,which would have thus achieved the greatest benefits. Better management would have been possible within the context of the projectby a more efficient allocation of infrastructure investments. However, the allocation of those ressources was ultimately within the responsibility of YWC without a deeper follow-up. Regarding targeting of infrastructure investments, our analyses suggest that the financed infrastructure measures were not able to reach a majority of the Jordanian customers and Syrian refugees (Figure 3). With this in mind, a target group and stakeholder analysis – at least astreamlined version– would have been advisable. A transparent disclosure of the selection criteria for infrastructure measures by YWC and a more precise monitoring would have presumably led to changes with regard to the areas where the infrastructure measures were finally located.

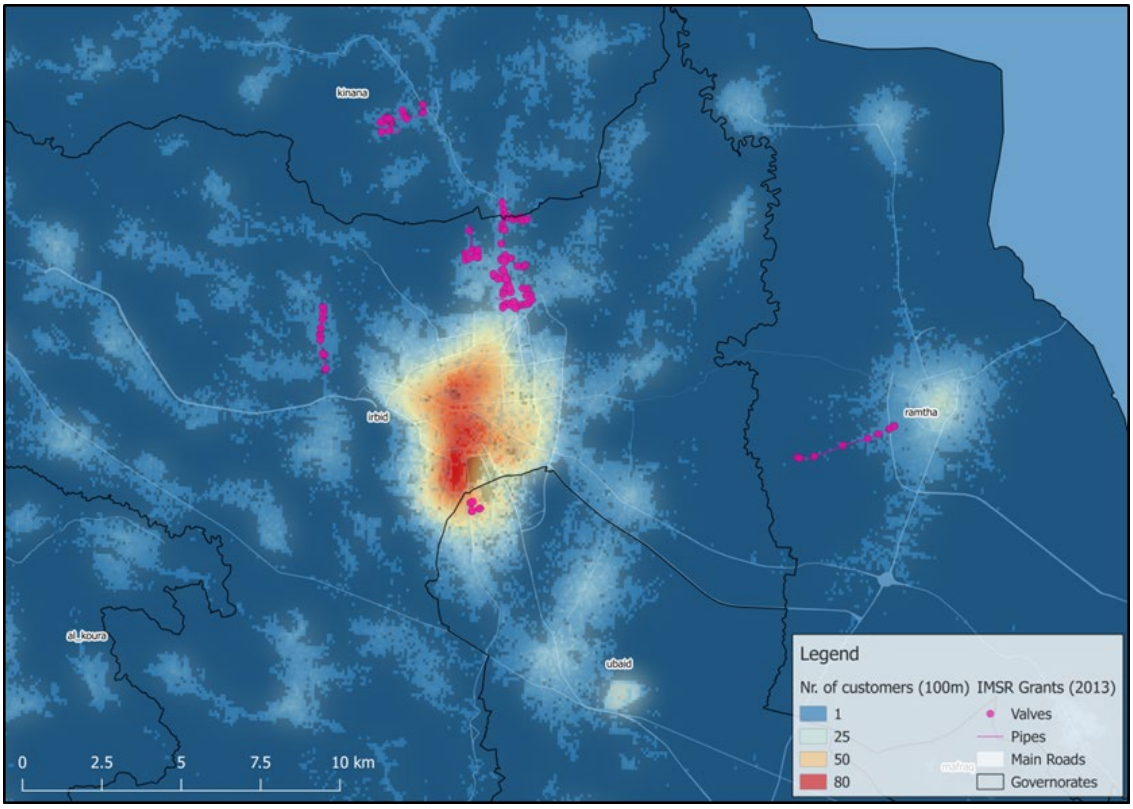


Figure 3: Locations of IMWS I and II infrastructure investments and consumer density

Note: The locations in which the IMWS I and II financial contributions were made are marked as “IMSR grants” in the legend. The consumer density was calculated for 100x100-metre grid based on the entire YWC database. The highest density is in the red areas in Irbid’s city centre. It is clear that IMWS I and II infrastructure investments were not targeted towards the core areas, and instead were located on the outskirts. Furthermore, an evaluation of individual geo-referenced consumer data combined with the location of IMSR I & II grants revealed that the recipient neighbourhoods neither had particularly low consumption values in 2013, nor did they have noticeable socio-economic disadvantages when compared to other locations in the intervention area .

Structural factors also reduce the allocation efficiency of the utilized funds. First, only one third of the production costs for water are covered by the current tariffs in Jordan and the remaining amount has to be subsidised by the state. The wrong incentives that are created by this system contribute to to the inefficient use of (finite) water resources in Jordan with the result that the costs for exagerated consumption will have to be borne by the general public, in particular, by future generations. In the context of decreasing rain fall and increasing temperatures due to climate change, sustainable use of groundwater resources in Jordan is imperative to efficiently allocate the scarce groundwater over the long term. Hydro-

geological models provided by the BGR suggest however, that the easily accessible groundwater-bodies may be completely depleted within the next two decades, which means that subsequent generations would have to pay a much higher price for water from alternative sources (e.g. desalination).

Furthermore, the Jordanian block rate tariff system is not ideal for creating good allocation efficiency on a broader basis. Although it is intended to primarily favour poorer households with an almost cost-free block of 18m^3 per month per connection, at the same time, it does not create an incentive to save water for many customers who remain beneath this (relatively high) threshold. In addition, this system often fails in practice as several families and neighbours in poorer districts often share one single water meter and thus quickly fall into a higher tariff group. These people thus carry a disproportionate financial burden while the main beneficiaries are small urban households from the middle and upper classes.

Efficiency rating: 3 (both projects)

Impact

The implicit objective of the project at the impact level was to lessen social and political conflict potential by improving the water supply in Jordan. However, no explicit indicator was defined for this objective during the conception phase. At the time of ex post evaluation, a replacement indicator was thus defined to show the social sentiment in the project region. The basis for this was the evaluation of frequency data from the Google Trends tool, which enables insights into local search topics across several years and thus allows comparisons over time. To do this, Google Trends shows the monthly search frequency of specific keywords and adjusts the frequency analysis for factors that also influence overall search activity. To analyse the social sentiment, keywords were defined that made it possible to make conclusions about restricted, critical water supply in the greater Irbid area. These keywords and a graphical overview of their development over time can be seen in figures 4 & 5.

Indicator	Status PA, target PA	Ex post evaluation
(1) The frequency of keywords that indicate limited water supply do not suggest a critical increase after project completion.	Target value: no critical increase for four examined keywords	No critical increase

1) Defined during ex post evaluation

Jordan's stability has been astounding since the turbulent months of the Arab Spring. Despite the increased number of refugees, public services have not collapsed, and the macroeconomic and social parameters have not worsened excessively up to date. However, many stakeholders on the ground are increasingly worried about the country's debt burden, which is why it is currently too early to sound an all-clear signal. Persistent levels of unemployment, rising prices and income tax reform have (also) led to the onset of new protests in 2018.

Jordan's water supply has remained stable with high volumes of external financial assistance, and no extraordinarily major supply crises in the project region have been recorded. In this sense, the overarching objectives of the project were achieved, even if the specific contribution to crisis prevention for the individual IMWS I & II projects cannot be quantified. Statements from the project stakeholders suggest that the project made a significant contribution to short-term stabilisation of the water supply, particularly after the height of the crisis in 2012–2013. Our impact indicators from the Google Trends evaluation confirm these statements. Crisis-relevant search terms in Irbid mainly reached their highest levels in 2012 and the beginning of 2013, but they decreased rapidly when water production increased starting in mid-2013. Over the past three years, however, gradual increases were measurable, which indicates a gradual deterioration of the supply situation (see figures 4 & 5). This interpretation also corresponds with the observed low increases in consumption at the household level between 2013 and 2017.

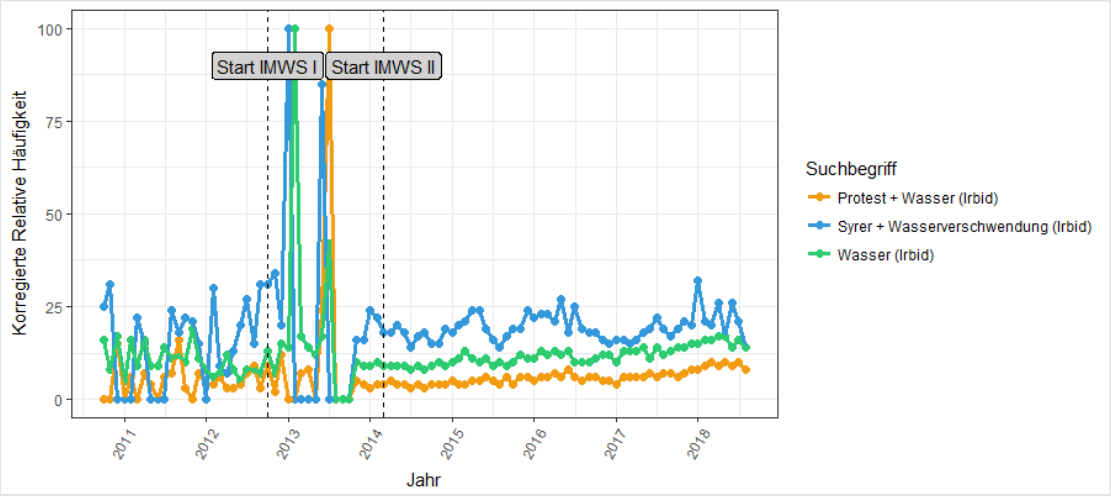


Figure 4: Development of relative search frequency over time for three keyword combinations with the Google search engine (Oct. 2010 to Oct. 2018)

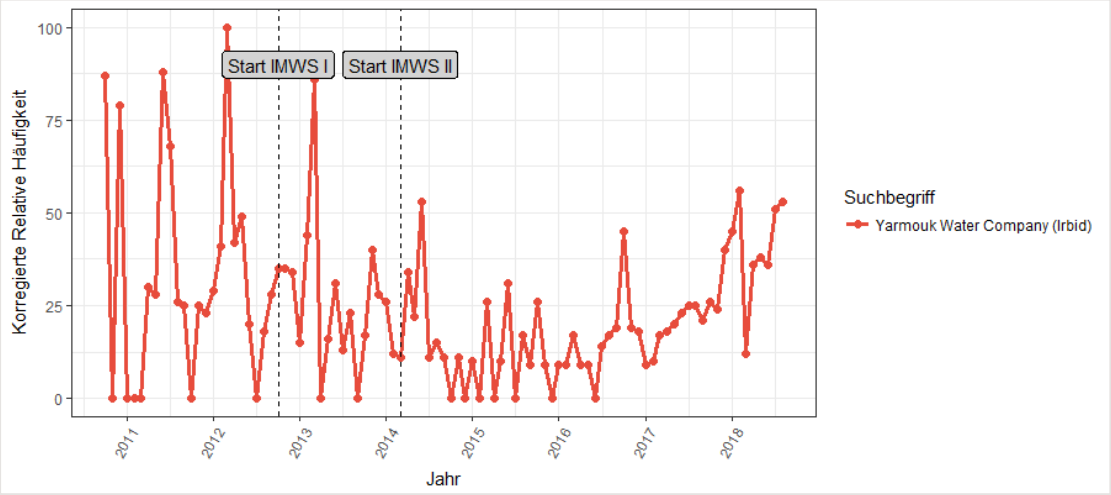


Figure 5: Development of relative search frequency over time for Yarmouk Water Company with the Google search engine (Oct. 2010 to Oct. 2018)

Note: The search was limited to the governorate of Irbid in all cases. All search queries were adjusted for the number of overall search queries on Google (user activity) and normalised with their maximum value. All other frequencies should be viewed relative to this maximum value.

From a development policy perspective, the project did not contribute to structural improvements in the Jordanian water sector and also did not have a positive impact at the administrative level. Due to YWC's difficult business situation and increasing public debt, we estimate that structural conditions will worsen. The sharp rise in YWC debt during the project term led to a takeover of its fiscal authority by the treasury department in 2018, which in turn greatly limits YWC's operational freedom. Because of this important maintenance measures have been delayed or not initiated at all, which is why several investments only have limited functionality or are no longer functional at all after just a couple of years in operation. In addition to significant losses in well production, a lack of maintenance could also explain the rise in non-revenue water from 42.7% in 2009 to 46.0% in 2016. The non-revenue water rates are particularly alarming against the background of increasing water scarcity in Jordan.

Impact rating: 3 (both projects)

Sustainability

Evaluating the sustainability of Financial Cooperation presents a particular challenge in the context of fragility and crises. Crises require the ability to act quickly and primarily aim for fast impacts. As a result, in the context of crises, sustainability is interpreted through the lens of compatibility with subsequent projects, with measures not needing to have structural impacts per se. If structural impacts cannot be achieved for projects in a fragile context, it should be possible to create an option to continue work using longer-term measures in a less fragile target situation.

The ability of the measures from IMWS I & II to be used in conjunction with a longer-term development strategy for the Jordanian water sector is generally classified as low. First, there is no chance that the wells will be used over the long term, which can be traced back to the very problematic developments concerning the water table in Jordan in addition to YWC's precarious business situation. 13 of the 35 financed wells were already no longer in operation at the time of the ex post evaluation. Experts estimate that the further operating time of the remaining wells is around five to maximum ten years on average. Although wells can be drilled deeper with additional investments, which would at least theoretically tap into deeper layers of the groundwater body, this is associated with high costs and contradicts the official political objective of the Ministry of Water and Irrigation to greatly diversify water production by 2025.

Sustainable management of the groundwater resources with a approximate balance between refill and extraction of water is unrealistic in Jordan currently and in the foreseeable future. A controlled management of emptying the groundwater ressources is even more at risk after 2012 due to sharply increasing water withdrawals. According to measurements from several local monitoring wells, the drop in the water table has accelerated rapidly and uncontrolled since 2012. However, this is not only the result to state-run bulk water production. It is also due to uncontrolled (illegal) water withdrawal by private agriculture.

We also argue that the compatibility of the infrastructure investments and the acquired material resources is limited. YWC's increasing debt situation places maintenance of the infrastructure and other material resources at great risk. The increasing Jordanian national debt and planned sector-wide austerity measures will additionally increase the pressure to reduce costs in the coming years. Furthermore, there is hardly any leeway to increase water tariffs and the associated income due to the fragility of the political situation. As YWC is neither privately operated nor does it have fiscal authority over its operations, we assume that austerity measures will be inefficiently allocated over the long term (for example, by saving on materials for maintenance instead of personnel costs). Furthermore, the exceptionally large-scale investment activities of foreign donors (currently EUR 3.16 billion in the water sector) run the risk of sending the wrong signals to the partner country and setting bad incentives for maintenance.

To conclude, we would like to mention that a large portion of emerging donor activities have the explicit objective of reducing structural deficits in the Jordanian water sector. At the time of the ex post evaluation, we cannot yet predict if or when these measures will be able to have a broad impact.

Sustainability rating:4 (both projects)

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).