

Completion Report

Green Water Credits - Algeria



Project:
Internationaal Excelleren, 2g@there,
demonstratieproject
TGTS120006

Project completion report

1 Introduction

The Netherlands' government aims at intensifying collaboration with Algeria. To this aim the *2g@there* program "Algerian Water Technology" was initiated in 2012. As part of this program a demonstration project, referred to as "Green Water Credits", has been undertaken by a group of seven partners. The demonstration project ran from 2012 to 2014, but was extended twice with a final termination date of October 1, 2015.

Green Water Credits is a concept that supports upstream land and water users to improve water resources management for the benefit of all water users in a catchment, creating a win-win situation. Interventions upstream in a watershed not only provide local benefits to the farmers who implement them, but also to water users downstream, through better water provisioning and less flood risks (as extremes are buffered, and infiltration of rainwater is enhanced), less sediments in rivers and reservoirs (through reduced erosion rates), thus less damage to hydropower turbines and reduced costs for dredging. These extra benefits of the downstream water users can be (partly) used to support the upstream stakeholders in implementing the required interventions.

The Oued de la Mina, which is a catchment of the Cheliff Basin in Northern Algeria was selected as demonstration project area.

The Netherlands' partners in this project are: (1) ISRIC (project leader), (2) FutureWater, (3) Wageningen Universiteit, (4) Micro Water Facility, (5) W.R.S. Critchley, (6) Plant Research International (PPO/PRI), en (7) NABC. The Algerian partners are: Ministry of Water Resources and Environment, Ministry of Agriculture, Rural Development and Fisheries, Agence Nationale des Ressources Hydrauliques (ANRH), Office National de l'Irrigation et de Drainage (ONID), Agence National pour les Barrages et Transferts (ANBT), Agence des Bassins Hydrographiques (ABH), L'Algérienne Des Eaux (ADE), Institut de Recherche Agronomique d'Algérie (INRAA), Institut National des Sols de l'Irrigation et du Drainage (INSID).

2 Project activities and main results

The main envisaged project result was to show the viability of a Green Water Credits (GWC) investment model within an Algerian context. To this end several activities were foreseen:

WP1	Identification and collection of baseline data for the study area	Achieved?
1.1	Static biophysical (soils, DEM, land use, agriculture, etc)	Yes
1.2	Dynamic biophysical (streams, climate, etc)	Yes
1.3	Socio-economics	Yes
1.4	Kickoff Workshop: GWC Concept / Awareness	Yes

For the Green Water Credits concept it is crucial to fully understand and quantify the up- and downstream interactions in terms of water flows and sediment transport. Consequently good data on the interfering variables of the current situation are needed and must be analysed with the appropriate tool. The SWAT (Soil-Water Assessment Tool) model was used in this study to analyse the impacts of land use management strategies on the water and sediment dynamics in the la Mina basin.

Data were provided by Algerian partners or retrieved from Internet sources. A detailed summary of the data used is given in the final project report (in French) and in the separate SWAT report. It is to be noted that with the available data in combination with the SWAT model a good impression could be given of what benefits can be achieved by implementing GWC. For detailed design purposes more detailed and/or reliable data may be needed for some parameters.

WP2	Impact Assessment	Achieved?
2.1	Training: Hydrological / Biophysical modelling	Yes
2.2	Setup Soil Water Assessment Tool (SWAT)	Yes
2.3	Calibration/validation SWAT	Yes
2.4	Scenario analysis SWAT	Yes
2.5	Integration of Crop models in SWAT	Yes
2.6	Setup Benefit-Costs Tool (WEAP)	Yes
2.7	Calibration/validation WEAP	Yes
2.8	Scenario analysis WEAP	Yes
2.9	Integration of components	Yes

For the current study, as for earlier GWC studies in other countries, the Soil and Water Assessment Tool (SWAT) (Gassman et al. 2007) was chosen to evaluate the impact of crop-land-soil management on downstream water and sediment flows. SWAT was chosen because it is a basin-scale model, which is able to quantify the impact of land management practices in large, complex watersheds. The main advantage of SWAT for the exploration of GWC in the Mina basin is that SWAT uses a physical-based rainfall-runoff scheme, instead of a purely data-based statistic or conceptual scheme. This guarantees more reliable scenario simulations and better performance in poorly gauged catchments, which is essential for a study at this scale. Besides, the model is primarily focused on the interaction between land management versus water-and erosion processes. This makes the tool appropriate for this study, as it is able to represent and simulate the impact of land management practices on basin-scale water and sediment yields.

The modelling was performed by the project partner FutureWater. An introductory training in the use of the model was given to some 25 Algerian participants from various institutions at the end of the project.

WP3	Degradation and Conservation / Green Water Management	Achieved?
3.1	Training: Mapping & Documentation/selection	No, or only partly
3.2	Mapping of degradation & conservation status in the study area	Partly (outside study area)
3.3	Selection of (existing and new) options for GWM in a participatory process	Partly
3.4	Field implementation of selected GWM measures	No

Since it turned out not feasible to visit the Mina Basin (study area) ourselves, the mapping activity nor the corresponding training was implemented completely. For the same reason, but also because this pilot was more a theoretical exercise than a field activity, no field implementation was realised. A selection of possible measures with a positive “Green Water Management” (GWM) impact was made on the basis of the [WOCAT](#) database, which contains more than 500 SLM case studies from all over the world, and literature study. Three measures that are quite common in the region were selected for the SWAT modelling purpose:

- Stone lines
- Bench terraces
- Contour tillage



WP4	Field Monitoring and Remote Sensing	Achieved?
4.1	Field monitoring and testing	Yes
4.2	Remote Sensing	Yes

Monitoring is an essential element in the GWC concept in order to establish a proper compensation mechanism: how does the degradation status of the land evolve, what measures are implemented where and with what effect? Monitoring in the field is detailed and effective but costly. Remote sensing on the other hand covers large areas at relatively low costs but with less detail (or the costs increase). An intermediate low-cost but high-resolution solution is monitoring with the use of drones or “Flying Sensors”. These miniature airplanes fly at relatively low altitude (a few hundred meters) and provide very high resolution imagery, enabling the observation of field-level terrain features that are important to distinguish erosion and other degradation phenomena, as well as recognising various Sustainable Land Management practices. A test exercise using Flying Sensors was (for practical reasons) undertaken in Spain, near Cartagena, with conditions largely similar to those in the Mina basin. The ensuing report illustrated clearly the potential of this type of monitoring of land degradation and SLM measures.

WP5	Project coordination and management	Achieved?
5.1	Management & Coordination	Yes
5.2	Reporting	Yes
5.3	Evaluation in Algeria	Yes

Management and project coordination was done by ISRIC – World Soil information. A mid-term progress report (in Dutch) was submitted to RVO in November 2013. Various technical and background reports were prepared (in English or French), see [Annex I](#). Several meetings and workshops were held with Algerian partners to present the results and discuss the viability of the concept in Algeria (e.g. January 2014 and the closing workshop-cum-training in September 2015). From these meetings, and especially the last one, it was clear that the Algerian Ministry of Water Resources would like to follow up on the pilot project and will make a proposal for further collaboration.

3 Cooperation between implementing team and beneficiaries

The project started as a collaboration among seven Dutch partners as listed above. These partners were selected on the basis of the expected activities. In the preparatory phase under the 2g@there program “Algerian Water Technology” various Algerian partners had also been approached (see above) and several workshops were held to explain the GWC concept and the need for data and collaboration. Nevertheless it took a long time before it became clear which institution would take the lead on the Algerian side and what would be the role of the various institutions. Therefore the project became mainly a “top-down” demonstration by the Dutch consortium of a new concept. This confusion led to some delays in the project. Also, the discussions with Algerian partners led to some adaptation of the planned activities. Where first the entire (very large) Cheliff basin was selected as a pilot study area, this was narrowed down to the (sub)watershed of the Mina river, in the western part of the Cheliff basin, near Relizane.

However, a field visit in the Mina basin was never realised for administrative reasons and the project therefore remained a conceptual exercise, though with real data from the study area, provided by Algerian partners or retrieved from Internet sources. It was clear during the discussions (esp. in January 2014) that the main interest on Algerian side was in the biophysical modelling aspects, in other words: what are the potential effects of the interventions we are taking. For this reason the financial mechanism and to some extent the institutional and legal aspects got a lower priority, decreasing the envisaged workload for some (Dutch) consortium partners, and increasing for others.

Programme aims/objectives

Economic Interest

The project noted considerable interest for Dutch expertise in water and land management-related issues. Initially contacts were somewhat sluggish but with increasing clarity on the roles and responsibilities this also improved.

Bilateral public relations

Algerian institutions were introduced to and familiarised with the work of several Dutch organisations in the field of soil and water management and new contacts were established. The Ministry of Water resources expressed at the closing workshop their wish for follow-up activities and would take the lead in further proposals.

Project effect and sustainability

The project has increased awareness among various stakeholders – at this stage mainly at the institutional level – of the importance of upstream-downstream interaction and interdependency within watershed. In other words the realisation that interventions upstream will have an impact on downstream areas as well. Creating this awareness is one of the goals of the GWC concept, as it is indispensable if a compensation scheme for upstream land users is to be set up.

For a full implementation of the GWC concept a more detailed study, with better and more detailed data, will be required for a watershed to be selected (whether the Mina basin or other is to be decided by the Algerian stakeholders). Also a precondition for successful implementation of the full GWC concept is a good collaboration between different (government and non-government) institutions, such as the Ministry of Water Resources and the Ministry of Agriculture and their regional/local spin-offs. Experience in other countries has shown that this is sometimes one of the more difficult aspects, due to vested interests and (fear of) competition. Yet, this is not the first step in the process and a start can be made by a more detailed quantification and demonstration of the benefits of upstream interventions for downstream users. If there is a general realisation that such benefits are thus mutual, it will be easier to make all stakeholders collaborate.

Important developments

The communication with Algeria first largely ran through NABC, who were the coordinator of the overarching *2g@there* program “Algerian Water Technology” and who did a great deal of preparatory work. As the Algerian authorities preferred to communicate with a formal government institution, a separate G2G project was established with Dienst Landelijk Gebied (DLG) as coordinator. Communication with Algeria was also more streamlined via the Dutch Embassy in Algiers, which turned out to be a significant improvement.

The project had, by its nature as a demonstration project, rather a top-down character, since it was the Dutch side aiming to demonstrate to the Algerian beneficiaries what could be achieved with this approach. However, this especially initially caused a lack of ownership feeling among the Algerian parties, and thus an unclear distribution of roles and responsibilities which led to some delays in data collection and in various workshops to be held. This was enhanced by the fact that no funding was available for the Algerian partners to perform their activities in the project.

Follow up and recommendations

During the closing workshop in September 2015 it was agreed that the initiative for follow-up activities would have to be on the Algerian side to ensure that those activities indeed fulfil Algerian needs and requirements. Capacity building in biophysical modelling and planning of SLM practices emerged as one possible field for collaboration.

A full GWC implementation project should fulfil some basic preconditions:

- Is there a (water) problem to be solved? E.g. lack of water in the dry season, too much (floods) in the wet season; erosion and sedimentation & subsequent downstream damage etc.
- Is there room for improvement? If the upper part of the watershed is already fully protected by (for instance) natural forest, there is relatively little to gain.
- Are there potential upstream implementers (farmers) who can improve their land management? This can also be the government who wants to invest by the way.
- Are there sufficient downstream water users that will benefit from better water regulation and cleaner rivers? And are these sufficiently wealthy to support investments upstream?
- Is precipitation sufficient for both upstream and downstream users to benefit? In other words, is there still excess water after it has been used upstream to benefit the local crops?
- Is the subsurface hydrology suitable (e.g. if the drainage direction from the upper part is in a different direction than where downstream beneficiaries are, it won't work)
- And most importantly: it should be really desired by the demanding party/country! Proper involvement of the beneficiaries should start at the design phase of the project.

Some of these considerations apply to the entire concept (i.e. including the "Credits, the PES), but the focus may be more on certain parts of the concept, e.g. the (bio-physical) modelling rather than the financial mechanism part. The concept should not be seen too strictly as an undividable entity.

Annex I: Technical reports

- GWC-Algerie rapport.pdf (FR)
- Innovation and Extension Systems under GWC schemes.pdf (EN)
- Mina_GWC_WEAP.pdf (EN)
- Report_landcover_classification_Algeria.pdf (EN)
- WOCAT - Cons. measures for semi-arid areas.pdf (EN)
- Flying sensors pilot Spain_v04.pdf (EN)
- GWC_Algeria_Final_SWAT.pdf (EN, French translation available))
- GWC_ToolkitsFR.pdf (scheme, EN)
- GWC-Algerie- aspects institutionnels.pdf (FR)

Annex II: Meetings and workshops

Preparatory visits (for the 2g@there programme "Algerian Water Technology"):

- Feb-2011: P. Bindraban (ISRIC).
- Apr-2011: G. van Lynden (ISRIC), participation in Pollutec, Algiers, meeting with several Algerian institutions.
- Jul-2011: G. van Lynden (ISRIC), P. Droogers (FutureWater), GWC presentation at ANRH, with representatives from other organisations (e.g, ONA, INSID, ONID).
- Okt-2011: Incoming visit Algerian delegation to Aquatech meeting; incl. visit to Wageningen.

Demo project visits & meetings

- Feb-2013: N. Ouibrahim (NABC).
- Apr-2013: G. van Lynden (ISRIC). N. Ouibrahim (NABC), J. Brandsma (FutureWater): Algiers. Discussions at INSID, Dutch Embassy, Min. of Water - Relations Extérieures et Cooperation Internationale, Min. of Agriculture, ANRH, ONID, ANBT, ABH, ADE, INRAA.
- Mei-2013: J. Brandsma (FutureWater). Participation in Pollutec, Oran.
- Nov-2013: Incoming visit Algerian delegation to Aquatech meeting; incl. visit with NABC to ISRIC & FutureWater.
- Jan. 2014: G. van Lynden, J. Brandsma: workshop Algiers.
- May 2014: G. van Lynden: Restitution workshop WAWARIA, Ouargla.
- October 2014: Incoming visit Algerian delegation to AfricaWorks conference, Leiden. Presentation on GWC by G. van Lynden held in Algeria workshop.
- September 2015: G. van Lynden, J. Brandsma: training and Closing Workshop, Ksar el Boukhari.