Project Evaluation Series
08/2020

Mid-term evaluation of the project "Monitoring water productivity by remote sensing as a tool to assess possibilities to reduce water productivity gaps"

Project code: GCP/INT/229/NET

Annex 3. Learning Note

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2020

Contents

Learning Note
(Findings and lessons from the mission in Ethiopia)

1 Introduction

1. Ethiopia was a designated focus country – next to Mali and Lebanon – for the Project GCP/INT/229/NET "Monitoring water productivity by Remote Sensing as a tool to assess possibilities to reduce water productivity gaps"[1]. In this context, the Mid Term Evaluation (MTE) mission visited Ethiopia. The relevance of the findings has encouraged the evaluation team to prepare this Learning Note, summarizing what was seen, heard and discussed with the national stakeholders, project partners and within the team.

2. This Learning Note briefly assesses (1) the implementation of the country-specific activities under WaPOR; (2) the potential for applications as assessed from the country visit; and (3) lessons and suggestions for future engagement in the country. Some of them are also reflected in the Recommendation of the Report and may also apply, duly adapted, to all 21 countries where level 2 WaPOR data are available.

3. Special efforts were made to get WaPOR grounded in Ethiopia:

   i. WaPOR data were made available at level 2 (100 by 100 m resolution) for the entire country;
   ii. For Koga Irrigation System and Upper Awash level 3 data (30 by 30 m) were developed;
   iii. For the entire Awash Basin a Water Accounting Plus (WA+) study was undertaken. This is Ethiopia's most intensely used river basin;
   iv. Under component 4 of the Project, a special field activity was implemented in the Koga Irrigation Scheme, that familiarized more than 1000 farmers with better irrigation management and the opportunities for increased Water Productivity;
   v. Both under the current WaPOR Project and under a parallel DUPC[2] Project on water accounting 58 persons in Ethiopia were trained in the use of WAPOR.

4. In addition to the activities under the WaPOR Project, activities were undertaken under other programs. For instance, FAO supports an Irrigation Systems database where WaPOR is intended to be used to calculate performance indicators for small, medium and large irrigation systems. Also the Dutch-funded project "Water-PIP" (Water Productivity Improvement in Practice) applied WaPOR database in four large irrigation systems: Wonchi, Metahara, Finchaa, Tendehao, as well as in the flood based/ rain-fed systems in Afar.

[1] Referred as "WaPOR Project" or "the Project" in this Note

[2] The Directorate-General for International Cooperation (DGIS) of the Dutch Ministry of Foreign Affairs and IHE Delft run a joint Programmatic Cooperation called DUPC

2 Current project activities in Ethiopia

5. Under the different components of the WaPOR Project, the activities at country level included three main areas of work: (i) Training; (ii) Rapid Water Accounting plus (WA+); and (iii) A pilot field action.

2.1 Training

6. Overall, 58 persons were trained in Ethiopia in a series of training events provided by IHE Delft. The online survey carried out by the evaluation team (see Annex 3) shows that those in operational positions are not "first batch" WaPOR users. The results of 22 persons responding from Ethiopia to the online survey shows the following:

i. Most trainees were from universities (58 percent).

ii. 62 percent used the training for research and study; 31 percent for operational purposes.

iii. 38 percent of trainees used the database more than 4 times following the training.

iv. The training was almost uniformly appreciated (93 percent), the usefulness was related to the introduction of the concepts of Water Productivity and Water Accounting (81 percent) and to encouraging the use of the database (73 percent).

v. The open and free access of WaPOR is considered the strongest feature (96 percent) and the large database (69 percent).

vi. Main minus are: the low resolution (46 percent), the need to collect additional data (46 percent) and the lack of real life examples in the training (36 percent).

vii. Trainees see the largest application in improved irrigation management (92 percent) and more transparent water allocation (88 percent) – research organizations and water system managers are seen as the largest potential users.

viii. Proportionally, among the trainees, experts and consultants are the most eager users (100 percent intensive use). This group is also most inclined to use Wapor for operational use.

2.2 Rapid Water Accounting Plus Study (WA+)

7. A Rapid Water Accounting Plus study was completed (in draft version) by IHE Delft for the Awash Basin, which is Ethiopia's most intensely used and most contested basin – covering the country's capital, with most industries and large irrigation systems situated in the basin. During the peak, irrigation systems stress and conflicts are common.

8. By using remote sensing, a complete picture of water availability and water use in the Basin could be generated, showing the percentage of precipitation consumed through evapotranspiration, the outflow of the basin, storage in wet year and depletion in dry years, the overall management water fraction, the importance of irrigation as a portion of managed water use (95 percent).

9. The Rapid Water Accounting Plus study highlights the importance of irrigation management in the basin: *"To satisfy the growing demand of water in the basin, strategies focusing on increasing water use efficiency and storage capacity need to be implemented to*

reduce the inter-annual variability ". The study also established some possible anomalies in the WaPOR database – in the highland and in the Afar Basin.

10. The work was done with no engagement of local stakeholders and expertise, and the completed draft study is yet unknown in Ethiopia. As part of the evaluation exercise, the draft study (available online) was shared with some stakeholders and these were asked for their opinion. The most common remarks were that it was a thorough and appreciable overview, yet a heavy report to read with no specific actionable conclusion.

11. By nature, water accounting has to be pitched at a very high level of strategic decision making, and if it does not have engagement at that level, it may have no follow up. In general, Water Accounting may have a more limited application than for instance the analysis of specific water systems, because the identification of actionable items will be less obvious. So far, the Rapid Water Accounting Plus study for Awash Basin has made no ripple on the ground and did little to land WaPOR in Ethiopia.

2.3 Pilot field action

12. A pilot field action was undertaken in the Koga Irrigation Scheme. The Scheme draws water from the Koga River, one of 50 tributary streams joining the Ethiopian Upper Blue Nile. It was meant to irrigate 7000 ha, but in reality, its service areas are closer to 5000 ha., according to the Scheme Managers.

13. The pilot activities are executed by project partner IWMI. In the pilot activities, awareness was raised among water users on the scope for better irrigation management – by making farmer measure soil moisture and subsequently assess the need for irrigation or not. Two instruments were introduced: the Wetting Front Detector (WFD) and Chameleon Water Sensor.

14. The WFD is considered simpler – an ingenious plastic tube that has air pressure building up to signal soil saturation. The Chameleon Water Sensor on the other hand uses wires to probe soil moisture and signal the score as green, yellow or red – to flag the need or not for irrigation. These two sensors had been tested before by IWMI in Koga, but under the WaPOR project they were introduced at scale, with focus on two out of six blocks of this large irrigation system. Farmers were introduced with these instruments and taught how to use them.

15. The pilot activity provided WFDs to 144 farmers, and Chameleon Sensors to 72 farmers. Informal groups were formed to share the information on soil moisture and irrigation needs. Through these groups, 1061 farmers (about 10 percent of the eligible target farmers in the entire Koga scheme) were reached. Special data collectors were deployed to help share the information between farmers.

16. This brought very good results: within one or two seasons of being familiarized with these measuring tools, farmers adjusted their irrigation supplies from the decentralized storage ponds in the Koga System– typically by extending the irrigation cycle from 8 to 11 days, or 9 to12-13 days – effectively a water use reduction of 35 per cent., according to farmers and reserachers information Part of the earlier high-water wastage related to the need to make ploughing easy. With reduced water applications, the wheat crop yield went up: according to farmers met and interviewed approximately with 10 to 20 per cent. Additional research

by Bahir Dar University also showed that soil nutrient loss was reduced. All in all, a notable increase in water productivity was achieved and a large group of farmer advocating for better water management came into being during the pilot activity.

17. In spite of this success, the Koga pilot action also had a number of missed opportunities. Firstly, the farmers that participated in the Focus Group Interview, raised two questions: (i) why the innovations were not introduced throughout the Koga Scheme; and (ii) why the project after the successful introduction of moisture management and better irrigation scheduling – driven by farmer's demand – abruptly ended and even removed the instruments from the farmer fields.

18. Secondly, there was no follow up to the pilot nor an exit plan: Not only were the sensors removed, also the good results were not shared with farmers throughout the Koga scheme (through farmer to farmer exchange for instance). A possible exit plan could have even been developed for local youth to sell the sensor or provide this as a service, as mentioned in an interview. This was not done.

19. Thirdly, the results were not shared with the Koga scheme management – who could have planned more efficient irrigation scheduling throughout the system, especially if combined with the use of WaPOR for system analysis. This is in fact the fourth missed opportunity: No WaPOR analysis was done by IWMI. Interviews revealed that those directly involved in the pilot project were a priori skeptical on what WaPOR could bring about. The results from the pilot, including the work of four students from Bahir Dar University, could be used to validate WaPOR but so far this is not on the cards – as the pilot project is considered closed.

20. Fifthly, the promising results of the pilot projects were not shared with stakeholders at regional or national level. All this is not irreparable, but would need to be corrected with a follow up/ impact plan addressing all missed opportunities.

3 Potential for applications

21. It is fair to say that the three Project activities described above did not add up to a critical mass of WaPOR applications in Ethiopia and none of them had a significant impact thus far. On the other hand, during the evaluation mission several **positive developments were observed in terms of local capacity and interest** – not just through the project – but also by other initiatives:

i. Some champions and practitioners have emerged in Ethiopia (e.g. professors and researchers, service providers, some technical officers and Ministry advisors).

ii. Another FAO project is supporting the development of a National Irrigation Date Base. This will measure systems performance with WaPOR. Shape files will be available (National Irrigation database) for all systems.

iii. Local training capacity is in place at the Addis Ababa University and MSc students are exposed to the use of WaPOR.

iv. There are several PhD and MSc students working with WaPOR on water productivity for their thesis.

v. There is considerable research on water productivity (with and without WaPOR). With at least 16 studies, it is an important research topic.

vi. WaPOR and water productivity is part of a Federal Training on Water Management.

vii. A local private service provider is in place that is working on the analysis of six large water systems with local clients/ problem owners.

22. **There is also a huge and politically significant demand for improved irrigation management**, in particular in the medium and large-scale systems, where water wastage is large and irrigation schedules often ill-adapted to local conditions and seasonal variations (as also confirmed in several meetings with Government high-level officers). It is also common to see large sections of the command areas not being served whereas in other parts overirrigation, water logging, non-beneficial ET and undue seepage occur.

23. There is particularly interest, especially in large irrigation systems, to use WaPOR for systems improvement by main system owners:

i. Regional government (e.g. Oromya)
ii. Sugar Corporation
iii. Irrigation Commissioner

24. In fact, to improve water management in almost all medium and large-scale systems constitutes an important low hanging fruit. WaPOR could make a substantial contribution by showing high and low performing sections of these systems, and, allowing analysis on ET throughout the season, the occurrence of overirrigation or agricultural droughts and other elements of scheme management such as water allocation.

25. **The systems diagnosis with WaPOR could be combined with farmer activities such as in Koga – so as the create a groundswell for water management improvement combined with system diagnosis using WaPOR**. In any case, validation of WaPOR with field data is essential. This could potentially contribute to food security, import substitution (sugar and wheat) and improved agricultural livelihoods, and should be able to provide results within relatively short period of time.

26. The application of WaPOR in dry areas, such as Afar (see annex 5) is also promising, making it possible to analyze the impact of investment in flood water spreading in terms of ET and biomass peaks, and comparing the different areas. It may be possible to assess the volume of water captured by the water harvesting structures (a unique opportunity) and the increase in biomass due to water harvesting – tracking it over the 10-day periods in WaPOR.

4 Lessons for country engagement

27. WaPOR could potentially help put water management on the agenda, supported with data and provide openings and tools for improvements on the ground. The Koga experiment showed that it is possible: to reduce water use, to increase production with no investment in infrastructure.

28. The potential contribution of WaPOR is large, but unless the country activities are connected, coordinated and focused on creating permanent capacity and useful applications the potential of WaPOR will remain unexploited. So far, the unread reports, scientific publications or one-off trainings did not create impact.

29. Therefore, the Project should develop a vision, for each country, on what would constitute the success of WaPOR, what would be the long-term permanency, where the central activities (the development, upkeep and improvement of the database) would lead to, and what is the model of service provision to the water sector in the different countries.

30. Moreover, the Project should develop a tailored strategy at country level, where demand is connected to service provision, and the different service providers are connected and contribute to one another's work and the focus is on impact – i.e. increased water productivity on the ground. Moreover, the Project should define what would be the main target group, and what are the country-specific partnership strategy and implementation arrangements. …

31. Specific lessons for country engagement are:

i. Create local service capacity to analyze, backstop and train in private sector and academia.

ii. Work on existing cases and low hanging fruit to create a place for WaPOR and improve water management. Also, move beyond analysis to the diagnosis of solutions.

iii. Combine in the existing cases systematic engagement of irrigation system managers and problem owners, the creative use of WaPOR in new applications, visual communication, field validation and farmer engagement (as in Koga).

iv. Work on larger ownership and demand of major players in the country.

v. Make a link to on-going policies, priorities and regulations in the country.

vi. Create training capacity around practical applications and improvements.

vii. Consider local alliances of those that need WaPOR and are the protagonists of better water management and those that provide and develop services.