Policy Brief - Egypt

Increasing water productivity in Egypt

The aim of this policy brief is to communicate the outcomes and recommendations of the policy review and dialogues in Egypt. The policy brief reflects on insights from multiple bilateral and one multilateral discussions with stakeholders in Egypt on strategies for agricultural development and their implications for different national development objectives.

Outcomes of the policy review[1]

The water sector in Egypt is complex and characterized by increasing interdependencies among users over water scarcities within and outside Egypt. Egypt's water resources are almost entirely (97%) dependent on water from the Nile. Thus, upstream developments are expected to affect the water resources available in Egypt. Groundwater resources in Egypt are mainly fossil, thus limiting the opportunities for sustainable groundwater use. With increased water scarcity due to population growth and climate change, Egypt is facing the challenge of meeting multiple development objectives while simultaneously obtaining food security. Agriculture uses around 80% of the country's water resources. By 2030, Egypt is planning to reduce this to 70% in order to optimize the water allocation among the multiple sectors. Moreover, urbanization of the Nile Delta poses challenges for land use transformation in the area. Under this context, Egypt has the following specific agricultural water management policy objectives:

- Maximizing benefits derived from water in various economic sectors.
- Rationalizing water use in agriculture.
- (Near) self-sufficiency in specific strategic goods (wheat, maize, sugar).
- Promoting low water consuming crops and net virtual water imports.
- Promoting exports.
- Expansion of agricultural area and production by improving irrigation efficiency.

Two different strategies were defined to meet these objectives, namely the vertical expansion strategy (old lands) and the horizontal expansion strategy (Figure 1). The main water source in the old lands is Nile water (either as surface water or shallow groundwater recharged from the Nile). The main water source in the new lands is fossil groundwater, posing questions regarding the environmental sustainability of this strategy. The vertical expansion strategy refers to raising production in existing agricultural lands (old lands in the Nile Delta) where mostly staple crops are grown for the domestic market. Staple crop production (especially wheat and maize) is important for food self-sufficiency, which is a development objective that Egypt wants to achieve. However, the economic benefits derived from cereal crop production is limited. The horizontal expansion strategy, referring to the expanding agriculture in new areas in the desert (new lands) with production of, high value crops mainly for the export market, is expected to increase the economic output of agriculture and increase the purchasing power of Egypt. Thus, Egypt could import the necessary staple crops for domestic consumption.

Figure 1: (left) Vertical and (right) horizontal expansion strategy

[1] One page report available at WaterPIP website: https://waterpip.un-ihe.org/sites/waterpip.un-ihe.org/files/egypt_policy_review_-_one_pager_-_formatted.pdf

Policy dialogues

Bilateral policy dialogues with different stakeholders (Embassy of the Netherlands in Cairo, EU Water Stars, IWMI, FAO, Wageningen Research) were conducted between May and July 2020. During these online meetings, the team fine-tuned the findings of the policy review and presented an analysis regarding the trade-offs between the two strategies. Based on the framework developed by Hellegers and Davidson (2021)[2], a multi-criteria framework to evaluate agricultural strategies, the team assessed the two expansion strategies against seven indicators (biophysical water productivity, land productivity, economic water productivity, food security, food self-sufficiency, employment and environmental sustainability) that reflect broader strategic development objectives (socio-economic development through water use in agriculture). This assessment was visualized through a spider diagram and facilitated an integrated understanding of agricultural strategies, their impacts and trade-offs. The framework pinpoints the involved trade-offs to make the inherent political decision on agricultural development transparent and explicit[3].

A multilateral policy dialogue on water productivity and the different trade-offs was realized through an interactive session during the 2020 Cairo Water Week (CWW). Together with IWMI and FAO, the team facilitated an interactive dialogue on the implications and trade-offs between the two strategies for Egypt and future steps for improved water productivity in Egypt. In total, 93 participants followed the session, including researchers, staff from international organizations and NGOs and local policy relevant stakeholders. 22 participants assessed the two agricultural development strategies against the seven indicators of the framework. The scale of assessment ranges between 1 (indicating very low scoring to the related indicator) and 5 (indicating very high scoring to the related indicator). The results of the assessment of the strategies is shown in Figure 2.

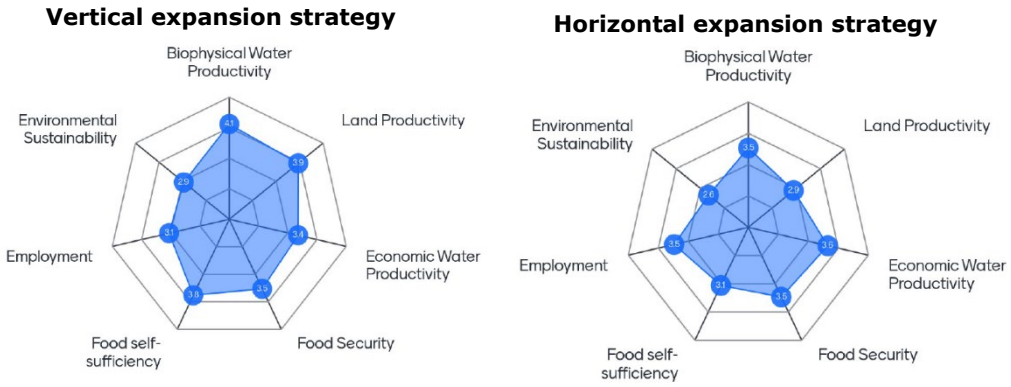

Figure 2: Results of the assessment of the vertical (left) and horizontal (right) expansion strategy as done by participants of 2020 CWW (very low score, 1, and very high score, 5, are in the center and periphery of the spider diagram respectively).

Biophysical water productivity was given a higher score under the vertical expansion strategy. This is justified by the fertile soils of the Delta, where vertical expansion focuses on. However, this might not be the case as the primary goal of the vertical expansion is to maximize production per unit of land, i.e. land productivity. As such, land productivity under vertical expansion was scored higher than horizontal expansion. Economic water productivity, i.e. the economic value in monetary terms per unit of water consumed, was scored higher under the horizontal expansion strategy. This is justified by the high-value export crops cultivated in the desert areas where horizontal expansion primarily focuses on. Subsequently, food security; i.e. the access to food for all people, under horizontal

[2] Hellegers, P., & Davidson, B. (2021). Resolving the problems of commensurability in valuing water. Water International, 46(5), 637-651.

[3] More information on the assessment framework on a hypothetical case is available at WaterPIP website: https://waterpip.un-ihe.org/sites/waterpip.un-ihe.org/files/integrated_assessment_framework_for_national_policies_related_to_agricultural_water_management_5.3_0.pdf

expansion is higher compared to vertical expansion. This is because of the increased economic purchasing power that the strategy provides and can be used to import the domestic staple needs. On the other side, food self-sufficiency; the ability of a country to domestically produce its food needs, was scored lower under the horizontal strategy. This is justified through the higher exports of domestic food production. Employment was scored higher under horizontal expansion as more job opportunities will be created in the desert areas. Lastly, in terms of environmental sustainability, both options scored low, with horizontal expansion is scoring slightly lower than vertical expansion. This is justified by the increased water consumption that is expected to take place through expansion of agriculture in new areas. Based on the feedback received from the participants of the session, the framework was useful in showing the trade-offs between the two strategies and that each strategy has strengths and weaknesses. The horizontal expansion is strong in improving food security but limits the opportunities for self-sufficiency (as horizontal expansion is focused on exports that increase purchasing power) while requiring more groundwater resources and thus reducing the environmental sustainability.

Although the scores for the various indicators were (and should) be up for discussion, a very clear trade-off was presenting itself. Namely, whether Egypt should pursue reclamation of new lands for economic profitable agriculture that scores high on crop and economic water productivity or whether Egypt should increase its land productivity on existing land with fewer jobs, but with a higher environmental sustainability. This is a political decision that is made explicit through the use of the framework and thus the framework provided an effective platform for dialogues. Moreover, the framework exposes the limitations under each strategy which highlights the policy areas that other strategies need to focus on. This is an effective way to distribute and manage the risks associated with each strategy.

Several stakeholders mentioned that the clear-cut distinction of the two strategies and the subsequent scoring of each created the impression of two distinct and non-complementing strategies. Participants noted that these two strategies are complementary to each other as they might be combined on the ground. Moreover, the performance of each strategy is highly case-specific and thus the generalization of this exercise to national level was challenging to score. In order to avoid generalizations, participants saw great value in case-specific analysis of two cases (each one indicative of each strategy) with quantification of each indicator. Such analysis requires additional data to be obtained either directly from the ground or through secondary sources. To this end, it would be interesting to obtain the needed additional field data on agronomic aspects (water use, agricultural water management at farm level) and socio-economic aspects (employment opportunities, costs of production etc) for three case studies (East and Middle Delta, indicative of the vertical expansion strategy and West Delta, indicative of a combination of vertical and horizontal strategy).

Conclusions

The main conclusions from the dialogues are the following:

- There is no golden bullet that can magically resolve trade-offs. Each strategy has strengths and weaknesses as shown in the results of the CWW.
- Opportunities exist when distributing and balancing the strengths and weaknesses of each strategy into context-specific regional development.
- Horizontal expansion is likely to result in higher water consumption. Considering the increased water scarcity (population growth, upstream developments, increased sectoral competition), horizontal expansion is likely to be constrained by the fossil groundwater resources.
- From an economic water productivity perspective, it would be wise to see whether farmers in the Delta are willing to switch from staple crops to high-value crops without increased water consumption. This would generate income and jobs. On the other side, such crop switch will have negative impacts in terms of self-sufficiency targets.

Recommendations

The main recommendations and points for further analysis are the following:

- Urbanization of the Nile Delta is taking place. Water for horizontal expansion of agriculture in the desert areas might be provided from the decreased agricultural land, and thus water, use in the Nile Delta due to urbanization trend. This needs further research.
- Improving water productivity per se carry over the risk of generating a 'rebound effect' that can induce an increase in water consumption (similarly to what 'irrigation efficiency' can do). Therefore, a 'cap' or 'limit' to water consumption needs to be introduced in parallel to water productivity increase. 'Water Accounting' needs to accompany any water reform, modernization process, and/or productivity improvement in order to monitor if unintended consequences (increasing the agricultural land, effectively increasing the water consumption) would results from the implementation of new the policies and related targets.
- Quantification of the different indicators of the assessment framework is needed. Such analysis requires data from the field that are difficult to find but are essential for an informed and effective decision making.

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