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Water

CONSTRAINTS TO SUSTAINABLE, EFFICIENT, AND RESILIENT IRRIGATION SYSTEMS IN GEORGIA — WHAT IS A POSSIBLE WAY FORWARD?

Irrigation Sector Policy Note

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Policy note

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ADB	Asian Development Bank
AFD	Agence Française de Développement
DSS	Decision Support Systems
EIB	European Investment Bank
EU	European Union
FAO	Food and Agriculture Organization
GA	Georgian Amelioration
GDP	Gross Domestic Product
GEL	Georgian Lari – 1 GEL = 0,27 € (June 2021)
GILMDP	Georgia Irrigation and Land Market Development Project
GNERC	Georgian National Energy and Water Supply Regulatory
HAIP	Hydro-Agro Informatics Program
I&D	Irrigation and Drainage
ICT	Information Communications Technologies
IFAD	International Fund for Agricultural Development
IMT	Irrigation Management Transfer
ISET	International School of Economics at Tbilisi State University
IWRM	Integrated Water Resources Management
MEPA	Ministry of Environmental Protection and Agriculture of Georgia
M&E	Monitoring and Evaluation
NEA	National Environment Agency
O&M	Operation and Maintenance
OECD	Organisation for Economic Cooperation and Development
RDA	Agricultural and Rural Development Agency
USAID	United States Agency for International Development
USD	US Dollar
WFD	Water Framework Directive
WUA	Water Users Association
WUO	Water Users Organization

1 EXECUTIVE SUMMARY

Agriculture plays a vital role in the economy of Georgia despite the relatively small size of the sector. Agriculture is the country's largest employer and makes a significant contribution to exports even though agriculture contributes a modest share to total GDP. Agriculture in Georgia, as in many countries in the region, is primarily rainfed, but irrigation and drainage (I&D) investments are vital against climatic extremes and are critical for high-value agriculture production. Non-irrigated areas are used for livestock grazing and rainfed cereal crops while irrigated areas in the lower elevations are devoted to fruits and vegetables. In the mountains of the eastern and western regions, agriculture is focused on crops such as maize, wheat, and natural pastures. The eastern part of the country, which is subject to frequent droughts, requires the use of irrigation to buffer climatic extremes. The western part of the country, which is wetter, is confronted with drainage problems.

Following the collapse of the former Soviet Union, actual irrigated area in Georgia declined significantly. This can be partly attributed to the abandonment of I&D infrastructure due to lack of maintenance, difficulty of continuing operation of large infrastructure, and reduced financial resources allocated to I&D management resulting from lack of economic or financial viability. The poor performance of the sector combined with the characteristics of farming systems, land reforms, the transition to a market economy, and the loss of markets with traditional trading partners have also contributed to a significant reduction of the irrigated area (FAO 2019). Although, irrigation potential is estimated to be 725,000 hectares (FAO 2019), out of these, only about 17 percent of total area is equipped with irrigation today (WBG 2021).

Georgia is currently facing important challenges related to the development of its agricultural sector, which requires the rehabilitation of irrigation and drainage systems and the establishment of institutional organizations that makes it sustainable. An ambitious, nine-year irrigation strategy was initiated in 2017. Although significant steps have been made, including the rehabilitation of a large part of the main canal systems, and in some areas secondary and tertiary irrigation systems, expanding the irrigable area from 88,000 hectares in 2015 to about 130,000 ha in 2020, many issues still need to be addressed to achieve sustainable, efficient, and resilient irrigation systems in Georgia.

Meanwhile, Georgia faces the challenges of climate change and pandemic-related exogenous shocks related to food security and employment, which have negatively impacted the agricultural sector.

This policy note on the irrigation sector supports the World Bank-led analytical study on Agricultural, Land, and Water Policies to Scale-Up Sustainable Agri-Food Systems in Georgia. It was carried out during the months of April to July 2021, in close collaboration with the main stakeholders of the irrigation sector in Georgia and the services of the World Bank.

The analysis in this policy note identifies the following core constraints, which are hindering irrigation sector performance in Georgia and leading to the slow implementation of the irrigation strategy with a brief overview of some of the factors that are contributing to these constraints:

1. **Limited knowledge and data on water resources** and types of **farming systems**, preventing resilient Irrigation & Drainage (I&D) infrastructure development and management.
    - Limited number of farmers willing to sign irrigation contracts with GA or willing to join Water User Organizations as their needs are not considered when providing irrigation services.
2. **Irrigation system planning** lacks an integrated water resources management (IWRM) approach for sound irrigation management.
    - Without sound irrigation planning and allocation to manage climate risks, limited water supplies result in the inability of GA to irrigate agreed command areas according to the needs of farmers.

- More emphasis on rehabilitation of the main systems as well as the secondary and tertiary systems is needed as without this, it results in limited irrigation water supply to farm fields as secondary and tertiary systems are neglected without clear criteria for prioritization of irrigation rehabilitation and modernization.

3. **Need to improve reliability of irrigation services** and service delivery systems.
    - Farmers face increasing production losses without more reliable irrigation services due to climate risks such as increasing temperatures and variable rainfall levels.
    - GA has limited capacity to deliver irrigation services to water users in a timely and operationally efficient manner, the reform of its governance structure is not yet agreed by higher levels of government (work is underway), and the regulation role by the Georgian National Energy and Water Supply Regulatory Commission (GNERC) for the irrigation sector, will only commence in 2023.
    - Limited willingness of water users to pay a higher irrigation tariff without significant improvement in the service quality, leading to a vicious cycle of limited recovery of O&M costs by GA, increased reliance on state funds for GA operational activities, deterioration of irrigation schemes, which were recently upgraded.
4. **Accelerate Water User Organization (WUO) establishment.**
    - The WUO law is adopted, Georgian Amelioration has successfully established a WUO support unit, but establishment of WUOs is delayed resulting in low tariff collection rates, deteriorated tertiary irrigation systems, and limited irrigation water supply to farm fields.
5. **Finalize reform of the irrigation tariff** to finance O&M costs of irrigation systems.
6. **Need to establish advanced irrigation performance monitoring systems** and processes.
7. **Increase the human resources for irrigation and drainage development**.
8. **Address gaps in policy coordination and encourage champions at all scales to accelerate irrigation performance.**

The combination of these gaps may prevent the government from reaching the target of restoring irrigable areas to 200,000 hectares by 2025 due to delays in the implementation of the Irrigation Strategy.

Considering the constraints identified, seven strategic themes are discussed in this note:

- **In any irrigation and drainage investment project, the needs, constraints and requirements of the farmers or water users, the needs of the surrounding environment, including economic, social, and ecological factors should be studied beforehand so that the effect of the planned investments can be anticipated, and its design adjusted if necessary**. Although this represents one of the basic underpinnings of sound irrigation development in a country, we find that these aspects could be strengthened in the context of Georgian irrigation and drainage infrastructure interventions.
- **Water User Organizations should be established, in relevant irrigated command areas, once the necessary enabling conditions for their establishment (which have been outlined in this note) are present**. Where the technical, hydrological, economic, and social conditions are not met, other modalities for irrigation service delivery to farmers should be considered, including the possibility of individual contracts between water users and Georgian Amelioration or the involvement of Municipalities. WUOs should be established in areas where either the full scheme (from primary to tertiary facilities) has been rehabilitated and is ready to be handed over to WUO members, relevant infrastructure is in good working condition, and/or after ensuring the willingness and ability of potential WUO members to carry out rehabilitation works on secondary and tertiary schemes on their own. These aspects can facilitate the process of IMT to future WUO members.
- **Adequate financing for operation and maintenance, scheme specific and based on asset management, is necessary** to ensure the sustainability of the irrigation sector.

- **Pilot approaches** should be implemented to identify lessons, success, and failure factors, as well as externalities, and thus facilitate learning and flexibility **to adjust interventions to better suit contextual needs** and create conditions for replication. This implies the need for **relevant and effective monitoring and evaluation systems**.
- **Intra and inter-sectoral dialogue** must be improved and the conditions for **strong leadership** to flourish at all scales must be built.
- The **human resources of the irrigation sector must be strengthened** to allow for both a real implementation of the activities and a generational renewal of technical skillsets to meet the demands of irrigation services of the future.
- Georgian Amelioration can be further modernized by focusing on **accountability, performance-driven** with a **customer service approach equipped with modern tools for measuring performance, monitoring, and analyzing irrigation and drainage services, as well as managing climate risks to water availability**. The objective should be to have the performance of the private sector but in the service of the public. Accountability implies the development of robust **regulatory capacities** for the sector, however, should be underpinned by a comprehensive and transparent monitoring of system performance which takes a shift away from measuring investments made towards monitoring results of irrigation schemes, as well as subsidy policies, and water allocation, etc.

To support these overarching strategic themes, this note details a practical and complementary action plan to reinforce the successful steps the government has already undertaken to reform the irrigation sector. These actions are divided into short-term and medium-term to facilitate their appropriation and implementation by the decision makers.

An initial draft of this policy note was presented for comment and feedback to both MEPA and GA in detailed sessions to give decision makers the opportunity to review the constraints and recommendations proposed in the note. Next, the study team also conducted a prioritization session with the Department of Hydro-Melioration in MEPA and with senior GA staff, in which the government endorsed all recommended actions highlighted by this note as important but prioritized and sequenced the actions according to their immediate needs. These are presented in the table below in order of priority as reported by MEPA and GA:

Recommendations and actions endorsed for immediate priority action by MEPA	Rationale for endorsement & prioritization
Strengthening the service delivery capacity of GA **Carry out a service delivery performance assessment of Georgian Amelioration** and formulate an action plan to make GA more customer oriented, accountable, reliable, efficient, and financially sustainable. Clarify what performance means (and should be) for GA, and improve monitoring and evaluation, in order to shift from measuring investments to monitoring results.	■ GA institutional model needs to be clarified to allow for more efficient operation, less burden on the state's financial resources, and at the same time be an agency at the service of public policies in the sector. ■ Beyond the institutional model, it is more generally the tools used by GA, the procedures, and the way in which performance is assessed and activities are monitored that need to be modernized in the short term, both internally (how GA monitor and evaluates its own activities) and externally. ■ MEPA is already monitoring GA but the question of the degree of its involvement in the activities of GA, as well as the degree of involvement of GNERC (the regulator) needs to be addressed.

Prioritize investments by means of an irrigation and drainage master planning	■ Preparation of a master plan (or investment plan) appears to be an essential step in the very short term. ■ MEPA must be able to prioritize investments based on clear criteria. The objective is to have a full understanding of why an investment is needed and what the expected impacts are, to be able to prioritize. ■ These studies must be sufficiently detailed to allow decisions to be made but must not become a hindrance to the advancement of projects because of their complexity and formalism. ■ According to MEPA these studies should focus more on economic considerations than on environmental and social aspects, insofar as more detailed additional studies covering environmental and social factors will be required by the technical and financial partners.
Define a typology of water users and improve the understanding of farmers, on-farm practices and water use and cropping needs	■ Better knowledge of farmers and their practices also appears to be a prerequisite for the establishment of WUOs and the definition of an appropriate water tariff.
Design, calculate, begin introducing an appropriate regional binary bulk irrigation tariff	■ The issue of financial resources for the sector and covering O&M costs is also crucial. The difficulty lies not so much in calculating an appropriate tariff as in the steps to implement a new tariff.
Strengthen cooperation with higher education institutions and the Ministry of Education and Science of Georgia to increase specialist graduates for recruitment in key water sector agencies in the Georgian government.	■ The issue of generational renewal in the irrigation and drainage sector, regardless of the actor involved, is a key issue and it should start being addressed as soon as possible. ■ There is a problem of attractiveness of the irrigation sector's professions that must be solved through joint actions and the implementation of concerted strategies with the education sector. ■ Donors financial support might be key, helping to increase the resources available for the implementation of such reforms (e.g., financing the establishment of advanced programs in the fields where specialists are most needed).
Establishment of successful and sustainable WUOs	■ Establishment of WUOs is an important area of reflection for the Ministry as it is not only a question of establishing them, but also of making them operational and sufficiently independent so that they can operate sustainably.

Scale and sustain recent recruitments of regional WUO support staff to lead WUO establishment processes with annual budgetary support for long-term sustainability where schemes are going to be rehabilitated and where water users express the willingness to self-organize and contribute to WUO establishment.	■ MEPA aims that some WUOs can be established under the ongoing World Bank funded Georgia Irrigated Land Markets Project (GILMDP), but the interest of this project is also to clearly identify the associated costs and good practices to be able to replicate the approaches and enable the establishment of associations in other territories. ■ There is therefore a strong stake in the success of this pilot approach and in identifying all the conditions necessary for scaling up.
Recommendations and actions endorsed as important for medium-term implementation	**Rationale for endorsement & prioritization**
Invest in a robust Hydro-Agro informatics program (HAIP) for integrated monitoring of water and agriculture and set up a Hydro-Agro Informatic Center (HAI Center)	■ The modernization of the sector through the introduction of new technologies based on remote sensing and earth observation tools is of great interest, as is the case for land issues, but the question of related costs must not be neglected. ■ Therefore, it will be useful to go through pilot approaches to properly assess the relevance and costs associated with these new tools.
Strengthen the Ministry of Environment Protection and Agriculture (MEPA's) capacities	■ The assessment of ongoing personnel and skills needs within MEPA and the sector should be ongoing, as well as skill upgrading and updating initiatives, as the needs of the sector evolve and the strategy progresses.
Strengthen institutional mechanisms and find new ways to improve intra and inter sectoral dialogue.	■ Intra- and inter-sectoral dialogue clearly needs to be improved but setting up committees is probably too simple a tool because there is a high risk that it will be not followed up with concrete action. ■ Stakeholders' association agreements with clearly defined implementation plans specifying the responsibility of each main stakeholder and/or group of stakeholders would be more appropriate, to engage stakeholders in more fruitful exchanges and lead to better outcomes.

2 INTRODUCTION

"You asked a question about the performance of Georgia's irrigation sector. But compared to what? Compared to 10 years ago, the situation is much better. It is on the road of development. But we still face many challenges." [1]

Official from Ministry of Environmental Protection and Agriculture

Georgia is divided into two surface water drainage basins, with the eastern portion draining to the Caspian Sea and the west draining to the Black Sea. Major rivers include the Mtkvari (Kura) in the east with major tributaries including the Alazani and the Iori, and the Rioni in the west. The climate in the east is semi-arid, while the west is more sub-tropical with over a 1,000 mm of rainfall a year. Hence irrigation is a common requirement in the East, while artificial drainage is often required in the West. To support and develop its agricultural sector, the Georgian Government initiated an ambitious irrigation strategy in 2017 for a duration of nine years. Although significant improvements have been achieved, including the rehabilitation of a large part of the irrigation systems to expand from 88,000 irrigable hectares in 2015 to about 130,000 ha in 2020, many issues still need to be addressed on the way to sustainable, efficient, and resilient irrigation and drainage systems.

Gaps and barriers exist at various levels of the irrigation sector. These constraints may be structural, linked to the history of irrigation and its organization, or related to external factors such as the impacts of climate change on the availability of water resources or the agricultural economy. These difficulties do not allow the irrigation sector to fully play its role as a lever to accelerate agricultural development in Georgia, strengthening food security and resilience to climate risks, and increasing the income of rural households. Existing constraints result in lowered efficiency of investments and a significant burden on the state budget to finance recurring costs to build, maintain, and operate ageing irrigation systems.

Meanwhile, the development of the drainage sector has been characterised with more ad-hoc projects initiated by the local governments and implemented by the centralized amelioration authority, Georgian Amelioration. This is primarily due to lack of a dedicated agency focused on sustainable drainage management in Georgia, leading to reduced focus and investment in developing the drainage sector. Although this report aimed to examine the status of both irrigation and drainage in Georgia, due to limited awareness among the stakeholders interviewed about the drainage sector, and no nationally approved drainage strategy, with limited data on the status of drainage systems, this report was unable to gather adequate information for analysis on the drainage sector in Georgia. Thus, this study primarily focuses on a detailed diagnostic analysis of the irrigation sector with preliminary data about drainage provided throughout the report.

OBJECTIVE

The objective of this policy note and the irrigation sector diagnostic carried out to produce this note was to identify road blocks to building a sustainable irrigation sector in Georgia, grounded in the perspectives of the actors who work and are impacted by irrigation related challenges. The identification of obstacles and constraints was essential for us to determine practical, realistic, and actionable recommendations in the short and medium term, targeted to decision makers in the Georgian Government. This work has culminated as a practical policy brief and guide to the Government and other stakeholders, including farmer organizations and donors to help them to improve policy coherence, by bringing together a wide range of perspectives, to define concrete steps to tackle serious constraints, and thus contribute to creating the conditions for a sustainable and efficient irrigation sector to enhance food security, farm incomes, and climate resilience of agriculture in Georgia.

[1] All sentences in italics and quotation marks are quotes form stakeholders interviewed between March and June 2021

WHY THIS NOTE AND WHY IT MATTERS?

This policy note supports the World Bank-led analytical study, Agricultural, Land, and Water Policies to Scale-Up Sustainable Agri-Food Systems in Georgia (the ASA). The objective of this ASA is to focus on closing key knowledge gaps and identifying binding constraints for the development of these three inter-related sectors. The ASA aims to bring forward a set of recommendations on what the policy actions are to close the gaps in these sectors with a view of building a solid and integrated approach for a much more productive, competitive, environmentally sustainable, and diversified agricultural sector to emerge.

Specifically, this note aims to sensitize policymakers and other key actors in Georgia on the rationale and urgency of critical water, agricultural, land, and rural development reforms with a view to foster an integrated vision of agri-food systems across the agriculture-water-land nexus. It supports the process of identification of relevant actions to implement as **the need for an integrated approach through the three sectors is becoming more imperative given climate change trends and their impacts on the agricultural sector in Georgia**.

Georgia faces significant water resource challenges due to climate change risks and exogenous shocks from pandemics. These challenges also impact the agricultural sector and reinforce the need for investment in the growth and resilience of the sector, given its importance to food security and employment.

HOW TO READ THIS POLICY NOTE

The policy note is structured as follows: Section 3 presents the approach, data collection strategy, and the methdological tools for analysis used to conduct the diagnostic exercise. Section 4 presents the critical conditions for achieving sustainable irrigated agriculture according to international experience. Section 5 provides an overview of the Georgian irrigated agriculture sector context. Section 6 identifies major constraints for the irrigation sector in Georgia including presenting their root causes, and impacts emerging from interviews of core actors in the sector. Section 7 provides strategic directions and practical short and medium term recommendations to address the root cause issues and accelerate sustainable irrigated agriculture in Georgia.

3 APPROACH, DATA COLLECTION, AND ANALYTICAL STRATEGY

3.1 STEP-WISE APPROACH AND STRATEGY FOR IRRIGATION SECTOR DIAGNOSTIC

The **first step** in conducting the irrigation sector diagnostic for Georgia was to agree an analytical approach around some of the basic ingredients for understanding what is 'good' irrigation sector performance. These can be summarized as:

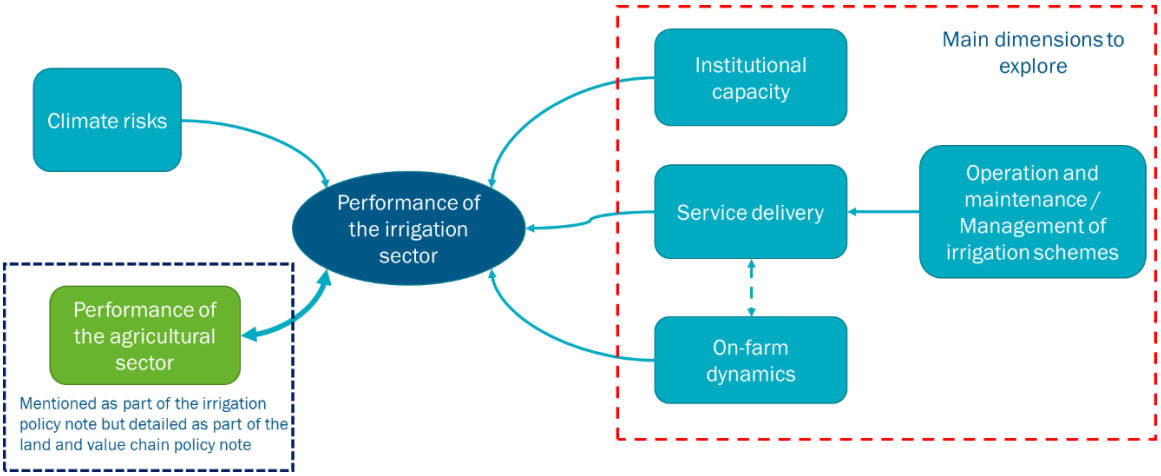
- **Irrigation water service is delivered on a timely and reliable basis**, which means that water resources are adequate, infrastructure is adapted to the needs of users and is in good condition, water delivery services meet water demand; financial and human resources are sufficient.
- **Irrigation infrastructure is sustainable with regular Operations & Maintenance (O&M)**, i.e., infrastructure remains functional over time and adapted to different types of farming systems; climate risks, environmental and social issues are considered; impacts on public finances remain reasonable.
- **The regulatory environment is well defined and adapted with clear laws governing the use of irrigation services**, i.e., a stable set of principles and shared long-term goals; a policy and legal arsenal that serves sustainable performance; a good information system on water and agriculture; a clear definition of key roles for irrigation management, a clear leadership.
- **Farmers are willing to irrigate (because they derive benefits from it) and pay the irrigation fee,** they receive training and support on irrigation techniques and for the strengthening and development of value chains of irrigated crops.

Based on these overarching ingredients for success, the following dimensions were selected to be explored to assess the state of irrigation performance in Georgia:

1. Irrigation sector institutional capacity at the national level
2. Service delivery (and operation and maintenance of irrigation systems)
3. On-farm dynamics (for water users including their irrigation technology choices)
4. Resilience to climate risks
5. Performance of the agricultural sector

These five core dimensions are key to study the performance of an irrigation sector. For the purposes of this diagnostic exercise, we examined the performance of the Georgian irrigation sector by focusing on the first two dimensions of institutional capacity and irrigation water service delivery, although climate risks and on-farm dynamics are also important elements to consider as they influence the performance of irrigation in Georgia. Dimension 5 - the performance of the agricultural sector in Georgia partially results from the performance of the irrigation sector, but it also impacts the way the irrigation and drainage schemes are managed and operated. However, this theme is studied through separate assessments for the preparation of land and value chains policy notes (WB, 2021) and therefore is not the core focus of this policy brief. The assessment of climate risks was beyond the scope of this study, except for the need to assess how climate risks are considered in the definition of the policies and design of irrigation and drainage projects, and some preliminary analysis of recent rainfall and temperature data indicating some general trends with respect to hydrological risks to irrigation in Georgia. On-farm dynamics were also studied, but not in detail. Figure 3-1 summarizes the different dimensions and the scope of the assessment.

Figure 3-1: Dimensions influencing the performance of the irrigation sector



Source: Authors

These dimensions can be linked to the critical conditions required for well-performing sustainable irrigated agriculture (see Chapter 4 for a detailed discussion of these conditions).

The **second step** involved the identification of relevant stakeholders to meet, the preparation of questionnaires (based on the dimensions and critical conditions identified) and the list of data to be collected. The questionnaires are specific to each stakeholder and make it possible to explore the core dimensions described above. The questionnaires and list of data collected are included in Annex 1.

In parallel, a kick-off workshop was held in April 2021 with the Ministry of Environmental Protection and Agriculture (MEPA), Georgian Amelioration (GA), the Georgian National Energy And Water Supply Regulatory Commission (GNERC), the Georgian Farmers Association (GFA) and the National Agency for Sustainable Land Management and Land Use Monitoring with the objectives to agree the key questions to be explored and consultations to be undertaken to conduct the analysis and engage the stakeholders in a collective reflection process.

Once these activities were completed, the **third step** was to conduct semi-structured interviews and focus group discussions with stakeholders listed in Table 3-1. Special attention was given to meeting with farmers. Due to the ongoing COVID-19 pandemic in Georgia, most of the interviews were carried out through videoconferencing tools. In total, 51 interviews were conducted (30 individual interviews and 21 farmers were interviewed (14 out of 21 individual farmers were interview by phone and the balance through focus group discussions). Although the small sample size of farmers interviewed does not allow for representativeness, which means that the information should be viewed with caution, it does provide useful qualitative information.

Table 3-1: Who was consulted and why?

Who?	Why?	Dimensions consulted
• MEPA (Deputy Minister of the MEPA, Department of Policy Analysis, Department of Hydromelioration and Land Management, Division of water resource protection, Financial Department) The Ministry of Environmental Protection and Agriculture of Georgia oversees the implementation of the State policy in the areas of environmental protection, agriculture and rural development.	Discuss the institutional capacities, the definition and advancement of the irrigation strategy and the drainage strategy, core legal framework and strategies for establishment of Water User Organizations (WUOs), the relationships between stakeholders, the legal and regulatory framework, the performance of the agricultural sector and irrigation from a national perspective, the on-going projects and upcoming or pipeline policies and projects.	• Institutional capacity at national level • Performance of the agricultural sector
• Georgian Amelioration	Discuss the irrigation and drainage strategies from national and local perspectives. Discuss the irrigation sector performance. Discuss the	• Service delivery • On-farm dynamics • Resilience to climate risks

Who?	Why?	Dimensions consulted
Formed in 2012 by merging four regional amelioration services companies, Georgian Amelioration is the State-owned company in charge of the O&M and development of irrigation and drainage schemes. It is held by the National Agency for State Property Management a division of the Ministry of the Economy, and it reports to the MEPA. It owns infrastructures related to irrigation and drainage. It provides irrigation and drainage services at primary, secondary and sometimes tertiary levels.	organization of Georgian Amelioration and constraints in the day to day management at national and local levels (legal, regulatory, human, financial, infrastructure constraints…). Discuss the performance of the irrigation and drainage services. Discuss the quality processes around irrigation system management, operation, and maintenance. Discuss the relationships with water users. Discuss WUO reform and perspectives for Georgian Amelioration. Discuss the on-going rehabilitation projects.	
• Georgian Amelioration – WUO support unit This sub-unit within Georgian Amelioration is in charge of the establishment of WUO.	Discuss WUO reform and WUO establishment processes including steps being taken to implement the WUO law (2019). Discuss the constraints and delays in the implementation of the reform and the WUO law.	• Service delivery • On-farm dynamics
• Agricultural and rural development agency This agency is under the MEPA. It implements agricultural and rural policies.	Discuss the performance of the agricultural sector, the relationships between irrigation and agriculture, the irrigation service related constraints and on-farm dynamics, the degree of micro irrigation adoption.	• Institutional capacity at national level • Performance of the agricultural sector • On-farm dynamics • Resilience to climate risks
• National Agency for sustainable land management and land use monitoring This new agency created in 2020 under the MEPA is in charge of the registration of agricultural land resources, production of land balance, creation of database, activities related to sustainable land management, etc.	To understand the relationships between land management and irrigation sector performance. Discuss the issues of land registration and land management.	• Institutional capacity at national level • Performance of the agricultural sector • On-farm dynamics
Ministry of Economy and Sustainable Development	Discuss the performance of the agricultural and irrigation sector.	• Institutional capacity at national level • Performance of the agricultural sector
Ministry of Finance	Discuss the financial flows with Georgian Amelioration and their magnitude.	• Institutional capacity at national level
• Georgian National Energy and Water Regulatory Commission (GNERC) The Georgia National Energy and Water Supply Regulatory commission reviews and approves tariffs charged by Georgian Amelioration.	Discuss water tariff issues and the capacity to perform the function of an irrigation regulatory body, and inter-agency coordination and cooperation with MEPA and GA.	• Institutional capacity at national level • Service delivery
• Georgian Farmers Association Founded in 2012, the Georgian Farmers association is a non-commercial, non for profit legal entity. It currently unites about 4,000 farmers across Georgia. The Association acts as a facilitator between the government and farmers. The Association is a member of various governmental and non-governmental boards, such as the Georgian Chamber of Commerce and Industry and the Georgian Alliance for Agriculture and Rural Development.	Discuss the performance of the agricultural sector, the relationships between irrigation and agriculture, the irrigation service related constraints and on-farm dynamics of farmers. Discuss the climate risks.	• Performance of the agricultural sector • Service delivery • On-farm dynamics • Resilience to climate risks

Who?	Why?	Dimensions consulted
Farmers (water users)	Discuss the performance of the water service and relationships with the service providers, including general awareness about WUOs. Discuss expectations from irrigation system and the linkages with farmers' choices (land registration, crop choice, irrigation technology choice, water collection and use). Discuss the constraints for the farming systems (irrigation service related and non-irrigation service related). Discuss the changes experienced in rainfall, temperature, and climate impacts. Discuss the mitigation strategies.	• Service delivery • On-farm dynamics • Resilience to climate risks
• Rural and Agricultural Policy and Development Institute Rural and Agricultural Policy and Development Institute (RAPDI) is a Georgian NGO, established in 2014 by former senior Government officials responsible for agriculture, food, and rural affairs. The NGO is involved in reflections on the agricultural sector in Georgia.	Discuss the performance of the irrigation and agricultural sector.	• Institutional capacity at national level • Performance of the agricultural sector • Service delivery • On-farm dynamics • Resilience to climate risks
Community of Donors (World Bank, USAID, IFAD, AFD, ADB, EIB, FAO)	Discuss the past and on-going projects. Discuss constraints, difficulties encountered, successes and perspectives from donors points of view. Discuss the organization of the irrigation sector.	• Institutional capacity at national level • Performance of the agricultural sector • Service delivery • On-farm dynamics • Resilience to climate risks
Individual external experts or consultants who are or were in charge of projects related to agriculture and irrigation development in Georgia with respect to irrigation management, tariff policies, legal frameworks, and water resources management.	Discuss the strategy, constraints and perspectives for the irrigation sector.	• Institutional capacity at national level • Performance of the agricultural sector • Service delivery • On-farm dynamics • Resilience to climate risks

In parallel, a significant desk literature review on the irrigation sector in Georgia, irrigation systems sustainability and irrigation management transfer[2] (IMT) was carried out.

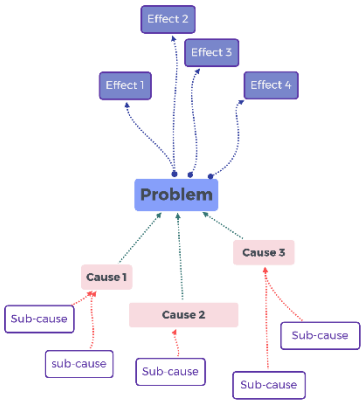
For the puporses of the study the team requested several secondary data from the relevant agencies operating under the MEPA, including GA, National Environment Agency (NEA) and Rural Development Agency (RDA).

[2] Irrigation Management Transfer (IMT) can be defined as the transfer of responsibility and authority for management of irrigation systems from government agencies to private-sector organizations that are meant to represent the interests of water users (Garces-Restrepo and al, 2007)

3.2 METHODOLOGICAL TOOLS FOR ANALYSIS OF DATA

Problem-tree methodological approach was used to carry out the analysis and derive recommendations, factoring in relevant data and opinions collected (literature review and interviews). The problem tree is a diagram showing the cause-effect relationships (see Figure 3-2). The first step is to identify the problems. For the problem identified, which can be global, a hierarchy of causes and effects is established. The idea is to identify what causes the problem and what are the impacts/effects of the problem. The trunk is the identified problem, the roots represent the causes, and the branches represent the effects. It provides a visual breakdown of problems into their impacts and causes and is a good way to create an easily understandable visual output.

Figure 3-2: Problem-tree diagram



The problem tree methodology has been used for some time in the Georgian context, particularly while performing Regulatory Impact Assessments (RIAs).

Some relevant references, which were developed as a manual for practitioners to support civil servants engaging in RIAs in Georgia, which explains how to apply the problem tree approach in the RIA context, and two examples in which the approach has been applied) are listed below:

- Georgia Good Governance Initiative. (2021). Ria Manual for Practitioners. Tbilisi: GGI Georgia.
- ISET Policy Institute. (2020). Regulatory Impact Assessment on Ways to Manage the Existing Backlog of Power PPAs and MOUs. Tbilisi: USAID Energy Program.
- UN Women. (2021). Regulatory Impact Assessment of ILO 189 - Domestic Workers Convention. Tbilisi: UN Women.

In addition, mind mapping was used as a visual tool to display the analysis, results in this policy brief.

4 UNDERSTANDING THE CRITICAL CONDITIONS FOR ACHIEVING SUSTAINABLE IRRIGATED AGRICULTURE

4.1 GLOBAL FRAMEWORKS FOR MEASURING IRRIGATION PERFORMANCE

International experience teaches us that several conditions must be met to achieve the goal of a well performing sustainable irrigated agriculture sector. The Governance in irrigation and drainage book published by the World Bank Group lays the foundations for understanding the key functions of performance in irrigation. Drawing on Ostrom (1990) and Merrey and al. (2007), a framework based on a practical set of performance areas of interest has been developed. It considers three thematic areas comprising groups of functions. Figure 4-1 summarizes the performance area per functional themes.

Figure 4-1: Functional themes and performance areas

Source: Waalewijn and al., 2020

Although this framework provides important insights, we find that the concept of sustainability is missing. Sustainability is a key dimension of irrigation sector performance; both in terms of financial sustainability as well as environmental sustainability. The OECD states that designing coherent policies is a complex task because of the synergies and trade-offs between different dimensions (OECD, 2021). Policy actions that are relevant for one dimension of performance could have negative side effects and be counterproductive in terms of sustainability. The OECD proposes some design principles to reduce the complexity of the task:

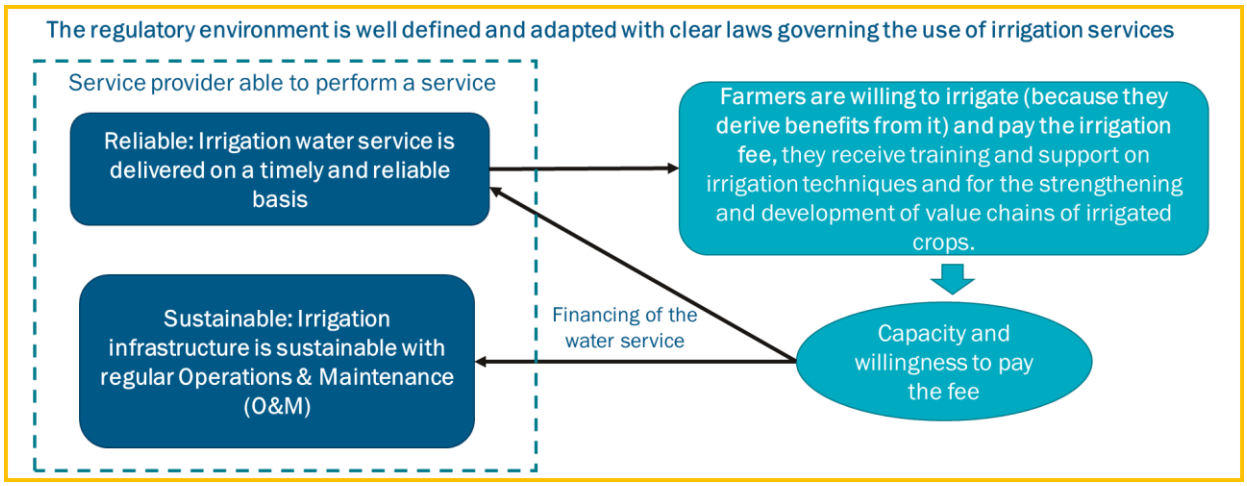
- *Documenting and, where possible, quantifying potential spillover effects is an important first step: not all potential synergies and trade-offs are real, or large enough to matter for policy design.*
- *Even where synergies are found, a single policy instrument will rarely be sufficient to achieve all objectives. Rather, a mix of instruments is usually needed.*
- *Where there are trade-offs, they can sometimes be avoided by a different choice of policy instruments. In other cases, society must choose between competing objectives. This is not a purely technical question but involves value judgments.* (OECD, 2021)

In irrigation, a good example of this complexity is the need to define a water tariff covering the operation and maintenance expenses and at the same time consider the capacities of water users to pay, however, when irrigation water supply is affected by climate shocks, the ability of the irrigation agency to supply timely water dwindles, despite rehabilitated or modernized canal systems, impacting the quality of service and the willingness of users to pay for that service. This complex process highlights the trade-offs and spillovers between resilience, competitiveness, and financial sustainability inherent to the irrigation sector. From a broader perspective, poorly designed and/or implemented irrigation policy can have undesirable effects, such as: overexploitation of water resources, soil salinization, abundance of low value crops with high water footprint with negative impacts in terms of food security or income potential for farming communities who are traditionally less well-off.

4.2 APPLYING AND BENCHMARKING IRRIGATION THEMES IN GEORGIA

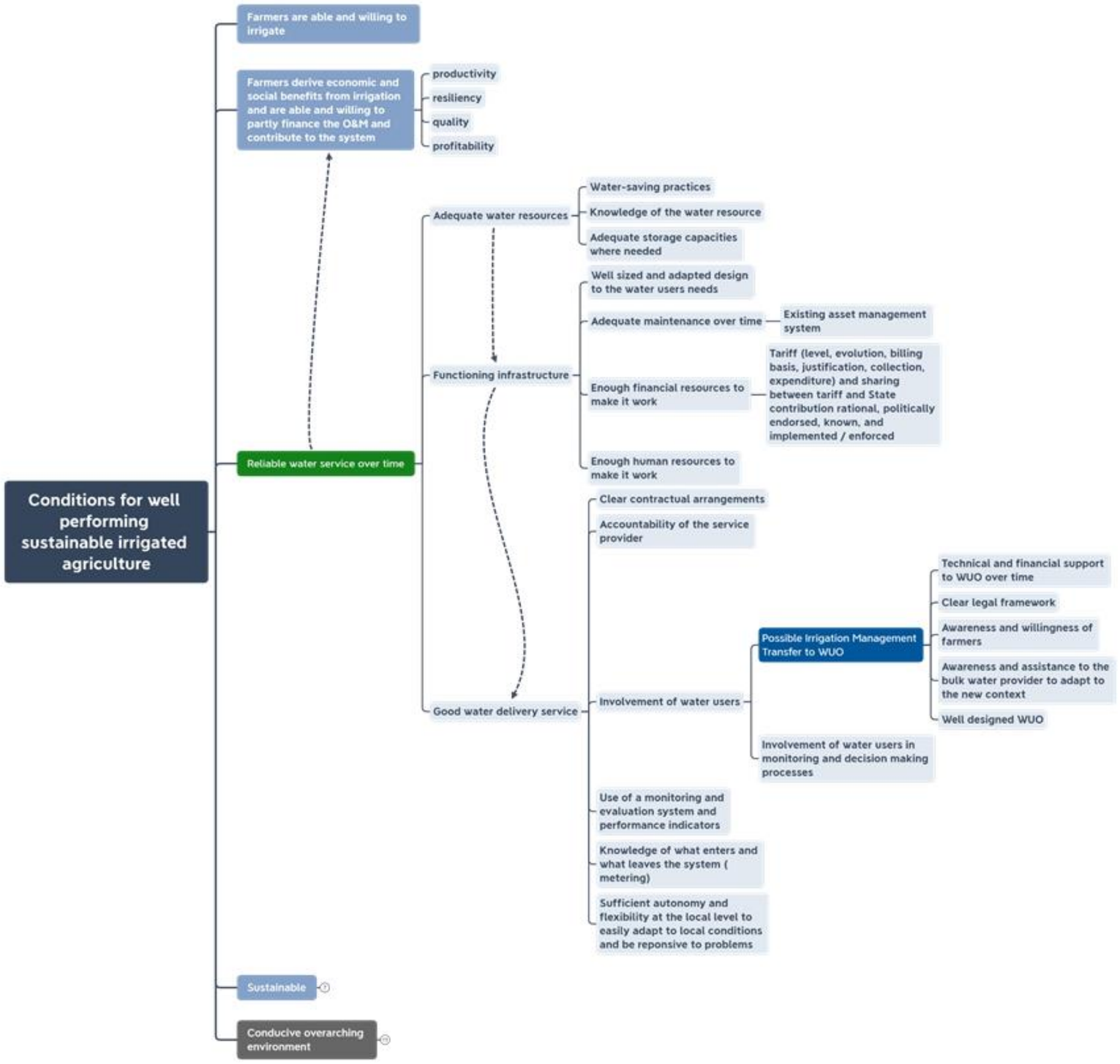
The World Bank's global framework briefly described in section 4.1 can be further developed in the form of a list of necessary conditions for well performing, sustainable, and efficient irrigated agriculture. Figure 4-2 and Figure 4-3 below aims to present those conditions. They can easily be linked to the core dimensions of assessment (institutional capacity, service delivery and O&M of irrigation schemes, on-farm dynamics, and resilience to climate risks that were presented in Chapter 3).

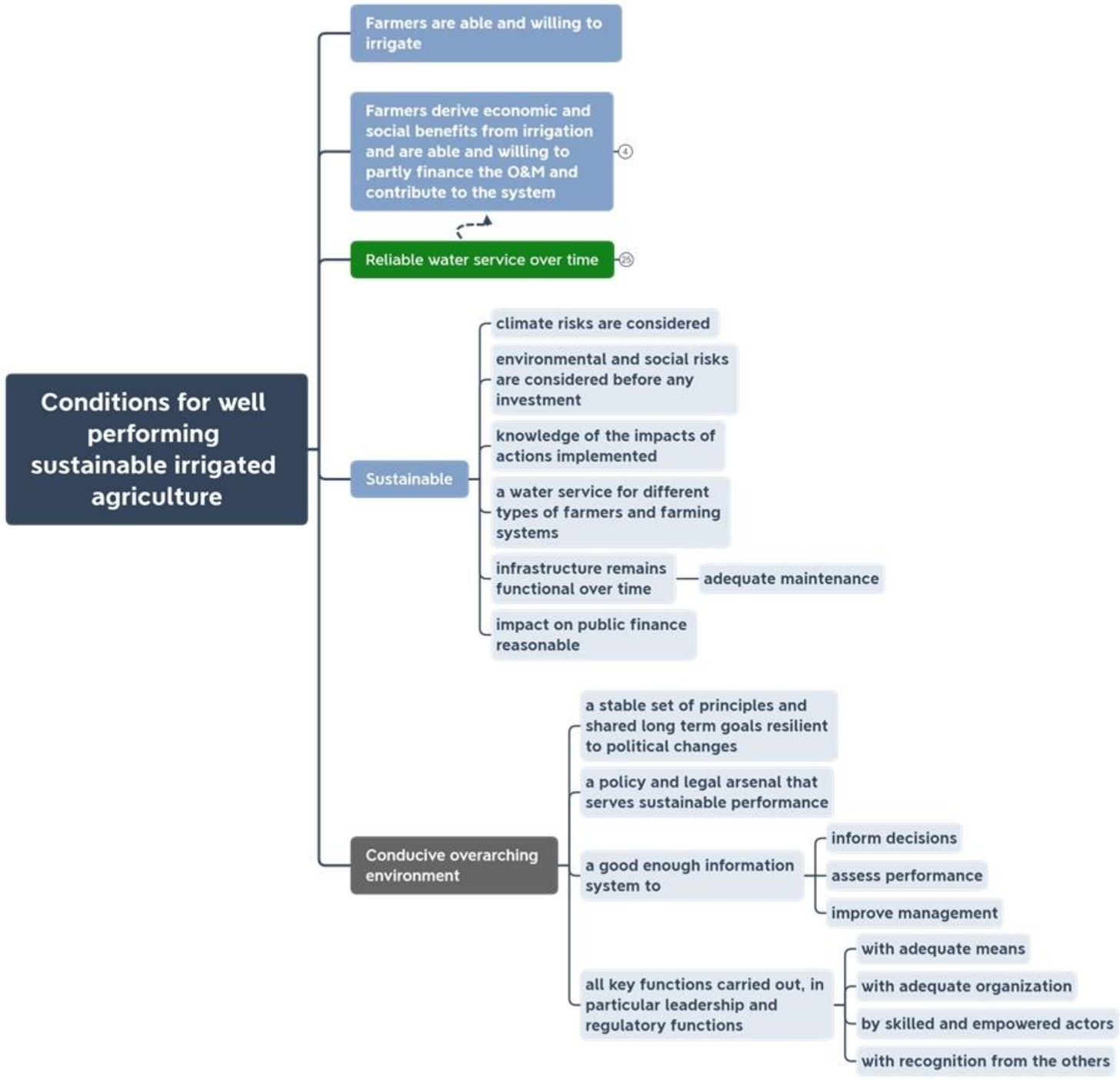
Figure 4-2: Necessary "ingredients" for good irrigation sector performance – in summary



Source: Authors

Figure 4-3: Conditions for well-performing and sustainable irrigated agriculture – in details




Conditions for well performing sustainable irrigated agriculture
Farmers are able and willing to irrigate
Farmers derive economic and social benefits from irrigation and are able and willing to partly finance the O&M and contribute to the system
4
Reliable water service over time
25
Sustainable
climate risks are considered
environmental and social risks are considered before any investment
knowledge of the impacts of actions implemented
a water service for different types of farmers and farming systems
infrastructure remains functional over time
adequate maintenance
impact on public finance reasonable
Conducive overarching environment
a stable set of principles and shared long term goals resilient to political changes
a policy and legal arsenal that serves sustainable performance
a good enough information system to
inform decisions
assess performance
improve management
all key functions carried out, in particular leadership and regulatory functions
with adequate means
with adequate organization
by skilled and empowered actors
with recognition from the others

4.3 SUMMARY OF PRELIMINARY IDENTIFIED CONSTRAINTS TO SUSTAINABLE IRRIGATION PERFORMANCE IN GEORGIA

During the inception workshop, which was held in April 2021, stakeholders were asked at an early stage in the diagnostic exercise process to collectively identify any constraints that may be hindering performance of the irrigation sector in Georgia. The constrains that they identified are summarized below and illustrate the clear linkages with the five dimensions of analysis presented in Chapter 3 and the necessary conditions for measuring irrigation sector performance highlighted in Figure 4-3:

- Agriculture is generally not seen as a business opportunity despite Georgia's rich natural assets in terms of good climate and soils. **Unreliable access to water** makes investment in high value agriculture and innovation risky for farmers. The lack of land registration means that it is difficult to buy, sell, and lease land for farmers that want to expand. The lack of agricultural inputs of quality, as well as qualified staff, extension services or structured value chains, is an issue for agricultural development.
  - ⇨ **Dimension**: Service delivery, On-farm dynamics, Performance of the agricultural sector
  - ⇨ **Conditions**: Farmers are able and willing to irrigate, Farmers derive economic and social benefits from irrigation
- The infrastructures at secondary and tertiary level are not always in good conditions.
  - ⇨ **Dimension**: Service delivery
  - ⇨ **Conditions**: Functioning infrastructure
- There is a scarcity of reliable data on water resources and farming systems.
  - ⇨ **Dimension**: Institutional Capacity, Service delivery
  - ⇨ **Conditions**: Knowledge of the water resource, Metering, Good enough information system
- There is no IWRM approach and limited consideration for environmental issues and climate change. Climate change is seen as a cause of the scarcity of water resources.
  - ⇨ **Dimension**: Service delivery, On-farm dynamics, climate risks
  - ⇨ **Conditions**: Farmers are able and willing to irrigate, Farmers derive economic and social benefits from irrigation
- The tariff does not reflect the real costs of O&M and the impact on public budget is significant.
  - ⇨ **Dimension**: Service delivery
  - ⇨ **Conditions**: sufficient financial resources to operate irrigation infrastructure, impact on public finance reasonable
- There is a shortage of skilled staff.
  - ⇨ **Dimension**: Service delivery, Institutional capacity
  - ⇨ **Conditions**: adequate quantity of skilled human resources to operate the ifnrastructures, all key functions carried out with adequate means
- There are delays in the establishment of WUOs.
  - ⇨ **Dimension**: Service delivery
  - ⇨ **Conditions**: conditions for successful irrigation management transfer to WUO (legal framework, awareness, etc.)
- The M&E system is insufficiently developed to inform decisions, assess performance and improve management
  - ⇨ **Dimension**: Service delivery, Institutional capacity

- ⇨ **Conditions**: use of a monitoring and evaluation system and performance indicators, a good enough information system

- Multi-stakeholder dialogue should be more developed.
  - ⇨ **Dimension**: Institutional capacity
  - ⇨ **Conditions**: conducive overarching environment

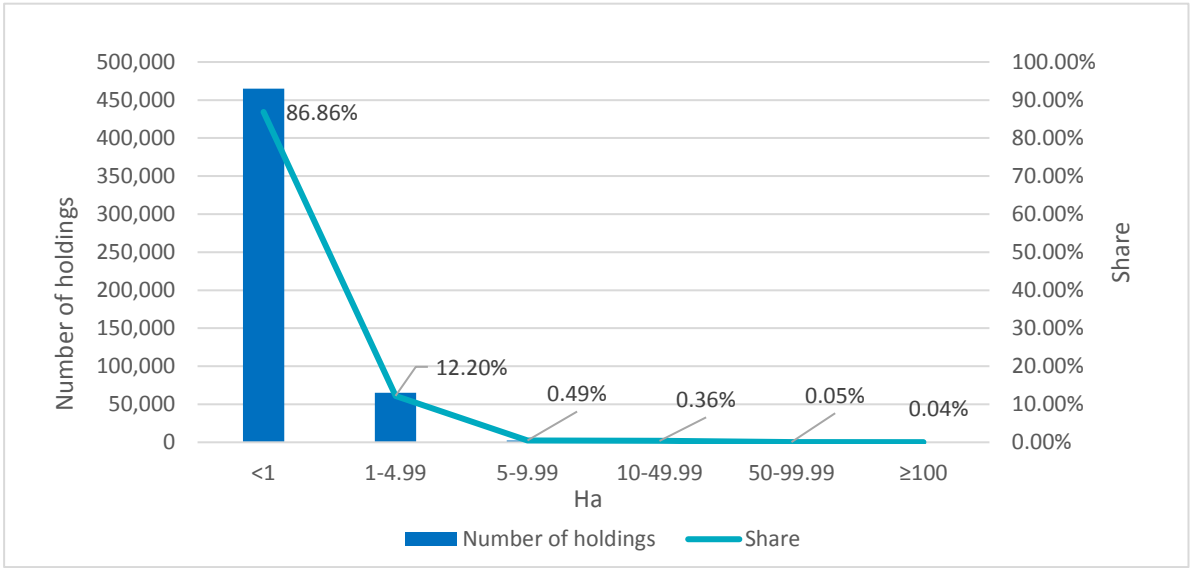
These constraints are described in more detail and discussed in depth in Chapter 6 with reference to information gathered during individual stakeholder interviews building on the initial findings from the inception workshop.

5 UNDERSTANDING THE GEORGIAN IRRIGATED AGRICULTURE CONTEXT

5.1 OVERVIEW OF THE GEORGIAN AGRICULTURE SECTOR

Agricultural GDP growth averaged 2.3% per year in real terms between 2011 and 2019, versus 4.7% for the overall economy. In 2020, GDP growth was impacted by the COVID crisis (decreasing by 6.2% compared to 2019) but the agricultural GDP growth continued to increase (+3.6%). Today, agriculture officially employs 19.8% of the population and makes up 7.4% of total GDP of Georgia. In addition to the officially employed in agriculture, a large percentage of the population living in the countryside depend on agricultural activities for their living. Most farmers are village households with other sources of income. According to the 2014 census, the average size of the agricultural land owned by a farmer in Georgia is 1.37 ha and 86.9% of agricultural holdings are operating arable land of less than 1 ha and only 0.1% own more than 50 ha (see Figure 5-1). In addition, because of its structural bottlenecks, Georgian agriculture is not attractive for new generations. In 2020, only 0.3% of agricultural land holders were less than 25 years old while 54% were more than 60 (GEOSTAT). According to 2019 data provided by the National Agency of Public Registry, 38% of landowners or co-owners in the irrigated areas are female, but the percentage of female water users (i.e., landowners who agreed to have irrigation service contracts with GA is just 3.7 percent), which presents a gender gap with respect to access to irrigation and secure land tenure[3].

Figure 5-1: Distribution of Land holding by size (ha)

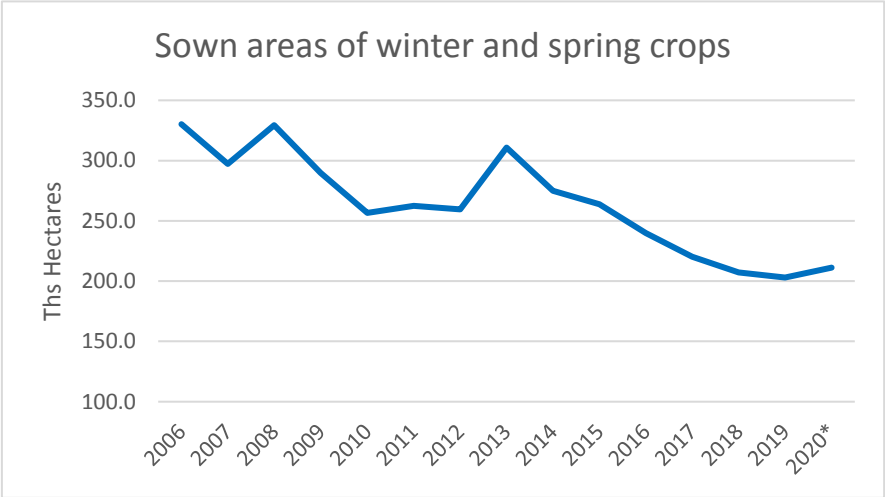


Source: Geostat (Census 2014)

According to Geostat data, in 2020, 210,000 ha of land were sown with annual crops. 29% of the sown area was devoted to winter crops, such as wheat and barley, while the rest, 150,000 ha, was occupied by spring crops, such as grain and leguminous crops (102,000 ha); potato, vegetables and melons (32,000 ha) and other crops (17,000 ha). The land area under permanent crops was 121,000 ha, mainly orchards (74,000 ha) and vineyards (36,000 ha). The sown area of winter and spring crops has been decreasing regularly since 2006 but has been partially offset by the increase in the areas cultivated with permanent crops. The sown areas of winter and spring crops over the last 15 years is presented in the Figure 5-2 below.

[3] Data on gender should be considered with caution as their reliability is uncertain according to the National Agency of Public Registry.

Figure 5-2: Sown areas of winter and spring crops



Source: Geostat

In Georgia, most of the high-value agricultural production[4] is located in the central and eastern regions and partly relies on irrigation. The Kakheti region represents about 40% of the agricultural land and Kvemo Kartli 15.5% (Geostat, 2014). According to the Irrigation Strategy for Georgia 2017-2025, one of the goals of the Government of Georgia is to restore Georgia's position as an important exporter of high-value agricultural products (as it was during the Soviet period). However, according to the strategy, to achieve this goal it is essential to increase the area of irrigated lands all over the country. As stated in the strategy, expansion of the irrigated land area by rehabilitating irrigation infrastructure and improved management of irrigation systems is critical to support farmers to shift their cropping patterns towards high-value crops.

5.2 CLIMATE CHANGE IN GEORGIA

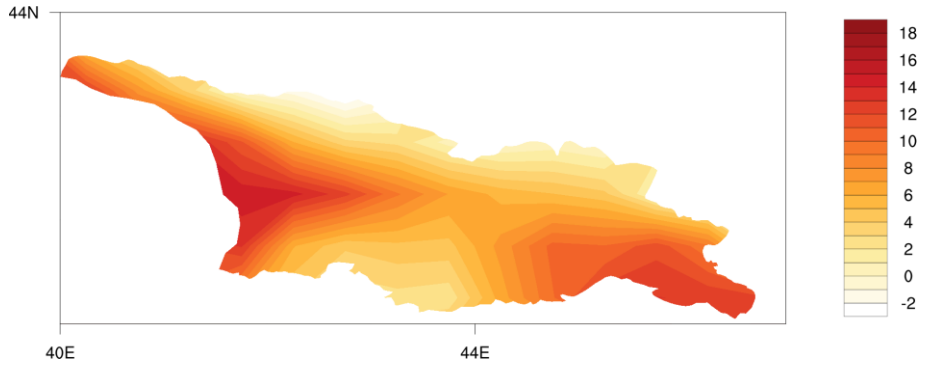
A profile of Georgia's climate smart agriculture was prepared in 2021 by the World Bank, EU and FAO (WB, 2021). The following elements are derived from this report.

Temperature. Georgia has two distinct climate zones in the west and the east regions. The Greater Caucasus range to the North of Georgia moderates local climate by serving as a barrier against cold air from the north, while Likhi range, crossing from the north to the south, divides the country into the Caspian Sea and the Black Sea catchments. The western part of Georgia is affected by temperate humid influences from the Black Sea with an average temperature of 15°C, winter temperatures well above freezing, and relatively hot summers with higher humidity and higher average precipitation. Black Sea coastal areas average annual temperatures that typically range from 9 to 14°C. Mountainous regions have a colder climate, with average annual temperatures of 2 to 10°C. The plains of eastern Georgia are shielded from the influence of the Black Sea by mountains that provide a more continental climate. Summer temperatures average from 20 to 24 °C, and winter temperatures range from 2 to 4°C (Figure 5-3). In the last decades (1960 - 2015), temperatures warmed all over the country. Georgia has experienced increased temperatures of 0.3°C in western regions with a maximal increment registered in Dedoplistskaro (0.9°C) and 0.4-0.5°C in eastern regions with the maximal increase of temperature registered in Poti (0.6°C). In the region of Mtskheta-Mtianeti and Kakheti the trend of warming was relatively weaker but significant.

[4] High-value agricultural products are those typically yielding high return on the market (such as fruits and vegetable).

With the rise in average temperature, the number of frost days will progressively decrease and increasing temperatures will lead to glacier melt reducing water surpluses. During the last 50 years, the number of glaciers in Georgia decreased by 13 percent and the glacier area decreased by 30 percent. With global warming, their full melting is projected by 2160.

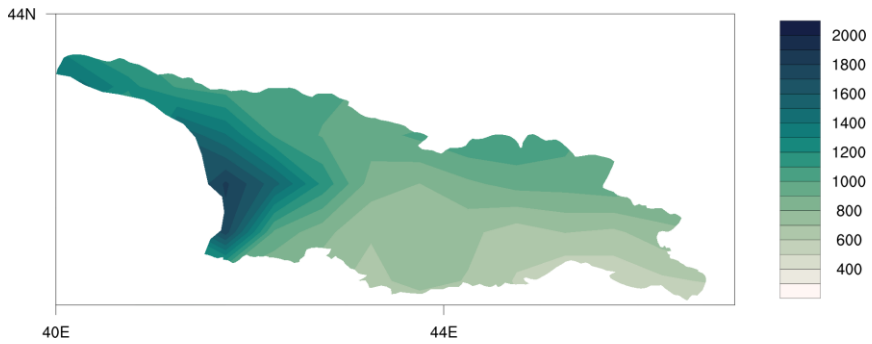
Figure 5-3: Annual Mean Temperature (in degree Celsius °C) in Georgia over the period 1901-2019



Source: WBG Climate Change Knowledge Portal (CCKP 2020) Georgia. Climate Data. Projections.
https://climateknowledgeportal.worldbank.org/country/georgia/climate-data-projections

Precipitation & Water Resources. Due to the altitude diversity as well as range of landscapes comprising mountains, lowlands, and river basins, Georgia boasts several micro-climates and rainfall patterns with a mix of sub-tropical and continental climates. The distribution of annual precipitation shows a clear division between a humid western and an arid eastern Georgia (Figure 5-4).

Figure 5-4 : Annual Mean Precipitation (in millimeters) in Georgia over the period 1901-2019

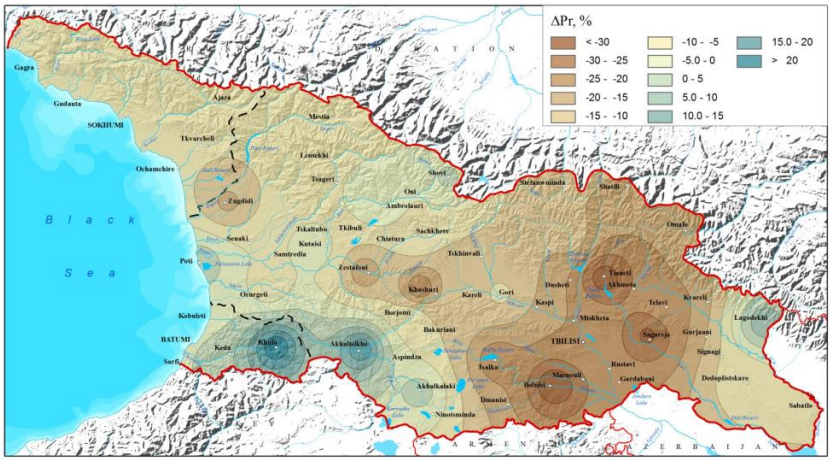


Source: WBG Climate Change Knowledge Portal (CCKP 2020) Georgia. Climate Data. Projections.
https://climateknowledgeportal.worldbank.org/country/georgia/climate-data-projections

Despite being rich in water resources, with 14,000 m^3 of surface water per capita compared to the European average of 9,300 m^3 (MEPA, 2019), available water resources are not evenly distributed in Georgia and they are mainly accumulated in the western part of the country (FAO, 2008). Moreover, the availability of water resources is highly dependent on the seasons. River flows, especially in Eastern Georgian, depend on snowmelt – with high flows occurring in April-May and low flows in July-August during the peak of when crops need irrigation.

Across the South Caucasus sub-region, climate trends show a slight decrease in mean precipitation over the past decade, although an increase in heavy precipitation has been observed in certain areas. Precipitation rates (over 1960 – 2015) increased in Western Georgia specifically in Svaneti low hill zones, Adjara Mountain areas, Poti and Imereti mountain areas – with a few exceptions such as the eastern part of Adjara at Goderdzi Pass (Figure 5-5). Apart from the Lagodekhi municipality where precipitation slightly increased, Eastern Georgia registered a reduction trend in precipitation. Glacial run-off is projected to decrease by 40 percent compared to 2010 levels by 2100, which will severely impact Georgia's energy, agriculture, and ecosystems. Droughts are also expected to put further pressure on water availability.

Figure 5-5: Precipitation changes in July between two 30-years period (1956-1985 and 1986-2015)



Source: National Environmental Agency (NEA), Government of Georgia, 2017

The warming trend is clear in Georgia according to all four emissions pathways (RPC 2.6; 4.5; 6; 8.5). (+1.6°C to 3.0°C in 2041-2070 compared to 1971-2000) (NEA, 2021). But estimates for the changes in precipitation are much more uncertain. Observations suggest that a decrease of rainfall in the summer period will be observed. Climate change is also expected to negatively affect irrigation water availability by reducing river flows with significant impacts on most crop yields (about –30% in the eastern lowlands in the 2040s). (Ahouissoussi and al., 2014)

Impact of Climate Change on Agriculture. Georgian agriculture is expected to be negatively affected by the direct impact of temperature and precipitation changes on crops, the increased irrigation demand required to maintain yields, and the decline in water supply associated with higher evaporation and lower rainfall, including the potential for more dry days (consecutive days without rainfall events). The expected impact of climate change on specific agricultural produce is described below:

- **Wheat**: Over 60 percent of wheat is produced in Kakheti (eastern region), and the rest is almost completely concentrated in other regions of eastern Georgia. The sector is severely suffering from rises in average temperature and increases in drought periods. The last of these severe droughts happened in 2020, therefore yields were lower than average.
- **Maize**: About 70 percent of maize comes from western Georgia, where humidity is high therefore production is not significantly dependent on irrigation. However, high temperatures can lead to serious negative impacts, like invasive pests reaching these altitudes. Kakheti, also a maize producer region, has seen a change in rainfall patterns which is requiring the use of irrigation for short periods in summer, at critical stages of grain filling. Few farmers have access to irrigation; therefore, this has led to decreased yields.
- **Viticulture**: The cultivation of grapes is widely practiced in Georgia, particularly in the country's eastern region: approximately 38,000 to 40,000 hectares are currently dedicated to grape production, and there are more than 35,000 small-scale grape growers. Over the past two decades, Georgia has faced increasingly heavy rainfall, hail, and flooding events, which have affected the Kakheti wine region, causing severe damage to hundreds of vineyards.
- **Potatoes**: Almost half of the potato production in Georgia comes from Samtskhe-Javakheti (central southern region), where the precipitation levels (May - June) have increased by 10 percent in the past ten years. This has led to increased water levels and flooding in areas of newly harvested potato seeds as well as higher infestation of fungus, specially phytophtora and alternaria.

- **Tangerines**: Most of the tangerines in Georgia come from the Adjara and Guria region (south-western region). The expected increase in average temperatures, in general, will positively impact the sector. However, currently the sector is characterized by huge volatility due to frequent early fall frosts and hail, when fruits are not yet fully developed and are highly susceptible to climatic conditions.
- **Hazelnuts**: More than half of the hazelnut production comes from Samegrelo (western region). Increases in precipitation levels during the vegetation period along with droughts in July through August and an increase of hot winds negatively affect hazelnut productivity.
- **Meadows and Pastures**: Of about 1.9 million ha of meadows and pasture areas, half is in Kakheti (eastern region). The decrease of humidity and the increase of strong winds have facilitated erosive processes on pastures in Kakheti. Moreover, unattended burning of crop residue causes the destruction of windbreakers established during the former Soviet Union (mainly in Dedoplistskaro).
- **Livestock**: Climate change can directly affect animal feed and water availability. Warm winters can also facilitate the spreading of livestock diseases and even the introduction of new types of insects

In summary, current trends of climate change in Georgia, such as increasing temperature, eroding soils, and intensifying floods, frost, and hail in addition to new pests and diseases affecting crops, forests, and livestock, are expected to reduce yields in major agricultural regions. Direct and indirect effects of climate change on crop growth are expected to affect food production. Direct effects include changes to carbon dioxide availability, precipitation, and temperatures. Indirect effects include changes through impacts on water resource availability and seasonality, soil organic matter alteration, soil erosion, changes in pest profiles and the arrival of invasive species, as well as declines in arable areas due to the submergence of coastal lands.

5.3 EVOLUTION AND CONTEXT OF THE IRRIGATION AND DRAINAGE SECTOR

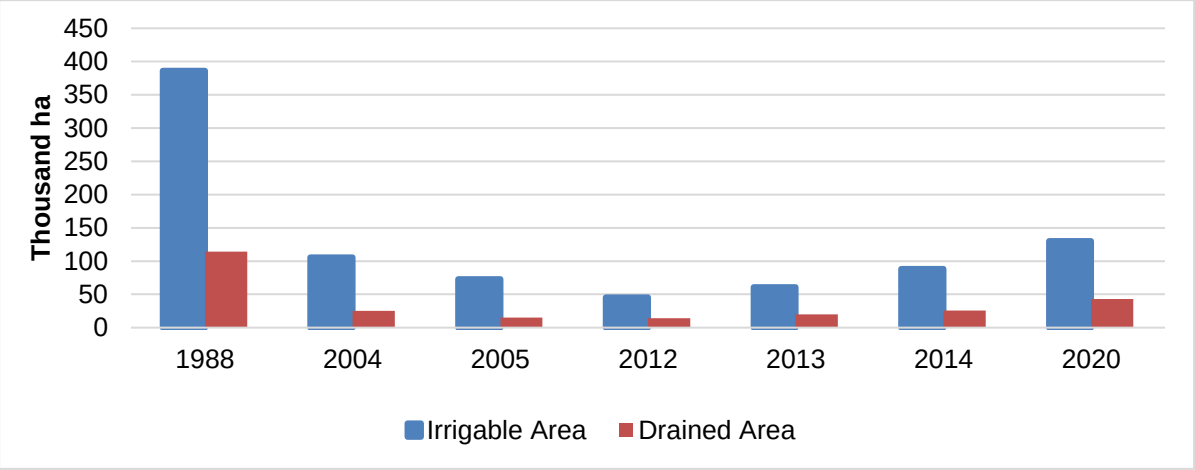
The Georgian irrigation (also known as the 'amelioration') sector infrastructure was mainly built when the country was part of the Soviet Union. During this period, the total irrigated area reached 386,000 ha in 1988 (MEPA / GA 2017). However, it must be noted that part of this area was irrigated despite the extremely high costs of operation and maintenance of the systems (ISET-PI 2016). After regaining independence in 1991, Georgia went through a turbulent transition period that resulted in the deterioration of a large part of the infrastructure. This caused a sharp decline in the irrigated area. As for the drainage infrastructure, by 1988, 114,000 ha of land were drained. However, since it received nearly no maintenance for a long time, the infrastructure continued deteriorating until 2012.

Up until 2011, 4 state owned companies in different regions of the country were providing amelioration services. In 2011, these companies were merged into one firm: Ltd. Georgian Amelioration(GA). GA is a Ltd operating under MEPA and is the sole provider of irrigation and drainage services in the country. GA manages and carries out the rehabilitation works of the existing amelioration infrastructure.

Since 2012, both the irrigation and the drainage area have increased. In 2012, the agricultural sector was identified as one of the key priority sectors for the country's development. Consequently, since 2012, with support of donor organizations such as the World Bank (WB) and International Fund for Agricultural Development (IFAD), the Government has been actively investing in the development of irrigation and drainage infrastructure. Between 2016 and 2020, roughly 125 million GEL (approximately $39.56 million)[5] were invested in infrastructure projects with World Bank funding (under the Land Market and Irrigation Development Project). Furthermore, around 19 mln GEL (approximately $6 million) were invested by IFAD over the same period.

According to GA, in 2020 there were a total of 123 irrigation schemes under use. Most of the schemes are gravity schemes. The public irrigable area increased since 2012 to reach about 130,000 ha today (see Figure 5-6), of which about 6,500 ha are served by pumping systems. According to GA, the total public irrigated area is about 65,000 ha. The share of irrigable land to total agricultural land is about 16.5%[6], but any land that does not have 'other' status has the status of agricultural land, including land where agriculture is not possible.

Figure 5-6: Area covered with irrigation and drainage infrastructure 1988 – 2020



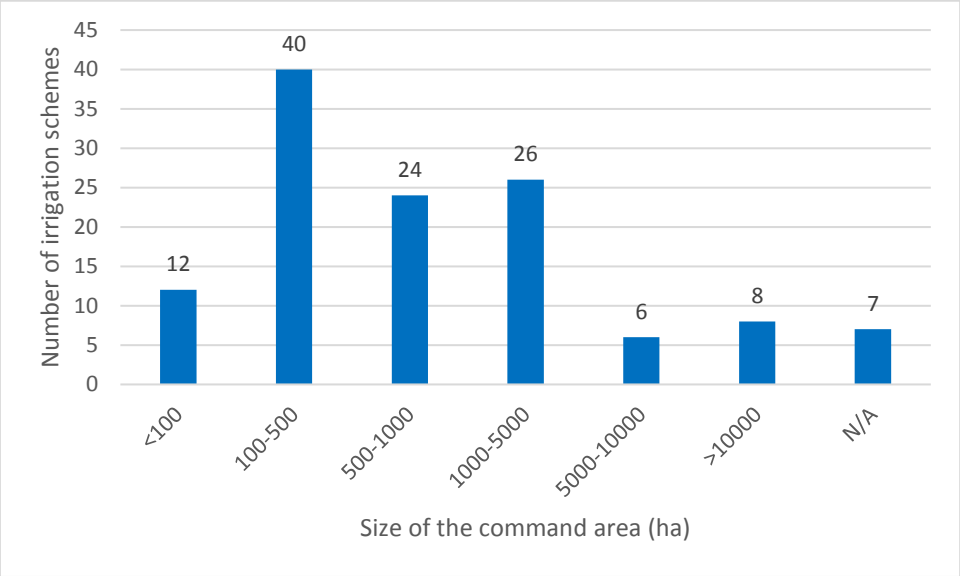
Source: (ISET-PI 2016), MEPA / GA

Most command areas covered by the irrigation schemes are around 100-500 ha, while only 14 command areas cover more than 5,000 ha (Figure 5-7).

[5] 1 USD= 3.16 GEL (exchange rate is taken as an average monthly exchange rate for June 2021 according to the National Bank of Georgia)

[6] Total agricultural land in 2014: 787,700 ha (Source: Geostat)

Figure 5-7: Distribution of command areas of irrigation schemes



Source: GA

The majority of the irrigation schemes operated by GA are located in the regions of Kakheti (35 irrigation schemes), Shida Kartli (29 irrigation schemes) and Kvemo Kartli (24 irrigation schemes). Among the different regions of Georgia, the largest area is irrigated in Kvemo Kartli region (27,658 Ha), followed by Kakheti (16,787 Ha) and Shida Kartli (16,417 Ha) regions. More details regarding the characteristics of the irrigation schemes are provided in the Table 5-1 below.

Table 5-1: Characteristics of the irrigation schemes operated by GA in each region

	Region						
Size of the command area (ha)	**Imereti**	**Kakheti**	**Kvemo Kartli**	**Mtskheta Mtianeti**	**Samtskhe-Javakheti**	**Shida Kartli**	
<100	3	3			1	5	
100-500	3	10	7	2	10	8	
500-1000	2	7	4	3	2	6	
1000-5000	1	4	9		5	7	
5000-10000		2	2	1		1	
>10000	2	2	2			2	
N/A		7					
Total number of irrigation schemes	11	35	24	6	18	29	**Total (ha)**
Total command area (ha)	32 724	80 157	76 330	11 666	13 193	69 097	283 167
Total water supplied area (ha)	11 096	27 686	45 964	7 801	4 862	30 520	127 929
Total irrigated area (ha)	982	16 787	27 658	1 811	1 101	16 417	64 755
Water supplied area/Command area (%)	34%	35%	60%	67%	37%	44%	45%
Irrigated area/Water supplied area (%)	9%	61%	60%	23%	23%	54%	51%

Source: GA, 2020

This presentation provides only a partial overview of the irrigation situation as some farmers have been able to develop individual water withdrawal systems and are supplying their irrigation needs mainly with groundwater. However, no data on private irrigation was available for the preparation of this note. Although, there is no unified country level data to assess number of farmers using boreholes, experience of two irrigation schemes in Kakheti shows that their number is increasing and area irrigated through the use of groundwater is growing over the years. The details are discussed in subsection 5.4.

Another important aspect characterizing the Georgian irrigation sector until recently has been the prevalent use of supplemental irrigation complementing mainly rain-fed agriculture (Ministry of Agriculture of Georgia, 2017a). For instance, the irrigation strategy states that local level water delivery involves scheduling based on demand from the farmer, relayed to a ditch-level "regulator" working for GA and then aggregated upward. Farmers judge crop water needs visually, and often try to delay irrigation to avoid having to pay irrigation service fees, relying instead on rainfall, until an extended drought makes irrigation unavoidable. In practice, there are often informal arrangements among farmers sharing a ditch for sharing irrigation turns among themselves. Generally, little maintenance is carried out at this level. At times, farmers may undertake ditch cleaning themselves, or they may request assistance for a particular repair or cleaning from GA. Thus, the predominant supplemental nature of irrigation in Georgia has certainly contributed to reduced incentives among farmers of joining public irrigation schemes and subscribing to GA services, resulting in lower revenues for GA and a slower expansion of command areas under surface irrigation in Georgia. The Irrigation Strategy cites this as a major risk to the development of the irrigation sector as Georgian irrigation and agriculture is characterized by "*dilapidated infrastructure, small markets for agricultural products, large number of small and scattered farm plots, the absence of a functioning land market, and above all, the fact that irrigation is supplemental to rainfall in many places*" (Irrigation Strategy, 2017, p. 61).

More recently, however, due to the unpredictable changes in temperature and precipitation patterns caused by climate change, farmers have started becoming more aware of the need for irrigation, which provides a more stable and reliable source of water for agriculture. This point emerged from our discussions with representatives of the Farmers' Association, according to which an increasing number of farmers that were previously uninterested about irrigation opportunities – including owners of smaller land plots – are now considering connecting to public irrigation services and/or developing independent irrigations solutions, with the final choice depending on the relative costs and the expected reliability of GA irrigation services. This underscores the need to improve irrigation service delivery to an increased number of water users who are beginning to rely more and more on adequate and timely surface irrigation as climatic extremes reduce their ability to rely on rainfall as their main source of water for crop production.

5.4 CURRENT CONDITIONS OF IRRIGATION SYSTEMS IN GEORGIA

Georgia's irrigation infrastructure was adapted to soviet farming practices (Kolkhoz and Sovkhoz[7]), that were conducted on large land plots. After the first wave of land privatization in the 1990s, agricultural land plots were substantially segregated and divided into smaller plots, leading to a situation in which the infrastructure is no longer really adapted to the new agrarian context and is not able to meet the modernization needs of farmers. From a situation where the infrastructure was designed for large plots that all had a demand for water at the same time, the systems evolved towards very small plots with water needs that could differ between contiguous plots due to different crop rotation choices. The original infrastructure was not designed to meet this type of irrigation demand.

[7] Sovkhoz is a large, state-owned farm in the Soviet Union while kolkhoz is a farming collective in the former Soviet Union.

In addition, scarcity of water resources can be critical in some places during the summer period. According to the Irrigation Strategy, GA manages 16 reservoirs in total and 18 reservoirs are managed by other organizations (not specified by whom), but the storage capacities remain limited with only six reservoirs are operational for irrigation purposes and managed by GA (see table 5-2 below). A prefeasibility study for the development/rehabilitation of dams based on a sample of 25 reservoirs (13 new and 12 for which some construction exists on the ground, at various stages of advancement) will be carried out in 2021-2022[8].

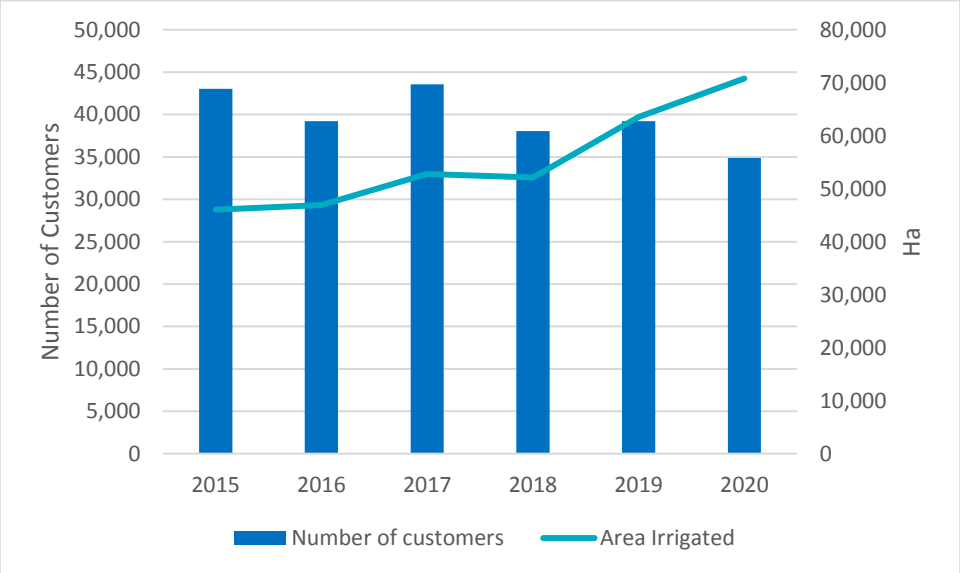
Table 5-2: Reservoirs used for irrigation purposes and managed by Georgian Amelioration

Reservoir	Municipality	Irrigation Scheme	Volume of the Reservoir (Mm^3)	Potential irrigated area under full capacity (Ha)
Sioni Reservoir	Tianeti	Zemo and Kvemo Samgori	325.00	69,400
Tbilisi Reservoir	Tbilisi	Zemo Samgori	308.00	22,500
Algeti Reservoir	Tetritskharo	Tbisi-Kumisi, Marneuli	65.00	14,500
Jandara Lake	Gardabani	N/A	54.28	8,000
Iakublo Reservoir	Dmanisi	Dmanisi-Gantiadi	11.00	5,000
Pantiani Reservoir	Dmanisi	Mashavera Systems	5.30	1,000

Source: GA

To address the challenges of availability of water resources and efficient provision of irrigation services, GA has focused in recent years on rehabilitating irrigation systems, but limited financial resources have prevented it from intervening in all secondary and tertiary systems, making it impossible to restore a fully satisfactory water service. This is why there is a significant discrepancy between the potential public irrigable area and the actual irrigated area covered by public irrigation schemes managed by GA (about 65,000 irrigated hectares vs 130,000 irrigable ha according to GA). The number of customers in the sector have been decreasing since 2015 (Figure 5-8). Over the same period, however, the irrigated area has been increasing. This may be caused by more irrigators preferring private irrigation from groundwater sources or other factors as discussed below in Box 1. Analysis of the groundwater scenario in Georgia: Case of two schemes in Kakheti RegionBox 1.

Figure 5-8: Number of customers of Georgian Amelioration and irrigated area



Source: GA

[8] Under the GILMDP with the support of the WB.

Box 1. Analysis of the groundwater scenario in Georgia: Case of two schemes in Kakheti Region

Groundwater in Georgia is considered abundant, of good quality, but largely underutilized. Natural fresh groundwater resources amount to 573 m^3/s (about 49.5 Mm^3/day) in 4 large hydro-geological systems, but are unevenly distributed in the Country. 62% comes on West Georgia, East Georgia—25% and 13% comes on South Georgia (Gaprindashvili, 2014). Groundwater abstraction is about 500 million m^3/year. Around 60% of Georgian drinking water comes from groundwater (OECD, 2021b). Groundwater is a strategic resource for the water supply of Tbilisi. Global warming is expected to have negative impacts on the avialability of groundwater resources, especially in East Georgia. Development of irrigation on this resource should be considered, but with caution. There is little data on the use of groundwater for irrigation, but interviews with stakeholders suggest that there is an increase in the use of this resource.

For this reason, it is not clear whether the situation illustrated in Figure 5-8 is linked to changes in the rules of contracting between GA and farmers (with, for example, the obligation that the parcel be registered, and/or the attempt to aggregate contracts by farmer rather than by land plot), land consolidation, cleaning up of the customers databases, combined with the development of boreholes and pumping systems that make it possible in some instances to move from a public collective system to a private individual one.

Based on existing data from GA this has been actively happening in Zemo Alazani and Lagodekhi-Kverli systems. In Zemo Alazani scheme privately irrigated area using groundwater has increased from 173 ha in 2015 to 272 ha in 2020 and already represents 11% of total irrigated area. In Lagodekhi-Kvareli system growth is even larger from 72 ha in 2016 to 413 ha in 2020, that represents 30% of total irrigated area. Although, this changes are still small on a country scale, this indicates that some private water users are ready to substitute lack of public irrigation services with private investments to access groundwater resources for irrigation. Availability of groundwater resources creates an opportunity for more conjunctive use of surface and groundwater resources.

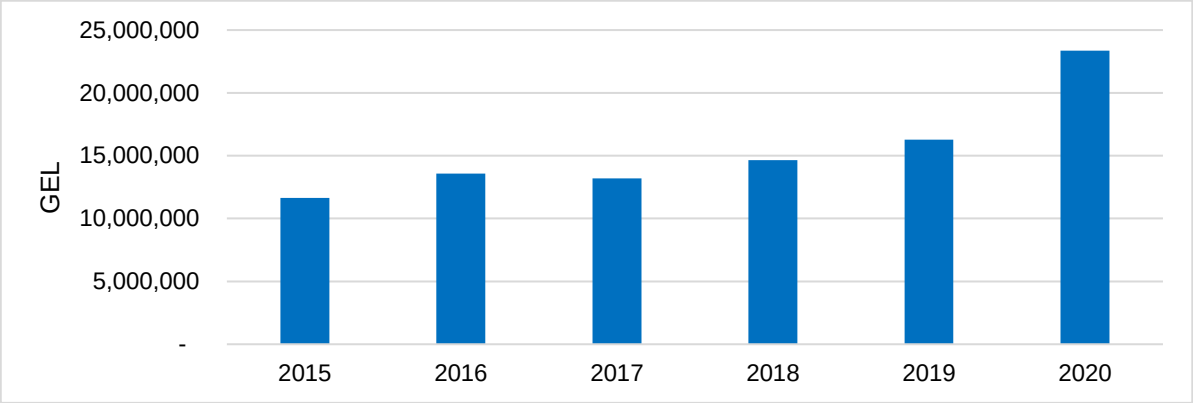
From a financial perspective, as of 2017, the income from irrigation and drainage services or other water services covered only 40% of the O&M costs (which includes salaries, cost of electricity, cost of maintenance of the amelioration system, cost of intervention to ensure business safety, business trips and other costs needed for the company's proper functioining). In 2020, income from irrigation services covered an even lower 25% of GA costs. As a consequence, Georgian Amelioration is nearly fully dependent on government subsidies and is not able to engage new investments without the Government's support, and the level of subsidies has been increasing over the years (see Figure 5-9). The operation and maintenance costs have been growing over the past 5 years, approaching 25 mln. GEL (approximately US$ 8 million) in 2020 (See Table 5-3 below).

Table 5-3: Georgian Amelioration - Operation and Maintenance expenditure and income (in GEL)

	2017	2018	2019	2020	2021 (planned)
TOTAL EXPENSES (1)	**44 700 000**	**49 500 000**	**53 000 000**	**45 000 000**	**68 675 000**
O & M	*13 000 000*	*14 500 000*	*17 000 000*	*24 700 000*	*20 675 000*
Capital Investments (rehabilitation)	*31 700 000*	*35 000 000*	*36 000 000*	*20 300 000*	*48 000 000*
TOTAL INCOME (2)	**5 252 085**	**5 236 298**	**5 962 375**	**6 179 793**	**NA**
Irrigation and drainage services	*3 476 422*	*4 047 082*	*4 707 454*	*4 831 391*	*NA*
Technical water (fisheries, HPP, etc.)	*1 775 663*	*1 189 216*	*1 254 921*	*1 348 402*	*NA*
NET TOTAL (2) – (1)	**-39 447 915**	**-44 263 702**	**-47 037 625**	**-38 820 207**	

Source: GA

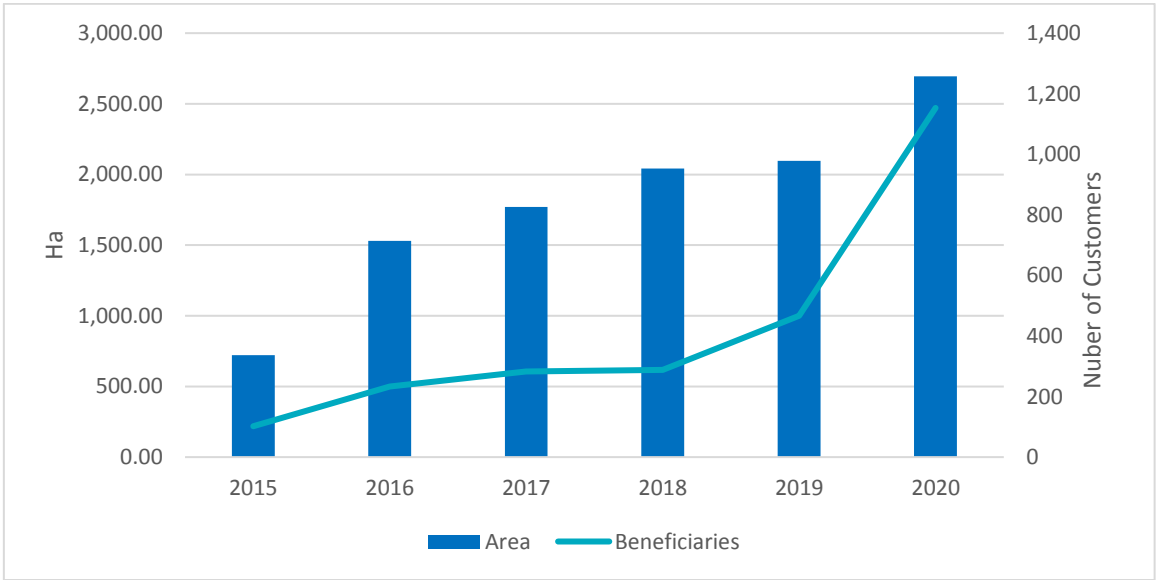
Figure 5-9: Government Subsidies to Georgian Amelioration 2015 - 2020



Source: MEPA

In addition to providing public funds to subsidize GA O&M costs and for infrastructure investments, the Government of Georgia also provides farmer support for purchase of drip and sprinkler irrigation systems. Since 2015, in scope of the project "Plant the Future", which provides funding for the development of orchards, the Rural Development Agency (subsidiary of MEPA) has equipped roughly 11,000 ha of land with drip and sprinkler irrigation systems. The area covered per year under the project is increasing over the years (as it is shown on the Figure 5-10 below, which represents incremental yearly changes in the drip irrigated land areas under the program "Plant the Future'). This is the largest scale effort of the government of Georgia for increasing water efficiency in the Georgian irrigation sector.

Figure 5-10: Drip-irrigated area per year under the program "Plant the future" and number of beneficiaries 2015-2020



Source: Rural Development Agency

5.5 REGULATORY AND LEGAL FRAMEWORK GOVERNING IRRIGATION AND DRAINAGE IN GEORGIA

The first law of Georgia on amelioration of land was adopted in 1997, regulating management, financing, and the overall structure of the sector. In 2010, the law was abolished and the national energy and water supply regulatory commission (GNERC) issued a decree setting fixed tariffs for the provision of amelioration services (for irrigation: 75 GEL per ha for East Georgia and 45 GEL per ha for the West, for drainage: uniform 40 GEL per ha for the country). This was intended as a provisional decree to fill the gap until the irrigation and drainage sector reforms would be completed. This implies the implementation of the tariff reform and determination of the new irrigation tariff level and structure. According to the newly adopted law of Water User Organizations (adopted in December 2019), by 2023 GNERC should define new tariff for irrigation service for water users.

Following the abolition of the law on Land Amelioration of Georgia, no legislation specifically regulating the amelioration sector of the country exists and, as a consequence, one of the key issues for Georgian amelioration sector is policy uncertainty.

Over the past few years, Georgia has been working on a long sequence of reforms related to the adoption of EU regulations as per the country's association agreement (signed in 2014). This includes reforms in both water and agricultural sectors. One of the important reforms for the amelioration sector is the adoption of the EU Water Framework Directive (WFD), that will transform the country's water management sector to integrated river basin management. This will require changes in the irrigation sector legislation for effective management of the irrigation sector, taking into consideration impacts of the sector on the environment due to changes in water flows and quality of water bodies. The deadline for adoption of the WFD was set for December 2018, however the respective law on water resource management is not yet legislated by the Parliament of Georgia. The main objectives of the draft law on water management are as follows:

- To ensure the covergence of the water bodies towards the good qualitative status;
- Ensure the continued availability of drinking water and access to sanitation to the population as well as ensure access to water to all potential water users (including irrigation water users);
- Ensure efficient allocation of water resources among the water users.

5.6 VISION FOR SECTOR DEVELOPMENT AND UPCOMING REFORMS

In 2017, the Government of Georgia adopted the irrigation strategy 2017-2025. This document identifies major directions and priorities for the sector's development. In scope of the rehabilitation and modernization of the irrigation infrastructure, MEPA and GA intend to increase the irrigated land area to 200,000 ha by 2025, in addition to equipping at least 10% of irrigated land with drip irrigation infrastructure. These efforts are estimated to cost roughly US$ 360 million. Furthermore, the government aims to transform GA into a unified entity that manages primary irrigation systems (main channels) while operating at financial break-even point, not intending to provide the government with return on investments in the irrigation sector. For the local level, i.e., secondary channels, the strategy stipulates that operations will be managed by WUOs. The WUOs will have an exclusive authority to distribute the bulk water received to individual farmers.. Furthermore, according to the strategy, the Government intends to reform the irrigation tariffs. The vision for the strategy is to establish a two-component tariff with a fixed component per irrigated area and a variable component per volume of water consumed. This tariff will be applied to WUOs and individual water users, while individual irrigators will pay the retail tariff set by the WUO themselves to cover operation and maintenance costs of the secondary and tertiary canals. GNERC will regulate GA with its monopoly structure. The strategy stipulates that GNERC will also serve as an institution for dispute resolution based on irrigation contracts between GA and WUOs.

In 2019 the law on Water User Organizations was adopted to support the implementation of the irrigation strategy. Along with creating a framework for the establishment of WUOs around the country, the law mandates GNERC to set the tariffs that GA will be charging to WUOs for bulk irrigation water supply.

Box 2. Water Users Organisations in Georgia – an old story

Georgia already experimented with establishing water users' organizations in the past. After the independence of the country, around 200 amelioration service cooperatives were created for operating a command area of 200,000 ha. These cooperatives failed and management was transferred to Village Councils. In 2001, 259 water user associations were established. With the support of the World Bank, 50 amelioration associations were successfully formed across the area formerly managed by the cooperatives. According to national and international consultants interviewed as part of this assignment, the associations were operational and effective, but the Government closed all amelioration association activities in 2006 as part of an ideologically driven push to privatize public services. The remaining associations were formally dissolved in 2010. Local organizations in charge of operation and maintenance of irrigation schemes were thus introduced several times but have not sustained over a longer period. According to MEPA and international consultants, the main reasons for this situation are poor irrigation infrastructure, lack of training of WUO members, lack of human and financial resources to support the organizations, lack of technical and political support from the State, and lack of a legal basis and ideology. However, recently the government has taken positive steps in passing the 2019 WUO law, which provides future associations with a legal basis to operate and has successfully appointed and trained staff in the central and regional offices of GA to oversee WUO establishment processes. These latest developments are promising and indicate willingness and support at the highest levels of government to establish WUOs as per the direction of the Irrigation Strategy.

The agriculture and rural development strategy of Georgia (2021-2027) emphasizes the need to increase the resilience of the agricultural sector to climate change by implementing plans for rapid response to droughts, floods, and other extreme events in agriculture or by introducing innovative methods of irrigation management and water use. Improvement of the irrigation and drainage systems is one of the objectives under Goal 1 'Competitive agricultural and non-agricultural sector'.

Georgia has not adopted any drainage strategy yet. However, a draft drainage strategy 2018-2027 was prepared in 2017. The draft stipulates the need for: (i) rehabilitation, (ii) improved operation and maintenance, (iii) funding and (iv) creation of a policy framework. According to the draft drainage strategy the funding source should be the drainage charge for land, which will be added to the property tax bill (Ministry of Agriculture of Georgia, 2017b). During consultations with stakeholders, we note that most officials interviewed were not aware of the existence of such a document.

6 ROADBLOCKS AND CONSTRAINTS IN ACHIEVING SUSTAINABLE IRRIGATED AGRICULTURE IN GEORGIA

This chapter provides an analysis of the constraints hindering irrigation sector performance in Georgia. Based on the data collected and the responses from stakeholder interviews and farmer consultations, the results are summarized and presented below as a series of 8 constraints that emerged as major issues within the irrigation sector in Georgia:

1. Constraint 1 (C1): limited knowledge and data on water resources and farming systems for I&D development
2. Constraint 2 (C2): irrigation planning lacks an IWRM approach for sound irrigation management
3. Constraint 3 (C3): need to improve reliability of irrigation services and service delivery systems
4. Constraint 4 (C4): accelerate WUO establishment
5. Constraint 5 (C5): finalize reform of the irrigation tariff
6. Constraint 6 (C6): need to establish advanced irrigation performance monitoring systems and processes
7. Constraint 7 (C7): increase the human resources for irrigation and drainage development
8. Constraint 8 (C8): address gaps in policy coordination and encourage champions at all scales to accelerate irrigation performance

Table 6-1 below presents an overview of how we came up with these 8 constraints by illustrating which stakeholders highlighted these concerns during interviews. We summarized stakeholder responses into broad themes and present the frequency with which each organization mentioned these constraints during the interview with an "X" (see Table 6-1). In addition, the interviews identified a cross-cutting constraint related to the slow implementation of the irrigation strategy. This is not a standalone constraint per se but rather the result of other identified constraints, but it is important to highlight it to inform the definition of recommendations and actions.

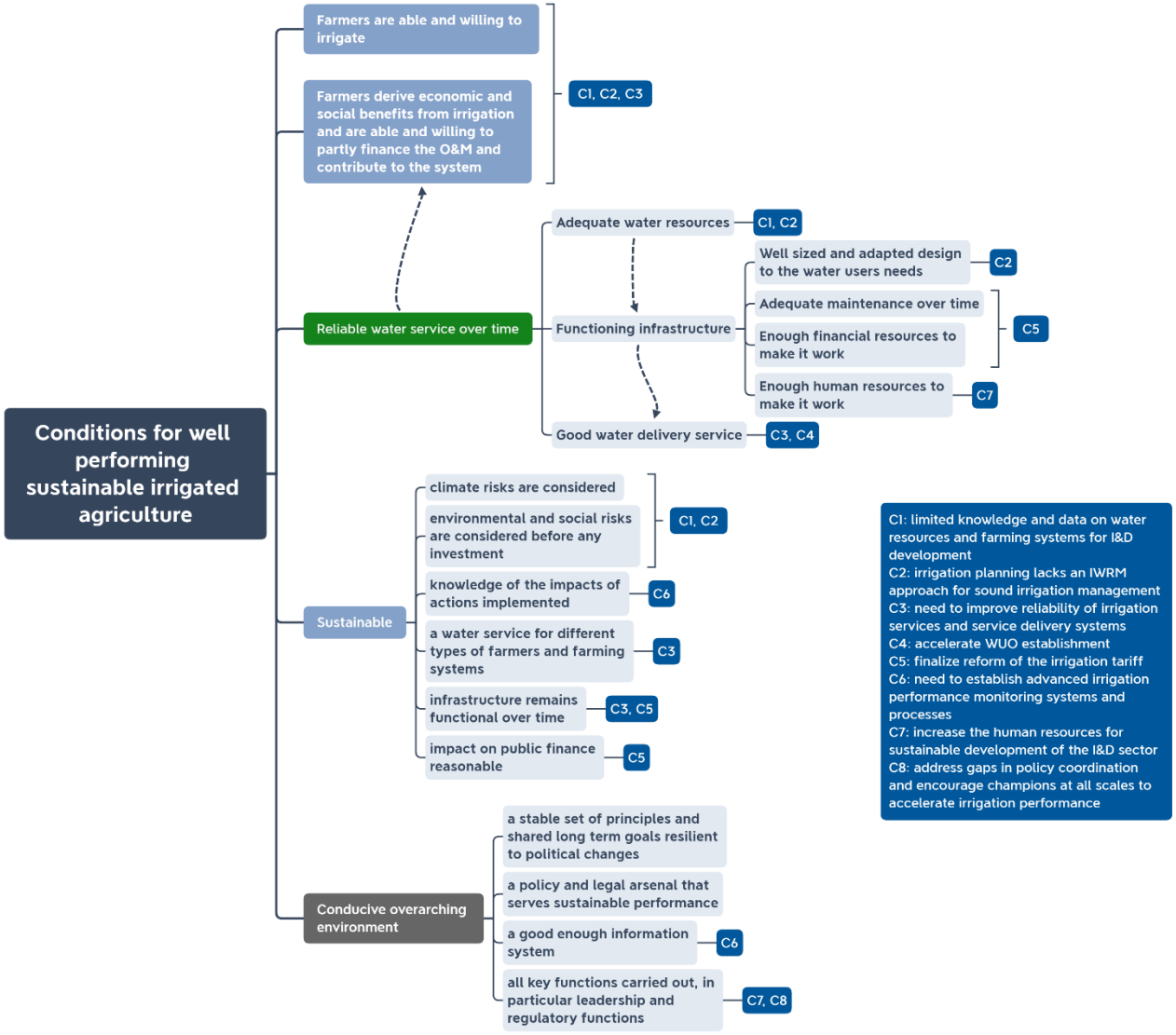
Building on Figure 4-3, which presented the '*conditions for well-performing and sustainable irrigated agriculture*' in Chapter 4, we graphically present the 8 core constraints in Figure 6-1 below, with each constraint explained in detail in the following sections.

Table 6-1: Core constraints identified by the main stakeholders interviewed

	C1	C2	C3	C4	C5	C6	C7	C8	Comment
MEPA	×	×	×	×	×	×	×	×	
GA	×		×	×	×		×		
GA-WUO support unit	×		×	×	×	×	×		
Agricultural and rural development agency									The agricultural and rural development agency mentioned that irrigation policy and conditions of the irrigation sector is not within their competences thus the agency cannot make any statement.
GNERC	×				×				
National Agency for sustainable land and land use monitoring	×								
Ministry of Economy and Sustainable Development								×	
Ministry of Finance					×				
Georgian Farmers Association			×						
Rural and Agricultural Policy Development Institute			×		×	×	×	×	
Farmers		×	×						
Community of Donors	×	×	×	×	×	×	×	×	
International consultants	×	×	×	×	×	×	×	×	

C1: limited knowledge and data on water resources and farming systems for I&D development; C2: irrigation planning lacks an IWRM approach for sound irrigation management; C3: need to improve reliability of irrigation services and service delivery systems; C4: accelerate WUO establishment; C5: finalize reform of the irrigation tariff; C6: need to establish advanced irrigation performance monitoring systems and processes; C7: increase the human resources for irrigation and drainage development; C8: address gaps in policy coordination and encourage champions at all scales to accelerate irrigation performance.

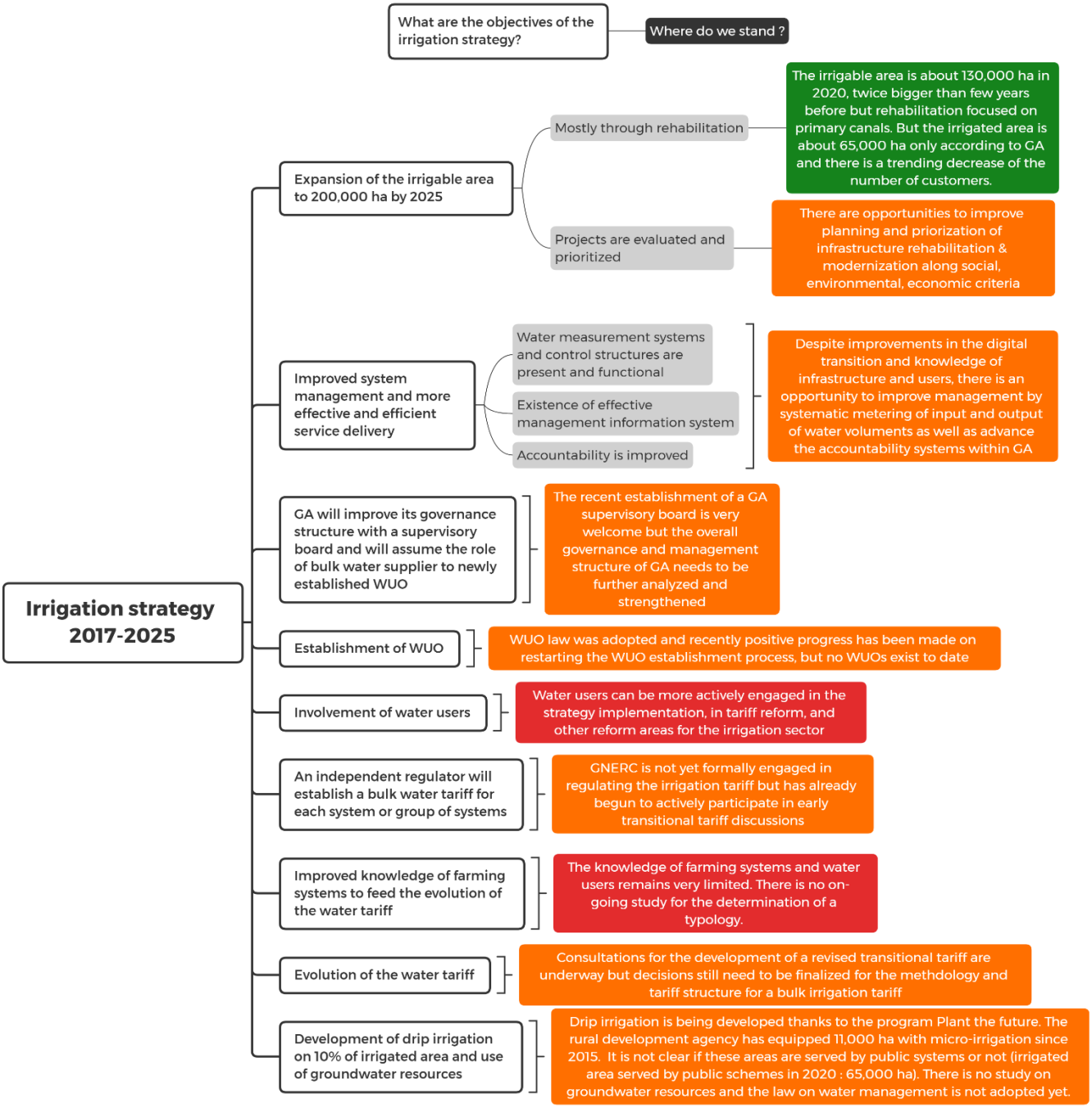
Figure 6-1: Conditions for well performing sustainable irrigated agriculture – A summary of constraints in Georgia



6.1 CROSS-CUTTING CONSTRAINT –SLOW IMPLEMENTATION OF THE IRRIGATION STRATEGY

Several stakeholders, including donors and MEPA, emphasized the slow implementation of the irrigation strategy. The delays are even prompting some to consider that the 2017-2025 strategy framework is now outdated and that a new strategy, better suited to the needs of the sector, is needed. The irrigation strategy has now been under implementation since 2017 and so far, shows mixed results. On the one hand, important work has been carried out on the expansion of irrigable areas and progress can therefore be described as very positive, but on the other hand, the other components identified by the strategy show little progress. Figure 6-2 below aims to summarize the objectives of the strategy (or work areas) and where we stand now by using a 'traffic light' color scheme to indicate degrees of progress. Green boxes illustrate where progress has been made, orange boxes indicate partial progress and red boxes illustrate no progress made.

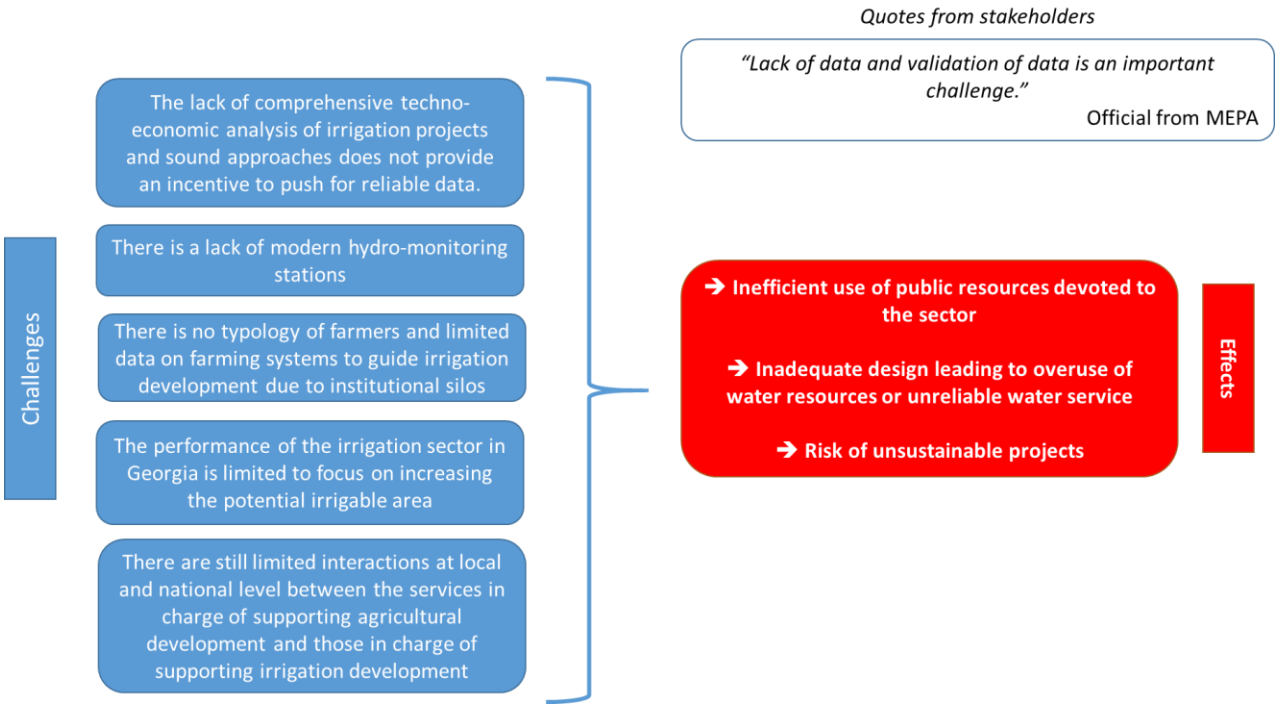
Figure 6-2: Irrigation strategy 2017-2025 – Where do we stand?



6.2 CONSTRAINT 1: LIMITED KNOWLEDGE AND DATA ON WATER RESOURCES AND FARMING SYSTEMS FOR I&D DEVELOPMENT

The figure below aims to summarize in the form of a problem tree the results from the stakeholder interviews, which led to the identification of this constraint (Figure 6-3). The blue boxes are the challenges related to the core constraint, as identified by the stakeholders, and the red box shows the effects of the challenges.

Figure 6-3: Problem tree – Limited knowledge and data on water resources and farming systems for irrigation and drainage development



Source: Authors based on stakeholders' interviews

This constraint is related to the ability of the Georgian authorities to identify and prioritize irrigation projects by utilizing state funds as efficiently as possible to meet the development objectives of the irrigation sector. However, several stakeholders we interviewed reported that MEPA has limited investment capacity to develop the irrigation sector. Investment requirements for rehabilitation were estimated according to the 2017-2025 strategy at 361.2 million USD. During our exchanges with stakeholders, the following reasons for these gaps were identified:

- **The objectives of irrigation development are not backed by sound techno-economic analysis**. The setting of objectives for irrigation development should be based on the identification of the sector's needs and of an ex-ante understanding of how it contributes to higher level objectives such as addressing rural poverty, stimulating high value crops (HVC) production, increasing incomes for agricultural producers, etc. However, donors, individual consultants, and GA staff, reported limited data on water resources and farming systems prior to irrigation planning and investment in O&M. **The lack of comprehensive techno-economic analysis of irrigation projects does not provide an incentive to push for reliable data on farming systems**. As several of the international consultants we interviewed pointed out, while it is not mandatory to have a complete techno-economic analysis, it is not necessary to have the basic data.

- MEPA and donors highlighted that **interactions between officials in charge of irrigation development and those in charge of agricultural development could be improved to favour the identification of diverse farm typologies to better understand farm irrigation needs and dissemination of data related to hydrological and socio-economic conditions of the irrigated areas**. Despite positive attempts to break the silos between irrigation and agriculture by a combined agriculture, environmental protection, and irrigation under MEPA, several interviews with stakeholders (donors, consultants, Georgian Amelioration) showed there are still limited interactions at local level between the services in charge of supporting agricultural development and those in charge of supporting irrigation development resulting in lower efficiencies in supporting farmers and designing new projects adapted to their needs.

  The target of extending the national irrigable area to 200,000 ha is therefore questionable insofar as it is an arbitrary goal not backed by a techno-economic analysis of how much irrigable area is needed to support sustainable growth of the agricultural sector. Instead, current targets are simply based on increasing the total number of hectares of irrigable area. Implementing a multi-dimensional irrigation masterplan that considers all key opportunities, needs, constraints, water resources availability, soil conditions, cropping patterns, types of markets available to farmers, farmer willingness to uptake irrigation services and is based on rigorous infrastructure analysis and stakeholder consultations can more valuably conclude as to how many hectares it makes sense to irrigate (whether it is 20,000 ha or another value). This can also result in a more objective justification of the targets and goals for irrigation development in Georgia.

- **Detailed data on water resources is missing**. The Georgian hydrological and climatological monitoring system only provides a partial view of the state of the water resource and thus poses risks in the design of current and future irrigation investment projects and the sustainability of the irrigation sector. Hydrological and meteorological monitoring systems used to have a wide network across the country during the soviet period (150 stream gauging stations and more than 200 meteorological stations). According to the NEA[9], currently, there are only about 50 stream gauging stations still in operation. The lack of a modern hydrological monitoring system affects the availability of reliable data for hydro-agricultural infrastructure design studies, effective IWRM and does not allow to feed climate forecasting models to anticipate the effects of climate change in meeting the irrigation demands of water users in the command areas.

- **Detailed data on farming systems are also scarce leading to a lack of understanding of the needs of water users to adapt the service and define projects accordingly**. As emphasized by several stakeholders such as MEPA and donors, there is no typology of water users and there are very few studies describing the characteristics of the farming systems in Georgia. Geostat provides different types of data to have a global picture of the agricultural sector (types of crops, farm sizes, etc.)[10]. Thus, a global picture exists, but a detailed understanding of farmers is necessary to operate the irrigation schemes. Depending on the type of crops or the irrigation practices at plot level, water users' needs can differ from one farm to another. For example, the introduction of drip irrigation requires a daily availability of water and the introduction of higher value crops requires a reliable water supply. A farmer using furrow irrigation will not have the same requirements to the water service. The increased interest expressed by farmers about irrigation opportunities indicates that the potential demand for irrigation services is growing among all the typologies of farmers, and that there is a transition away from relying on irrigation only as supplemental in Georgia. This increase in demand can be expected to contribute to greater financial and technical sustainability of the system, but only if the irrigation services are designed to match the specific needs of the different groups of farmers, transforming potential demand into actual demand.

- **Validation of data is an issue**. According to MEPA, the human resources devoted to the monitoring and validation of data from multiple sources are insufficient to ensure the reliability and validation of data for irrigation and drainage planning, investment, and management.

[9] Interviewed in 2020 by the authors during a study for AFD (BRLi, AFD, 2020).

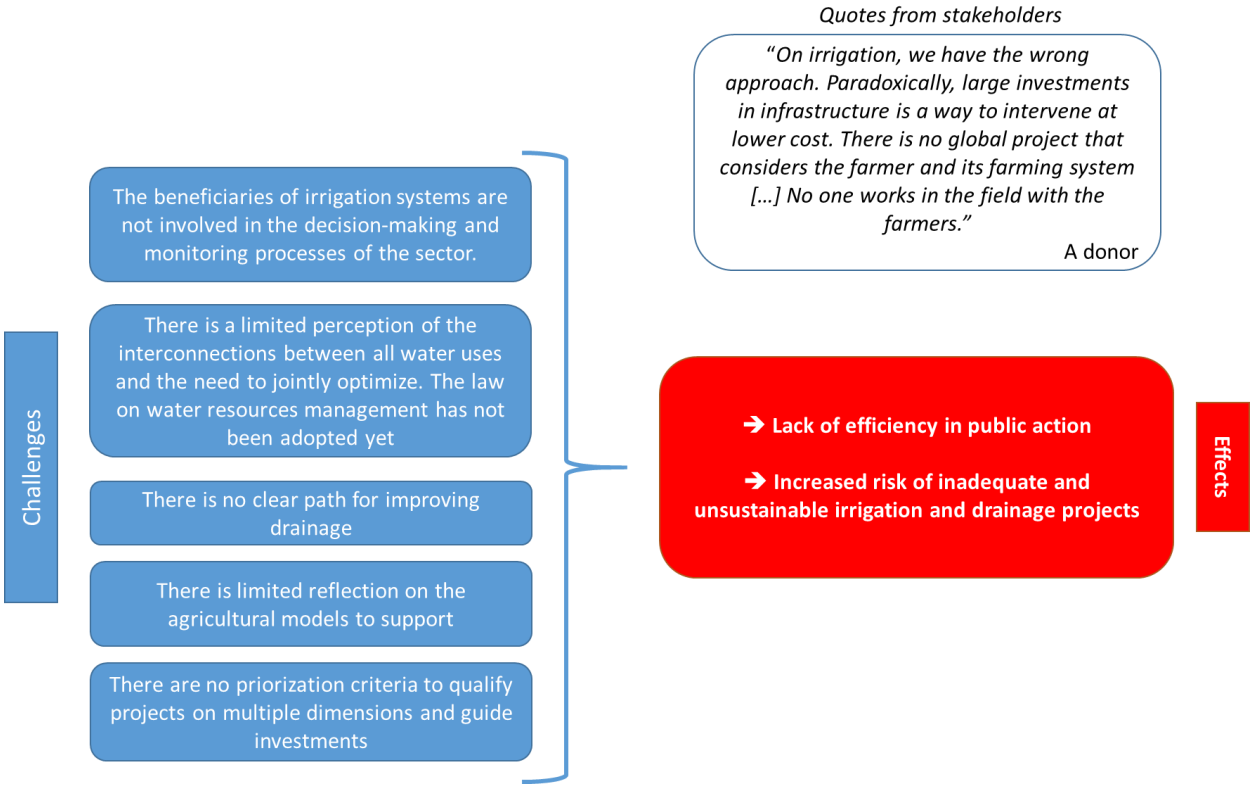
[10] https://www.geostat.ge/en/modules/categories/196/agriculture

- **Standards and norms are outdated**. International experience and the future law on water management are incentives for the Georgian government to rethink the way projects are designed and to consider the regulatory changes that are necessary so that irrigation investments do not result in negative externalities to the environment. According to individual consultants, technical standards used for the design of infrastructures are outdated (for example the determination of the water demand is based on standards from the soviet period and not grounded in an up-to-date water balance model for the river basin in question where the scheme is located). In addition, the determination of minimum ecological flow is not regulated by law in Georgia. Environmental and sanitary flows are taken to be 10% of annual average river flow (Irrigation Strategy 2017-2025). This value is based on a practice inherited from the Soviet era. In practice, there are limited ways (procedures and facilities) in several places to ensure that this rule is respected. It could lead to overexploitation of water resources or mistakes in the design of infrastructures (oversized design). The law on water resources management, which is still under consideration, once adopted aims to provide clear guidance and norms to address this issue, if the required investments are made. Another point to consider as a provision under the proposed water management law is to manage water resources with legal entitlements for use and allow for the provision of performance incentives for meeting water quality and water use standards by different users.

The analysis of conditions for a well-performing sustainable irrigation sector clearly highlighted the need to have a detailed understanding of the farming systems and state of the water resources, as well as sound approaches based on up-to-date norms and standards for designing I&D systems. This requires robust institutional capacity within the irrigation agency to guide irrigation development and to identify and design projects supporting a more reliable water service for farmers. However, as we have illustrated, these aspects are currently missing in the Georgian irrigation sector and these constraints result in a potential limit on the economic returns of public investments in irrigation infrastructure development. This also results in investments that could be unsustainable in the medium-term for supporting growth in irrigated agriculture in Georgia.

6.3 CONSTRAINT 2: IRRIGATION PLANNING LACKS AN IWRM APPROACH FOR SOUND IRRIGATION MANAGEMENT

Figure 6-4: Problem tree – Irrigation planning lacks an integrated water resources management approach for sound irrigation management



Source: Authors based on stakeholders' interviews

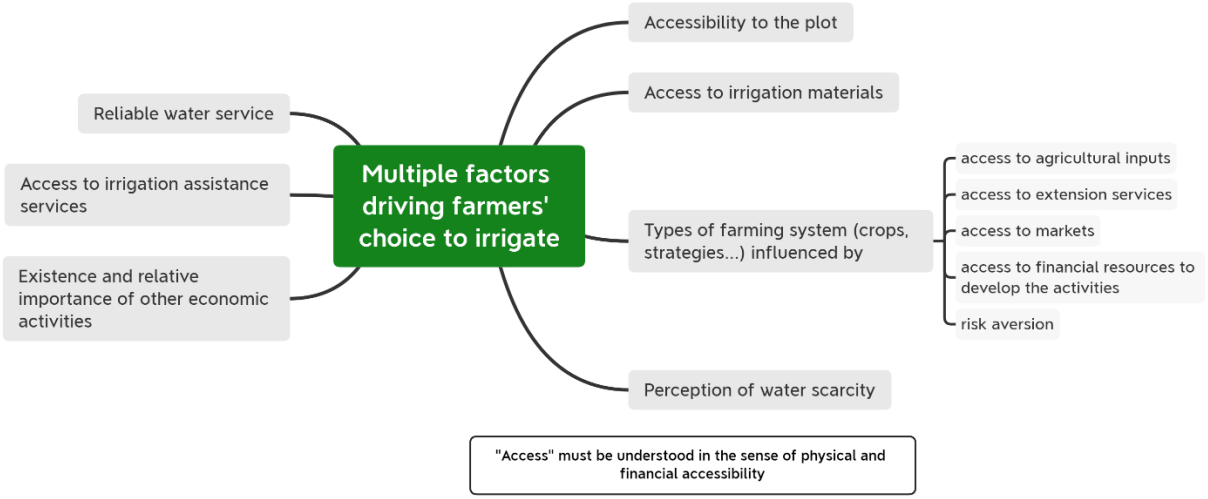
The performance objective of the irrigation sector in Georgia is limited to focus on increasing the potential irrigable area by rehabilitation of existing irrigation schemes. The implication is that increasing this area would be sufficient to improve performance. However, interviews with Georgian farmers (see Box 3) show that the choice to irrigate or not is influenced by many other factors: reliability of the water service, access to agricultural inputs and credit, accessibility of the plot (road conditions, means of transport available), access to electricity, access to markets, other economic activities, etc.).

Box 3. Irrigation drivers – What can we learn from Georgian Farmers?

Georgian farmers interviewed stressed the importance of irrigation for their cropping systems but clearly highlighted that water availability is not the only driver, which contributes to their decision to irrigate or not. 25% of the 21 farmers interviewed mentioned difficulties of affordable access to finance (agro-credits). 14% stressed the importance of accessibility of irrigation water to the farm plot when considering the development of the cropping system and the introduction of irrigation. Some of the interviewed farmers own land plots remotely from their living area and to reach his land they need to hire a tractor because it is impossible to reach the land plot with a regular car. Access to knowledge and information about irrigation management can also be a challenge and several farmers mentioned that after drip irrigation systems were introduced, they experienced yield losses due to misuse of the system. 33% of farmers also pointed out the challenge of accessibility to the market. They do not always have access to a local market to sell their produce and this is one of the driving forces behind the choice to irrigate or not and to develop their plots more intensively.

This means that to improve the performance of irrigation it is essential to incorporate sound understanding of the farming system in irrigation planning. A water-access policy based only on physical consideration would be inefficient because it would set aside significant socio-economic drivers of irrigation (Graveline and al., 2021) (see Box 4 for a case study from France for understanding drivers of irrigation choices). Figure 6-5 summarizes some of the major factors that contribute to a land user's choice of farming system and choice to irrigate or not, stemming from the summary of the interviews with farmers.

Figure 6-5: Multiple factors driving farmers' choice to irrigate



Source: Authors

Box 4. Irrigation drivers and policy making – what can we learn from a recent study in south-eastern France?

A study led in south-eastern France aimed to understand the conditions of the adoption of irrigation for vineyards. Results of different econometric models show that irrigation patterns seem to be motivated by drivers that rely not only on physical "terroir" characteristics but also on farm-specific and growers' characteristics. These socio-economic drivers include farmers' perceptions of water stress, age, risk aversion or objectives. Specifically, perceptions of water scarcity seem to drive future irrigation projects much more than real water scarcity. About a quarter of farmers are not interested in irrigation even if they have or will have access to irrigation schemes. *The policy implications of these findings are important: they suggest that irrigation projects might have differing benefits and rationales depending on the characteristics of the farm considered, and that* ***a water-access policy based only on physical considerations would be inefficient because it would set aside significant socio-economic drivers of irrigation*** (Graveline and al., 2021). Identifying and carefully considering these drivers will help avoid inefficient investments in the irrigation sector.

The beneficiaries of irrigation systems are not involved in the decision-making and monitoring processes of the sector. Water users are not part of the advisory and decision-making framework for the irrigation sector. According to the discussions with farmers and the Georgian Farmers association, they are rarely consulted and have limited means to influence the decision-making processes related to key irrigation sector. They are therefore confronted with the outcomes of decisions already made. As an example some farmers mentioned the fact that they were not consulted for a rehabilitation project and the new design was not adapted to their needs. With the adoption of the water law this situation should evolve as water user councils will be created at basin scale, supporting an increased involvement of the users in the decision processes and project monitoring.

Integration between irrigation/water issues and environmental dimensions is also very limited according to the community of donors and the consultants involved in the European Union Water Initiative Plus (EUWI+). There is a limited perception of the interconnections between all water uses and the need to jointly optimize. There is no IWRM approach to the water sector or a focus on river basin planning and management. The adoption of the law on water management cannot be postponed indefinitely. The first river basin plan in Georgia was prepared in 2016 but was not implemented until now due to the lack of legal framework. Once the law is enacted, and basin level management will be implemented this will impact the way to consider the development of the irrigation sector. Having water, agriculture, and the environment under one ministry can also create many trade-offs between increasing irrigation development versus maintaining environmental flows and ensuring high water quality. Box 5 provides examples from the continent of how countries in the EU are managing similar concerns between environmental sustainability and irrigation expansion.

Box 5. New approaches for irrigation development from the European Union and International Donors

With the growing awareness of environmental issues and climate change, combined with the identification of the factors of failure of irrigation projects, both international donors and public bodies involved in irrigation development in irrigated European countries have considerably reframed their approaches for irrigation development. New irrigation projects require:

- Participatory approaches for the design and implementation phases
- Environmental and Social Impact Assessment
- Extensive water balance studies in a context of climate change
- A clear rationale supported by cost-benefit analysis
- Analysis of alternatives and analysis of vulnerabilities to climate change

In France, to benefit from public funding for their projects, irrigation service providers (mainly WUOs) respond to calls for projects launched by local authorities and are evaluated according to criteria of cost per hectare, water savings, impact on the agricultural sector, etc.

From a global perspective, the European Water Framework Directive requires that both quantitative and qualitative issues related to the environment be considered. The objective of good status of water bodies requires a modification of practices by considering limit flows below which the balance of aquatic environments is endangered and by defining low-water target flows. For groundwater bodies, it requires improving the knowledge of aquifers and defining the limits of exploitation of the resource. It is thus a question of establishing a new resource-demand balance that integrates the specific needs of the environment. This new requirement has necessitated a revision of internal working methods of irrigation service providers and the integration of new issues in the development of infrastructure and their daily management. In concrete terms, this entails limiting withdrawals from certain aquatic environments, either through water-saving measures or through the substitution of resources.

There is no clear path for improving drainage despite an existing draft drainage strategy prepared in 2017. Drainage is closely linked to irrigation. Drainage is often mentioned as an issue in the various strategic or regulatory documents. According to Georgian Amelioration and international experience, the degradation of drainage systems can be very detrimental to soil fertility, especially in irrigated areas, where excess water must be removed, or soil fertility is lost through salinization or other related processes. However, the drainage strategy was never finalized by MEPA. However, recently the government in consultations with donors has highlighted the need to refocus efforts on tackling pressing drainage issues, particularly in Western Georgia, and negotiation with donors on the development of a drainage strategy are underway.

There is no informed reflection on the agricultural model(s) to support modernized irrigation development. The development of the irrigation sector is generally considered in the light of current agricultural activity or even past systems insofar as there are no or few detailed studies of water users. Several individual consultants interviewed underlined the importance of questioning the desired agricultural models and practices over several decades in relation to the life span of the infrastructures. In practical terms, this means that when thinking about irrigation development, it is important to think about the desired long-term agricultural model that best fits the needs of Georgia's rich and diverse agriculture sector. Stakeholders interviewed within FAO and members from the FinExCoop Georgia project[11] suggested to consider the question of opportunities for young farmers when implementing an irrigation project, which often involves land redistribution, as rural-urban migration is significant and access to land for young farmers can be critical.

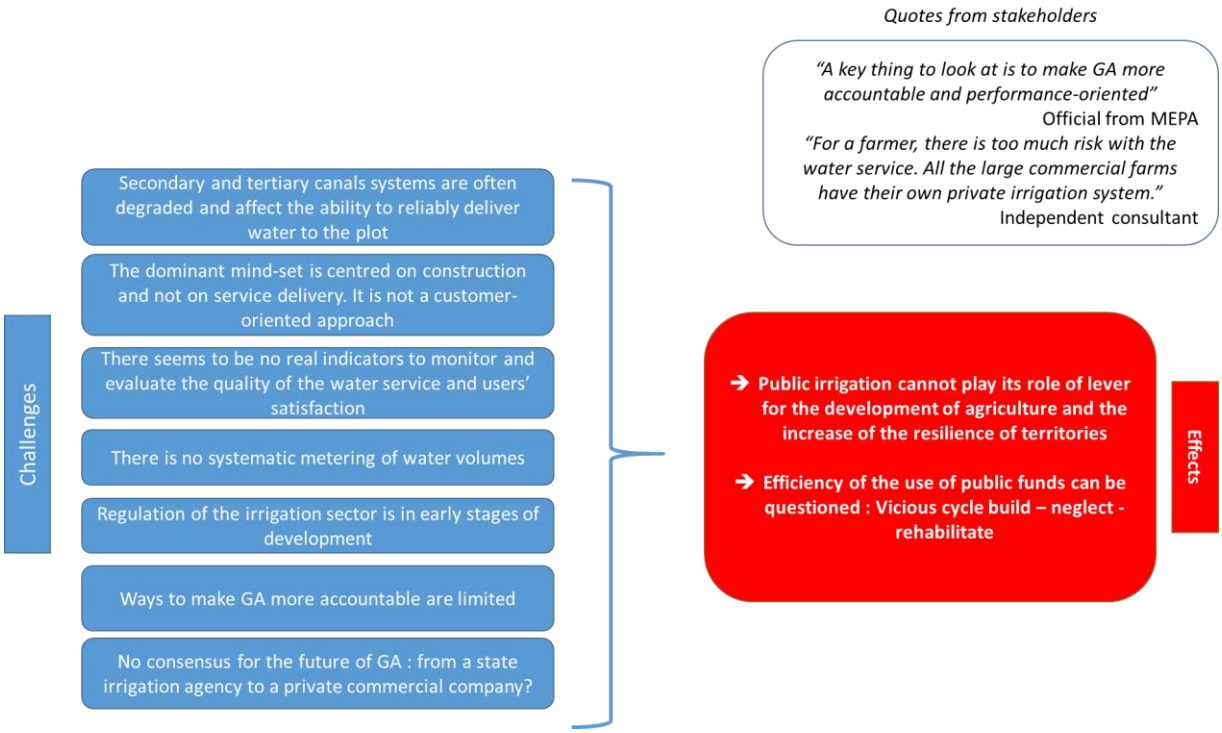
Rather than active planning, the intervention strategy is opportunistic, reacting to identified "hot spots". Several stakeholders we interviewed within MEPA stressed challenges related to the lack of prioritization criteria (e.g. cost per water savings, value of water for irrigation, etc.) to qualify irrigation projects. Instead planning based on multiple dimensions grounded in answers to the following questions: why undertake this project? What will be the benefits? Are the key conditions of feasibility met? How will local water users in the area respond to the intervention and does this align with their crop patterns and irrigation practices? is not common practice in Georgia.

These points highlight that critical conditions for well-performing and sustainable irrigation systems (such as well-sized and adapted design to the water user's needs) **are presently not met in Georgia, potentially leading to lower efficiency in public action and increased risk of inadequate project design but they also present ample opportunities and pathways for the Georgian government to consider reforming various irrigation development priorities**.

[11] FinExCoop Georgia (Finance, Extension and Cooperative Development for Georgian Farmers) is a EU project implemented by AFD. The project aims at improving access to finance and agricultural extension services for small farms and cooperatives in Georgia.

6.4 CONSTRAINT 3: NEED TO IMPROVE RELIABILITY OF IRRIGATION SERVICES AND SERVICE DELIVERY SYSTEMS

Figure 6-6: Problem tree – Need to improve reliability of irrigation services and service delivery systems



Source: Authors based on stakeholders' interviews

Irrigation service delivery is a key component of irrigation performance. A reliable water service contributes to creating the conditions for a better valorisation of the farming systems by mitigating the risks linked to inadequate water supply for crop production. Improved irrigation service delivery covers several dimensions. On the one hand, it requires setting up the conditions for the objectification of the reliability of the service within an irrigation command area. On the other hand, it is based on a full understanding of users' needs. Finally, it requires clarifying the relationship between the service provider and the water user, to define the duties of each and make both parties accountable. International experience shows that customer-oriented approaches are considered with increased interest by service providers to improve facility performance and make a service more efficient (FAO, 2007; Malano and al., 2006; Burton, 2010). Without detailed studies of water users, it is not possible to implement such an approach. To modernize the agricultural sector, farmers need a more efficient water service than in the past. The water service must therefore be modernized to match the water users needs and support agricultural development.

Despite significant investments in the rehabilitation of irrigation systems, the reliability of the water service is still an issue. Rehabilitation mainly focuses on primary systems according to the MEPA and GA, as a direct consequence of limited financial resources. Secondary and tertiary canals systems are often degraded and affect the ability to reliably deliver water to the plot, especially those further away from the main canals.

The dominant mind-set is not centred on service delivery but on construction as highlighted by the community of donors and the MEPA. This results from the objectives of the 2017-2025 irrigation strategy which plans an extension to 200,000 ha of irrigable area. Therefore GA is focused on the expansion of irrigable areas. GA also attaches great importance to the issue of uninterrupted service provision to farmers and positive changes have been observed in the past two years according to the donors and MEPA, but things are moving slowly. There seems to be no sufficient indicators to monitor and evaluate the quality of the water service. According to Georgian Amelioration and most of the stakeholders interviewed the main indicator for performance is the irrigable area. This indicator is relevant because of the objectives of the irrigation strategy but does not provide information on the quality of the water service (See Box 1Box 6for feedback from farmer interviews regarding quality of irrigation service delivery).

Box 6. What do Georgian farmers think of the water service?

All of the interviewed farmers state that it is very easy and convenient to communicate with local service center of GA and they are always very helpful. However, despite the easy communication there is no formal process to monitor and evaluate the quality of the service and provide a systematic feedback to the top management of GA. This hampers the capacity of top GA management to have an updated, reliable, realistic, and informative picture of the irrigation sector, key to identifying priorities and guiding the planning and implementation process.

When farmers face challenges that cannot be solved locally and require higher level intervention, this proves to be a key constraint. As a result, responsiveness to these challenges (which, mostly, affect the reliability of the service, water availability, water quality, design of the systems, etc.) is lower, leading about 70% of the 21 farmers interviewed to declare they do have issues with the irrigation service they are receiving.

Out of 21 interviewed farmers (including phone surveys and focus groups) 13 of them (62%) stated that the irrigation infrastructure is not always in good condition, especially the secondary and tertiary networks, and is not adapted to efficient and equitable use of the water resource. 47% of the interviewed farmers also claim that the rehabilitation work has not always improved the service, and has sometimes even degraded it.

Another issue with the rehabilitation of the irrigation schemes is that, in some cases, the irrigation canals were designed and rehabilitated in such a way that it became impossible for a farmer to get water if the neighbour farmer does not irrigate the land. The situation becomes tricky when neighboring farm plots have different crops.

60% of interviewed farmers have also raised an issue of polluted water (all those farmers were from Sagarejo municipality). In the Sioni Dam from which the farmers get the water, there is lot of waste and the garbage gets stacked in the pipes or in the filters and this hinders water flows.

In addition, and as result of the polluted water according to the farmers, development of drip irrigation systems also becomes problematic as the garbage can get stacked in the system as well. For instance, one farmer reported that he had to develop its own settling pond in his land plot and must wait one day before using the water to avoid damage to his drip system.

Another important problem highlighted by 50% of interviewed farmers is that some farmers can damage the irrigation canals to irrigate their plot. This has a direct impact on the irrigation management and the availability of water for downstream farmers, leading to conflicts between farmers. According to some farmers, it can also lead to a deterioration of the road infrastructure as leakages are more frequent with such practices. During interviews, farmers stressed the need for stricter control and repression of these practices by GA.

There is no objective assessment of the quality of the irrigation service delivery. The interviews did not identify any indicators related to water cuts, water losses or users' satisfaction. Such indicators would place GA in a service provider posture and help better identify investment decisions and guide GA's actions in the field. Georgia is not alone in grappling with issues of weak irrigation service delivery, as many countries around the world have implemented different solutions to address water user concerns. Box 7 provides an example of a customer feedback approach used by an irrigation service provider in the south of France.

Box 7. Feedback from BRL – a French irrigation service provider

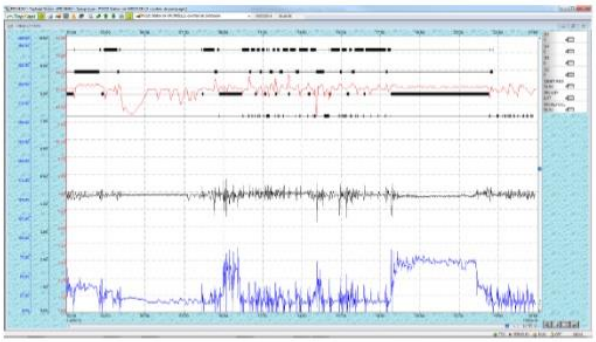
BRL was created in 1955 by government decree to develop irrigation in the south of France (130,000 ha). It is a trading company but with majority public sector shareholding (77%) (Local authorities). Another decree issued in 1956 awarded the company a 75-year concession for the design, construction and operation of water works contributing to the economic development of Languedoc-Roussillon. The construction works were declared of general interest. The infrastructures were transferred from the State to the local authorities (the Region) in 2008.

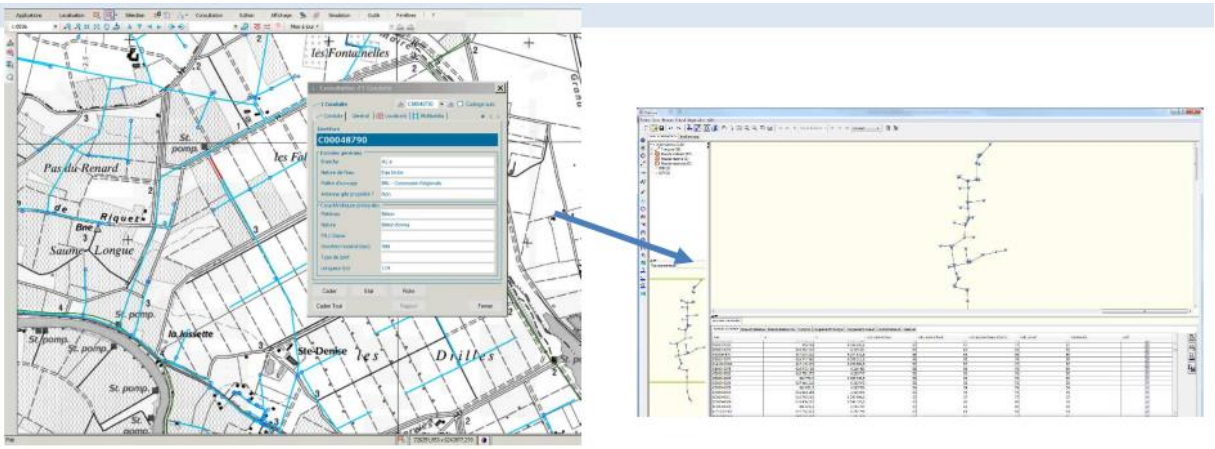
The Region is the majority shareholder of BRL (49%). BRL and the Region work in close collaboration to support the adaptation of territories and the agricultural sector to climate change. BRL's activities are controlled by the Region (as a concessioning authority) and by a board of directors composed of representatives of public and private institutions as well as representatives of the agricultural sector (French Chambers of Agriculture, public bodies representing French farmers and the rural world) and representatives of the environment (public body in charge of river management).

A person within the Region oversees the monitoring of BRL's activities on a full-time basis and monthly meetings are organized. Irrigation tariff is regulated by the concession contract between BRL and the Region. The Region therefore plays the role of regulator and is fully involved in monitoring and guiding BRL's activities.

Benchmarking performance across the board: The BRL Group's performance is assessed against a number of indicators: financial results, volumes distributed, network efficiency, linear loss indices, water quality, water use, level of use of the infrastructures, number of contracts and characteristics of the customers per area, water savings, energy efficiency (kWh/m3 distributed), service interruptions, O&M costs, investments made and planned, asset management, customer's satisfaction, measures of support to the agricultural sector especially for young farmers, quality of employment within the Group, etc.

To monitor all these indicators, BRL has made a digital transition for several years. Several tools are used to enable decentralized management of monitoring and evaluation. Each employee becomes an actor in monitoring thanks to these numeric tools. For example, there is a database of all the clients with their characteristics directly linked to a GIS software, in which there are the infrastructures, an O&M software and a remote sensing tool for monitoring all the infrastructures in real time (see the figures below showing screen captures of these tools.





For BRL, the most important elements include: continuity of the water service, network efficiency, energy efficiency (because of the use of pumping systems), and quality of employment within BRL. According to BRL an efficient water service can be defined through the following dimensions: continuity, water quality, responsiveness to water user needs.

The Board of Directors contributes to the definition of the Group's orientations and validates them. It can intervene in the organization of the Group. BRL is therefore accountable for its activities both to the regional authorities, which underlines the importance of the territorial development dimension, and to users, to a lesser extent. Indeed, the contracts with individual water users or WUOs clearly define the responsibilities of the parties. For example, BRL is authorized to interrupt water service for periods not exceeding a total of 10 days per season, seven of which can be consecutive days, for maintenance and repairs. In addition, differences between the subscribed flow rate, subscribed pressure and reality (lower flow rate or pressure) cannot exceed 4 hours per day. In case of failure, the repair debt is 10% of the subscription per day of failure, without exceeding 100%. Seven consecutive days of interruption never happen because of the strong pressure from the farmers.

To be as close as possible to water users, BRL conducts annual satisfaction surveys in addition to the complaints monitoring system.

BRL provides water to individual water users but also to 12 WUOs. The water tariff for WUOs allows them to resell water to end-users at the same price as BRL, while financing their own O&M costs. BRL can also be contracted by some WUOs to operate and maintain their infrastructure or to intervene for specific works.

The new BRL's 2021-2025 strategy focuses on three key areas: **customer satisfaction** and providing **user-specific solutions**, **water, and energy saving**[12].

In Georgia, water quality is not assessed resulting in the following negative outcomes: it can impact the drip systems at the plot by clogging them and on the other hand it can pose a problem to agricultural productions requiring a certification for the national or international market. Some farmers mentioned during the interview the problem of water quality as a constraint.

There is no systematic metering of water volumes due to the lack of financial resources according to GA. The information on the volumes and quantities of water discharged in main canals is collected by GA on a daily basis and it is planned to install volumetric water meters on relevant schemes in parallel with WUOs establishment, but there is limited knowledge of what enters and leaves the system and how water is used within an irrigation scheme. This situation hinders the capacity of GA to develop a customer-oriented approach and to improve the reliability of the water service because it is much more difficult to identify where water losses are particularly high for example. The need to establish a metering system is also critical for the advancement of the tariff reform.

[12] The 2020 activity report of BRL recalls these strategic orientations: https://www.brl.fr/dl?type=file&module=Kiosque&verifkey=cfc221b5e370c9d921df6b4617cd806e85cb7b12.pdf--82&f=1

Regulation of the irrigation sector is in very early stages of development. According to the irrigation strategy, GNERC should oversee regulation of the irrigation sector. However, according to the law on WUOs, GNERC is responsible to regulate tariffs that WUOs will have to pay to GA. GNERC wants to limit its mandate in regulating the sector to those provisions. GNERC highlighted that they cannot regulate the quality-of-service provision by GA as they do for other regulated sectors. For the energy sector, they have different mechanisms including customer quality complaint review system, that is fairly resource intensive and could not be replicated in the same way with the actual level of resources. To fully play their role for the regulation of tariffs, they should have a very detailed understanding of the costs of the irrigation water service. This topic is discussed in more depth in Section 6.6 in the constraint related to irrigation tariff reforms in Georgia.

Ways to make GA more accountable are limited. GA does not have a mission statement with specific goals to achieve that are evaluated and updated annually. A supervisory board, consisting of three members, has recently been established (in 2019) to supervise the activities and ensure that strategic decisions are closely linked to the mission statement and will achieve effective results, but its operationality and the importance of its strategic role should be reinforced. As a result, GA is not truly accountable for its actions. For example, in the field, in case of unsatisfactory performance of GA, there are no clear paths for individual farmers, communities, but also the Georgian State, to hold GA accountable and influences its decision-making processes.

Accountability concerns "the obligation of one actor to provide information about and/or justification for his or her actions in response to another actor with the power to make those demands and apply sanctions for non-compliance" (Wetterberg & Brinkerhoff, 2016)

GA is lacking a strategic road map to drive its operations and ensure financial sustainability. Making an irrigation service provider profitable is a challenge. International experience shows there are very few success stories when countries attempt to fully privatize irrigation services (see Box 8 of an example from Morocco and Spain). The potential of irrigation to generate profit for a hypothetical private company taking over the management of a scheme is very low, especially if the investments for the rehabilitation or the development of new schemes are not subsidized. Multi-purpose use of infrastructure is one of the factors that can increase the chances of profitability by allowing cross-subsidies between water uses (e.g., drinking water fees paying partly for irrigation). Some stakeholders assume that GA could be entirely private. However, for GA to be entirely private, it would need to operate only on the fees paid by water users for irrigation and drainage services. The operational cost of GA was approximately 25 million GEL in 2020 and 65,000 ha were irrigated. This means that GA should invoice at least 385 GEL/ha (USD 125), about 5 times higher than the actual cost (the farmers would, then, have to pay additional fees to WUOs for the operation and maintenance of secondary and tertiary canals, which is standard practice among WUO members across the world). And still, GA would not have the capacity to invest in rehabilitation, extension, or equipment to improve the service. In reality, however, it should be noted that by focusing on a bulk water supplier role, GA would very likely have lower operating costs, which is currently under consideration by the government in reforming the irrigation tariff.

Providing irrigation water to a vast number of farmers in large territories is not just a commercial activity as it often plays a strategic role as an engine of rural development, food security and helps improve integrated water resources management. These are public services that are hard to quantify and should not be financed only by water users but are also the responsibility of the state.

Box 8. Irrigation and privatization – Feedback from international experience

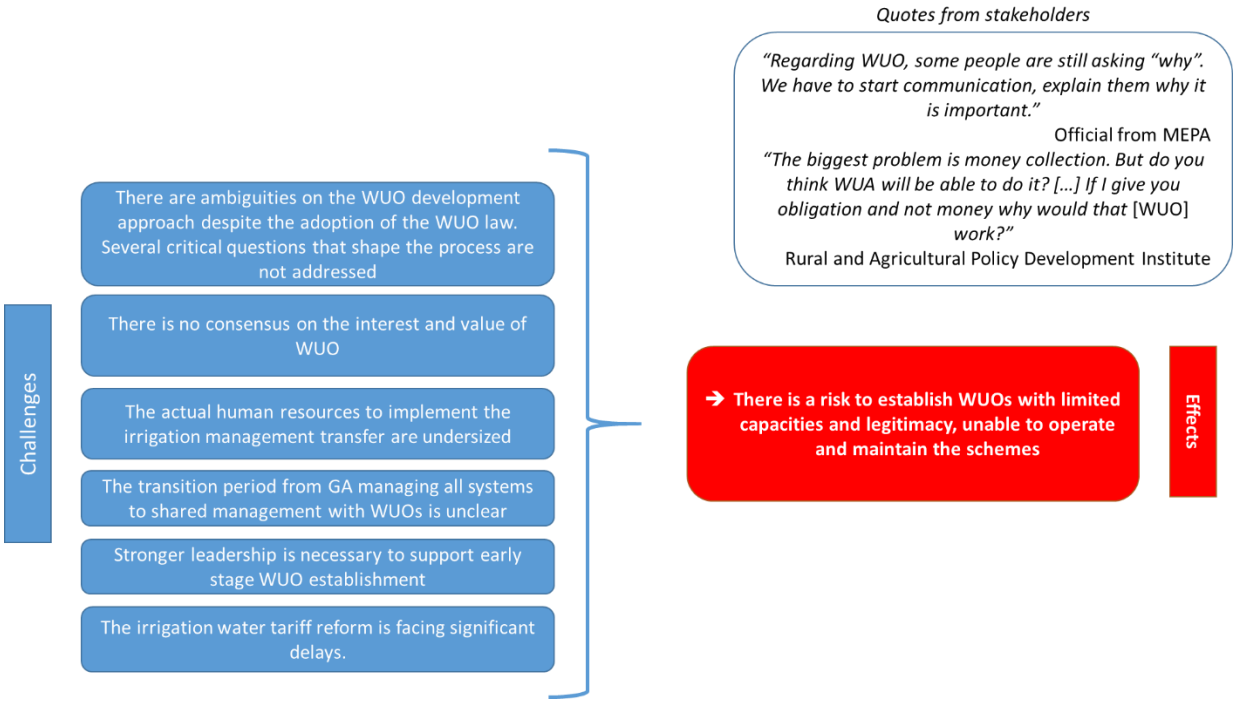
Due to low performance, low water productivity and financial scarcity, the potential role of the private sector in large-scale schemes has been considered with an increased interest by international donors and governments at different times in many countries. International experience shows that public private partnerships (PPP) in irrigation are highly context-specific and there can be very different ways to involve the private sector. But despite the attractiveness of this idea, **there are very few examples of successful PPPs in large public irrigation systems**.

In Morocco, the Government tried to build on the El Guerdane PPP to engage a reform of the irrigation management of large irrigation schemes, but studies have shown that the potential for irrigation to generate profit for a private company taking over the management of a scheme is very low without a significant financial support from the State (Molle and al., 2019). Private companies are often reluctant to take on the risks associated with irrigation and drainage management. Commercial, climatic, and political risks are considered high, and private companies do not want to be responsible for collecting fees from farmers, who often have significant political clout. Mechanisms for enforcement of non-payment that are hydraulically practical and socially acceptable are rarely met. Where privatization has been implemented, for example in Spain, it may have led to social and economic risks for farmers with significant cost increases and a lack of transparency from service providers (Sanchis-Ibor and al., 2017). The successful cases of privatization of water services appear generally in areas characterized by **intensive agriculture and high value crops**. But privatization has thus contributed to increasing the processes of concentration and specialization of the agricultural sector, leading to social and water resource management problems for the society. Moreover, privatization has often been paradoxically accompanied by high costs for the State, which has assumed a large part of the initial investments and in some cases is setting up loss compensation systems for the private operator. The risk is therefore borne mainly by the state, while profits are privatized. In any case, when considering the involvement of the private sector, **there is the need for an active regulator** to balance the power between the private company and the water users.

Performance-based service delivery is key for well-performing irrigation sector. Constraints in achieving a reliable water service, if not addressed, have different effects. First, “public” irrigation will not be able to play its role as a lever for the development of agriculture and the increase of the resilience of territories to climate change with negative impacts for the agricultural sector and rural territories as well as for the environment and ecological health of water and land. The processes of atomization of collective irrigation (from public collective systems to private individual systems) will accelerate and could lead to competition between farmers for individual access to water, which may result in a form of privatization through financial and technical means. There would be also a fiercer competition with other water users, as managing and coordinating water use, which will become more complex. Second, the efficiency of the use of public funds will be affected and the vicious cycle of “build-neglect-rehabilitate-neglect” will continue.

6.5 CONSTRAINT 4: ACCELERATE WUO ESTABLISHMENT

Figure 6-7: Problem tree – Accelerate Water Users Organization establishment



Source: Authors based on stakeholders' interviews

To improve irrigation management, the Georgian Government decided to reform GA to provide bulk water to WUOs, with the aim of establishing WUOs to take ownership of the role of water management at the tertiary or even secondary network level. A WUOs Support Unit was established and gradually staffed in 2018 within the World Bank Project Implementation Unit. Currently (since April 2020), it is a structural unit of GA. Since its establishment, the WUO support unit has been guided by a comprehensive action plan developed by a World Bank consultant and which has been periodically updated.

But **there are ambiguities on the WUO development approach despite the adoption of the WUO law** in 2019 and clear guidelines defined in the irrigation strategy since its implementation in 2017. The establishment of WUOs thus far in Georgia is slow, delayed by a lack of leadership, according to some donors and international consultants, whom we interviewed. In addition, stakeholders highlighted that several critical questions that shape the process of WUO establishment are not being addressed (not asked and/or not answered):

- Will the transfer of management be limited to tertiary systems or will it include secondary systems? The WUO law states that secondary and tertiary amelioration infrastructure will be transferred to WUOs, but the transfer is usually governed by the capacity of farmers to manage a hydraulic area. Depending on the type of scheme and farmer's capacities, this management can be more or less complex. What is feasible for farmers in one system may not be feasible in another. Therefore, the approach must be defined by taking into account the hydraulic characteristics of the system to be transferred.
- Should WUOs be created throughout the territory, including in areas where there is no clear will of the farmers to organize? The interviews with farmers highlighted that many farmers have little awareness of WUO establishment (see Box 9). In general, WUOs should be established where and only when there is a willingness of farmers to organize themselves and where technical and financial conditions for successful IMT are met (see Box 10). The law states that a WUO is established based on a decision made by the majority of landowners/possessors within a service area as specified by MEPA whose land plots make up more than 50% of the total service area of a WUO.

- Will secondary and tertiary irrigation infrastructure be rehabilitated before transfer to the newly established WUO? International experience shows that the infrastructure should be rehabilitated before irrigation management transfer (IMT) to WUOs (see Box 10). WUOs should be established in areas where either the full scheme (from primary to tertiary facilities) has been rehabilitated and is ready to be handed over to WUO members, relevant infrastructure is in good working condition, and/or after ensuring the willingness and ability of potential WUO members to carry out rehabilitation works on secondary and tertiary schemes on their own. According to GA, the process of establishing WUOs in the project areas will begin in parallel with the ongoing rehabilitation of on-farm network.
- Are the deadlines for implementing the reform really compatible with the means available? It was not clear in the irrigation strategy whether the 2025 deadline was for the establishment of WUOs nationwide or only in pilot areas. MEPA and GA provided valuable additional information, indicating that 2025 is only for pilot areas and that there is no deadline for the other schemes.

Box 9. What do Georgian farmers think of Water Users Organizations?

Most of the farmers we interviewed were not aware of the establishment of WUOs, and most had no knowledge of WUOs. Only 14% of the interviewed farmers had been members of WUO in the past. However, none of them thought that this system was efficient, and they do not wish to become members of such entity anymore. As for the remaining farmers, who have never been a member of WUO, only 40% of them think that they might consider becoming a member of a WUO if it were established in their municipality; of the remaining 60%, half are strictly against becoming member of WUO, while the other half say they have never thought about it and prefer to avoid answering the question. When they mentioned they were against becoming member of WUO, they didn't give the reasons why they would not want to be part of a WUO. Lack of understanding and preconceived notions related to echoes of past experiences could explain this attitude. That is why, the stakeholders involved in the WUO establishment are showing more prudence in planning and implementing any activity.

Three of the 21 farmers interviewed think that efficient irrigation systems will only be possible if they are fully managed by a private company, which can rely entirely on the income collected from its customers.

According to some officials in MEPA, the value of WUOs is being questioned as they see establishment of WUOs to reduce the costs for the State and to transfer the problem of tariff recovery to new entities. Others do not understand why it would be better to subsidize WUOs than to subsidize a large State entity. MEPA emphasized the need for increasing the awareness of people on the importance of WUOs, their contributions and benefits to improve irrigation service delivery in the country. In this note, we argue that due to the lack of a comprehensive assessment in establishing WUOs is leading to growing doubt about their purpose and benefits from stakeholders within the government. Establishing WUOs should not be a consequence of the reform of GA as bulk water provider, but the result of an assessment of ways to improve the management of irrigation systems.

The rationale for WUO establishment and irrigation management transfer can be summarized as follows: farmers have a **direct** interest in effective irrigation management. When they have the resources, the authority, and sufficient incentives to act collectively, they are more likely to improve irrigation operations and to do it with a better cost efficiency than public bodies or private companies. In two words, the rationale is "**better**" and "**cheaper**" irrigation delivery services leading to improve yields for farmers, reduced conflicts among farmers, and improvements in irrigation tariff fee collection.

However, depending on the local context and strategies used, IMT has had mixed results. Below, we list some of the main findings and lessons from an analysis of the outcomes of IMT (Garces-Restrepo and al., 2007). In **blue bold,** we indicate some emerging lessons learned with respect to the Georgian strategy of development of WUOs:

- IMT has reduced the cost of government allocations towards the O&M of irrigation systems but less than expected.

- The establishment of WUOs has resulted in increased accountability, transparency, and more efficient water supply.
- The level of cost recovery became generally higher after an IMT to WUOs.
- Successful IMT programmes always required strong political commitment. Lack of political support, resulting in poor funding of the reforms and inadequate support to the process, has led to failure of IMT in some countries.
- The process of IMT was adaptive and flexible with consideration of the local context. Where an identical rigid approach was implemented, the establishment of WUO usually failed. **The MEPA and GA assume that a transfer of pilot schemes to newly established WUO will be done by 2025**. **The use of a pilot flexible approach for the establishment of WUOS shows that MEPA and GA are aware of the importance to pay attention to the local context**.
- Systematic public awareness campaigns, consultations, and involvement of all key stakeholders were key conditions for the success of the establishment of a WUO. **Awareness campaigns are planned, and MEPA is fully aware of the importance of this point as highlighted during the interviews.**
- Successful irrigation management transfer programmes paid due attention to the financial capacity of WUOs and their strategies for financing irrigation management. In this regard, there is probably a critical size for WUOs in terms of service area. **GNERC, GA and MEPA stakeholders highlighted the importance of ensuring sufficient financial capacities of the newly formed WUOs. The WUO support unit emphasized the importance to establish WUOs with a critical size. But some issues will be probably encountered as, according to GA data, about 50 schemes have a command area of less than 500 hectares. MEPA and GA highlighted the importance to support the newly established WUOs in the definition of an adequate tariff that farmers would be willing to pay but would also support GA in recovering O&M costs.**
- Successful irrigation management transfer programmes included assistance to the irrigation State agency and specific measures were implemented to support the staff to adapt to the new situation. **Today it is commendable that MEPA and GA leadership have sanctioned GA staff to be appointed full-time to play the role of WUO Support Unit staff in the regional centers of GA, with technical trainings and on boarding trainings of how to perform their roles currently underway to be able to support WUO establishment in their areas.**
- Rehabilitation of the infrastructures before the irrigation management transfer was critical for the success of the reform. **The interviews showed ambiguities on this subject insofar as the rehabilitation before transfer will imply long delays and will prevent the transfer of irrigation management for many irrigation schemes as well as the lack of funds for rehabilitating secondary and tertiary systems. However, it is well noted that the ongoing World Bank supported GILMDP program is rehabilitating some schemes down to the tertiary level in areas where WUOs are envisioned to be established.**
- M&E systems were found to be necessary to permit progressive learning throughout the implementation process. **According to the community of donors and MEPA, existing M&E systems within GA can be further modernized and improved to enable progressive learning.**

Box 10presents examples from the lessons of WUO establishment and IMT within other countries, which offer examples for the Georgian experience with IMT.

Box 10. Benefits of WUO engagement for improved irrigation management – Feedback from international experience

More than 50 countries have embarked on some type of irrigation sector reform that includes irrigation management transfer since the 1960's. In France, Portugal, Italy or Spain, community irrigation exists historically, and has been standardized by regulations since the first half of the 20th century. Feedback from IMT experiences in Armenia, Turkey, Albania and Tunisia in the recent decades is presented below:

ARMENIA

The Government of Armenia adopted irrigation management transfer policy in 2002. The Government transferred responsibility for managing irrigation systems from State agencies to water users associations. The reform was based on the water code and on the law on water users associations (WUAs) and unions of water users associations. The law authorized the formation of water users associations of 1,000 to 6,000 ha (cadastral) to take over O&M from existing entities in charge of tertiary canals. In two years, about 54 WUA were established nationwide and registered. They were responsible for about 132,000 hectares (out of a total of 208,000 hectares of irrigable lands in Armenia). WUAs were restructured in different steps from 2008 to 2016 to reduce the number of entities and to improve their operational capabilities. In 2018, 15 WUAs were operating in Armenia, with sizes between 5,000 and 20,000 ha. A total of 148,000 hectares were actually irrigated under WUA and non-WUA management.

WUAs are served by a water supply agency (WSA), under the responsibility of a State committee for Water, or have their own water sources. There were initially four WSAs, but now there is only one. The WSA is a Closed Joint Stock Companies (CJSC) responsible for the safe management and operation of irrigation systems in strategic reservoirs, main canals, major pumping stations and other hydrotechnical centers. The company signs contracts with the WUAs for supplying bulk water (gravity and pumping separated) and is paid for this service. The Government subsidizes WUAs for the use of energy, and WUAs cover the service fee of WSA (including energy cost). The WSA also receives some subsidies from the Government for major repairs not reflected in the yearly O&M budget. Because of the willingness to improve the water service, salary costs for the WSA had to go up to recruit and retain qualified specialists and O&M costs followed the same trend to improve the reliability of the water service.

In addition, there are the following entities involved in irrigation management:

- The State Environmental Inspectorate (SEI) oversees the provision of water use permits, state registering of water resources, the amount of wastewater disposed in water resources including the number of hazardous substances in them, the normative limits of water leakage in water systems. Because of the absence of quality standards for irrigation water it is impossible to identify water polluters and assess the damage caused to water users through a water quality analysis. Even when the SEI identifies cases of water pollution it is not able to immediately alert the water users mainly because the WRMA does not have overseeing functions.
- Regulatory Board of Water Users Associations functions on a public basis. Its major objective is to coordinate the activities of Associations and Unions and provide them with consultations and training for legal, accounting, and technical issues. The Board ensures transparency and appropriateness of the financial and economic activities of WUA and WUA Unions.
- The Committee of Water of the Ministry of Territorial Administration and Infrastructures is a state body that develops and implements the policy of the Government of the Republic of Armenia in the sector of management and use of state-owned water systems. It regulates and supports the development and sustainable management of public irrigation systems throughout the country.

According to a study prepared by FAO in 2007, irrigation management transfer in Armenia resulted after less than 10 years in:

- The increase of O&M costs to farmers and to government
- The increase in the efficiency of fee collection
- The increase in terms of equity of water delivery and reliability of the water service
- The same quality of maintenance
- The increase in irrigated areas and increase in crop yields.

TURKEY

In Turkey, operation and maintenance for irrigation systems was centralised. The billing rate was very low as well as the collection rates. The water consumption was very high and there were limited interests from farmers in protecting the infrastructures leading to deterioration. To reduce the burden for the State budget and to address the concern of irrigation management and O&M in the expanding irrigated systems, Turkey initiated in 1993 an IMT program with the support of the WB. Within three years, one million ha were transferred to irrigation management organizations. WUOs in Turkey covered different cases, from irrigation associations to village legal entities, cooperatives, and municipalities. These organizations oversaw the secondary and tertiary systems, the central water agency (DSI) remaining responsible for the primary infrastructures. The program was undertaken entirely with the staff of the General Directorate of State Hydraulics (DSI), who were extensively trained and oriented to the program well in advance, and a sense of competition was instilled amongst the field staff for championing the change. A distinctive feature of the program was its entire reliance for implementation by its own staff rather than grassroot NGOs. Another distinctive feature was to transfer the management to existing locally controlled organizations, such as municipalities. Another distinct feature was the size of the irrigation units, which averaged 6,500 ha per association. The ownership of the infrastructure remains with the state, but O&M functions are vested with associations through a formal annual contractual mechanism between DSI and associations. The contracts do not define the obligations of, and can be unilaterally cancelled by, DSI. In effect, the municipality leaders execute the contract on behalf of the state, and not the users.

The first years of the IMT in Turkey has demonstrated that: (a) the process has evolved and has taken a program approach with strong political backing; (b) the demand for change emerged internally due to fiscal crises and was not pushed externally by donors; (c) the process was initiated from areas where the farmers already had some collective action experience for O&M; this initial momentum was used to create a competition amongst DSI regional staff to upscale, and they did not see emerging IAs as a threat to their jobs. The DSI has redefined its role from a direct service provider to catalyzer and support service provider; (d) the IAs were not overloaded with functions right from the start and had lot of assistance from DSI; (e) the fee collection for O&M improved considerably; and (f) the conflict resolution mechanisms are in place and seem to function well. (Ul Hassan and al., 2007)

In 2016, more than 90% of the areas, for which the DSI was responsible in the past, were transferred to WUOs. DSI still plays a role in supporting the WUAS and monitoring and evaluating the performances of the WUAs to ensure a correct maintenance and operation.

However, the reform has not been supported by appropriate legal reform which has caused some problems for the sustainability of WUOs operations. Starting from 2005, there were attempts to reform the IMT by improving the legal framework and the irrigation associations law has been adopted in 2011. The irrigation associations gained clear status but in 2018, some amendments to the law, resulted in a restoration of the government control through the DSI. In addition, several studies point to the fact that some WUOs are dominated by powerful large landowners and not by common farmers and water users are not involved in decision making and monitoring.

According to the FAO study carried out in 2007 and other studies (Kiymaz and al., 2006, Kadirbeyoglu, 2008), the irrigation management transfer in Turkey resulted in the following outputs:

- Decrease in the O&M cost to Government. This objective has been fully achieved. The DSI oversaw all the O&M expenses before the transfer and only 16% in 2005.
- Increase in the efficiency of fee collection from less than 40% to more than 80%.
- Budgets of WUA are lower than the O&M budgets of DSI, which shows that at least similar or even better management can be done by WUAs at lower cost.
- Increase in the reliability of the water service and improved customer satisfaction of water users. Performance was highly satisfactory for nearly 80% of WUAs according to a survey carried out by the DSI in 2017.

In terms of water efficiency, the first years were successful, but the rate is now quite similar as before the transfer (40%). (Topcu and al., 2019) The irrigation tariff structure didn't evolve a lot due to the constraints in terms of measurement of water consumption at farm level. Most part of the irrigation associations using a fee based on the area of irrigated land and the type of crop.

It took more than 15 years to empower the irrigation associations (this is still a work in progress) and as a result, some Government policymakers developed a negative view of irrigation associations and introduced amendments to strengthen Government control and consider other options of irrigation management transfer such as transferring to private entities. But the introduction of the privatization model in irrigation was strongly opposed by farmers and some political parties (Kibaroglu, 2020).

ALBANIA

In Albania, most of the infrastructure were deteriorated after the collapse of the central Government in the early 1990's. Before 1991, there were about 500 cooperatives and 150 state farms. The systems were administered by the Ministry of Agriculture through State owned companies. After 1991, about 300,000 ha of irrigation systems and 153,000 ha of drainage systems collapsed. Very similar to Georgia, land privatization led to very small farms with an average size of 1-4 ha. In 1994, Albania adopted an IMT process with the support of the WB. The objective was to decrease the burden for the State budget and improve irrigation management. WUAs were established and irrigation systems rehabilitated, the WUAs playing a role in planning, supervising rehabilitation, collecting water fees, and paying a part of the rehabilitation works. The state-owned enterprise was in charge until 1998 of the primary systems and reservoirs. In 1998, the Water enterprise was restructured to focus on drainage systems and a federation of WUAs was established to manage the primary irrigation systems.

But results were below the expectations and after 20 years of tentative efforts to improve the sustainability of WUAs operations, the Government decided to abolish all the WUAs and transfer the irrigation management responsibilities to the Municipalities in 2016. Municipalities have much higher capacities to finance the water service but the sustainability of the transfer in the long term can be questioned.

TUNISIA

In Tunisia, nearly all irrigation schemes were transferred to WUA between 2004 and 2007. WUAs oversee water distribution but are still dependent on Regional bodies in charge of agricultural development. These public bodies oversaw the irrigation systems before 2004 and are still in charge of large interventions in irrigation systems. However, the results of the IMT were mixed. Overall, about one third of the WUAs work well, one third with some difficulties and one third with major difficulties. The analysis of the different situations highlighted the following reasons for the difficulties encountered:

- The irrigation systems were not improved before the transfer to the WUAs;
- Poor participation of beneficiaries;
- Lack of resources for supporting the establishment of the WUA (training and equipment);
- Financial difficulties resulting from the tariff structure and collection rate;
- Unclear interface between the bulk water supplier and the WUA;
- There were no comprehensive support for the officials of the districts to enable them to change their position from direct managers of the schemes to advisers in the service of associations which was a major source of shortcoming of the program (Khadra and al, 2019).

Actual human resources to implement the irrigation management transfer are undersized. Well performing WUOs are critical for the success of irrigation management transfer and to ensure the sustainability and operability of rehabilitated and modernized irrigation systems in Georgia. However, the resources deployed by GA are currently insufficient for this support (understanding users' issues, convincing, negotiating, training WUO executives, and other activities) as the WUO support unit is made of 7 staff full-time (4 at central level and 3 at regional level). However, recent efforts by the government to increase the number of regional support unit staff in GA is already a step in the right direction.

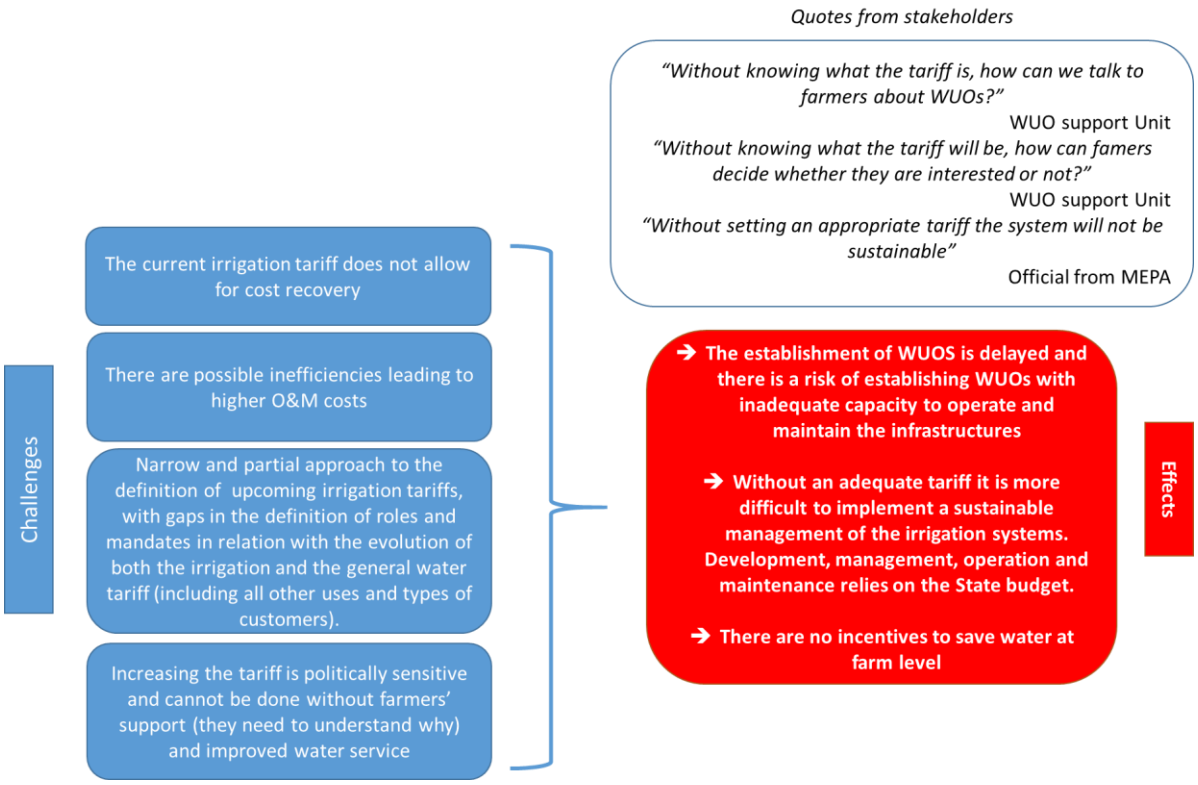
The transition period from GA managing all systems to shared management with WUOs is unclear. According to the irrigation strategy, the IMT should be done by 2025 in the pilot schemes but the reform of the water service implies that there will be a long transition period during which the infrastructure will be rehabilitated, and the associations created and supported by GA. **According to several donors this timeframe is unrealistic.** The risk would be to want to accelerate things and "abandon" poorly rehabilitated infrastructures to poorly designed and endowed associations. In addition, despite the adoption of the WUO law, some key rules, and regulations for the establishment of WUOs are still unclear according to the Consultants supporting the WUO support unit through the GILMDP project, such the structure and process for establishing a representative assembly, hindering any incentives for creation of WUOs, as well as the ownership rights for infrastructure at the tertiary or secondary level for future WUOs.

The roles given to Municipalities and other stakeholders related to the irrigation and drainage sector are not clear. The sector is mainly structured around Georgian Amelioration, GNERC and MEPA. Other stakeholders, such as municipalities, are mentioned in some documents (draft drainage strategy, irrigation strategy 2017-2025) but their role is not really considered despite the potential interests and their potential to contribute to a better management of the system.

Sustained political leadership is necessary to support early stage WUO establishment. If there is no clearer and strong political support for the realization of the most effective and efficient institutions and mechanisms for the distribution of irrigation water at the local level (WUOs or whatever else suits the local conditions), there is a high risk that Georgia will face significant irrigation management problems, such as increased difficulties to address water user's needs, in the short and medium term with direct impacts on agricultural performance and sustainability of water resources**.**

6.6 CONSTRAINT 5: FINALIZE REFORM OF THE IRRIGATION TARIFF

Figure 6-8: Problem tree – Finalize reform of the irrigation tariff



Source: Authors based on stakeholders' interviews

Irrigation tariffs can play a crucial role in ensuring the proper performance of an irrigation system. Irrigation water charging usually pursues two main policy objectives: cost recovery (financial sustainability) and demand management (resource sustainability)(FAO, 2004). Cost recovery should consider theoretically full supply costs (O&M as well as capital costs) but not opportunity costs and externalities associated with water allocation. In practice, cost recovery considers O&M costs. Demand management seeks to encourage the most productive use of water. Given the importance of the tariff to farmers, and the expected variation of O&M costs at the scheme level, it is crucial that tariffs do reflect the expected and specific O&M costs, rather than average O&M costs across all the schemes. This implies that the bulk water tariff set by GA should be differentiated by scheme. Such approach would also allow the government to assess the specific challenges faced by each scheme (especially if the transfer of the infrastructure to the WUO takes place before all infrastructure has been brought to perfect operational condition) and provide – when/if necessary – adequate targeted subsidies. Demand management seeks to encourage the most productive use of water. In this context, raising prices should force irrigators to irrigate more efficiently (reduce water consumption) and lead to more water saving (FAO, 2004). As mentioned in section 5.4, the tariffs that farmers currently pay for the provision of irrigation services were set by GNERC, in 2010, to 75 GEL per ha for East Georgia and 45 GEL per ha for the West.

The current irrigation **tariff does not allow for cost recovery**, as it is set at such a low level that the state-owned amelioration company – GA – can never break-even, let alone invest in new capital improvements, without financial support from the state. This problem is aggravated by the fact that, according to data received from GA, the area serviced by the four GA regional centres is less than half the officially rehabilitated area (64,519 ha serviced in 2020, against 130,000 ha officially rehabilitated according to MEPA, in December 2019). Without expanding the contracting\servicing coverage of GA, covering supply costs might remain problematic even if the tariff is raised. On the positive side, according to GA management, tariff collection rates have increased dramatically over the years, from about 50% in 2016 to 80-90% in the last years. This is encouraging, as it implies that expanding the contracted area and increasing the tariff, while maintaining high collection rates, might contribute to increasing GA revenues.

There is another key reason why the existing tariff methodology should be changed: **it does not discourage wasteful water use**[13]. This constitutes a problem because, as irrigable area increases and climate change reduces the availability of water[14], competition between irrigation, hydropower plants, other technical water uses[15], and drinking water use will intensify, and overuse of water will lead to increasing economic costs. As current fees are based on area irrigated rather than volume consumed, there is little financial incentive for irrigators to prudently use water and adapt their cropping systems accordingly.

GNERC representatives, as well as national and international experts interviewed have suggested moving to a volumetric fee as a crucial step to improve the efficiency and sustainability of the irrigation sector, which is consistent with what is mentioned in the 2017 strategy document. Experts and some MEPA representatives agreed that this is a way to minimize the risk of conflicts with other (non-irrigation related) water uses. The introduction of a tariff based on actual water consumption and capturing the true opportunity cost of water has indeed the potential to reduce water consumption for irrigation purposes (relative to what would happen without a tariff reform) and increase efficiency in water usage, by helping farmers internalize the true (higher) opportunity cost of water and lead to the most efficient possible outcome (Johansson, R.C. et al., 2002). However, as the literature on the topic shows (Molle and Berkoff 2007; Cohin-Kuper et al. 2014, Shi et al., 2014), high prices alone rarely promote water savings, because the marginal value of water in terms of production is far higher than its cost to the farmer, especially in water-scarce settings. In such instances, the increase in tariffs required to lead to desired water savings would be of such magnitude to significantly impact farmers' incomes, pushing farmers to shift to groundwater or leading to outright opposition rendering the reforms politically unfeasible. Therefore, the literature highlights the preferability of increasing block tariffs to pure volumetric pricing (whenever volumetric pricing is technically achievable). This provides the regulators the chance to both allow some minimum level of water consumption while discouraging the use of water beyond a certain established quota and reducing the negative impacts on farmers' incomes. Similar practices have been adopted successfully, for example, in Israel and in some schemes in Spain, France, and Italy (Molle et al. 2019).

[13] Both current consultations and past analysis of the irrigation sector (ISET PI, 2016) suggest the existence of water wastage is largely due to the adoption of inefficient irrigation methods (e.g., flood irrigation).

[14] Most stakeholders (MEPA representatives, GA representatives, farmers, national and international experts) underlined the recently observed trends towards a reduction in precipitations and water availability and expressed concerns about the future. This is in line with what can be observed from available data (NEA reports a decline in average precipitation rates in Georgia over the period 2017-2019, from 1509 to 1068 mm/year, respectively), and with what the WB was anticipating already in 2014 (Ahouissoussi and al., 2014). The WB report, while highlighting the challenge of estimating changes in precipitations over the long term, suggested that a decrease in the summer period would be observed, and climate change would negatively affect irrigation water availability by reducing river flows, with significant impacts on crop yields.

[15] The term technical water refers to water that is collected, generated or managed on board for uses other than potable water (see https://www.lawinsider.com/dictionary/technical-water).

The question of the revision of the tariff is a blocking point and **the responsibilities of the stakeholders engaged in the reform process are unclear, although initial consultations are underway to initiate a transitional irrigation tariff**. GNERC is currently directly involved in a transitional tariff task force – working with MEPA, GA, the World Bank, and external experts to define how to reform the existing bulk irrigation water tariff that GA will charge to WUOs. At present, GA and GNERC focus on the relationship between WUOs and GA, even though it is expected that there are going to be cases of contracting between individual farmers and GA (at least during a transitional period, but one that will be significantly long). As far as the irrigation tariff is concerned, GNERC representatives stressed that, according to the law on WUOs, the regulator is responsible to regulate tariffs that WUOs will have to pay to GA. GNERC aims to limit its mandate in regulating the sector to these provisions. It was also noted that, for regulatory purposes, GNERC cannot regulate the quality of service provision by GA, as it does for other regulated sectors, as this would require deciding about the admissibility of investment expenditures, and would lead GNERC to have a role in shaping the overall policy in the agricultural sector, which is outside the GNERC mandate. Another key issue raised by GNERC representatives concerns the lack of mandate to regulate tariffs for non-irrigation services provided by GA. This, while not in GNERC mandate, is vital to avoid cross subsidization issues.

Although no official estimates of the new tariff exist, all main stakeholders agree that it is likely to be higher than the current one. **The introduction of a higher tariff is a sensitive issue** as, although it is a necessary step, not all farmers might be able or willing to pay for it, and the acceptance of the reform by farmers is key for its success. A key assumption in the discussions about the introduction of the new irrigation tariff is that the majority of farmers will benefit from the access to irrigation services, even having to pay a higher tariff, and, understanding that, they will agree to the changes in the sector (including the tariff increase). In absence of a willing majority, however, ensuring that farmers' fee payments cover a substantial fraction of the sector's O&M costs, if not the full cost of water delivery, will become significantly more challenging. Among the farmers we consulted (see Box 11), two thirds mentioned that they might be willing to pay a higher tariff in exchange for an increased availability of water and a higher reliability of irrigation services. In absence of improvements in the reliability of water supply, however, all but one the farmers contacted (20 out of 21) are against a tariff increase (the remaining one is not receiving water from GA currently, but claimed he would pay any amount to receive it).

Box 11. What do Georgian farmers think of an increase of the tariff?

The farmers contacted have diverse views regarding the existing tariff, as well as change in tariff level or structure.

10 (48%) of the interviewed farmers report that the existing tariff is acceptable and there should not be any change/increase in tariff level or tariff structure. They strictly state that increase of the tariff is unacceptable for them, because:

- 8 out of those 10 farmers (80% of them) thinks that they already receive very good service, and it is impossible to get better irrigation service even in case of increased tariff.
- 2 farmers (20%) says that they sometimes face difficulties, but GA cannot set a tariff that will be affordable and at the same time the tariff cannot solve all of the existing problems.

Notably, none of those farmers are willing to switch to the volumetric tariff structure.

In contrast, remaining 11 out of 21 interviewed farmers (52%) believe that existing tariff is too cheap and such low level of tariff would not allow GA to improve the service, and provide enough water to the customers when required. Thus, they prefer to pay increased tariff and get more reliable service. Only 3 of those farmers specified how much (maximum) they would pay. They are ready to pay maximum 500 Gel per ha, 300 Gel per Ha and 200 Gel per Ha. 4 farmers (out of the 21 interviewed) would also agree to have a volumetric tariff.

Notably, one interviewed farmer also suggested that the most useful way of setting an irrigation tariff would be to get different tariffs for each month. For example, in June tariff of irrigation should be high when there is a high irrigation peak season. In this case, the farmers, for which high tariff is not acceptable will switch to other crops which require irrigation in autumn and pay lower tariffs.

It is for this reason that several stakeholders have highlighted the **importance of preparing and directly consulting with farmers about any proposed reforms to the existing tariff structure**, involving them in the rehabilitation process and in the design of the new secondary and tertiary systems (to make sure they match their needs), **increasing their awareness about the purpose of the tariff, the need to increase it, and the potential benefits associated with its increase**, and **providing them financial and technical assistance to reduce their initial costs**. It is planned that the introduction of the final tariff will be achieved through a gradual (and announced) increase in the tariff over an agreed transition period. All of these steps might be helpful in increasing the probability of buy-in of farmers, and boost their support to the reform.

Charging an irrigation tariff is not the only way to finance irrigation and drainage activities. As the provision of these services potentially benefits all the property owners within the serviced areas, part of O&M costs could be covered by adopting alternative tools, such as an ad-hoc (local) property tax. Box 12 briefly discusses how this approach is applied in Italy.

Box 12. Considering taxes to cover O&M costs – Experiences from Italy

In Italy, irrigation and drainage services are provided by "Consorzi di Bonifica" (Reclamation Consortia (RC)). RC are Legal Entities of Public Law, with an associative and self-governing structure, administered by the consortium members through democratically elected bodies. All private and public entities and individuals owning immobile property (land and\or buildings of any kind) within the area served by the RC and benefiting from their activities are members of the RC and participate to the election of members serving in their governing boards. RC coordinate public and private interventions for soil protection, regulation of waters, irrigation, and environmental protection.

Typically they cover one or more river basins, providing a wide range of services:

- Ensure the collection and the flow of rainfall, through networks of channels, reservoirs and pumping stations (these activities include drainage), thereby protecting fields, buildings and other infrastructures;
- Monitor and protect the hydrogeological stability of mountainous and hilly areas, through hydraulic regulation works;
- Maintain thousands of kilometres of country roads;
- Ensure the distribution of water, for irrigation and other uses.

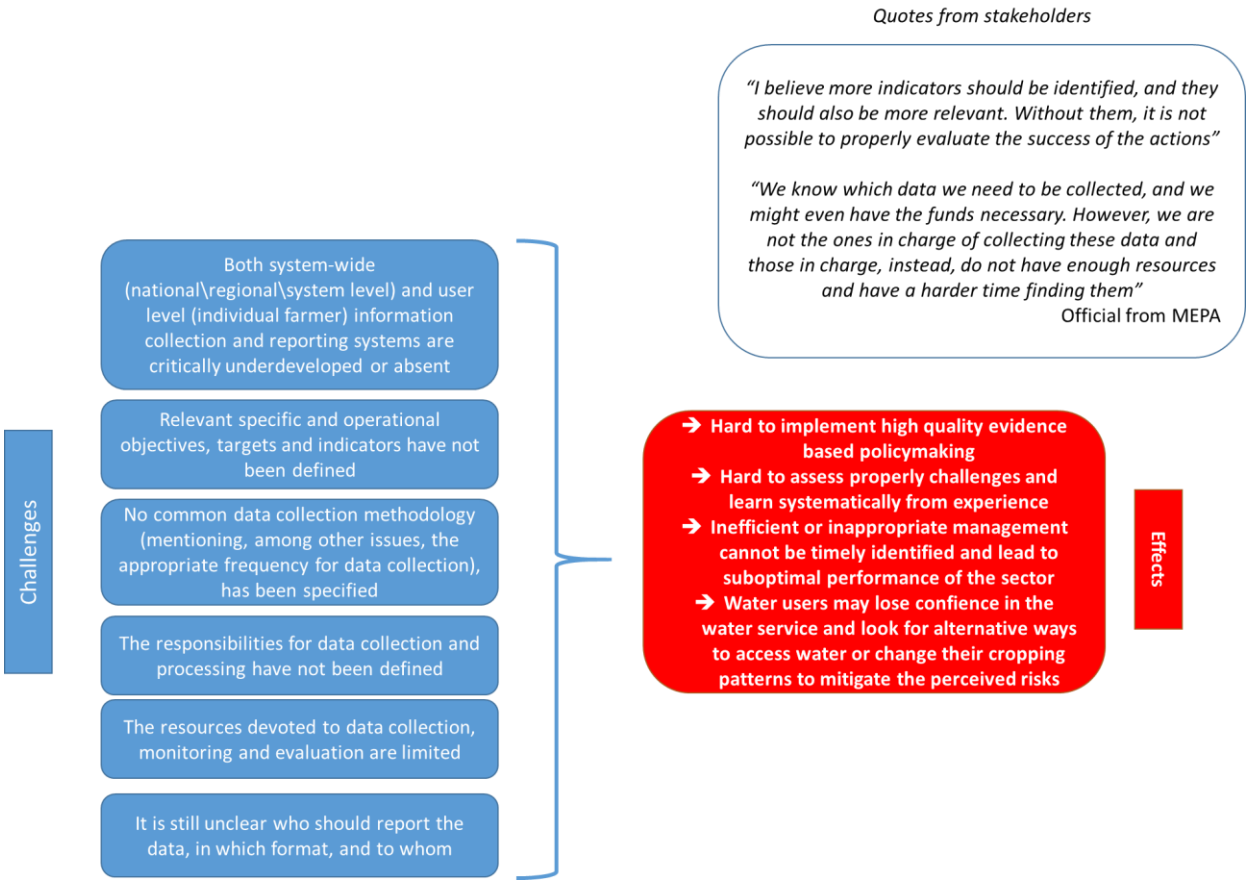
To allow the RC to acquire the resources necessary to maintain and manage the system, the RC have been granted the power to tax the immobile property of urban and rural members, benefiting from their activities. RC expenses are divided between the members in proportion to the benefits that their property gets from the RC activities, defined according to pre-defined rules.

ANBI is a national association of RCs, whose members serve more than 50% of the Italian territory. The association is a member of the European Union of Water Management Associations (EUWMA) and of "*Irrigants d'Europe*".

Establishing an appropriate and acceptable irrigation tariff is key to ensure the sustainability of the irrigation schemes, by improving the conditions for a proper maintenance of the irrigation infrastructure and limiting the burden on the public finances. This, in turn, contributes to a sustainable and a well-performing agricultural sector.

6.7 CONSTRAINT 6: NEED TO ESTABLISH ADVANCED IRRIGATION PERFORMANCE MONITORING SYSTEMS AND PROCESSES

Figure 6-9: Problem-tree – Need to establish advanced irrigation performance monitoring systems & processes



Source: Authors based on stakeholders' interviews

The existence of a system-wide and a user-level information collection and reporting system is key for ensuring the good governance of water resources and for well-performing and sustainable irrigation sector.

The **system-wide information collection and reporting system** allows policymakers and managers to assess the state of the system (including the availability of water resources), monitor its performance, track progress, encourage better management and accountability for projects and programs, identify deviations from expected (and planned) outcomes and put in place corrective measures in a timely manner, if necessary. The availability of data on key indicators about water availability and water flows (including water in reservoirs and channels, and precipitation and transpiration data), area irrigated (potential vs. contracted and served), performance of the irrigation service (including efficiency of water delivery, water losses, reliability, timeliness of delivery, consumer satisfaction), O&M costs, revenues (including information about collection rates and reasons for failure to collect), collected in a rigorous fashion, at a predetermined frequency, and at the most disaggregated level possible, is also key for future evaluation efforts, when the impact of the initiatives adopted will be assessed. In addition to the above mentioned areas, it would be important to collect data about land use and the performance of irrigated and non-irrigated agriculture (type of crops, productivity per ha, employment, etc.), at a disaggregated level. These data, when available, are currently aggregated at the national level or, at most, or at the regional level. However, a rigorous impact assessment would require them to be available at a more micro-scale, such as at the municipal level or at the irrigation system level.

A detailed **user-level information collection and reporting system** is key for ensuring both the accountability towards individual users and having the enforcement capacity necessary to ensure compliance with appropriation and use rules, if necessary.

Unfortunately, our stakeholder consultations revealed that both systems have not been, so far, properly established, as is described in the 2017 Irrigation strategy. **Several issues have been identified during our analysis, and\or have been highlighted by stakeholders** (by MEPA representatives, national and international experts), particularly as the monitoring and evaluation of the irrigation service is concerned:

- While general strategic goals (about increasing potential irrigable area, the number of projects that GA should be ranking in order or priority, for potential financing, and the establishment of a new unit to mobilize farmers and facilitate consultation and dialogue) have been defined, more specific operational targets and indicators (monetary, quantitative, qualitative – e.g. target for total revenues from fees, target for cost recovery level, target for actual serviced area, target for water delivered, target for consumer satisfaction, etc.) have not been defined or agreed.
- Despite the progress over the last years, GA does not yet have a fully operational modern system of data-based management allowing data collection to take place in a decentralized way (for example, about water supply and water usage in the rehabilitated schemes, a need highlighed also in the 2017 irrigation strategy[16]), in a way that allows data aggregation and analysis to take place in an efficient way at the centralized level as well as GA officials to be able to access this data from regional service centers.
- The responsibilities for data collection, storage, transmission, and processing have not been fully defined, and the resources devoted to data collection, monitoring, and evaluation are limited and dispersed. Currently, according to interviews with GA and MEPA stakeholders, no single unit – either in GA or MEPA – is tasked with gathering and analyzing the relevant data and information being generated across the organization and outside of it, and no common data repository exists. MEPA and GA stakeholders we interviewed were unsure, about who is in charge of the systematic and comprehensive M&E of the strategy implementation. There is also uncertainty about the coverage of such M&E activities, beyond a measure of the expansion in irrigable land, rehabilitated systems, and areas over which O&M activities are performed (which are the only data already available at the centralized level). Currently, each department collects the data related to its responsibilities, based on its internal priorities, with its own methodology (including – possibly – setting its own desired data collection frequency, selection of relevant indicators, etc.), and stores them separately from all other departments. For example, GA commercial and financial departments monitor the evolution of revenues and turnover, and the monitoring and audit department assesses how efficiently money is spent and whether expenditures are on predetermined items and according to law. This, of course, makes it harder to get an overall picture of the performance of the system, of its profitability, of its impact, and – therefore – implementing a meaningful aggregate M&E[17].

[16] Page 63.

[17] Challenges in this respect became obvious during the data collection exercise we performed to complete this report. When we asked GA for the data, we were assigned a contact person from the project management department. However, for each type of the data we requested she had to go to different departments, take data from them and send them to us (when available). At times she had to reiterate our requests to get the data. We encountered similar challenges when attempting to acquire data not generated by GA but very relevant for the proper management of the irrigation sector, like the NEA-generated data about actual river discharges, temperatures, and precipitation. Moreover, during our consultations it emerged that resource availability is also constraining data collection from responsible agencies. For example, MEPA representatives highlighted that NEA has limited resources to expand the coverage and frequency of its data collection activities.

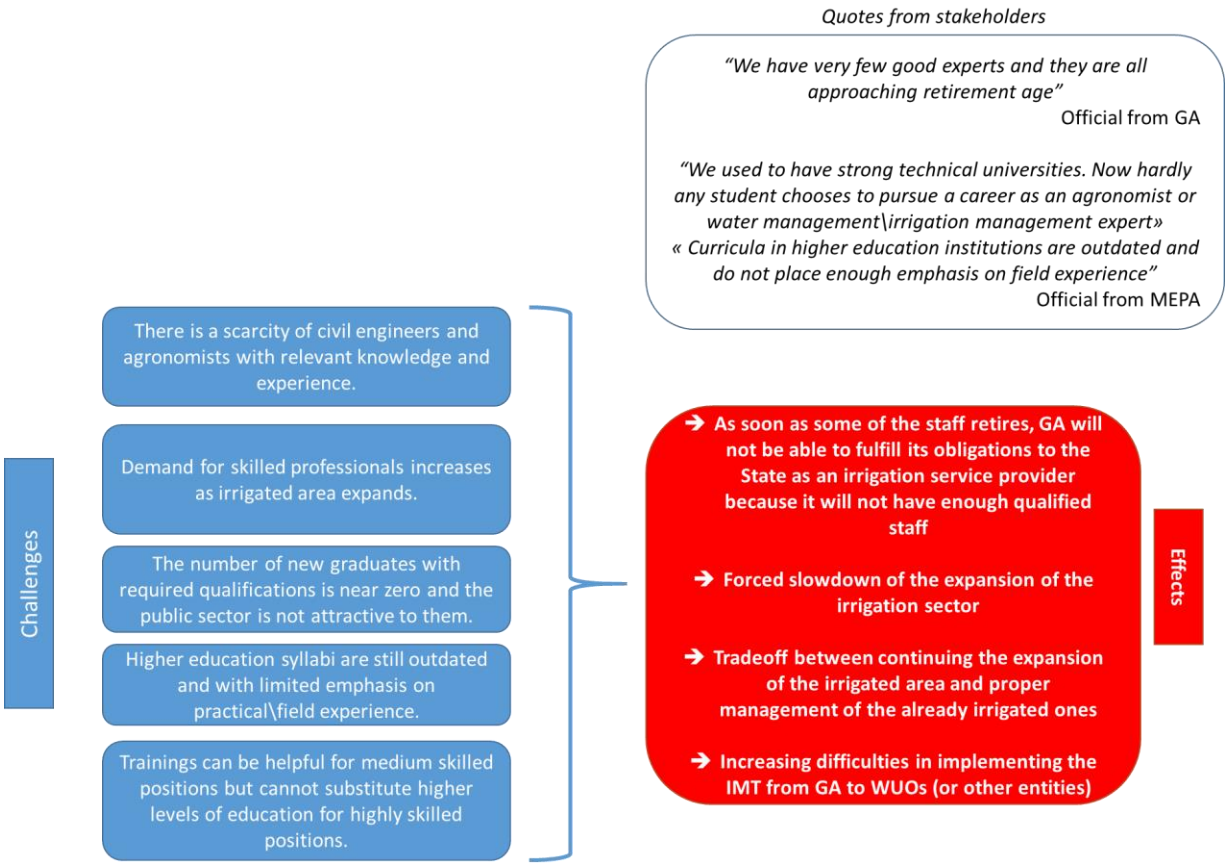
- Although GA produces yearly reports that become part of the MEPA yearly reports (which include achievements of MEPA, NEA and all units that are functioning under MEPA, including GA), the reported indicators are few, at an aggregated level, and mostly focus on documenting the expansion in rehabilitated areas, potentially irrigable area, O&M activities, and other activities such as training of existing staff. No information is provided about issues such as – among others – efficiency of water delivery (including estimates of water losses), reliability of the system, consumer satisfaction, overall contracted area (vs. serviced area), fee collection rates. Some of this information (as mentioned above) is available at the department level, but not easy to access. Other information is altogether missing. Also, NEA generated data that are relevant for the irrigation sector are not included in the yearly reports.
- In addition to the challenges in accessing data that are fragmented across departments and agencies, it is also hard or impossible to obtain data that are not under the specific responsibility of any department – although potentially interesting for the assessment of the performance of the system, like data about crop productivity in irrigated areas before and after rehabilitation, or to monitor its evolution, such as data about independent irrigators – as these data are not collected on a systematic basis (not even by MEPA).
- In this situation, it becomes also harder to ensure that the resources devoted to the functioning of the collection and reporting system (e.g. skills of personnel) are commensurate with the challenges, both inside GA (training of GA personnel so that it is able to implement a modern data management system)[18] and within MEPA.

In these conditions, it is difficult for the government to monitor and evaluate the performance of the irrigation systems, which may contribute to a non-optimal management of water resources and a reduced ability of the government to respond to challenges in irrigation performance. Overall, there is a critical need for a comprehensive and transparent monitoring of actual system performance, whether it is investment decisions, subsidy policies, or water reallocation.

[18] Ibid.

6.8 CONSTRAINT 7: INCREASE THE HUMAN RESOURCES FOR IRRIGATION AND DRAINAGE DEVELOPMENT

Figure 6-10: Problem tree – Increase the human resources for irrigation and drainage development



Source: Authors based on stakeholders' interviews

GA will need to strengthen the staffing and expertise in the organization to be able to adequately manage I&D systems as they expand. Irrigation is a complex sector, that cannot be managed effectively and efficiently without well trained specialists. According to all stakeholders we interviewed, the sector is currently characterized by a scarcity of civil engineers and agronomists with relevant knowledge and experience. There are currently only a few professionals with expertise in these areas and they were all trained in the Soviet period. These professionals are ageing, and are nearing retirement. Demand for their services, on the other hand, is expected to further increase with the rehabilitation of secondary and tertiary channels, and with the establishment of WUOs. Staffing might become even more challenging in the future, when also the WUOs will start hiring skilled professionals to take care of the O&M of their tertiary systems (and maybe even secondary, depending on whether they will also be transferred to WUOs or not), as they develop.

In the absence of decisive actions to increase the recruitment of specialists, the scarcity of skilled personnel is soon expected to become a major constraint to the development of the irrigation sector. So far, according to most of the stakeholders interviewed (MEPA, GA, national and international experts), the Georgian higher education sector has failed to attract and train a future work force of skilled human resources to meet the growing needs of the sector and to replace the current experts as they retire. The main issues reported by stakeholders are the extremely limited number of students with relevant specializations in water resources management, civil engineering, hydrology, agronomy, and related fields, coupled with outdated academic programs lacking an applied focus on in-field or vocational training.

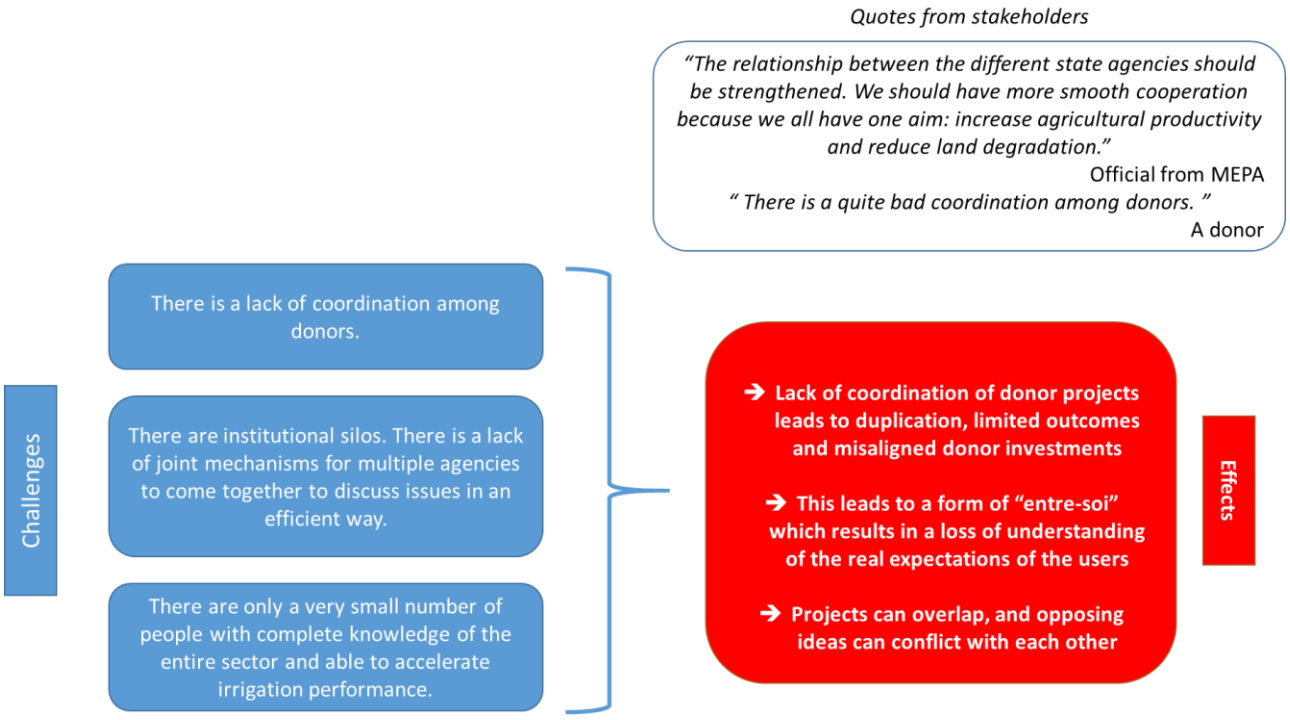
Some actions to increase the availability for support personnel have already been discussed, such as the development of training programs for the specialists that will be supporting WUOs and staffing GA field operations. Some trainings of GA staff have already been taking place. However, training of existing staff cannot substitute the recruitment of new qualified personnel, and training of new – but inadequately educated – recruits cannot increase the availability of highly skilled experts, in charge of designing, supervising, constructing and managing irrigation and drainage systems, something that requires potential candidates to graduate from properly upgraded and modernized higher education (MA, MSc, and Ph.D.) programs.

Specific emphasis on gender-related expertise in water resources management is also necessary.. Currently, according to the results of a preliminary study conducted by the WB (World Bank, 2021) the presence of women in the sector, both as customers (farmers) and service providers (GA staff) is limited. Moreover, most existing staff within GA or MEPA have not been undergoing proper gender sensitization trainings, to better understand how to approach and support female farmers.

Ensuring the availability of skilled water resources management professional in key irrigation sector agencies is crucial to ensure the good performance of irrigated agriculture, by supporting the increased reliability and efficiency of the irrigation services, through better design, operationa, and management of irrigation and drainage systems, and also supporting water users in adopting water saving practices at the plot level.

6.9 CONSTRAINT 8: ADDRESS GAPS IN POLICY COORDINATION AND ENCOURAGE CHAMPIONS AT ALL SCALES TO ACCELERATE IRRIGATION PERFORMANCE

Figure 6-11: Problem tree – Address gaps in policy coordination and encourage champions at all scales to accelerate irrigation performance



Source: Authors based on stakeholders' interviews

The implementation of public policies at the scale of such a sector requires both coordination of the actions of different stakeholders and the availability of formal collaborative spaces for the exchange of information on the problems of the sector and the development of solutions. These conditions are not fully met today according to the community of donors, we consulted.

There is a lack of coordination among donors. The Ministry is at the centre of interactions with the different donors. Relations between donors can be improved. Communication is haphazard, resulting in a loss of efficiency and effectiveness for both the donors themselves and the Ministry. For example, very similar initiatives can be carried out by separate donors at the same time. To identify and design projects, there are usually separate discussions between MEPA and each potential donor, but joint discussions rarely happen. However, there are some positive developments recently with ongoing donor coordination meetings with the World Bank, the ADB and AFD and with plans to hold a wider coordination meeting on irrigation investments between donors and MEPA as well as Ministry of Finance.

In addition, according to the MEPA and the community of Donors, **only a very small number of people in the Ministry have complete knowledge of the entire sector and have had extensive interactions with the various donors and experts**. While this has provided a high level of expertise and experience that now facilitates discussions, if any of these people change positions, the process will have to start from scratch and valuable time will be lost. Several donors highlighted concerns regarding the need to institutionalize knowledge of all aspects related to irrigation, drainage, and water resources management within the government.

There are institutional silos, lack of policy coordination, and lack of joint mechanisms for multiple agencies to come together to discuss issues in an efficient way according to several stakeholders (community of donors). Lack of coordination among donors leads to duplication, limited outcomes, and misaligned donor investments. Other Georgian institutional actors such as the Land Agency are not really involved in discussions on the irrigation sector despite their close links with the agricultural sector. Access to land is an issue that was raised by stakeholders related to agricultural development and the performance of the irrigation sector. In the same way, actors involved in agricultural development or agricultural academics are not part of the discussions on the irrigation sector as highlighted by the interviews with the FAO or national and international consultants. Mechanisms implemented in other countries could be considered to address this issue (see Box 13).

Box 13. Feedback from France – an AGORA for discussing water issues

In the Provence Region in the south of France, an assembly for the governance of water resources and aquifers was created in 2015 to affirm the relevance of the regional level in the management of water resources, by meeting the needs for representation of local stakeholders in the public debate and the integration of their priorities and interventions in a coherent shared strategy. The composition of this public body is made of representatives of public entities as well as water users and service providers or entities involved in water management. The mission of the assembly is to define strategic orientations for the water sector, action plans, examine the coherence of projects in agriculture, formulate advisory opinions, analyse the progress made in implementing the guidelines and the results obtained. This new body, despite the difficulties in bringing together many actors and going beyond simple discussions to propose operational things, has the merit of allowing regular exchanges between actors in a clearly formalized framework, of encouraging the debate of ideas and thus feeding the construction of public policies and design of new projects, and finally of putting everyone on the same level of information.

Some donors and international consultants have pointed out that the current way of working can make MEPA's work more difficult, as the Ministry must regularly adapt its approach to the individual requirements/characteristics of its interlocutors. MEPA is therefore not in the best position to develop its own approach and thus, it is recommended to support the emergence of champions at all scales, which is key to the performance of the irrigation sector (Waalewijn et al., 2020).

Leadership and institutional capacity are key elements of irrigation sector performance. The interviews, overall, have indicated that there are areas for improvement, which are necessary, and MEPA and GA leadership have opportunities to embrace solutions that can address some of these bottlenecks.

7 A POSSIBLE WAY FORWARD: RECOMMENDATIONS AND ACTIONS TO IMPROVE IRRIGATION SECTOR PERFORMANCE IN GEORGIA

Considering the constraints outlined in section 6, that are preventing Georgia from achieving its full potential in establishing a resilient, efficient, and sustainable irrigation sector, we conclude this policy note by summarizing seven strategic reform directions for the government to consider in further advancing the sector:

1. **In any irrigation and drainage investment project, the needs, constraints and requirements of the farmers or water users, the needs of the surrounding environment, including economic, social, and ecological factors should be studied beforehand so that the effect of the planned investments can be anticipated, and its design adjusted if necessary**. Irrigation is a lever for accelerating agricultural and rural development and different types of agriculture production by farmers. Any project or investment must aim to meet a clearly identified need, based on reliable and up-to-date data. Before extending irrigable areas, the objective should be to improve the reliability of the water service in the already serviced ones. A rapprochement between the irrigation, land, agriculture, and environmental sectors is necessary to allow a better understanding of farmer's expectations, their binding constraints in accessing irrigation water and growing crops, and to work at the service of farmers, and in particular young people.
2. **Water User Organizations should be established, in relevant irrigated command areas, after the necessary conditions for their establishment (which have been outlined in this note) are present**. Where the technical, hydrological, economic, and social conditions are not met, other modalities for irrigation service delivery to farmers should be considered, including the possibility of individual contracts between water users and Georgian Amelioration or the involvement of Municipalities. WUOs should be established in areas where either the full scheme (from primary to tertiary facilities) has been rehabilitated and is ready to be handed over to WUO members, relevant infrastructure is in good working condition, and/or after ensuring the willingness and ability of potential WUO members to carry out rehabilitation works on secondary and tertiary schemes on their own. These aspects can facilitate the process of IMT to future WUO members.
3. **Adequate financing for operation and maintenance, scheme specific and based on asset management**, **is necessary** to ensure the sustainability of the irrigation sector. Asset management is vital as a basis for benchmarking performance and for understanding and segmenting I&D infrastructure, management, operation, and maintenance costs (depending on exposure, durability, risk, and so on). This kind of assessment is fundamental in developing irrigation service fees, which underpin the financial sustainability of systems, as well as for providing a business-oriented service to water users; and it is highly pertinent to both customers and service providers in the context of improved irrigation service delivery performance (Waalewijn et al 2020).
4. **Pilot approaches** should be implemented to identify lessons, success, and failure factors, as well as externalities, and thus facilitate learning and flexibility **to adjust interventions to better suit contextual needs** and create conditions for replication. This implies the need for **relevant and effective monitoring and evaluation systems**.
5. **Intra and inter-sectoral dialogue** must be improved and the conditions for **strong leadership** to flourish at all scales must be built.

6. The quantity and quality of skilled **human resources of the irrigation sector must be strengthened** to allow for both a real implementation of the activities and a generational renewal.

7. Georgian Amelioration can be further modernized by focusing on **accountability, performance-driven** with a **customer service approach equipped with modern tools for measuring performance, monitoring, and analyzing irrigation and drainage services, as well as managing climate risks to water availability**. The objective should be to have the performance of the private sector but in the service of the public. Accountability implies the development of robust **regulatory capacities** for the sector, however, should be underpinned by a comprehensive and transparent monitoring of system performance which takes a shift away from measuring investments made towards monitoring results of irrigation schemes, as well as subsidy policies, and water allocation, etc.

To support these strategic reform directions, several practical recommendations can be formulated. These recommendations are limited to 6 in the short-term and 4 in the medium-term to facilitate their discussion and endorsement by the decision makers in the irrigation sector in Georgia[19].

ROADMAP TO REFORM – A POSSIBLE WAY FORWARD

SHORT TERM RECOMMENDATIONS (2 YEARS)

1. **Carry out a service delivery performance assessment of Georgian Amelioration and formulate an action plan to improve services.** At a first step, assess the efficiency of its full suite of irrigation and drainage activities, identify potential reorganization needs, human resource and capacity building needs, legal and financial model and cost structure over time and ways to make GA remain accountable, clarify what performance means (and should be) for GA, and improve monitoring and evaluation, in order to shift from measuring investments to monitoring results. In the initial year, a pilot M&E system should be tested in a specific irrigation scheme to ascertain validity and acceptance to roll it out in all GA service areas.

   Interests and ways to have a Board of Directors with representatives of public sector and water users will be assessed. Legal evolution of GA, as legal entity under public law or corporatized entity or other, will be envisaged with analysis of best types of PPP models that suit the needs of Georgian irrigators. **The role of a regulator (GNERC), the means to reinforce its control capacities, and the ways to measure the performance of GA will also require attention with regulatory roles and responsibilities agreed between GNERC and MEPA for oversight of the irrigation sector**. Ways to introduce more effective accountability should be considered (e.g. participatory budgeting, user's involvement in execution, redress tools such as functional complaint mechanisms, and easier access to legal recourse…).

HIGH LEVEL OBJECTIVE: Make GA more accountable, more focused on water users, more reliable, efficient, and financially sustainable to deliver timely and adequate irrigation and drainage services to users

[19] Although it would have been relevant to mention other actions, we considered them out of the scope of this policy note as these actions would be obligatorily undertaken in the short or medium term by the Georgian government (for example the adoption of the law on water resources management).

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C0: Slow implementation of the irrigation strategy C3: need to improve reliability of irrigation services and service delivery systems C6: need to establish advanced irrigation performance monitoring systems and processes	GA faces difficulties in implementing a reliable water service and there are questions about the sustainability, efficiency, and effectiveness of its activities. To be able to monitor progress and adjust irrigation service delivery to local needs	-Ways to make GA more efficient and more accountable for its actions are identified. - Analysis will lead to a clear action plan and operating model for reforming GA that is aligned to the needs of the irrigation sector GA can reliably collect, share, analyze, and take action on irrigation and user data to further improve service delivery & financial accountability.	- GA unable to provide reliable services to water users - Lack of staff and finances results in deteriorating I&D infrastructure - Higher costs than necessary and\or lower benefits than possible for society - GA unaccountable to users and State for irrigation services

2. **Design and calculate an appropriate local or regional binary (fixed and volumetric component) bulk irrigation tariff for future Water User Organizations in close consultation with water users for areas with WUOs and design and calculate an appropriate local irrigation tariff for areas without WUOs**, **including a transition path (implementation plan of the tariff policy)** towards cost recovery of at least the revised O&M costs for the main systems after secondary and tertiary systems have been handed over to future WUOs. The tariff should not only ensure the financial sustainability and efficiency of GA and WUOs, but the survival, evolution (better value for water) and competitiveness of the agricultural sector. It is important to define actuals, based on the required O&M, but if the irrigation service fee is too high for a particular scheme, e.g., if there is pumping or the system is in poor condition, a targeted subsidy to the WUO could be considered. Revise needed legal documents to explicitly require GNERC to set tariffs for water service provision from GA to all types of water uses from irrigation infrastructure[20]. Invest in low-cost volumetric measuring devices in main canal systems which are being rehabilitated under ongoing donor funded projects to allow for volumetric measurement of water user and calculation of the water fee accordingly. Consider revising the drainage tariff to better cover costs of providing adequate drainage services by GA to end users.

HIGH LEVEL OBJECTIVE: increasing financial resources for management, operation, and maintenance of existing and future irrigation schemes

[20] The definition of the water tariff could be established in two stages:

1) the tariff structure is redefined to encourage a more efficient use of the water resource at the farmers' level. The transition to a pricing system that includes a direct or indirect volumetric share (using information on the crop systems to be irrigated) could require a review of rehabilitation design and, more generally, the creation of conditions for effective monitoring or estimation of volumes consumed. The tariff should also consider the different types of water uses (industry, fish farm, small gardens in peri-urban area, and hydropower).
2) The level of tariffs is progressively increased to cover, initially, a larger share of operation and maintenance costs with the objective of covering at least the full O&M costs in the long term.

The definition of the tariff must consider, on the one hand, the IMT process and the new relations that will result between Georgian Amelioration, water users organized in WUOs, and individual water users. On the other hand, the role of GNERC must be clarified to consider the diversity of possible relationships between Georgian Amelioration and water users. Finally, the definition of the water tariff must consider the new basin management approach and must therefore consider the possible implications of the implementation of the integrated water resources management principles.

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C5: finalize reform of the irrigation tariff	Financial sustainability of the main irrigation service provider is essential to ensure proper functioning of irrigation systems in the long-term.	- GA has improved financial resources to hire and train new staff, modernize systems, and continue O&M - Reduction of state subsidies needed to finance GA operations - Farmers, if properly consulted during tariff design process, increase their willingness to pay a higher I&D tariff	- I&D systems deteriorate further - New investments are not possible - Number of farmers signing contracts with GA and number of farmers paying irrigation tariff is reduced - GA unable to upgrade and modernize HR and monitoring systems - Decline of overall irrigable area

3. **Promote farmer-to-farmer training and peer-to-peer capacity building model for establishing successful Water User Organizations in partnership with MEPA, GA, RDA, and Farmers Association in key irrigation command areas. Consider merging or find ways for local GA and MEPA service centers to work jointly for enhanced service delivery to customers**. Provide adequate human (skilled staff) and financial resources to these centers so that they can implement comprehensive support to farmers, especially targeting female as well as young, entrepreneurial farmers, to increase the adoption of sustainable agricultural practices.

HIGH LEVEL OBJECTIVE: holistic support to farmers and water users for successful development of WUOs and farming systems

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C3: need to improve reliability of irrigation services and service delivery systems C4: accelerate WUO establishment	To kick-start and ensure WUO establishment is owned and led by farmers jointly with GA staff	A more comprehensive support to farmers leading to better performance of the farming systems and innovation	- Lack of functional WUOs established - Underperformance of the agricultural sector.

4. **Define a shared vision and methodological approach for the development of the irrigation and drainage sector to guide and prioritize investments by means of an irrigation and drainage master planning exercise**. Developing a national irrigation and drainage master plan (separate or joint master plan) may include the clear definition of the role and mandate of the main actors, conducting a needs assessment study for the I&D sector. In addition, multiple prioritization criteria should be considered including better understanding of "why" a specific investment is needed, the expected benefits, the cost, the water balance (including with the impact of the climate change), the environmental and social considerations, as well as modernization and technological innovations. Based on this master plan, more detailed studies will be carried out, which is why the level of detail of the master plan will have to be adapted to inform the decision makers while considering all the studies that may result from it. More specifically a transparent prioritization is needed, and this may include the need to develop a multi-criteria decision model, to support stakeholders in prioritizing investments. A multi-criteria decision model is a systematic and transparent decision tool to decide what projects would receive the needed investment funds to complete a system or rehabilitate and modernize a system at the technically optimum speed. In addition, these studies may include specific modernization investments to promote on-demand water management in specific and relevant irrigation schemes in Georgia. For instance, the master planning exercise can explore specific options for on-demand irrigation water delivery to irrigated fields with controlled water application and utilization of new technologies and approaches (efficient irrigation methods, smart phone apps, drones, moisture probes, etc.), which may require specific modernization interventions, such as storage reservoirs close to where the water is needed, which can be detailed as part of the planning exercise.

HIGH LEVEL OBJECTIVE: Having a sound framework for strategic planning and policy implementation of irrigation and drainage sector reforms

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C0: Slow implementation of the irrigation strategy C2: irrigation planning lacks an IWRM approach for sound irrigation management	To address the lack of methodological approach and ensure that strategic planning takes place prior to investments in improving I&D infrastructure	- Clear roles and mandates of actors engaged in I&D activities in Georgia - Clear vision for the irrigation and drainage sector with an investment plan and steps based on a comprehensive approach to meet economic, environmental, and social goals	- Sunk public investments due to lack of comprehensive planning leading to investments with a high risk of irrelevance and unsustainability. - Low uptake of irrigation and drainages services by water users

5. **Define a typology of water users and improve the understanding of farmers, on-farm practices, water use and cropping needs as well as assess the motivation of farmers for joining a Water User Organization, paying water tariffs,** and create the conditions for improving irrigation service delivery. This assessment should be conducted prior to any new investment projects envisioned in irrigated areas and should also pay attention to the gender issues and young farmers.

HIGH LEVEL OBJECTIVE: Meeting the needs of water users to support agricultural development and establishment of sustainable water users' organizations

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C0: Slow implementation of the irrigation strategy C1: limited knowledge and data on water resources and farming systems for I&D development C2: irrigation planning lacks an IWRM approach for sound irrigation management C4: accelerate WUO establishment C5: finalize reform of the irrigation tariff	Investments in the irrigation sector aim to support agricultural development, but the farming systems and water user needs are a black box. No one can provide a detailed picture of their needs. This situation hinders the identification and implementation of relevant actions to provide *relevant* I&D services for users.	- Uptake of irrigation services by farmers increases - Increase in the number of farmers willing to pay a revised irrigation tariff - Increase in the number of farmers willing to join WUOs	- Inefficient use of public funds in developing I&D systems that users are not willing to use - Crop yields and farmer incomes are not improved due to limited uptake of I&D services

6. **Strengthen institutional mechanisms and find new ways to improve intra and inter sectoral dialogue.** Establish a committee composed of stakeholders from multiple agencies to pilot and follow-up the development of the irrigation sector could be considered. This committee would be composed of representatives from the MEPA (Agriculture and Environment), Georgian Amelioration, GNERC, the Community of Donors, national land agency, rural development and representatives of the Georgian Farmers Association. It would meet, for example, every three months to discuss ongoing projects, their progress, strategic decisions, and difficulties encountered. External participants could be invited from time to time at the request of one of the committee members. This committee can also be replicated at a more local level within the service centers of MEPA/GA or at a basin scale to represent other basin-level authorities. Such committees should not be the only mechanisms to consider. For example, binding agreements between agencies with implementation action plans and joint indicators of performance could be envisaged. In addition to setting up committees, and developing binding arrangements, it also important to actively engage users into direct forms of consultation on ongoing projects. This can include participatory budgeting, user's involvement in execution, and redress tools such as functional complaint mechanisms.

HIGH LEVEL OBJECTIVE: Enhanced leadership capacity and coordination of donor actions to benefit the agricultural sector and ensure coherent vision and reform of irrigation and drainage sector

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C0: Slow implementation of the irrigation strategy C8: address gaps in policy coordination and encourage champions at all scales to accelerate irrigation performance	To address the issues of policy incoherence, and weak coordination & leadership	- Joint and multi-sectoral approach to I&D policy reforms leading to improved policy implementation	- Inefficiencies due to overlapping projects or projects with contrary objectives implemented with the support of donors - Delays in the implementation of projects - Delays in irrigation strategy implementation

MEDIUM-TERM RECOMMENDATIONS (5+ YEARS)

1. **Scale and sustain recent recruitments of regional WUO support staff to lead WUO establishment processes with annual budgetary support for long-term sustainability** where schemes are going to be rehabilitated (primary, secondary, and tertiary systems) and where water users express the willingness to join WUOs and take ownership of the management of secondary and tertiary systems. Pay attention to the female representation in the WUO support unit and train the team on gender inclusion. Hire the available\necessary specialists in GA (including abroad, if necessary) to jumpstart\accelerate the process of improvements of the irrigation system and training of WUO staff and consider utilizing the services of the Georgian Farmers Association to support GA staff in local areas for WUO establishment.

HIGH LEVEL OBJECTIVE: Establish successful & sustainable WUOs that take ownership of the O&M of secondary and tertiary irrigation systems

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C4: accelerate WUO establishment	To address the issue of human resources within GA who are given responsibility for overseeing WUO establishment	Human Resources are available and lead the process of the establishment, training, capacity building and strengthening of WUOs	- WUO law is not implemented and WUOs are not established - Deteriorated secondary and tertiary systems leading to reduced willingness of farmers to avail irrigation services

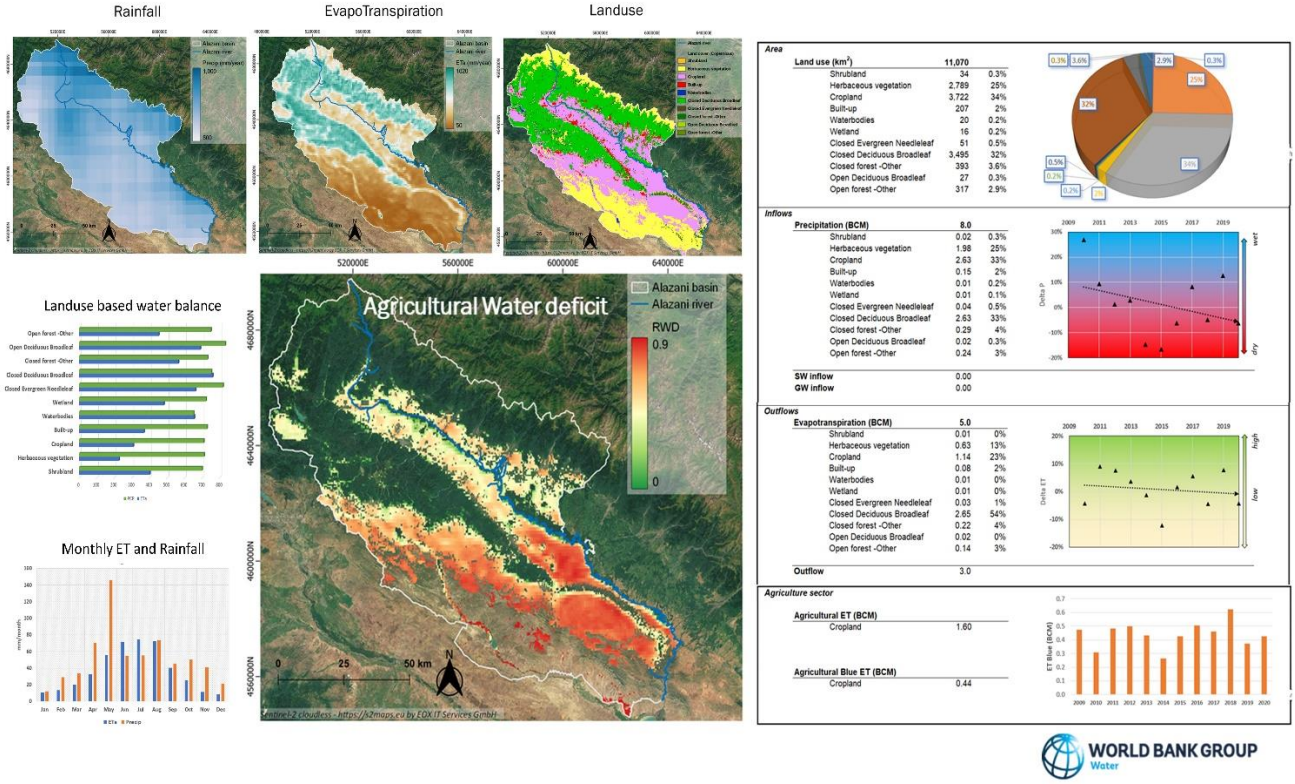
2. **Invest in a robust Hydro-Agro informatics program (HAIP) for integrated monitoring of water and agriculture and set up a Hydro-Agro Informatic Center (HAI Center).** The **Hydro-Agro Informatics Program (HAIP)** will be the foundation that Georgia needs for filling constraint 'C1' related to '*limited knowledge and data on water resources and farming systems for I&D development*' and entering a modern water and agricultural management era where decisions across multiple scales (farm to basin) are supported by continuous, reliable, and accessible data.

   Advanced tools such as **remote sensing**, big data analytics, and Information Communications Technologies (ICT) based applications will work in tandem with the conventional data monitoring systems such as flow gauges, water quality, groundwater monitoring and automatic weather stations and field surveys to provide a state-of-the-art comprehensive monitoring platform for water and agriculture. This integrated approach in providing complementary information on key water and agriculture related parameters and indictors will amplify the opportunities for operational use of the data for planning, operation, and enhanced irrigation and drainage service delivery.

   A Hydro-Agro Informatic Center (HAI Center) can be established within MEPA as the custodian and service provider of the HAIP in collaboration with universities and knowledge centres. The HAI Center will closely collaborate with the existing departments and units that are currently tasked with data collection and will upgrade and develop their hardware and software capacities for monitoring. On this basis, the HAI Center will roll out a bundle of DSS tools such as **water accounting**, **drought and flood monitoring**, **irrigation and crop monitoring system**, **basin management reports to provide actionable information across the scales from farm to basin**.

For instance, in recent discussions with the World Bank, the Georgian National Environment Agency (NEA), and GA, an initial remote sensing study of the potential of a water accounting tool for the Alazani river basin has been developed (see Figure 7-1). Water accounting is a tool to support decision-making in the irrigation sector. It enables users to make sense of how much water is available and how to use it as it is a systematic quantitative assessment of the status and trends in water supply, demand, distribution, accessibility, and use. Such a tool can enable GA, MEPA, and NEA to understand available water resources at a basin-scale, monitor and understand water consumption patterns to assess where water is needed, whether there is improved water productivity and better understand if future planned infrastructure investments will have sufficient water resources availability. Development of on-demand irrigation water delivery to irrigated fields with controlled water application and utilization of new technologies and approaches (efficient irrigation methods, smart phone apps, drones, moisture probes, etc.) may also require some specific modernization interventions, such as storage reservoirs close to where the water is needed. These tools are critical for GA and MEPA to enhance the resilience of irrigation systems against projected changes in temperature and precipitation and pinpoint priority areas for investment.

Figure 7-1: Example of water accounting application infographic using global remote sensing data for the Alazani River Basin in Georgia[21]



HIGH LEVEL OBJECTIVE: Enhance the climate resilience of irrigation systems as well as ensure water resources management planning is done within an IWRM framework

[21] Source: Poolad Karimi, World Bank

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C1: limited knowledge and data on water resources and farming systems for I&D development	To have regularly updated data on the water resources, and more generally on the water sector, to inform investment decisions.	Scheme level planning and investment planning appropriately targeted towards promoting equitable irrigation distribution, managing irrigation demand, and enhancing water productivity.	Increase in climate risks to current and future rehabilitation and modernization projects leading to inappropriate water allocation in irrigated areas and inability to meet water user irrigation needs.

3. **Strengthen cooperation with higher education institutions and the Ministry of Education, Science, Culture and Sport of Georgia** to address the lack of professionals in the water sector, update relevant curricula and increase the number of courses and degrees offered, and encourage enrolment in higher education and professional programs training water sector experts including training a future generation of gender aware irrigation, drainage, and water resources management specialists.

HIGH LEVEL OBJECTIVE: have qualified officers and technicians in key water sector agencies in the Georgian government for the implementation of public policies and to support agricultural development

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C7: increase the human resources for I&D development C8: address policy gaps coordination and encourage champions at all scale to accelerate irrigation performance	To address shortage of technically trained water management professionals	Increase the number and quality of professionals to expand the next generation of water sector policymakers and experts	Impossibility of implementing reforms on the ground and deterioration of the sector's performance

4. **Strengthen MEPA's capacities, through training and recruitment of skilled technical staff in related fields (a continuous process based on needs), to lead and implement the irrigation strategy. Define what performance of the irrigation and drainage sector means, define a baseline for agricultural development, set up modernized and robust M&E systems** and **define indicators and ensure that the same indicators are used by all stakeholders**. A comprehensive and transparent monitoring of actual performance is critical, which requires a shift from monitoring investments made and amount spent to monitoring results, which can be done effectively by deploying new remote sensing technologies.

HIGH LEVEL OBJECTIVE: Be able to monitor, evaluate, and reshape policies & irrigation investments when and where necessary

Main constraint to be addressed	Why?	What will be the impact?	What is the cost of no action?
C0: Slow implementation of the irrigation strategy C6: need to establish advanced irrigation performance monitoring systems and processes C8: address gaps in policy coordination and encourage champions at all scales to accelerate irrigation performance	To be able to monitor progress, evaluate and reshape irrigation policies	- Improved policy implementation	- Delays in the implementation of projects - Delays in irrigation strategy implementation - Delays in identifying and addressing issues

MINISTRY OF ENVIRONMENTAL PROTECTION AND AGRICULTURE ENDORSEMENT & PRIORITIZATION OF PROPOSED ACTIONS & RECOMMENDATIONS

An initial draft of this policy note was presented for comment and feedback to both MEPA and GA in detailed sessions to give decision makers the opportunity to review the constraints and recommendations proposed in the note. Next, the study team also conducted a prioritization session with the Department of Hydro-Melioration in MEPA and with senior GA staff, in which the government endorsed all recommendations highlighted by this note as important but prioritized and sequenced the recommendations according to their immediate needs. These are presented in the table below in order of priority as reported by MEPA and GA:

Recommendations & actions endorsed for immediate priority action by MEPA	Rationale for endorsement & prioritization	Plan for implementation of the action
Strengthening the service delivery capacity of GA	■ GA institutional model needs to be clarified to allow for more efficient operation, less burden on the state's financial resources, and at the same time be an agency at the service of public policies in the sector. ■ Beyond the institutional model, it is more generally the tools used by GA, the procedures, and the way in which performance is assessed and activities are monitored that need to be modernized in the short term, both internally (how GA monitor and evaluates its own activities) and externally.	■ MEPA is drafting a Terms of Reference for a Donor funded consultancy to assess the service delivery performance of GA

	■ MEPA is already monitoring GA but the question of the degree of its involvement in the activities of GA, as well as the degree of involvement of GNERC (the regulator) needs to be addressed.	
Prioritize investments by means of an irrigation and drainage master planning	■ Preparation of a master plan (or investment plan) appears to be an essential step in the very short term. ■ MEPA must be able to prioritize investments based on clear criteria. The objective of is to have a full understanding of why an investment is needed and what the expected impacts are, so as to be able to prioritize. ■ These studies must be sufficiently detailed to allow decisions to be made but must not become a hindrance to the advancement of projects because of their complexity and formalism. ■ According to MEPA these studies should focus more on economic considerations than on environmental and social aspects, insofar as more detailed additional studies covering environmental and social factors will be required by the technical and financial partners.	■ This activity is under consideration to be partly financed under a new investment project to be financed by the World Bank in the water, agriculture, and land sectors.
Define a typology of water users and improve the understanding of farmers, on-farm practices and water use and cropping needs	■ Better knowledge of farmers and their practices also appears to be a prerequisite for the establishment of WUOs and the definition of an appropriate water tariff.	■ This activity is under consideration to be partly financed under a new investment project to be financed by the World Bank in the water, agriculture, and land sectors.
Design, calculate, begin introducing an appropriate regional binary bulk irrigation tariff	■ The issue of financial resources for the sector and covering O&M costs is also crucial. The difficulty lies not so much in calculating an appropriate tariff as in the steps to implement a new tariff.	■ This activity is on-going. GNERC is working on the tariff definition and the WB is supporting the government in providing technical assistance for an international expert to work on the definition of a revised irrigation tariff.

Strengthen cooperation with higher education institutions and the Ministry of Education, Science, Culture and Sport of Georgia to increase specialist graduates for recruitment in key water sector agencies in the Georgian government.	■ The issue of generational renewal in the irrigation and drainage sector, regardless of the actor involved, is a key issue and it should start being addressed as soon as possible. ■ There is a problem of attractiveness of the irrigation sector's professions that must be solved through joint actions and the implementation of concerted strategies with the education sector. ■ Donors financial support might be key, helping to increase the resources available for the implementation of such reforms (e.g., financing the establishment of advanced programs in the fields where specialists are most needed).	
Establishment of successful and sustainable WUOs	■ Establishment of WUOs is an important area of reflection for the Ministry as it is not only a question of establishing them, but also of making them operational and sufficiently independent so that they can operate sustainably. ■ There is therefore a strong stake in the success of this pilot approach and in identifying all the conditions necessary for scaling up.	■ MEPA aims that some WUOs can be established under the ongoing World Bank funded Georgia Irrigated Land Markets Project (GILMDP), but the interest of this project is also to clearly identify the associated costs and good practices to be able to replicate the approaches and enable the establishment of associations in other territories.
Recommendations & actions endorsed as important for medium-term implementation	**Rationale for endorsement & prioritization**	
Invest in a robust Hydro-Agro informatics program (HAIP) for integrated monitoring of water and agriculture and set up a Hydro-Agro Informatic Center (HAI Center)	■ The modernization of the sector through the introduction of new technologies based on remote sensing and earth observation tools is of great interest, as is the case for land issues, but the question of related costs must not be neglected.	■ Initial pilot study of remote sensing tools for planning irrigation investments in Georgia is under consideration to be financed as a World Bank study for the Government of Georgia, in partnership with MEPA and NEA

	■ Therefore, it will be useful to go through pilot approaches to properly assess the relevance and costs associated with these new tools.	
Strengthen the Ministry of Environment Protection and Agriculture (MEPA's) capacities	■ The assessment of ongoing personnel and skills needs within MEPA and the sector should be ongoing, as well as skill upgrading and updating initiatives, as the needs of the sector evolve and the strategy progresses.	
Strengthen institutional mechanisms and find new ways to improve intra and inter sectoral dialogue.	■ Intra- and inter-sectoral dialogue clearly needs to be improved but setting up committees is probably too simple a tool because there is a high risk that it will be not followed up with concrete action. ■ Stakeholders' association agreements with clearly defined implementation plans specifying the responsibility of each main stakeholder and/or group of stakeholders would be more appropriate, to engage stakeholders in more fruitful exchanges and lead to better outcomes.	

8 ILLUSTRATIVE SUMMARY OF POLICY NOTE

Conditions for a modern and well performing irrigation sector

Regulatory environment is well defined and adapted with clear laws governing the use of irrigation services: a stable set of principles and shared long term goals; a policy and legal arsenal that serves sustainable performance; a good information system on water and agriculture; a clear definition of key function for irrigation management, a clear leadership.

SERVICE PROVIDER
able to perform
a service:

SUSTAINABLE:
with regular operation and maintenance. Infrastructures remains functional over time, adapted to different types of farming systems; climate risks, environmental and social issues are considered, impact on public finance remains reasonable.

RELIABLE:
irrigation water service is delivered on a timely and reliable basis, water resources are adequate, infrastructures are adapted to the needs and in good state, water delivery service meets the demand; financial and human resources are sufficient.

CAPACITY & WILLIGNESS
to pay the fee

FARMERS
- are competent to practice irrigation and develop irrigated agriculture
- participate to governance
- derive economic and social benefits

CONSTRAINTS

C0. **Slow implementation** of the irrigation strategy

C1. **Limited knowledge and data** on water resources and farming systems for I&D development

C2. Irrigation planning **lacks an IWRM approach** for sound irrigation management

C3. Need to improve **reliability** of irrigation services and service delivery systems

C4. Accelerate **Water User Organization (WUO)** establishment

C5. Finalize reform of the the **irrigation tariff**

C6. Need to establish advanced irrigation performance **monitoring systems & processes**

C7. Increase the **human resources** for irrigation and drainage development

C8. Address gaps in **policy coordination** and encourage **champions** at all scales to accelerate irrigation performance

These constraints make it difficult to achieve all objectives of the strategy, but broadly, they do not allow the conditions for efficient and resilient irrigated agriculture to be met. Specifically, the following gaps are contributing to these constraints:

- **Georgian amelioration (GA) has limited capacity to deliver irrigation services to water users in a timely and operationally efficient manner,** the reform of its governance structure is not yet agreed by higher levels of government, and the regulation role by the Georgian National Energy and Water Supply Regulatory Commission (GNERC) for the irrigation sector, will only commence in 2023.
- **The WUO law is adopted, GA has successfully established a WUO support unit, but establishment of WUOs is delayed** resulting in low tariff collection rates, deteriorated tertiary irrigation systems, and limited irrigation water supply to farm fields.
- Limited willingness of water users to pay a higher irrigation tariff without significant improvement in the service quality, leading to a **vicious cycle of limited recovery of O&M costs by GA, increased reliance on state funds for GA operational activities, deterioration of irrigation schemes**, which were recently upgraded.
- Limited number of farmers willing to sign irrigation contracts with GA or willing to join Water User Organizations as their **needs are not taken into account when providing irrigation services**.
- **Farmers face increasing production losses without more reliable irrigation services** due to climate risks such as increasing temperatures and variable rainfall levels.
- Without **sound irrigation planning** and allocation to manage **climate risks**, limited water supplies result in the inability of GA to irrigate agreed command areas according to the needs of farmers.
- **More emphasis on rehabilitation of the main systems as well as the secondary and tertiary systems is needed as without this, it results in limited irrigation water supply to farm fields** as secondary and tertiary systems are neglected without clear criteria for prioritization of irrigation rehabilitation and modernization.

GAPS

What is a possible way forward?

7 strategic themes

HOLISTIC APPROACH

In any irrigation and drainage investment project, the needs, constraints and requirements of the farmers or water users, the needs of the surrounding environment, including economic, social, and ecological factors should be studied beforehand so that the effect of the planned investments can be anticipated and its design adjusted if necessary.

Any project or intervention must aim to meet a clearly identified need, based on reliable and up-to-date data. Before extending irrigable areas, the objective should be **to improve the reliability of the water service** in the already serviced ones.

WATER USERS ORGANISATION

Water User Organizations should be established, in relevant irrigated command areas, once the necessary enabling conditions for their establishment are present.

Where the technical, hydrological, economic, and social conditions are not met, other modalities for irrigation service delivery to farmers should be considered, including the possibility of individual contracts between water users and Georgian Amelioration or the involvement of Municipalities.

PILOT APPROACHES

Pilot approaches should be implemented to **identify lessons, success and failure factors**, as well as externalities. This implies the need for relevant and effective monitoring and evaluation systems.

DIALOGUE

Intra and inter-sectoral dialogue **must be improved** and the conditions for strong leadership to flourish at all scales must be built.

CUSTOMER SERVICE APPROACH

Georgian Amelioration can be further modernized by focusing on **accountability, performance-driven** with a customer service approach equipped with **modern tools** for measuring, monitoring, and analyzing irrigation and drainage services, as well as managing climate risks to water availability.

FINANCIAL RESOURCES

Adequate financing for operation and maintenance, scheme specific and based on asset management, is necessary to ensure the sustainability of the irrigation sector.

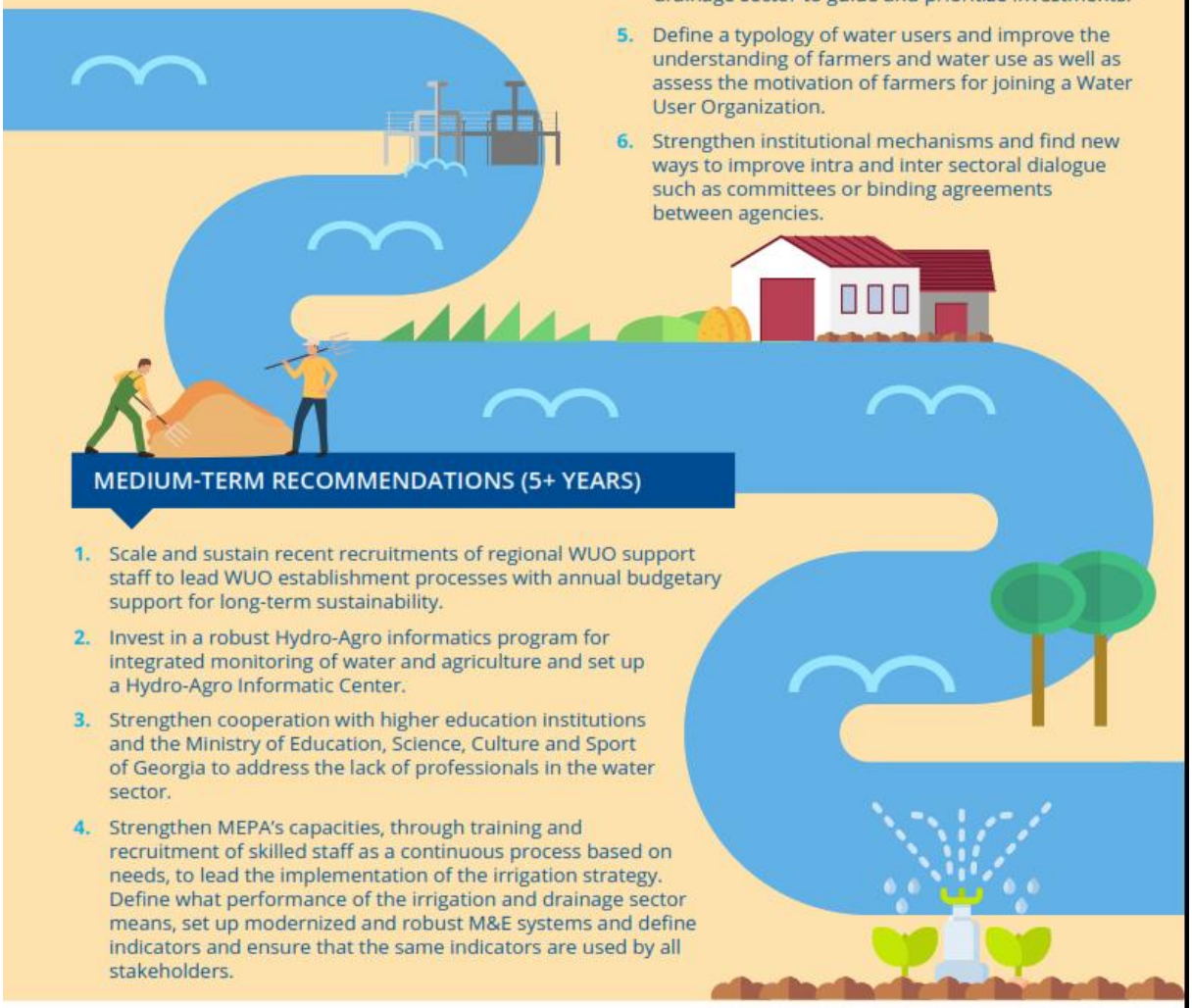
HUMAN RESSOURCES

The **human resources of the irrigation sector must be strengthened** to allow for both a real implementation of the activities and a generational renewal with the skillsets to meet the demands of irrigation services of the future.

Roadmap

SHORT TERM RECOMMENDATIONS (2 YEARS)

1. Carry out a service delivery performance assessment of Georgian Amelioration and formulate an action plan to improve services and monitoring and evaluation of performance.
2. Design and calculate an appropriate local or regional binary bulk irrigation tariff and define an implementation plan of the tariff policy.
3. Promote farmer-to-farmer training and capacity building model for establishing successful Water User Organizations in partnership with MEPA, GA, RDA, and Farmers Association in key irrigation command areas.
4. Define a shared vision and methodological approach for the development of the irrigation and drainage sector to guide and prioritize investments.
5. Define a typology of water users and improve the understanding of farmers and water use as well as assess the motivation of farmers for joining a Water User Organization.
6. Strengthen institutional mechanisms and find new ways to improve intra and inter sectoral dialogue such as committees or binding agreements between agencies.



MEDIUM-TERM RECOMMENDATIONS (5+ YEARS)

1. Scale and sustain recent recruitments of regional WUO support staff to lead WUO establishment processes with annual budgetary support for long-term sustainability.
2. Invest in a robust Hydro-Agro informatics program for integrated monitoring of water and agriculture and set up a Hydro-Agro Informatic Center.
3. Strengthen cooperation with higher education institutions and the Ministry of Education, Science, Culture and Sport of Georgia to address the lack of professionals in the water sector.
4. Strengthen MEPA's capacities, through training and recruitment of skilled staff as a continuous process based on needs, to lead the implementation of the irrigation strategy. Define what performance of the irrigation and drainage sector means, set up modernized and robust M&E systems and define indicators and ensure that the same indicators are used by all stakeholders.

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REFERENCES

Ahouissoussi, Nicolas, James E. Neumann, and Jitendra P. Srivastava. 2014. Building Resilience to Climate Change in South Caucasus Agriculture. Directions in Development. Washington, DC: World Bank. doi:10.1596/978-1-4648-0214-0. License: Creative Commons Attribution CC BY 3.0 IGO

Burton M., 2010. Irrigation management. Principles and practices.

Carles Sanchis-Ibor, Rutgerd Boelens, Marta García-Mollá, 2017. Collective irrigation reloaded. Re-collection and re-moralization of water management after privatization in Spain.

Chohin-Kuper, A., Garzón Delvaux, P. A., & Strosser, P. (2014). Approche économique de la gestion de la demande en eau en Méditerranée: Instruments économiques, Plan Bleu, Valbonne. (Les Cahiers du Plan Bleu 15)

FAO, 2004. Water charging in irrigated agriculture. An analysis of international experience. Rome. http://www.fao.org/3/y5690e/y5690e00.htm#Contents

FAO, 2007. Modernizing irrigation management – the MASSCOTE approach. By Daniel Renault, Thierry Facon and Robina Wahaj.

FAO, 2008. Country Profile – Georgia. FAO Aquastat

Gany A. H., Sharma P. and Singh S., 2019. Global review of institutional reforms in the irrigation sector for sustainable agricultural water management, including water users' associations

Gaprindashvili g. and Gaprindashvili M., 2014. Fresh Groundwater Resources in Georgia and Management Problems.

Garces-Restrepo Carlos and al., 2007, Irrigation Management Transfer. Worldwide Efforts and Results, FAO Water Report n°32

Georgia Good Governance Initiative. (2021). Ria Manual for Practitioners. Tbilisi: GGI Georgia.

Graveline Nina and Grémont Marine, 2021. The role of perceptions, goals and characteristics of wine growers on irrigation adoption in the context of climate change.

ISET Policy Institute, 2016. Regulatory Impact Assessment (RIA) of draft irrigation/drainage tariff methodology.

ISET Policy Institute. (2020). Regulatory Impact Assessment on Ways to Manage the Existing Backlog of Power PPAs and MOUs. Tbilisi: USAID Energy Program.

Johansson, R.C., Tsur, Y., Roe, T.L., Doukkali, R. and Ariel Dinar. (2002). Pricing irrigation water: a review of theory and practice. Water Policy, Volume 4, Issue 2, Pages 173-199.

Kadirbeyoglu Z., 2008. Decentralization and democratization: The case of water user associations in Turkey.

Khadra Roula, Sagardoy Juan Antonio, 2019. Irrigation Governance Challenges in the Mediterranean Region : Learning from Experiences and Promoting Sustainable Performance.

Kibaroglu A., 2020. The role of irrigation associations and privatization policies in irrigation management in Turkey.

Kiymaz S., Ozekici B., Hamdy A., 2006. Problems and solutions for water users associations in the Gediz Basin.

Malano, H.M., & Van Hofwegen, P.J.M. (2006). Management of Irrigation and Drainage Systems – A Service Approach (1st ed.). CRC Press. *https://doi.org/10.1201/9780203748428*

Ministry of Agriculture of Georgia, 2017a. Irrigation Strategy for Georgia 2017-2025.

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Ministry of Agriculture of Georgia, 2017b. Draft drainage strategy for Georgia 2018-2027.

Ministry of Environmental Protection and Agriculture of Georgia, 2019. Agriculture and Rural Development Strategy of Georgia 2021-2027.

Molle, F., & Berkoff, J. (Eds.). (2007). Irrigation water pricing: The gap between theory and practice. Wallingford: CABI

Molle F. and Sanchis-Ibor Carles, 2019. Irrigation policies in the Mediterranean: Trends and Challenges.

OECD (2018), Facilitating the Reform of Economic Instruments for Water Management in Georgia, OECD, Studies on Water, OECD Publishing, Paris.

OECD, 2018. OECD Water Governance Indicator Framework

OECD, 2021. Agriculture Policy Brief. Making coherent policies for food systems.

OECD, 2021b. Developing a Water Policy Outlook for Georgia, the Republic of Moldova and Ukraine.

Ostrom, E. 1990. Governing the commons: the evolution of institutions for collective action.

Shi, M., Wang, X., Yang, H. and Wang, T. (2014). Pricing or Quota? A Solution to Water Scarcity in Oasis Regions in China: A Case Study in the Heihe River Basin. Sustainability 2014, 6, 7601-7620; doi:10.3390/su6117601

Topcu, S., Kibaroglu, A., & Kadirbeyoglu, Z. (2019). Irrigation in Turkey: Policy and practice in historical perspective.

Ul Hassan, M.; Qureshi, A. S.; Heydari, N. 2007. A proposed framework for irrigation management transfer in Iran: Lessons from Asia and Iran. Colombo, Sri Lanka: International Water Management Institute. 37 pp. (IWMI Working Paper 118)

UN Women. (2021). Regulatory Impact Assessment of ILO 189 - Domestic Workers Convention. Tbilisi: UN Women.

Waalewijn and al., 2020. Governance in irrigation and drainage. Concepts, Cases, and Action-Oriented Approaches – A Practitioner's Resource. Washington, DC: World Bank.

World Bank, European Union and Food and Agriculture Organization, 2021. Climate smart agriculture in Georgia.

Wetterberg, A., Brinkerhoff, D., 2016. Gauging the Effects of social accountability on Services, Governance, and Citizen Empowerment.

APPENDICES

Appendix 1. Questionnaires for interviews and focus groups

The following questions have been used to guide the interviews and exchanges with the stakeholders. They were not strictly asked in the way they are written. Depending on how the interview went, other questions may have emerged or questions that were planned were not asked because they no longer seemed relevant.

MEPA – Department of policy analysis / Department of Agriculture, Food and Agricultural Development / Department of Hydroamelioration and Land Management

Objectives of strategies and main constraints

According to your knowledge of the irrigation sector what are the main issues and constraints? What are the main challenges? Can you indicate at least 5 issues/constraints? Can you prioritize them?

What could be improved within the strategy?

Does the strategy reflect the development plans of irrigation service providers? What is there and what is missing? Does the strategy enhance those development plans?

What are the major obstacles (from your perspective) in implementing the strategy (at a national scale, basin scale, scheme scale, farm scale)?

What are the main on-going and future projects dealing with the improvement of the irrigation sector?

Data, evidence-based decision-making

How does the planning happen? What is the basis for decision-making in-service planning and development process?

Is there an information system already in place? Do you think it is already capable of supporting properly the implementation of the I&D strategy?

Do you collect and analyze data to make accurate decisions for irrigation management? Which ones? Do all the data necessary to understand and manage the sector exist and can be regularly updated? If no, can you explain why? What should be done to ensure that all relevant data are available?

Are data and projections on water demand for irrigation available and guiding decisions? If yes, how reliable do you think they are?

Are key data publicly available and communicated?

M&E

Are there evaluation mechanisms in place to systemically and regularly assess performance/effectiveness, gaps and overlaps in the regulatory framework?

Do formal requirements exist for monitoring and evaluation?

Is there a M&E system in place for the follow-up of the implementation of the strategy? If yes, who is in charge of that monitoring?

Are there agreed-upon key performance indicators? If yes, what are the main indicators? What is the follow-up frequency? Are there any other indicators than defined ones that would allow more efficient evaluation of the performance?

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Is there an assessment of the impacts of decisions on water management and irrigation performance?

Are, currently, benefits regularly evaluated and showcased to decision makers and key stakeholders?

At the end of the implementation period, what will allow us to say that the strategy has been a success? Similarly, what would lead to say that the strategy has been a failure?

Are there provisions or incentives for civil society monitoring?

Are there financial resources available to train civil society organizations in project monitoring?

Observed outcomes and impacts

What has already been implemented as part of the irrigation strategy?

Do you already observe some impacts of these actions? If yes, what impacts? If no, why, according to you?

What has not been implemented? Do you know why?

How do you explain the delays in the implementation of the Irrigation Management Transfer?

Why is the WUA law not being implemented?

Why is the drainage strategy not validated? Should this strategy be combined with the irrigation strategy?

Risk-Management

What are the main risks related to the irrigation sector and to the implementation of the strategy? How can these risks be mitigated?

Is there a risk management process in place? If yes, how is the risk management process structured?

What are the data to consider for risk-management?

Stakeholders: involvement and interactions

What are the main stakeholders involved directly and indirectly in the irrigation sector, what are their institutional responsibilities and how are they distributed? What capabilities have they developed to fulfil their tasks? Are there still gaps?

How well do the stakeholder interact? To what extend can they cooperate successfully? Do they share the same objectives? Do their objective sometimes conflict?

How would you describe the current relationship between the water service providers and water users?

Do you think water users can/should participate in the definition of rules at local level or be better involved in the improvement of the performances of the sector? Why do you think so?

Do you think that the sequence of activities to undertake is clear to all stakeholders whatever the scale? If no, can you detail?

Do you know if there is a roadmap for each stakeholder involved in the implementation of the strategy or is there “only” a general roadmap?

Do the involved stakeholders have the adequate level of autonomy, staff and budget to carry out their functions and implement the strategy?

Accountability and enforcement

What are the existing mechanisms to ensure compliance with water use rules? Do they work? Are they efficient?

What is the level of accountability of service providers to water users?

Are the roles and responsibilities for the implementation of the irrigation strategy clearly defined?

Are the existing enforcement capacities (based on the current legislation and institutional structure) sufficient to ensure compliance with the strategy? Or do you expect additional elements might be needed in the strategy?

What are the technical and financial capacities for the development of the irrigation sector and day to day management? Are they sufficient? Is there a strategy to increase them?

Suggestions\reflections for improvement

Do you think something should be first improved or changed for implementing the policy changes and actions described in the strategy? Can you explain what and why?

Are there on-going reflections to improve the strategy (for example by adding new activities)? Which ones? Are these reflections made informally or are they shared through formalized arena?

From a legal perspective, are all the tools necessary for the improvement in the performance of the irrigation sector existing or is the legal framework not sufficient?

Has the strategy been discussed at national level only or consultations have also been carried out at local level?

Is the pathway for improving the irrigation sector clear in the I&D strategy?

Institutional coordination and strategy implementation

Is the irrigation strategy promoting institutional reforms? What are the main ones?

How do you see the interaction between the IRBM and the I&D strategy?

Do you think something could be improved in the way tasks are shared?

Are there contractual arrangements for the implementation of the strategy? Two potential directions: 1) are there contractual arrangements currently in place for the implementation of the strategy ; 2) do you think there are contractual arrangements that should be put in place for/during the implementation of the strategy.

Are there horizontal and vertical coordination mechanisms for the implementation of the strategy? Who is in charge? Is there any change you would suggest to the current coordination setup to improve its functionality?

Are there provisions, frameworks or instruments to ensure that decisions taken in other sectors are water wise from an irrigation and agricultural development point of view?

Are there conflict mitigation and resolution mechanisms? How complex is this process and what is the scale of this process?

Are there intra and inter sectoral dialogue platforms and networks of professionals for experience and knowledge sharing?

Water tariff and its components

What do you think of the water tariff for irrigation? What do you think of a bulk water tariff?

Do you think the current level of expenses for operation and maintenance of the system are consistent with an efficient use of water and best practices? Do you think the current level of costs for operation and maintenance are sustainable in the long term?

Are the capacity to pay and willingness to pay of water users evaluated through solid economic analysis and dedicated surveys?

What are the main constraints to the reforms in the water tariff?

Are water accounts separated to ensure traceability of the water money?

What is the level of awareness of the water users? What is implemented to make water users aware of the need to change the water tariff?

Innovation

The strategy emphasizes the need for innovation. What is understood by "innovation"?

Do incentives exist to produce, disclose, use water related data and information through innovative ways?

Are there any public bodies or accredited bodies fostering innovation in the irrigation sector?

Do innovative tools and processes to build capacities exist? Raise awareness? Engage stakeholders? Share information? Engage within and across organisations?

MEPA – Division of water resource protection

Institutional coordination and strategy implementation

At what stage of development is the IRBM system?

How do you see the interaction between the IRBM and the I&D strategy? Are there horizontal and vertical coordination mechanisms in place, or being designed? Who is in charge? Is there any change you would suggest to the current coordination setup to improve its functionality?

What are the existing mechanisms to ensure compliance with water use rules? Do they work? Are they efficient? Will they be applied also to irrigation and drainage activities?

Do you think something could be improved or clarified in the way tasks are shared?

Are the existing enforcement capacities (based on the current legislation and institutional structure) sufficient to ensure compliance with the strategy? Or do you expect additional elements might be needed in the strategy?

Are there provisions, frameworks or instruments to ensure that decisions taken in other sectors are water wise from an irrigation and agricultural development point of view?

Are there conflict mitigation and resolution mechanisms? How complex is this process and what is the scale of this process?

Are there intra and inter sectoral dialogue platforms and networks of professionals for experience and knowledge sharing?

How do you see (if you see it) the involvement of GA\WUO and other stakeholders in the broader framework? Will they have a voice?

Suggestions\reflections for improvement

Do you think something should be set up, improved or changed before IRBM and I&D implementation reach a more advanced stage? Can you explain what and why?

Have you been involved in discussions about the interaction between IRBM (and law on water management) and I&D strategy?

Water tariff and its components

What do you think of the water tariff for irrigation? What do you think of a bulk water tariff? What do you think will be the relation between water tariff for irrigation and the water tariffs for other water users? Will there be any? Should water tariffs be differentiated by basin?

Ministry of Finance

Data, evidence-based decision-making

Do you monitor the evolution of GA (and, more generally, of the irrigation\drainage sector) needs?

Did you project its expected evolution (in light of the I&D strategy) and its potential impact on the public budget in the future years?

Have you set any targets\ thresholds that should not be passed and\or that, if passed, would require stricter monitoring and\or corrective actions?

Risk-Management

What is your attitude (how do you feel) towards the financial obligations associated with the development of the I&D sector in the coming years?

What are the main risks related to the irrigation sector and to the implementation of the strategy? How can these risks be mitigated?

Is there a risk management process in place? If yes, how is the risk management process structured?

What are the data to consider for risk-management?

Suggestions\reflections for improvement

Do you think something should be improved or changed in the way the I&D functions and\or in its structure to make it more efficient and sustainable?

GEORGIAN AMELIORATION

General Director / Operation Director / Technical Director / Department of project planning and management

1. What is your role in Georgian Amelioration? What is the role of your Department?
2. According to your knowledge of the irrigation sector what are the main issues and constraints? What are the main challenges? Can you indicate at least 5 issues/constraints? Can you prioritize them?
3. How would you rate the performance of the irrigation sector on a scale of 0-5 (0 = very bad and 5 =excellent)?
4. Along which dimensions would you define the performance of the irrigation sector? Indicate at least 5 possible performance indicators.

Service Delivery

5. What is an efficient irrigation service for you? How would you define it?
6. What are the main elements to consider when it comes to irrigation efficiency? Could you indicate at least 5?
7. How reliable is the water service? How flexible it is? How equitable it is? What is the situation in case of drought?
8. What are your main constraints as service provider? Indicate at least 5.
9. What are your main strengths?
10. How would you describe the current relationship between GA and water users?
11. Do you think you have enough information to know and understand the needs and characteristics of the farmers where you are supplying irrigation water? What is the most important information to know?

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12. What are the existing mechanisms to ensure compliance with water use rules? Do they work? Are they efficient?

13. What are the technical and financial capacities for the development of the irrigation sector and day to day management? Are they sufficient?

14. Do you think the current level of expenses for operation and maintenance of the system are consistent with an efficient use of water and best practices? Do you think the current level of costs for operation and maintenance are sustainable in the long term?

15. What do you think of the water tariff for irrigation? What do you think of a bulk water tariff?

16. What do you think of the way water fees are set? Is it efficient? Should this system be improved?

17. What is the share of farmers that could theoretically access your services and choose to do so (basically, what share of farmers who could get your services decides to sign a contract with you)?

18. What is the share of farmers that do not pay for water services they receive? What are the main stated reasons for not paying?

19. What are the main constraints to the reforms in the water tariff?

20. What is the level of awareness of the water users? What is implemented to make water users aware of the need to change the water tariff?

21. Are data and projections on water demand for irrigation available and guiding decisions for rehabilitation and improvement projects? If yes, how reliable do you think they are? More generally, what are the criteria used for the selection of places where projects will be implemented? How does the planning happen? What are the basis for decision-making in service planning and development process? How do you consider the climate risks in your strategy?

22. Is there an assessment of the impacts of decisions on water management and irrigation performance?

23. Do you observe an impact of the rehabilitation projects on the water service and on your day to day management?

24. Can you explain what the annual objectives of Georgian Amelioration are? How are set these objectives? What kind of indicators do you use to monitor and evaluate your activities?

25. What are the main on-going and future projects dealing with the improvement of the irrigation sector?

Institutional capacity

26. What could be, according to you, the drivers to improve the irrigation sector?

27. According to your knowledge of the irrigation and strategy, what are the main changes promoted by the strategy? What are the objectives?

28. Are there targets and indicators you have to monitor and\or report, and you are responsible to achieve?

29. Do you think the strategy, as defined, will enable to address the issues encountered and improve the performances of the irrigation sector?

30. Does the strategy reflect your own development plans? What is there and what is missing? Does the strategy enhance those development plans?

31. Does the strategy take into account the climate risks? More generally are these risks taken into account in the design of policies and projects?

32. Do you already observe some impacts of these actions? If yes, what impacts? If no, why, according to you?

33. What has not been implemented yet? Do you know why? How do you explain the delays in the implementation of the Irrigation Management Transfer?

34. What do you think of the WUO reform?

35. Do you think water users can/should participate in the definition of rules at local level or be better involved in the improvement of the performances of the sector? Why do you think so? How is this/could this be implemented?

36. What could be improved within the strategy?

37. Do you think something should be first improved or changed for implementing the policy changes and actions described in the strategy? Can you explain what and why?

38. Is the pathway for improving the irrigation sector clear in the I&D strategy? Is it clear in your mind?

39. Are there on-going reflections to improve the strategy (for example by adding new activities)? Which ones? Are these reflections made informally or are they shared through formalized arena?

40. Do you have your own roadmap within the irrigation strategy? Do you know if there is a roadmap for each stakeholder involved in the implementation of the strategy or is there "only" a general roadmap?

41. Do you think that the sequence of activities to undertake is clear to all stakeholders whatever the scale? If no, can you detail?

42. Are the roles and responsibilities for the implementation of the irrigation strategy clearly defined?

43. Do you think something could be improved in the way tasks are shared?

44. What are the major obstacles (from your perspective) in implementing the strategy (at a national scale, basin scale, scheme scale, farm scale)

45. Are there contractual arrangements for the implementation of the strategy?

46. Are there horizontal and vertical coordination mechanisms for the implementation of the strategy? Who is in charge? Is there any change you would suggest to the current coordination setup to improve its functionality?

47. Are there other policies that could improve the performances of the irrigation sector? Can you describe them?

48. From a legal perspective, are all the tools necessary for the improvement in the performance of the irrigation sector existing or is the legal framework not sufficient?

49. Are there evaluation mechanisms in place to systemically and regularly assess performance/effectiveness, gaps and overlaps in the regulatory framework?

50. Do you think that some actors (who should be) are not taken into account in the strategy?

51. At the end of the implementation period, what will allow us to say that the strategy has been a success? Similarly, what would lead to say that the strategy has been a failure?

52. Do you know the draft drainage strategy?

53. Why is this strategy not validated? Should this strategy be improved? Explain why?

Georgian Amelioration - Internal audit and monitoring department

1. What is your role in Georgian Amelioration ? What is the role of your Department ?

2. According to your knowledge of the irrigation sector what are the main issues and constraints? What are the main challenges? Can you indicate at least 5 issues/constraints? Can you prioritize them?

3. How would you rate the performance of the irrigation sector on a scale of 0-5 (0 = very bad and 5 =excellent)?

4. Along which dimensions would you define the performance of the irrigation sector? Indicate at least 5 possible performance indicators.

Service Delivery

5. What is an efficient irrigation service for you? How would you define it?

6. What are the main elements to consider when it comes to irrigation efficiency? Could you indicate at least 5?

7. From your perspective how efficient is the water service?

8. What are the technical and financial capacities for the development of the irrigation sector and day to day management? Are they sufficient?

Institutional capacity

9. Can you explain what the annual objectives of Georgian Amelioration are? How are set these objectives? What kind of indicators do you use to monitor and evaluate the activities?

10. Is there an assessment of the impacts of decisions on water management and irrigation performance?

11. Are there evaluation mechanisms in place to systemically and regularly assess performance/effectiveness, gaps and overlaps in the regulatory framework?

12. Are data and projections on water demand for irrigation available and guiding decisions for rehabilitation and improvement projects? If yes, how reliable do you think they are? More generally, what are the criteria used for the selection of places where projects will be implemented? How does the planning happen? What are the basis for decision-making in service planning and development process?

13. From your perspective what are the main constraints for GA? Indicate at least 5.

14. What are your own main constraints within the Department? Indicate at least 5.What are the main strengths of GA?

15. If your monitoring and audit activities highlight issues in the strategy implementation what do you do? How efficient is the monitoring process?

16. What are the main targets and indicators you are monitoring?

17. Do you think you have enough resources for your mission?

18. Do you have relationships with monitoring departments from other structures (Departments from the MEPA, other Ministries…)? Can you detail? How would you qualify the relationships with other stakeholders?

Georgian Amelioration – WUO Support Unit

1. What is your role in Georgian Amelioration ? What is the role of your Department ?

2. According to your knowledge of the irrigation sector what are the main issues and constraints? What are the main challenges? Can you indicate at least 5 issues/constraints? Can you prioritize them?

3. How would you rate the performance of the irrigation sector on a scale of 0-5 (0 = very bad and 5 =excellent)?

4. Along which dimensions would you define the performance of the irrigation sector? Indicate at least 5 possible performance indicators.

Service Delivery

5. What is an efficient irrigation service for you? How would you define it?

6. What are the main elements to consider when it comes to irrigation efficiency? Could you indicate at least 5?

7. From your perspective how efficient is the water service? How flexible it is? How equitable it is?

8. What are the technical and financial capacities for the development of the irrigation sector and day to day management? Are they sufficient?

9. What do you think of the water tariff for irrigation? What do you think of a bulk water tariff?

10. What do you think of the way water fees are set? Is it efficient? Should this system be improved?

11. What are the main constraints to the reforms in the water tariff?

12. What is the level of awareness of the water users? What is implemented to make water users aware of the need to change the water tariff?

13. Are data and projections on water demand for irrigation available and guiding decisions for rehabilitation and improvement projects? If yes, how reliable do you think they are? More generally, what are the criteria used for the selection of places where projects/WUO will be implemented? How does the planning happen? What are the basis for decision-making in service planning and development process? How do you consider the climate risks in your strategy?

Institutional capacity

14. What are the main constraints of GA? Indicate at least 5

15. What are the main strengths?

16. What are your main constraints as a WUO support unit? Indicate at least 5.

17. Do you think you have enough resources?

18. According to your knowledge of the irrigation and strategy, what are the main changes promoted by the strategy? What are the objectives?

19. Are there targets and indicators you must report about and are responsible for?

20. Do you think the strategy, as defined, will enable to address the issues encountered and improve the performances of the irrigation sector?

21. At the end of the implementation period, what will allow us to say that the strategy has been a success? Similarly, what would lead to say that the strategy has been a failure?

22. Does the strategy reflect GA's development plans? What is there and what is missing? Does the strategy enhance those development plans?

23. Does the strategy take into account the climate risks? More generally are these risks taken into account in the design of policies and projects?

24. Do you already observe some impacts of these actions? If yes, what impacts? If no, why, according to you?

25. What has not been implemented yet? Do you know why? How do you explain the delays in the implementation of the Irrigation Management Transfer?

26. What do you think of the WUO reform? Do you think this reform is strongly supported by GA? Why?

27. Do you think the roadmap is clear and realistic for the WUO establishment? What could/should be improved?

28. Do you have annual objectives? How are you evaluated?

29. Do you think water users can/should participate in the definition of rules at local level or be better involved in the improvement of the performances of the sector? Why do you think so? How is this/could this be implemented?

30. What could be improved within the strategy?

31. Do you think something should be first improved or changed for implementing the policy changes and actions described in the strategy? Can you explain what and why?

32. Is the pathway for improving the irrigation sector clear in the I&D strategy? Is it clear in your mind?

33. Are there on-going reflections to improve the strategy (for example by adding new activities)? Which ones? Are these reflections made informally or are they shared through formalized arena?

34. Do you think that the sequence of activities to undertake is clear to all stakeholders whatever the scale? If no, can you detail?

35. Are the roles and responsibilities for the implementation of the irrigation strategy clearly defined?

36. Do you think something could be improved in the way tasks are shared?

37. What are the major obstacles (from your perspective) in implementing the strategy (at a national scale, basin scale, scheme scale, farm scale)

38. Are there horizontal and vertical coordination mechanisms for the implementation of the strategy? Who is in charge? Is there any change you would suggest to the current coordination setup to improve its functionality?

39. Are there other policies that could improve the performances of the irrigation sector? Can you describe them?

40. From a legal perspective, are all the tools necessary for the improvement in the performance of the irrigation sector existing or is the legal framework not sufficient?

Department of environmental supervision

1. What is your role in the Department of environmental supervision? What is the role of your Department?

2. According to your knowledge of the irrigation sector what are the main issues and constraints? What are the main challenges? Can you indicate at least 5 issues/constraints? Can you prioritize them?

3. What are the main strengths of the sector?

4. How would you rate the performance of the irrigation sector on a scale of 0-5 (0 = very bad and 5 =excellent)?

5. Along which dimensions would you define the performance of the irrigation sector? Indicate at least 5 possible performance indicators.

6. What are the main constraints in your activities? Indicate at least 5.

7. Do you think you have enough resources?

8. Do you think data and projections on water availability and water demand for irrigation are available and guiding decisions for rehabilitation and improvement projects? If yes, how reliable do you think they are? More generally, what are the criteria used for the selection of places where projects will be implemented? Environmental data are considered? How does the planning happen? What is the basis for decision-making in service planning and development process?

9. Do you observe an evolution of the water availability in Georgia? Do you think the climate risks are considered in the strategies of development of the agricultural sector?

10. Do you observe a competition between different water uses? What is the trend? How are the trade-offs made?

11. Do you observe an evolution of the water uses for irrigation?

12. Is there an assessment of the impacts of decisions on water management, environment and irrigation performance?

13. Do you observe an impact of the rehabilitation projects on the water availability and water demand?

14. According to your knowledge of the irrigation and strategy, what are the main changes promoted by the strategy? What are the objectives?

15. Do you think the strategy, as defined, will enable to address the issues encountered and improve the performances of the irrigation sector?

16. Does the strategy take into account the climate risks?

17. Do you think something should be first improved or changed for implementing the policy changes and actions described in the strategy? Can you explain what and why?

18. What are the major obstacles (from your perspective) in implementing the strategy (at a national scale, basin scale, scheme scale, farm scale)

19. Are there horizontal and vertical coordination mechanisms for the implementation of the strategy? Who is in charge? Is there any change you would suggest to the current coordination setup to improve its functionality?

20. From a legal perspective, are all the tools necessary for the improvement in the performance of the irrigation sector existing or is the legal framework not sufficient?

21. Are there evaluation mechanisms in place to systemically and regularly assess performance/effectiveness, gaps and overlaps?

22. Do you think that some actors (who should be) are not taken into account in the strategy?

23. Have you been involved in discussions about the interaction between IRBM (and law on water management) and I&D strategy?

24. What are your expectations about the changes that will take place (challenges emerging, opportunities arising) following the approval of the Law on Water Management?

AGRICULTURAL AND RURAL DEVELOPMENT AGENCY

1. How would you evaluate performance of irrigation / drainage sectors?

2. How much of the constraint is the current condition of the sector for agricultural and rural development? What are the main key constraints?

3. What are the possible spillovers from development of amelioration infrastructure, do you have any specific cases / success stories?

4. How reliable is the water service? How flexible it is? How equitable it is? What is the situation in case of drought?

5. How would you describe the current relationship between the water service providers and water users?

6. How would you assess the current technological development of irrigation / drainage technologies on farm levels? Are their differences in terms of farm sizes? What are those differences?

7. What are current projects you are implementing in for access to irrigation technologies? Is data on these projects accessible?

8. Do you have any data, or assessment in regard to farmers attitude towards irrigation sector?

9. How do you see role of WUOs in overall development of amelioration services? What is its role in overall rural development?

10. From your perspective is implementation of WUOs feasible on? What could be main constraints to their implementation?

11. What is an efficient irrigation service for you? How would you define it?

12. What could be, according to you, the drivers to improve the irrigation sector?

13. Have you been involved in the preparation of the irrigation strategy? Have you been involved in the preparation of the draft drainage strategy? Do you know why the drainage has not been finalized?

14. Are there any mechanisms to monitor the degree of advancement of the agricultural strategy, the rural development strategy, the irrigation strategy? How decisions are taken to guide the implementation of the strategies and if necessary take corrective actions?

15. According to your knowledge of the irrigation and strategy, what are the main changes promoted by the strategy? What are the objectives?

16. Does the strategy take into account the climate risks? More generally are these risks taken into account in the design of policies and projects?

17. What could be improved within the irrigation strategy?

18. Are there other policies that could improve the performances of the irrigation sector? Can you describe them?

19. Do you already observe some impacts of the irrigation strategy? If yes, what impacts? If no, why, according to you?

20. What has not been implemented? Do you know why?

21. Do you think something should be first improved or changed for implementing the policy changes and actions described in the strategy? Can you explain what and why?

22. Are there horizontal and vertical coordination mechanisms for the implementation of the strategy? Who is in charge? Is there any change you would suggest to the current coordination setup to improve its functionality?

23. At the end of the implementation period, what will allow us to say that the strategy has been a success? Similarly, what would lead to say that the strategy has been a failure?

24. What do you think of the overall water management sector? What do you think of the new law on water management and basin management structures? Is this new law helpful?

25. Are there provisions, frameworks or instruments to ensure that decisions taken in other sectors are water wise from an irrigation and agricultural development point of view?

26. Are there conflict mitigation and resolution mechanisms? How complex is this process and what is the scale of this process?

27. Are there intra and inter sectoral dialogue platforms and networks of professionals for experience and knowledge sharing?

NATIONAL AGENCY FOR SUSTAINABLE LAND MANAGEMENT AND LAND USE MONITORING

1. What are main challenges in relation to land management in Georgia? Land fragmentation? Any other issues?

2. What are main challenges in land registration process? What kind of constraints do you face?

3. What are the constraints farmers face in land registration?

4. What are the programs that are currently implemented for incentivizing land registration?

5. Are there any land related conflicts that you are aware of that is related specifically to irrigation / drainage or access to water? How do you resolve this conflicts?

6. Are you aware of irrigation and/or drainage strategies? What do you see as main challenges in implementation of these strategies?

7. What types of links do you see between the performance of the irrigation sector and the land tenure situation?

8. Have you been involved in the preparation of the irrigation strategy?

9. Are there other policies that could improve the performances of the irrigation sector? Can you describe them?

MINISTRY OF ECONOMY AND SUSTAINABLE DEVELOPMENT -DEPARTMENT OF ENERGY POLICY AND INVESTMENT PROJECTS

1. Are you aware in developments in irrigation sector? What is your awareness about irrigation strategy? What do you think about its feasibility? Are there any constraints that are problematic for development of energy sector?
2. Are there any water related conflicts between irrigation and energy sectors? How are they normally resolved?
3. Is there an interest from investors to invest in development of power plants on existing or potential irrigation reservoirs? What are the arrangements in those cases? Are there any special treatments to those kinds of investors?
4. Have you ever had the case that power plant investor participated in any way in development of irrigation project? If so what was the arrangement of water use, did you provide any specific benefits?
5. Discuss the already observed and potential impacts of climate change. How is it anticipated? How priorities in terms of water use will be defined?
6. Is there a kind of committee to discuss at national or local level the issues related to the water uses?
7. What do you think of the overall water management sector? What do you think of the new law on water management and basin management structures? Is this new law helpful?
8. Are there provisions, frameworks or instruments to ensure that decisions taken in other sectors are water wise from an irrigation and agricultural development point of view?
9. Are there conflict mitigation and resolution mechanisms? How complex is this process and what is the scale of this process?
10. Are there intra and inter sectoral dialogue platforms and networks of professionals for experience and knowledge sharing?

GNERC - TARIFF DEPARTMENT WATER DEPARTMENT

1. Does the strategy reflect the development plans of irrigation service providers? What is there and what is missing? Does the strategy enhance those development plans?
2. Are the roles and responsibilities for the implementation of the irrigation and drainage strategy clearly defined?
3. Do you know if there is a roadmap for each stakeholder involved in the implementation of the strategy or is there “only” a general roadmap?
4. What are the main constraints to the reforms in the water tariff?
5. Do the involved stakeholders have the adequate level of autonomy, staff and budget to carry out their functions and implement the strategy? Especially in cae of GNERC?
6. Are you currently ready to start regulating irrigation / drainage sectors? What is level of readiness? What is that has to be done in addition?
7. Are water accounts separated to ensure traceability of the water money?
8. What are major data challenges in regulating irrigation tariffs by GNERC?
9. Are you in favour of the establishment of WUA? If yes, why? If no, why? Are you planning to become actively involved in the WUA? If yes, why? If no, why?

10. If needed is GNERC able to regulate WUOs as well? What are potential challenges and benefits of doing it?

GEORGIAN FARMERS ASSOCIATION

1. How would you evaluate irrigation service delivery for your members? Do you often hear problems? What kind of problems do you hear?
2. Does association have any irrigation related projects?
3. According to your knowledge of the irrigation and strategy, what are the main changes promoted by the strategy? What are the objectives? What could be improved within the strategy?
4. What do you think of the water tariff for irrigation?
5. Irrigation tariffs need to be increased to ensure the self-sustainability of the irrigation system. Are there any specific changes\improvements in the system that could make the tariff increase acceptable? If yes, which? If no, why?
6. What is the share of farmers that do not pay for water services they receive? What are the main stated reasons for not paying?
7. What is the level of awareness of the water users? What is implemented to make water users aware of the need to change the water tariff?
8. How do you see the possibility of creation of WUOs? What do you think will be main challenges? What are main benefits?
9. What is an efficient irrigation service for you? How would you define it?
10. How reliable is the water service? How flexible it is? How equitable it is? What is the situation in case of drought?
11. What is the level of accountability of service providers to water users?
12. How would you describe the current relationship between the water service providers and water users?
13. Do you think water users can/should participate in the definition of rules at local level or be better involved in the improvement of the performances of the sector? Why do you think so? How is this/could this be implemented?
14. What are the existing mechanisms to ensure compliance with water use rules? Do they work? Are they efficient?
15. What could be, according to you, the drivers to improve the irrigation sector?
16. Do you think the strategy, as defined, will enable to address the issues encountered and improve the performances of the irrigation sector?
17. What could be improved within the strategy?
18. Have you been consulted for the preparation of the irrigation strategy? For the agricultural strategy? Have you been consulted for the selection of places where rehabilitation projects are implemented?
19. Do you already observe some impacts of the irrigation strategy? If yes, what impacts? If no, why, according to you?

20. At the end of the implementation period, what will allow us to say that the strategy has been a success? Similarly, what would lead to say that the strategy has been a failure?

21. Are you involved in the monitoring and evaluation of the strategies?

22. What are the main risks related to the irrigation sector and to the implementation of the strategy? How these risks can be mitigated?

23. What do you think of the overall water management sector? What do you think of the new law on water management and basin management structures? Is this new law helpful?

24. Are there intra and inter sectoral dialogue platforms and networks of professionals for experience and knowledge sharing?

25. Discuss innovation

26. Discuss impacts of climate change

Community of Donors

1. What irrigation-related projects are you supporting in Georgia? Can you describe them in few words?

2. Who are your main interlocutors?

3. What kind of constraints do you face in the implementation of the projects?

4. From your experience what are the main lessons you have learned from recent projects?

5. According to your knowledge of the irrigation sector what are the main issues and constraints? What are the main challenges? Can you indicate at least 5 issues/constraints? Can you prioritize them?

6. What are the main strengths of the sector?

7. How would you rate the performance of the irrigation sector on a scale of 0-5 (0 = very bad and 5 =excellent)?

8. Along which dimensions would you define the performance of the irrigation sector? Indicate at least 5 possible performance indicators.

Service Delivery

9. What is an efficient irrigation service for you? How would you define it?

10. What are the main elements to consider when it comes to irrigation efficiency? Could you indicate at least 5?

11. From your experience, how reliable is the water service in Georgia? How flexible it is? How equitable it is?

12. What do you think of Georgian Amelioration?

13. From your perspective, do you think the technical and financial capacities for the development of the irrigation sector and day to day management are sufficient?

14. Do you think the current level of expenses for operation and maintenance of the system are consistent with an efficient use of water and best practices? Do you think the current level of costs for operation and maintenance are sustainable in the long term?

15. What do you think of the water tariff for irrigation?

16. What do you think of the way water fees are set? Is it efficient? Should this system be improved?

17. From your experience, what are the main constraints to the reforms in the water tariff?

Institutional capacity

18. Do you think data and projections on water demand for irrigation are available and guiding decisions for rehabilitation and improvement projects? If yes, how reliable do you think they are? More generally, what are the criteria used for the selection of places where projects will be implemented? How does the planning happen? What are the basis for decision-making in service planning and development process? How do you consider the climate risks in the strategy?

19. Is there an assessment of the impacts of decisions on water management and irrigation performance?

20. Do you observe an impact of the rehabilitation projects on the water service and the performances of the irrigation sector?

21. What are the main on-going and future projects dealing with the improvement of the irrigation sector?

22. What could be, according to you, the drivers to improve the irrigation sector?

23. According to your knowledge of the irrigation and strategy, what are the main changes promoted by the strategy? What are the objectives?

24. Do you think the strategy, as defined, will enable to address the issues encountered and improve the performances of the irrigation sector?

25. Does the strategy take into account the climate risks? More generally are these risks taken into account in the design of policies and projects?

26. Do you already observe some impacts of these actions? If yes, what impacts? If no, why, according to you?

27. What has not been implemented yet? Do you know why? How do you explain the delays in the implementation of the Irrigation Management Transfer?

28. What do you think of the WUO reform?

29. What could be improved within the strategy?

30. Do you think something should be first improved or changed for implementing the policy changes and actions described in the strategy? Can you explain what and why?

31. Is the pathway for improving the irrigation sector clear in the I&D strategy? Is it clear in your mind?

32. Are there on-going reflections to improve the strategy (for example by adding new activities)? Which ones? Are these reflections made informally or are they shared through formalized arena?

33. Do you think that the sequence of activities to undertake is clear to all stakeholders whatever the scale? If no, can you detail?

34. Are the roles and responsibilities for the implementation of the irrigation strategy clearly defined?

35. Do you think something could be improved in the way tasks are shared?

36. What are the major obstacles (from your perspective) in implementing the strategy (at a national scale, basin scale, scheme scale, farm scale)?

37. At the end of the implementation period, what will allow us to say that the strategy has been a success? Similarly, what would lead to say that the strategy has been a failure?

38. Are there horizontal and vertical coordination mechanisms for the implementation of the strategy? Who is in charge? Is there any change you would suggest to the current coordination setup to improve its functionality?

39. Do you have regular meetings with other donors to coordinate your actions?

40. Is there a M&E process for the projects you are supporting? Can you describe it? How are the results used to redesign activities or projects? What is the quality of dialogue with the authorities?

41. Are there other policies that could improve the performances of the irrigation sector? Can you describe them?

42. From a legal perspective, are all the tools necessary for the improvement in the performance of the irrigation sector existing or is the legal framework not sufficient?

43. Are there evaluation mechanisms in place to systemically and regularly assess performance/effectiveness, gaps and overlaps in the regulatory framework?

44. Do you think that some actors (who should be) are not taken into account in the strategy?

45. Do you know the draft drainage strategy?

46. Why is this strategy not validated? Should this strategy be improved? Explain why?

47. From a more global perspective, what do you think of the performances of the agricultural sector? Do you think it has an impact on the irrigation sector?

48. What do you think of the on-farm dynamics? Are there any supports for innovation in agricultural practices or irrigation technologies at plot level, for example? Do you observe an evolution of water uses?

CONSULTANTS IN CHARGE OF LAND POLICY NOTE

1. What are the main policy gaps you identified in land policy note?

2. How do they relate to implementation of irrigation strategy?

3. Are those gaps important constraints for implementation of irrigation strategy?

4. How should those gaps resolved? What are main policy interventions / findings? What do you think will be the impact of implementing your recommendations on irrigation sector?

CONSULTANTS IN CHARGE OF THE VALUE CHAIN POLICY NOTE

Irrigation and agricultural development\performance of the agricultural sector

How is the current state of the irrigation\drainage sector affecting the development of the agricultural sector?

How reliable is the water service? How flexible it is? How equitable it is? What is the situation in case of drought? Are farmers able to get as much water as they need, when they need it?

Where do farmers integrated in successful value chains take water from?

How are farmers in successful value chains irrigating their fields (technology)?

Is this related to the current performance of the irrigation system\water availability?

Do you know whether farmers are considering changing their irrigation technology and\or your crops, depending on the evolution in the irrigation system (e.g. higher reliability)

Is it only a minority of smallholder irrigating farmers that are engaged in high value crops?

Could there be a realistic plan to get a substantial number of smallholder farmers shift from low value crops to high value crops ? Is there a path for that ?

Objectives of strategies and main constraints

According to your knowledge of the irrigation sector what are the main issues and constraints? What are the main challenges? Can you indicate at least 5 issues/constraints? Can you prioritize them?

What are the main on-going and future projects dealing with the improvement of the irrigation sector?

Suggestions\reflections for improvement

Do you think something should be first improved or changed for implementing the policy changes and actions described in the strategy? Can you explain what and why?

Water tariff and its components

What do you think of the water tariff for irrigation? What do you think of a bulk water tariff?

Irrigation tariffs need to be increased to ensure the self-sustainability of the irrigation system. Are there any specific changes\improvements in the system that could make the tariff increase acceptable? If yes, which? If no, why?

What do you think is the maximum water tariff increase that would be compatible with the development of the agricultural sector?

Risk-Management

What are the main risks related to the irrigation sector and to the implementation of the strategy? How can these risks be mitigated?

Is there a risk management process in place? If yes, how is the risk management process structured?

What are the data to consider for risk-management?

FARMERS

1. Do you cultivable your agricultural land? What are the main crops you are cultivating?
2. What is the average size of your land plot?
3. What are your main constraints? Can you prioritize them?
4. Do you need to irrigate your land plot?
5. If you are currently irrigating your land, where do you take the water come from? Georgian Amelioration or any other provider? Other groundwater \surface water ? Would you prefer to get it from other sources if you had a choice? Why?
6. Are you able to get as much water as you need, when you need it? Impacts of climate change?
7. Has poor performance of the irrigation system become the reason of your loss of crop productivity?

8. How are you irrigating your fields (technology)? Is this related to the current performance of the irrigation system\water availability? Have you considered changing your irrigation technology and\or your crops, depending on the evolution in the irrigation system (e.g. higher reliability, greater availability of water, etc.)? If so, how?

9. Are you planning to\interested in innovating your farming activities? Could an improvement of the irrigation service help you? Why and how?

10. Does the performance of the irrigation service affect productivity of your cultivated land? If there is relatively new rehabilitated irrigation system, did the rehabilitation has impact on the productivity? Did it cause to change your cultivation pattern?

11. [If GA customer] How do you evaluate the service provided by the GA? What are the main drawbacks? What needs to me improved most urgently? How reliable the service is?

12. Do you have a contract with GA? If no but you use the water service provided by GA, why don't you have a contract? What are the conditions of the contract? Do you know them?

13. Do you receive compensations in case of unreliable service ?

14. Is the existing tariff level acceptable for you?

15. Are there any specific changes\improvements in the system that could make the tariff increase acceptable? If yes, which? If no, why?

16. Is the payment of GA service tariff being an issue for you? Are you paying regularly? If not, why?

17. In case of conflicts with the water service provider what do you do?

18. How would you qualify the relation with your service provider?

19. Do you receive information from GA? What type of information? How?

20. Have you registered your agricultural land? Is a land registration an issue for you? What are the main obstacle you face?

21. Are you in favour of the establishment of WUA? If yes, why? If no, why? Are you planning to become actively involved in the WUA? If yes, why? If no, why?

Appendix 2. List of stakeholders interviewed

Entity	Name	Date
MEPA - Deputy Minister	Otar Shamugia	27/05/2021
MEPA - Department of Policy Analysis - head of policy coordination division	Lasha Zivzivadze	22/04/2021
MEPA - Department of Hydromelioration and Land Management	Gizo Chelidze	28/04/2021
MEPA - Department of Hydromelioration and Land Management	Ekaterine Sanadze	30/04/2021
MEPA – Division of water resource protection	Marina Makarova	20/04/2021
MEPA - Financial Department	Tamar Zedgenidze	28/04/2021
Georgian Amelioration - General director	David Tsitlidze	21/05/2021
Goergian Amelioration - Technical Director	Tengiz Lakirbaia	26/04/2021
Georgian Amelioration - Project Coordination and International relations Department	Levan Tabatadze; Nata Khutsurauli; Mikheil Margvelashvili	07/05/2021
Georgian Amelioration – WUO support unit	Davit Kajaia	07/05/2021 and 10/05/2021
Agricultural and rural development agency	George Jibladze	31/05/2021
National Agency for sustainable land management and land use monitoring	George Misheladze	20/05/2021
Ministry of Economy and sustainable development -Department of energy policy and investment projects	Tornike Kazarashvili	20/05/2021
Ministry of Finance	Shota Gunia	17/05/2021
GNERC - Tariff Department	Gocha Chitidze- Giorgi Kelbakiani	20/05/2021
GNERC - Water Department	Giga Nadiradze	20/05/2021
Georgian Farmers Association	Rati Kochlamazashvili - Edvard Shermadini	23/04/2021
World Bank project - GILMDP	Giorgi Kalandadze	17/05/2021
USAID	David Tsiklauri	20/05/2021
AFD	Raphael Jozan/Tanguy Vincent	10/05/2021
ADB	Avtandil Tskhvitava - Frank Radstake	24/05/2021
EIB	Seejore Jatin	20/05/2021
FAO	Javier SanzAlvarez	10/05/2021
FinExCoop	Christophe Cordonnier	28/05/2021
Consultants in charge of WUO development - GILMDP	Onno Schaap – Davit Kajaia- Gevorg Michikyan - Stephen Hodgson	31/03/2021 and 9/06/2021
Consultants in charge of land policy note	Salome Deisadze	23/04/2021
EUWI+ Georgian Office	Zurab Jincharadze	07/05/2021
Rural and agricultural policy development institute	Ilia Kvitaishvili	05/05/2021
External expert	Mark Svendsen	05/05/2021
External expert	David Tuchschneider	11/05/2021