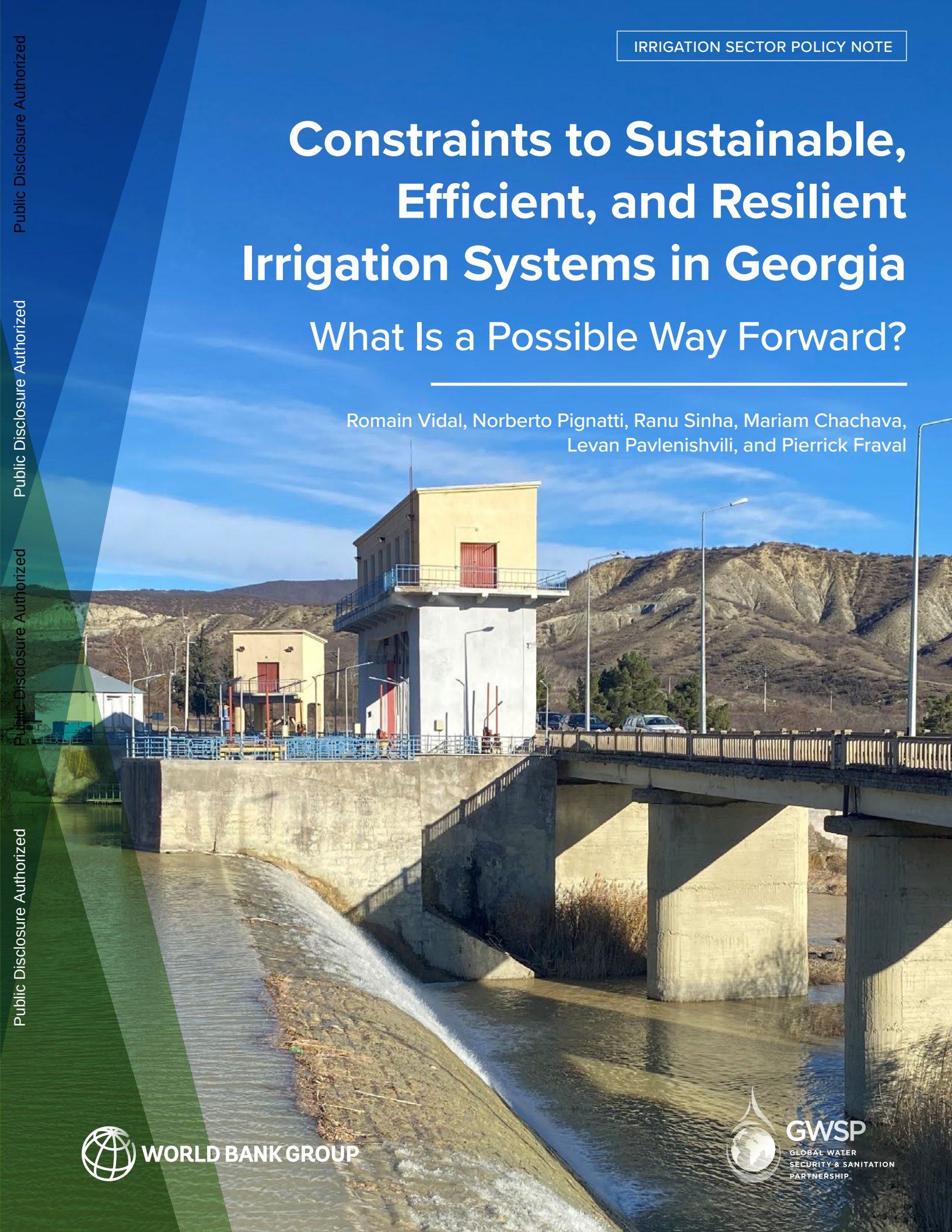
IRRIGATION SECTOR POLICY NOTE

Constraints to Sustainable, Efficient, and Resilient Irrigation Systems in Georgia

What Is a Possible Way Forward?

Romain Vidal, Norberto Pignatti, Ranu Sinha, Mariam Chachava, Levan Pavlenishvili, and Pierrick Fraval



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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 contributes significantly to exports—even though agriculture contributes a modest share to total gross domestic product (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 for high-value agriculture production. Non-irrigated areas are used for livestock grazing and rainfed cereal crops, and irrigated areas in the lower elevations are devoted to fruits and vegetables. In the mountains of the eastern and western regions, crops such as maize, wheat, and natural pastures are grown. The eastern part of the country has frequent droughts and requires irrigation to buffer climatic extremes. The western part of the country, which is wetter, has drainage problems.

After 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 because of a lack of economic or financial viability. The poor performance of the sector combined with the characteristics of farming systems, land reforms, transition to a market economy, and loss of markets with traditional trading partners 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.

Georgia faces important challenges related to developing its agricultural sector. It must rehabilitate I&D systems and establish institutional organizations to make the sector sustainable. An ambitious, nine-year irrigation strategy was initiated in 2017 (Georgia, MEPA 2017b). 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. The irrigable area has increased from 88,000 hectares in 2015 to about 130,000 hectares in 2020. However, many issues still need to be addressed to achieve sustainable, efficient, and resilient irrigation systems. Meanwhile, Georgia faces climate change and pandemic-related exogenous shocks related to food security and employment, which have negatively affected 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 from 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 that are hindering irrigation sector performance in Georgia and leading to the slow implementation of the irrigation strategy. It includes a brief overview of some of the factors contributing to these constraints:

- **Limited knowledge and data on water resources** and types of **farming systems**, preventing resilient I&D infrastructure development and management. Limited number of farmers willing to sign irrigation contracts with Georgian Amelioration (GA) or willing to join water user organizations (WUOs) because some have limited confidence in associative structures given recent history and at the same time think that GA does not pay much attention to their needs.
- **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 farmers' needs. Without rehabilitation of the main systems and the secondary and tertiary systems, there is limited irrigation water to farm fields; and secondary and tertiary systems are neglected without clear criteria for prioritization of irrigation rehabilitation and modernization.

- **Need to improve reliability of irrigation services** and service delivery systems. Climate risks such as increasing temperatures and variable rainfall levels can lead to increased production losses without more reliable irrigation services. GA has limited capacity to deliver timely and operationally efficient irrigation. Higher levels of government have not yet agreed on governance structure reforms (work is underway). The regulatory role by the Georgian National Energy and Water Supply Regulatory Commission (GNERC) for the irrigation sector will commence in 2023. Limited willingness of water users to pay a higher irrigation tariff without significant improvement in the service quality leads to a vicious cycle of limited recovery of operations and maintenance (O&M) costs by GA, increased reliance on state funds for GA operational activities, and deterioration of recently upgraded irrigation schemes.

- **Accelerate WUO establishment**. The WUO law is adopted, and GA has successfully established a WUO support unit, but establishment of WUOs is delayed, which does

not address the problem of low tariff collection rates, deteriorated tertiary irrigation systems, and limited irrigation water supply to farm fields.

- **Finalize reform of the irrigation tariff** to finance O&M costs of irrigation systems.
- **Need to establish advanced irrigation performance monitoring systems** and processes.
- **Increase the human resources for I&D development**.
- **Address gaps in policy coordination and encourage champions at all scales to accelerate irrigation performance**.

Because of delays in the implementation of the irrigation strategy, these gaps may prevent the government from reaching the target of restoring irrigable areas to 200,000 hectares by 2025. Considering the constraints, seven strategic themes are discussed in this note:

- **In any I&D investment project, the needs, constraints, and requirements of the farmers or water users and the needs of the surrounding environment (including economic, social, and ecological factors) should be studied so the effect of the planned investments can be anticipated and their design adjusted, if necessary**. Although this concept is a basic underpinning of a nation's sound irrigation development, these aspects could be strengthened in Georgia's I&D infrastructure interventions.
- **WUOs should be established in relevant irrigated command areas once the enabling conditions for their establishment (outlined in this note) are present**. When the technical, hydrological, economic, and social conditions are not met, other modalities for irrigation service delivery to farmers should be considered, including individual contracts between water users and GA 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 to WUO members, relevant infrastructure is in good working condition, or after ensuring the willingness and ability of potential WUO members to carry out rehabilitation works on secondary and tertiary schemes. These aspects can facilitate the process of irrigation management transfer (IMT) to future WUO members.
- **Adequate financing for O&M—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 (M&E) systems**.

- **Intra- and intersectoral dialogue** must be improved, and the conditions for **strong leadership** to flourish at all scales must be built.
- **Irrigation sector human resources must be strengthened** to allow for both a real implementation of the activities and a generational renewal of technical skill sets to meet future demands of irrigation services.
- GA can be further modernized by focusing on **performance-driven accountability** that has a **customer service approach equipped with modern tools for measuring performance, monitoring, and analyzing I&D services, as well as managing climate risks to water availability**. The objective should be to achieve the performance level of the private sector but be in service of the public. Accountability implies the development of robust **regulatory capacities** for the sector underpinned by a comprehensive and transparent monitoring of system performance. This takes the shift away from measuring investments made toward monitoring results of irrigation schemes, as well as subsidy policies and water allocation.

To support these overarching strategic themes, this note details a practical and complementary action plan to reinforce the successful steps the government has already taken 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 the Ministry of Environmental Protection and Agriculture of Georgia (MEPA) and GA in detailed sessions, and decision-makers reviewed the constraints and recommendations proposed in the note. The study team 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 table ES.1 in order of priority, as reported by MEPA and GA.

TABLE ES.1 Recommended Short- and Medium-Term Actions in Georgia's Irrigation Sector

Recommendations and actions endorsed for immediate priority action by MEPA	Rationale for endorsement and prioritization
Strengthen service delivery capacity of GA **Carry out a service delivery performance assessment of GA** and form an action plan to make it more customer-oriented, accountable, reliable, efficient, and financially sustainable. Clarify what performance means (and should be) for GA and improve M&E to shift from measuring investments to monitoring results	• GA institutional model needs to be clarified to allow for more efficient operation, lower the burden on the state's financial resources, yet be an agency at the service of public policies in the sector. • GA's tools, procedures, and ways in which performance is assessed and activities are monitored need to be modernized in the short term, both internally (how GA monitors and evaluates its 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), need to be addressed.
Prioritize investments through I&D 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. • 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. (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 is a prerequisite for the establishment of WUOs and the definition of an appropriate water tariff.
Design, calculate, and introduce an appropriate regional binary bulk irrigation tariff	• Financial resources for the sector and covering O&M costs are crucial topics. The difficulty lies not so much in calculating an appropriate tariff as in the steps to implement a new tariff.

(table continues next page)

TABLE ES.1 *(Continued)*

Recommendations and actions endorsed for immediate priority action by MEPA	Rationale for endorsement and prioritization
Strengthen cooperation with higher education institutions and the Ministry of Education and Science to increase specialist graduates for recruitment in key water sector agencies in the Georgian government	• The issue of generational renewal in the I&D sector, regardless of the actor involved, should be addressed as soon as possible. • The problem of attractiveness of the irrigation sector's professions 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 to implement such reforms (e.g., financing the establishment of advanced programs in the fields in which specialists are most needed).
Establishment of successful and sustainable WUOs **Scale and sustain recent recruitments of regional WUO support staff to lead WUO establishment processes with annual budgetary support for long-term sustainability** in which schemes are going to be rehabilitated and water users express the willingness to self-organize and contribute to WUO establishment	• Establishment of WUOs is an important area of reflection for the ministry; it is not only a question of establishing them but also of making them operational and sufficiently independent so they can operate sustainably. • MEPA aims that some WUOs can be established under the ongoing World Bank–funded GILMDP, but the interest of this project is to clearly identify associated costs and good practices 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 for medium-term implementation	**Rationale for endorsement and prioritization**
Invest in a robust HAIP for integrated monitoring of water and agriculture and set up a HAIC	• Modernizing through 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. • Pilot approaches can be used to assess the relevance and costs associated with these new tools.

(table continues next page)

TABLE ES.1 *(Continued)*

Recommendations and actions endorsed for immediate priority action by MEPA	Rationale for endorsement and prioritization
Strengthen MEPA's capacities	• Assessment of ongoing personnel and skills needs in MEPA and the sector, skill upgrading, and updating initiatives should be ongoing as the needs of the sector evolve and the strategy progresses.
Strengthen institutional mechanisms and find new ways to improve intra- and intersectoral dialogue	• Intra- and intersectoral dialogue 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. • Stakeholder association agreements with clearly defined implementation plans specifying the responsibility of each main stakeholder or group of stakeholders would engage stakeholders in fruitful exchanges and lead to better outcomes than committees alone.

Note: GA = Georgian Amelioration; GILMDP = Georgia Irrigated Land Markets Project; HAIC = hydro-agro informatic center; HAIP = hydro-agro informatics program; M&E = monitoring and evaluation; MEPA = Ministry of Environment Protection and Agriculture; WUO = water users organization.

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Abbreviations

ADB	Asian Development Bank
AFD	Agence Française de Développement
ASA	advisory services and analytics
DSI	General Directorate of State Hydraulics
EIB	European Investment Bank
EU	European Union
EUWI+	European Union Water Initiative Plus
FAO	Food and Agriculture Organization
GA	Georgian Amelioration
GDP	gross domestic product
GFA	Georgian Farmers' Association
GILMDP	Georgia Irrigation and Land Market Development Project
GNERC	Georgian National Energy and Water Supply Regulatory Commission
GoG	Government of Georgia
HAIC	hydro-agro informatic center
HAIP	hydro-agro informatics program
I&D	irrigation and drainage
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
M&E	monitoring and evaluation
NEA	National Environment Agency
NGO	nongovernmental organization
O&M	operations and maintenance
OECD	Organisation for Economic Co-operation and Development
PPP	public-private partnership

RAPDI	Rural and Agricultural Policy and Development Institute
RC	Reclamation Consortia
RDA	Agricultural and Rural Development Agency
RIA	Regulatory Impact Assessment
USAID	United States Agency for International Development
WFD	Water Framework Direcstive
WSA	water supply agency
WUA	water users association
WUO	water users organization

Georgian lari: 1 GEL = US$ 0.317 (June 2021)

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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."

—Official from MEPA[1]

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 semiarid, and the west is more subtropical with over 1,000 millimeters of rainfall per year. Irrigation is a common requirement in the east, and artificial drainage is often required in the west. To support and develop its agricultural sector, the Georgian government initiated an ambitious, nine-year irrigation strategy in 2017 (Georgia, MEPA 2017b). 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 hectares in 2020. However, many issues still need to be addressed on the way to sustainable, efficient, and resilient irrigation and drainage (I&D) 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. Constraints result in lowered

efficiency of investments and create a significant burden on the state budget to finance recurring costs to build, maintain, and operate aging irrigation systems.

Meanwhile, the development of the drainage sector has been characterized by ad hoc projects initiated by local governments and implemented by the centralized amelioration authority, Georgian Amelioration (GA). Because there is no dedicated agency focused on sustainable drainage management in Georgia, this leads to reduced focus and investment in developing the drainage sector.

This report intended to examine the status of I&D in Georgia. But because of limited awareness among the stakeholders interviewed about the drainage sector, no nationally approved drainage strategy, and limited data on the status of drainage systems, this report was unable to gather adequate information for analysis. Thus, this study presents 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 is to identify obstacles to building a sustainable irrigation sector in Georgia, grounded in the perspectives of the actors who work and are affected by irrigation-related challenges. Identifying 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. The intention is to help them to improve policy coherence by bringing together a wide range of perspectives, define concrete steps to tackle serious constraints, and contribute to a sustainable and efficient irrigation sector to enhance food security, farm incomes, and climate resilience of agriculture in Georgia.

Why this Note 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 advisory services and analytics [ASA]). The objectives are to close key knowledge gaps and identify binding constraints for the development of these three interrelated sectors. The ASA recommends

policy actions to close the gaps in these sectors and build a solid and integrated approach for a much more productive, competitive, environmentally sustainable, and diversified agricultural sector to emerge.

This note aims to sensitize policy makers and other key actors in Georgia on the rationale and urgency of critical water, agricultural, land, and rural development reforms to foster an integrated vision of agri-food systems across the agriculture-water-land nexus. It supports identifying relevant actions to implement because **the need for an integrated approach is becoming urgent 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 affect 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.

Structure of this Policy Note

Section 2 presents the approach, data collection strategy, and methdological tools for analysis used to conduct the diagnostic exercise. Section 3 presents the critical conditions for achieving sustainable irrigated agriculture according to international experience. Section 4 provides an overview of the Georgian irrigated agriculture sector context. Section 5 identifies major constraints for the irrigation sector in Georgia, including root causes, and impacts emerging from interviews of core actors. Section 6 provides strategic directions and practical short- and medium-term recommendations to address the root cause issues and accelerate sustainable irrigated agriculture in Georgia.

Note

1. All quoted statements are from stakeholders interviewed between March and June 2021.

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Approach, Data Collection, and Analytical Strategy

2.1 Stepwise Approach and Strategy for Irrigation Sector Diagnostic

The first step in conducting the irrigation sector diagnostic for Georgia was to agree on an analytical approach based on what is "good" irrigation sector performance. These can be summarized as:

- **Irrigation water service is timely and reliable**. Water resources are adequate, infrastructure is adapted to the needs of users and is in good condition, water delivery services meet water demand, and financial and human resources are sufficient.
- **Irrigation infrastructure is sustainable with regular operations and maintenance (O&M)**. Infrastructure remains functional over time and is adapted to different farming systems; climate risks and 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**. 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; and 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.

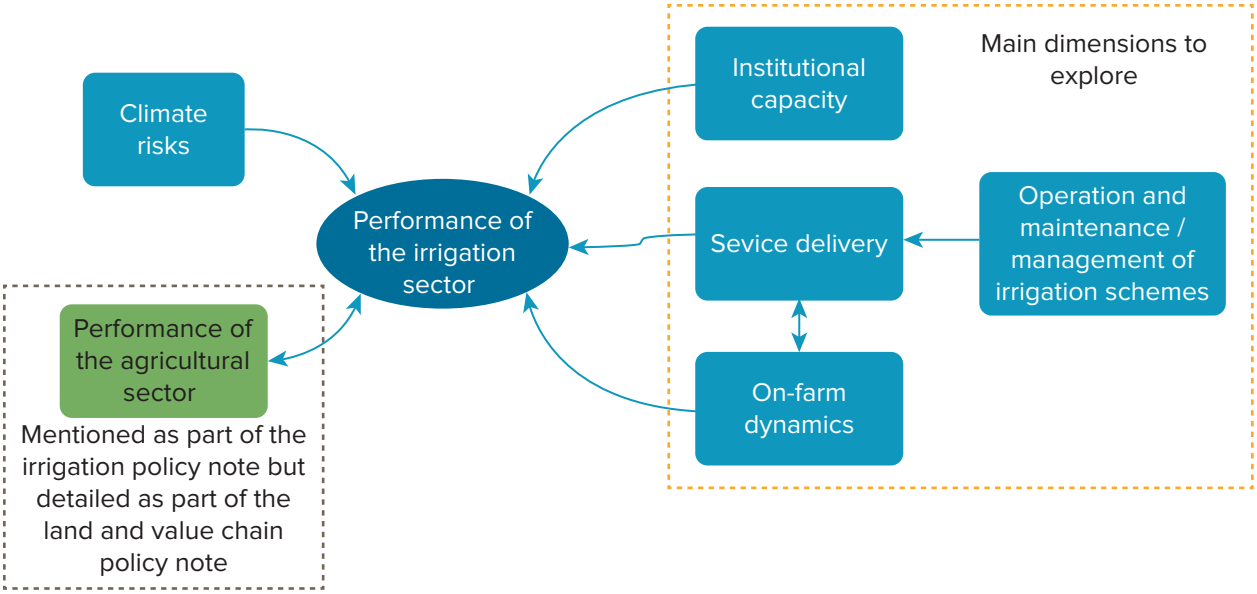
Based on these overarching ingredients for success, the following dimensions were selected to be explored to assess the state of irrigation performance in Georgia:

- Irrigation sector institutional capacity at the national level
- Service delivery and O&M of irrigation systems
- On-farm dynamics for water users, including their irrigation technology choices
- Resilience to climate risks
- Performance of the agricultural sector

These five core dimensions are key to study the performance of an irrigation sector. 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 influences, too. Dimension 5, the performance of the agricultural sector in Georgia, partially results from the performance of the irrigation sector, but it also affects the way the irrigation and drainage (I&D) schemes are managed and operated. However, this theme is studied through separate assessments for the preparation of land and value chains policy notes 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 I&D projects, and some preliminary analysis of recent rainfall and temperature data indicating general trends with respect to hydrological risks to irrigation in Georgia. On-farm dynamics were studied but not in detail. Figure 2.1 summarizes the dimensions and the scope of the assessment. These dimensions can be linked to the critical conditions required for well-performing sustainable irrigated agriculture (see chapter 3 for a detailed discussion of these conditions).

The **second step** involved identifying relevant stakeholders to meet, preparing questionnaires, and listing data to be collected. The questionnaires are specific to each stakeholder and make it possible to explore the core dimensions. The questionnaires and list of data collected are in appendix A. 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 on the key questions to be explored and

FIGURE 2.1 Dimensions Influencing the Performance of the Irrigation Sector in Georgia



Source: Authors.

consultations to be undertaken to conduct the analysis and engage the stakeholders in a collective reflection process.

The **third step** was to conduct semistructured interviews and focus group discussions with stakeholders (see table 2.1). 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. Fourteen out of 21 farmers were interviewed by phone and the balance through focus group discussions. The small sample size of farmers interviewed does not allow for representativeness, which means that the information should be viewed with caution, but it does provide useful qualitative information.

In parallel, a significant desk literature review on the irrigation sector in Georgia, irrigation systems sustainability and irrigation management transfer[1] (IMT) was carried out. For 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).

TABLE 2.1 Interview and Discussion Participants and Why They Were Chosen

Who	Why	Dimensions consulted
MEPA (deputy minister of the MEPA, Dept. of Policy Analysis, Dept. of Hydromelioration and Land Management, Div. of Water Resource Protection, Financial Dept.) MEPA oversees the implementation of state policy in environmental protection, agriculture, and rural development.	Discuss institutional capacities; definition and advancement of the irrigation strategy and drainage strategy; core legal framework and strategies for establishment of WUOs; relationships between stakeholders, legal and regulatory framework; performance of agricultural sector and irrigation from a national perspective; ongoing projects; upcoming or pipeline policies and projects.	• Institutional capacity at national level • Performance of agricultural sector
GA Formed in 2012 by merging four regional amelioration services companies, GA is the state-owned company in charge of O&M and development of I&D schemes. It is held by the National Agency for State Property Management, a division of the Ministry of the Economy, and it reports to MEPA. It owns I&D-related infrastructures. It provides I&D services at primary, secondary, and sometimes tertiary levels.	Discuss I&D strategies from national and local perspectives; irrigation sector performance; organization of GA and constraints in day to day management at national and local levels (legal, regulatory, human, financial, infrastructure constraints, and so on); performance of I&D services; quality processes around irrigation system management and O&M; relationships with water users; WUO reform and perspectives for GA; ongoing rehabilitation projects.	• Service delivery • On-farm dynamics • Resilience to climate risks
GA, WUO support unit This subunit is in charge of establishment of WUO.	Discuss WUO reform and WUO establishment processes, including steps being taken to implement WUO law (2019); constraints and delays in implementation of reform and WUO law.	• Service delivery • On-farm dynamics
Agricultural and Rural Development Agency This agency is under MEPA. It implements agricultural and rural policies.	Discuss performance of agricultural sector; relationships between irrigation and agriculture; irrigation service constraints and on-farm dynamics; degree of micro-irrigation adoption.	• Institutional capacity at national level • Performance of agricultural sector • On-farm dynamics • Resilience to climate risks

(table continues next page)

TABLE 2.1 *(Continued)*

Who	Why	Dimensions consulted
National Agency for Sustainable Land Management and Land Use Monitoring This new agency, created in 2020 under MEPA, is in charge of registration of agricultural land resources, production of land balance, creation of database, activities related to sustainable land management, and so on.	Discuss relationships between land management and irrigation sector performance; issues of land registration and land management.	• Institutional capacity at national level • Performance of agricultural sector • On-farm dynamics
Ministry of Economy and Sustainable Development	Discuss performance of agricultural and irrigation sector.	• Institutional capacity at national level • Performance of agricultural sector
Ministry of Finance	Discuss financial flows with GA and their magnitude.	• Institutional capacity at national level
GNERC It commission reviews and approves tariffs charged by GA.	Discuss water tariff issues and capacity to perform the function of an irrigation regulatory body; interagency coordination and cooperation with MEPA and GA.	• Institutional capacity at national level • Service delivery
GFA Founded in 2012, it is a noncommercial, nonprofit legal entity. It currently unites about 4,000 farmers across Georgia. The association acts as a facilitator between the government and farmers. It is a member of governmental and nongovernmental boards, such as the Georgian Chamber of Commerce and Industry and the Georgian Alliance for Agriculture and Rural Development.	Discuss performance of agricultural sector; relationships between irrigation and agriculture; irrigation service constraints; on-farm dynamics of farmers; climate risks.	• Performance of agricultural sector • Service delivery • On-farm dynamics • Resilience to climate risks

(table continues next page)

TABLE 2.1 *(Continued)*

Who	Why	Dimensions consulted
Farmers (water users)	Discuss performance of water service and relationships with service providers, including general awareness about WUOs; expectations from irrigation system and linkages with farmers' choices (land registration, crop choice, irrigation technology choice, water collection and use); constraints for farming systems (irrigation service and nonirrigation service); changes experienced in rainfall, temperature, and climate impacts; mitigation strategies.	• Service delivery • On-farm dynamics • Resilience to climate risks
RAPDI It 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 performance of irrigation and agricultural sector.	• Institutional capacity at national level • Performance of agricultural sector • Service delivery • On-farm dynamics • Resilience to climate risks
Community of donors (World Bank, USAID, IFAD, AFD, ADB, EIB, FAO)	Discuss past and ongoing projects; constraints, difficulties encountered, successes, and perspectives from donors' points of view; organization of irrigation sector.	• Institutional capacity at national level • Performance of agricultural sector • Service delivery • On-farm dynamics • Resilience to climate risks

(table continues next page)

TABLE 2.1 *(Continued)*

Who	Why	Dimensions consulted
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 strategy, constraints, and perspectives for irrigation sector.	• Institutional capacity at national level • Performance of agricultural sector • Service delivery • On-farm dynamics • Resilience to climate risks

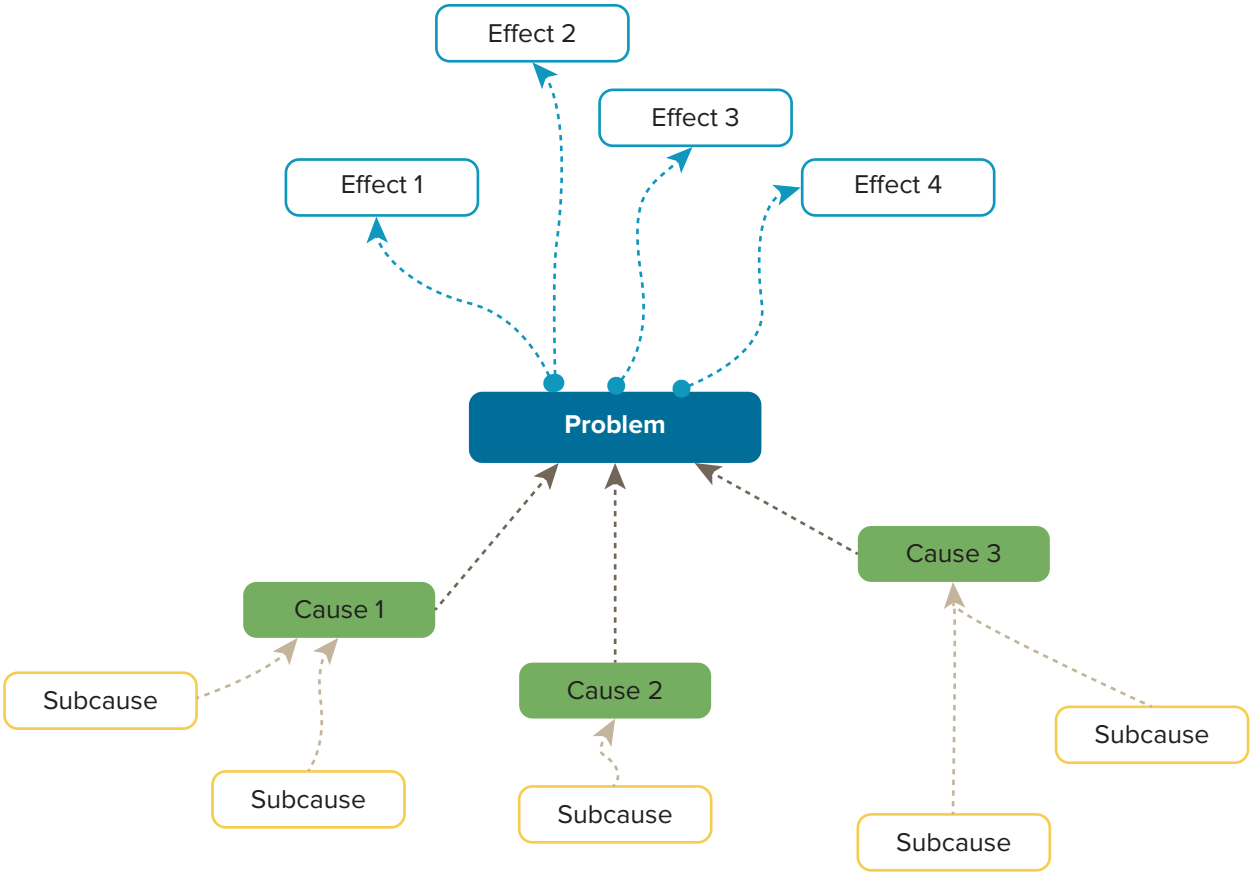
Note: ADB = Asian Development Bank; AFD = Agence Française de Développement; EIB = European Investment Bank; FAO = Food and Agriculture Organization; GA = Georgian Amelioration; GFA = Georgian Farmers' Association; GNERC = Georgian National Energy and Water Supply Regulatory Commission; I&D = irrigation and drainage; IFAD = International Fund for Agricultural Development; MEPA = Ministry of Environmental Protection and Agriculture; O&M = operations and maintenance; RAPDI = Rural and Agricultural Policy and Development Institute; USAID = United States Agency for International Development; WUO = water users organization.

2.2 Methodological Tools for Analysis of Data

A problem tree methodological approach was used to carry out the analysis and derive recommendations, factoring in relevant data and opinions (literature review and interviews). The problem tree is a diagram showing the cause-effect relationships (figure 2.2). It is used to identify what causes the problem and what are the impacts or effects of the problem. The first step is to identify the problems. Then a hierarchy of causes and effects is established for the problem, which can be global. 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 to create an easily understandable visual output.

The problem tree methodology has been used for some time in the Georgian context, particularly while performing Regulatory Impact Assessments (RIAs). Some relevant references were developed as a manual for practitioners to support civil servants engaging in RIAs in Georgia (ISET Policy Institute 2021). They explain how to apply the problem tree approach in the RIA context. Two other examples are in USAID (2020) and UN Women (2021). In addition, mind mapping was used as a visual tool to display the analysis and results in this policy brief.

FIGURE 2.2 Problem Tree Diagram



Note

1. Irrigation management transfer (IMT) is 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, Muñoz, and Vermillion 2007).

3

Understanding the Critical Conditions for Achieving Sustainable Irrigated Agriculture

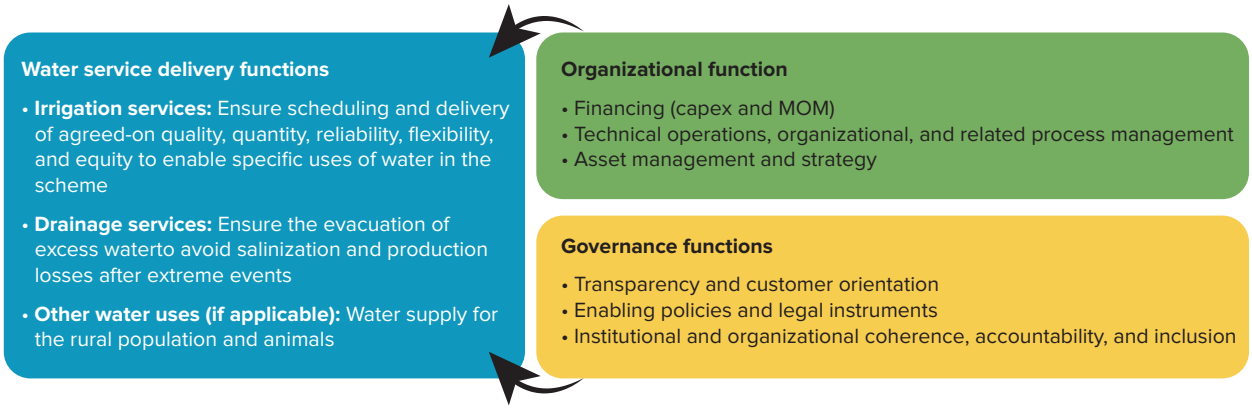
3.1 Global Frameworks for Measuring Irrigation Performance

International experience teaches us that several conditions must be met to achieve a well-performing, sustainable irrigated agriculture sector. Waalewijn et al. (2020) lays the foundations for understanding the key functions of performance in irrigation. Drawing on Ostrom (1990) and Merrey et al. (2007), a framework based on a practical set of performance areas of interest has been developed. It considers three thematic areas made up of groups of functions. Figure 3.1 summarizes the performance area per functional themes.

Although this framework provides important insights, sustainability is missing. Financial and environmental sustainability are key dimensions of irrigation sector performance. OECD (2021b) states that designing coherent policies is a complex task because of the synergies and trade-offs between different dimensions. Relevant policy actions for one dimension of performance could have negative side effects and be counterproductive to sustainability. OECD (2021b) proposes 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.

FIGURE 3.1 Functional Themes and Performance Areas



Source: Waalewijn et al. 2020.

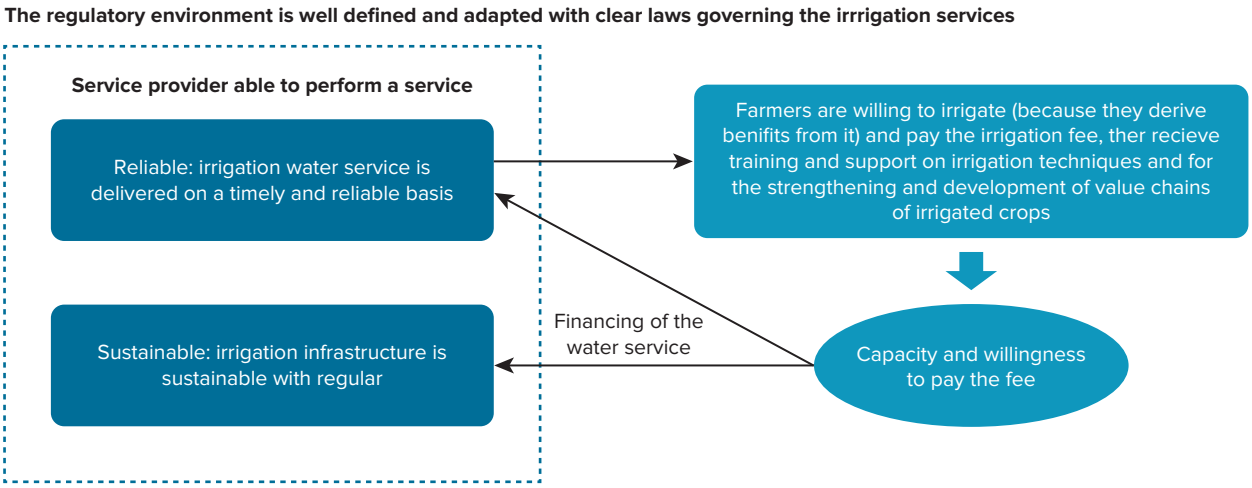
- Even when synergies are found, a single policy instrument will rarely be sufficient to achieve all objectives. A mix of instruments is usually needed.
- Trade-offs can sometimes be avoided by a different choice of policy instruments. In other cases, society must choose between competing objectives. This is not a purely technical question but involves value judgments.

In the irrigation sector, policy makers often need to define a water tariff covering the O&M expenses and 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. This situation affects 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 or implemented irrigation policy can have undesirable effects, such as overexploitation of water resources, soil salinization, or abundance of low value crops with high water footprint. There is also the threat of negative impacts such as food security or lower income potential for farming communities that are traditionally less well-off.

3.2 Applying and Benchmarking Irrigation Themes in Georgia

The World Bank's global framework can be developed as a list of necessary conditions for well-performing, sustainable, and efficient irrigated agriculture (figures 3.2 and 3.3). They can

FIGURE 3.2 Factors of Good Irrigation Sector Performance



Source: Authors.
Note: O&M = operations and maintenance.

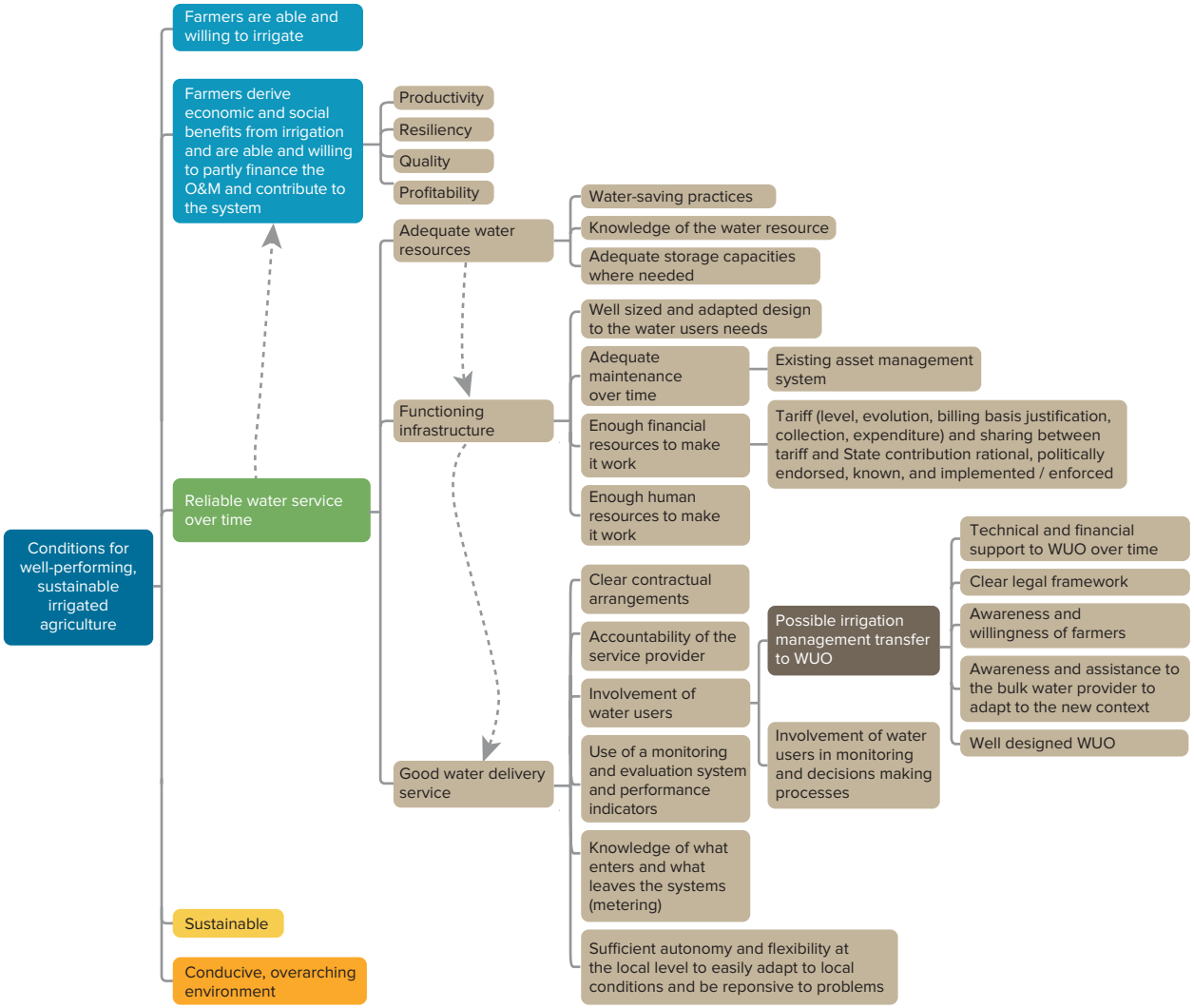
be linked to the core dimensions of assessment (institutional capacity, service delivery, and O&M of irrigation schemes, on-farm dynamics, and resilience to climate risks, as presented in chapter 2).

3.3 Preliminary Constraints to Sustainable Irrigation Performance

During the inception workshop 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 constraints illustrate the clear linkages with the five dimensions of analysis presented in chapter 2 and the necessary conditions for measuring irrigation sector performance (figure 3.3):

- Agriculture is generally *not seen* as a business opportunity—despite Georgia's rich natural assets 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 who want to expand. The lack of agricultural inputs of quality—as well as qualified staff, extension services, or structured value chains—are issues for agricultural development.

FIGURE 3.3 Conditions for Well-Performing and Sustainable Irrigated Agriculture



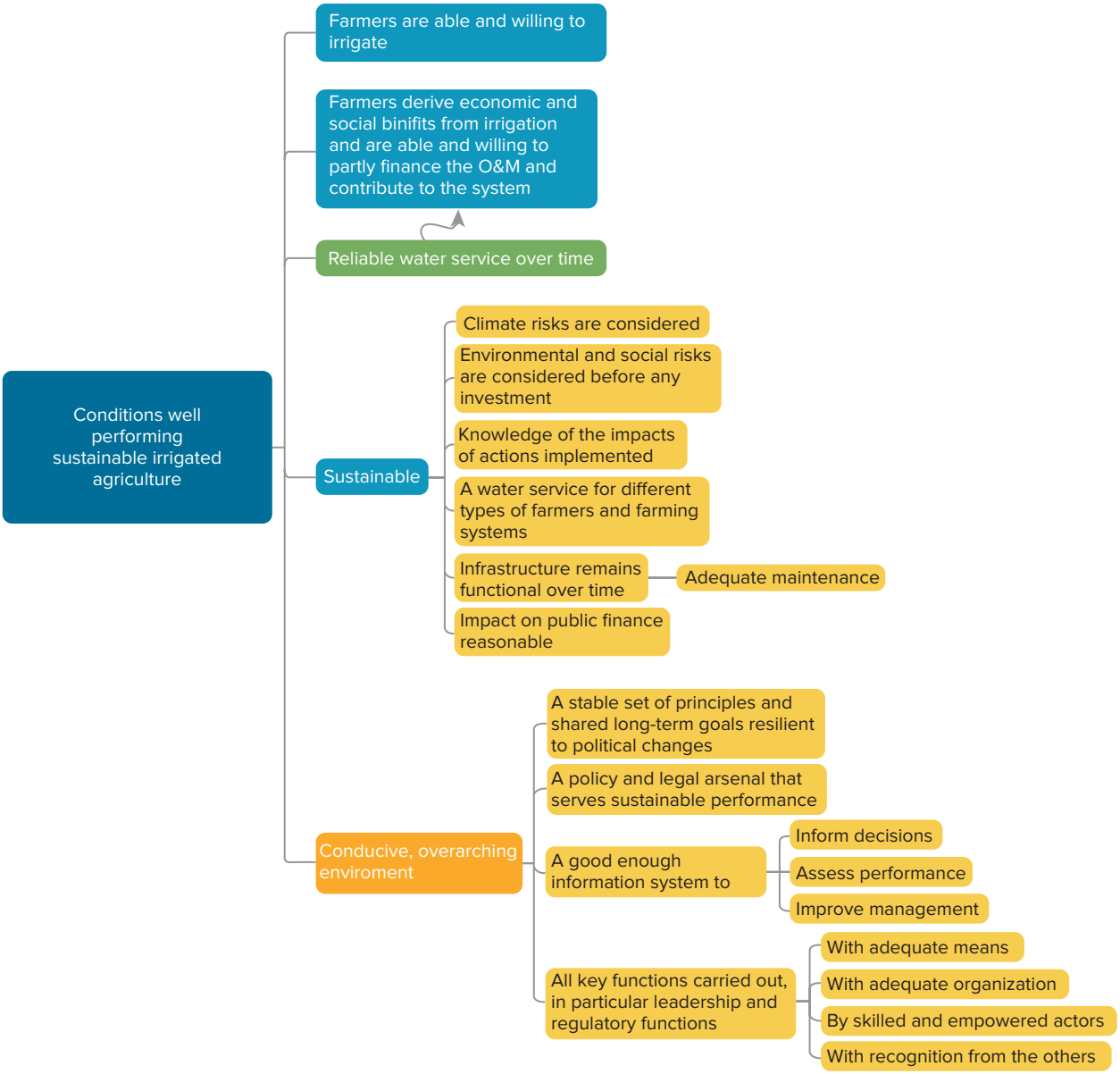
(figure continues next page)

Source: Authors.

- **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

- Infrastructure at secondary and tertiary levels are not always in good condition.
  - **Dimension**. Service delivery
  - **Conditions**. Functioning infrastructure

FIGURE 3.3 *(Continued)*



Source: Authors.

- 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 integrated water resources management (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 is reasonable

- There is a shortage of skilled staff
  - **Dimension**. Service delivery, institutional capacity
  - **Conditions**. Adequate quantity of skilled human resources to operate infrastructure; all key functions carried out with adequate means

- There are delays in the establishment of water user organizations (WUOs)
  - **Dimension**. Service delivery
  - **Conditions**. Conditions for successful irrigation management transfer to WUOs (e.g., legal framework, awareness)

- The monitoring and evaluation (M&E) system is insufficiently developed to inform decisions, assess performance, and improve management
  - **Dimension**. Service delivery, institutional capacity
  - **Conditions**. Use of M&E system and performance indicators, a good enough information system

- Multistakeholder dialogue should be more developed
  - **Dimension**. Institutional capacity
  - **Conditions**. Conducive overarching environment

These constraints are discussed in depth in chapter 5 with reference to information gathered during individual stakeholder interviews and that build on the initial findings from the inception workshop.

4

Understanding the Georgian Irrigated Agriculture Context

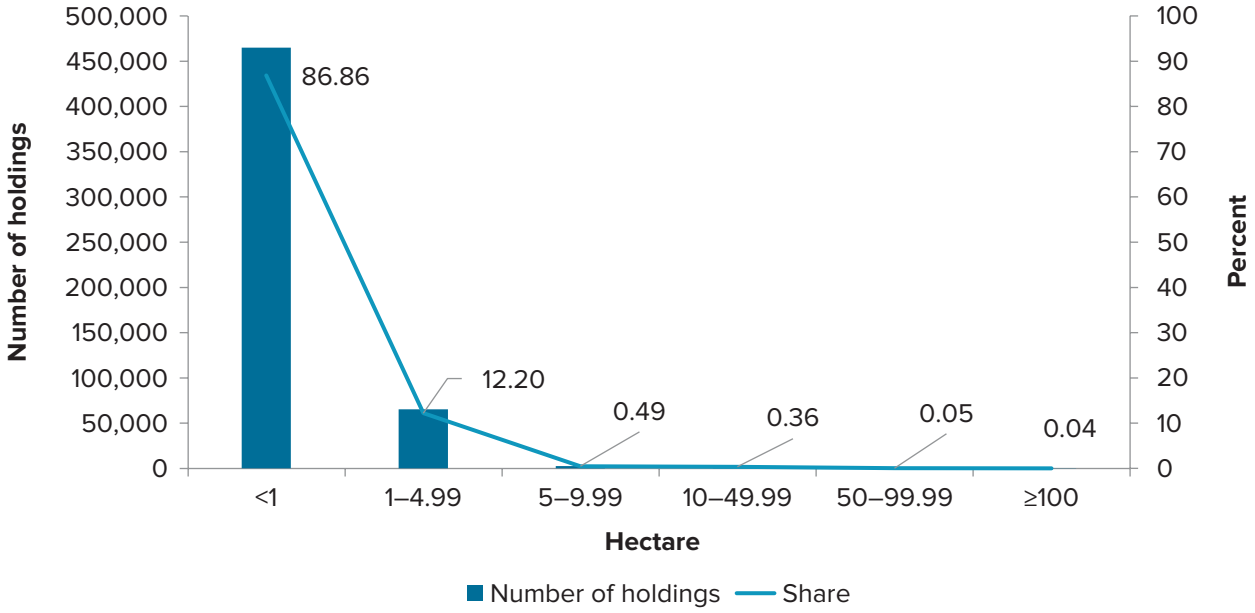
4.1 Overview of Agriculture Sector

Agricultural gross domestic product (GDP) growth averaged 2.3 percent per year in real terms between 2011 and 2019, compared to 4.7 percent for the overall economy. In 2020, GDP growth was affected by the COVID crisis (decreasing by 6.2 percent compared to that of 2019), but the agricultural GDP growth continued to increase (plus 3.6 percent). Agriculture officially employs 19.8 percent of the population and makes up 7.4 percent of total GDP. In addition to those officially employed in agriculture, a large percentage of the population living in the countryside depend on agricultural activities for their living. Most farmers are part of 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 hectares, and 86.9 percent of agricultural holdings are operating arable land of less than 1 hectare. Only 0.1 percent own more than 50 hectares (see figure 4.1). Because of structural bottlenecks, Georgian agriculture is not attractive to new generations. In 2020, only 0.3 percent of agricultural land holders were younger than 25 years old, and 54 percent were older than 60.[1] According to the National Agency of Public Registry (2019), 38 percent of landowners or co-owners in the irrigated areas were female, but the percentage of female water users (landowners who agreed to have irrigation service contracts with Georgian Amelioration [GA]) was just 3.7 percent.[2]

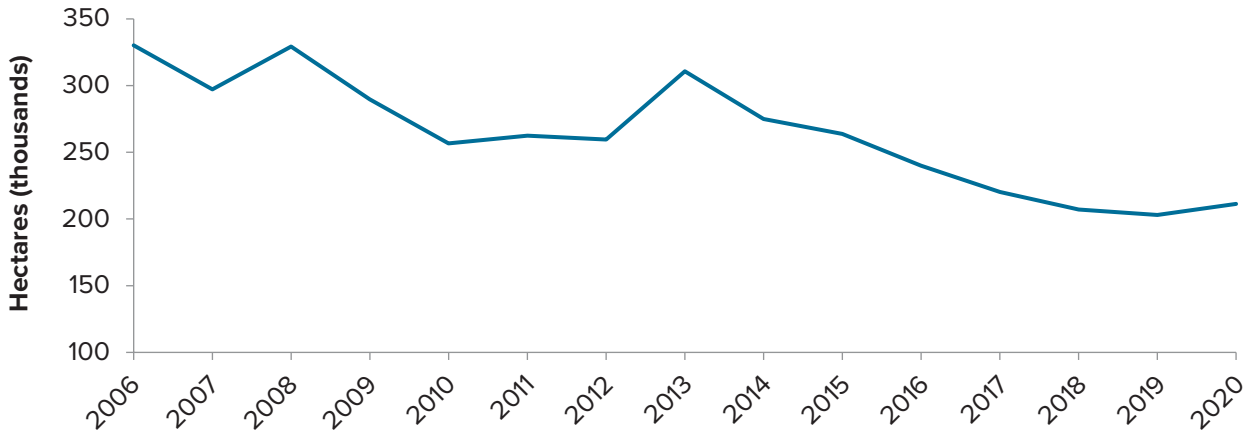
In 2020, 210,000 hectares of land were sown with annual crops.[3] Twenty-nine percent of the sown area was devoted to winter crops, such as wheat and

FIGURE 4.1 Distribution of Land Holding by Hectare Size, Georgia, 2014



Source: Geostat, Census 2014.

FIGURE 4.2 Sown Hectares of Winter and Spring Crops, Georgia, 2006–20



Source: https://www.geostat.ge/en/modules/categories/196/agriculture, Retrieved in July 2021.

barley, while the rest, 150,000 hectares, was occupied by spring crops, such as grain and leguminous crops (102,000 hectares); potato, vegetables, and melons (32,000 hectares), and other crops (17,000 hectares). The land area under permanent crops was 121,000 hectares, mainly orchards (74,000 hectares) and vineyards (36,000 hectares). The sown area of winter and spring crops has been decreasing regularly since 2006 but that 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 in figure 4.2.

In Georgia, most of the high-value agricultural production[4] is in the central and eastern regions and partly relies on irrigation. The Kakheti region represents about 40 percent of the agricultural land, and Kvemo Kartli, 15.5 percent.[5] According to the irrigation strategy, one of the goals of the Government of Georgia (GoG) is to restore Georgia's position as an important exporter of high-value agricultural products (as it was during the Soviet period) (Georgia, MEPA 2017b). 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 toward high-value crops.

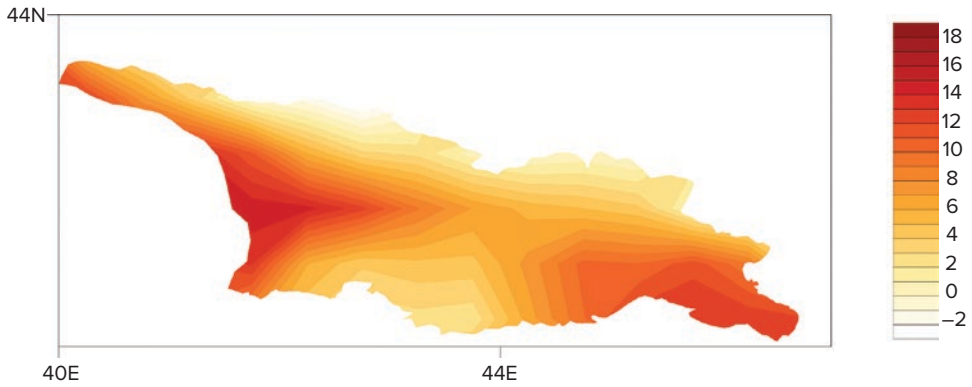
4.2 Climate Change in Georgia

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

Temperature. Georgia has two distinct climate zones in the west and the east. The Greater Caucasus range to the north of Georgia moderates local climate by serving as a barrier against cold air from the north. The Likhi range, crossing from the north to the south, divides the country into the Caspian Sea and the Black Sea catchments. Western 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°C to 14°C. Mountainous regions have a colder climate, with average annual temperatures of 2°C 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°C to 24°C, and winter temperatures range from 2°C to 4°C (figure 4.3). From 1960 to 2015, temperatures warmed all over the country. Georgia has experienced increased temperatures of 0.3°C in western regions, with a maximal increment in Dedoplistskaro (0.9°C) and 0.4°C to 0.5°C in eastern regions, with a maximum increase of temperature in Poti (0.6°C). Mtskheta-Mtianeti and Kakheti saw a relatively weaker but significant warming trend.

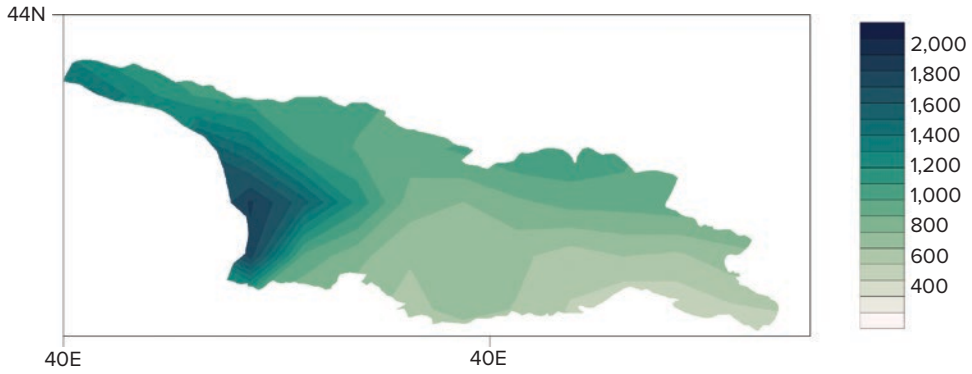
With the rise in average temperature, the number of frost days will progressively decrease, and increasing temperatures will lead to glacier melt, reducing water surpluses. During the last 50 years, the number of glaciers in Georgia decreased by 13 percent, and the glacier area decreased by 30 percent.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

FIGURE 4.3 Annual Mean Temperature in Georgia, 1901–2019



Source: World Bank 2020.

FIGURE 4.4 Annual Mean Precipitation in Georgia, 1901–2019



Source: World Bank 2020.

Precipitation and water resources. Due to the altitude diversity and landscapes comprising mountains, lowlands, and river basins, Georgia boasts several microclimates and rainfall patterns with a mix of subtropical and continental climates. The distribution of annual precipitation shows a clear division between a humid western and an arid eastern Georgia (figure 4.4).

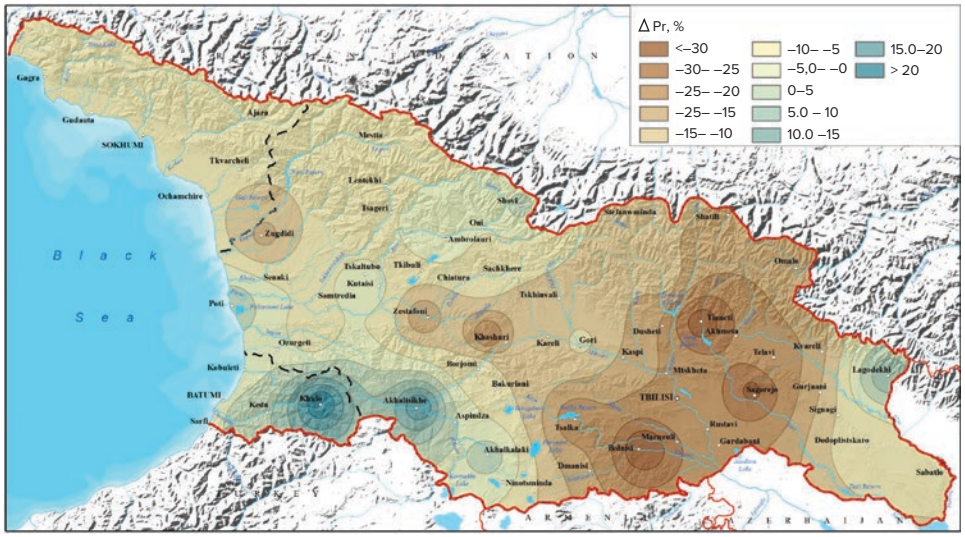
Despite Georgia's wealth in water resources, with 14,000 cubic meters of surface water per capita, compared to the European average of 9,300 cubic meters (Georgia, MEPA 2019), available water resources are not evenly distributed in Georgia, and they are mainly accumulated in the western part of the country.[6] Moreover, the availability of water resources is highly dependent on the seasons. River flows, especially in eastern Georgia, depend on snowmelt. High flows occur in April to May, and low flows, July to August, during the peak of when crops need irrigation.

Across the South Caucasus subregion, climate trends show a slight decrease in mean precipitation over the past decade, although heavy precipitation has increased in certain areas. From 1960 to 2015, precipitation rates increased in western Georgia—specifically in Svaneti low hill zones, Adjara Mountain areas, and Poti and Imereti mountain areas—with a few exceptions, such as the eastern part of Adjara at Goderdzi Pass (figure 4.5). Apart from the Lagodekhi municipality, in which precipitation slightly increased, eastern Georgia had a reduction trend in precipitation. Glacial run-off is projected to decrease by 40 percent compared to 2010 levels by 2100, which will severely affect Georgia's energy, agriculture, and ecosystems. Droughts are expected to put further pressure on water availability.

The warming trend is clear in Georgia, according to all four emissions pathways (RPC 2.6; 4.5; 6; 8.5) (plus 1.6°C to 3.0°C in 2041 to 2070 compared to that of 1971 to 2000) (Georgia, GoG 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 expected to negatively affect irrigation water availability by reducing river flows, with significant impacts on most crop yields (about minus 30 percent in the eastern lowlands in the 2040s) (Ahouissoussi, Neumann, and Srivastava 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

FIGURE 4.5 Precipitation Changes in July between Two 30-Year Periods in Georgia, 1956–85 and 1986–2015



Source: GoG 2021.

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 increases in average temperature and drought periods. The last of these severe droughts happened in 2020, with yields lower than average.
- **Maize**. About 70 percent of maize comes from western Georgia, where humidity is high and production is not significantly dependent on irrigation. However, high temperatures can lead to serious negative impacts, such as invasive pests reaching these altitudes. Kakheti, a maize producing region, has seen a change in rainfall patterns, 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 eastern region. Approximately 38,000–40,000 hectares are 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 in May to June have increased by 10 percent in the past 10 years. This has led to increased water levels and flooding in areas of newly harvested potato seeds and higher infestation of fungus, especially phytophtora and alternaria.
- **Tangerines**. Most of the tangerines come from the Adjara and Guria region (southwestern region). The expected increase in average temperatures, in general, will positively affect the sector. However, 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, droughts in July through August, and an increase of hot winds negatively affect hazelnut productivity.
- **Meadows and pastures**. Of about 1.9 million hectares 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 facilitate the spreading of livestock diseases and even introduce new types of insects.

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.

4.3 Evolution and Context of the I&D Sector

Georgian irrigation (also known as the amelioration) sector infrastructure was mainly built when the country was part of the Soviet Union. The total irrigated area reached 386,000 hectares in 1988 (MEPA, 2017b). However, this area was irrigated despite the extremely high costs of operations and maintenance (O&M) of the systems (ISET Policy Institute 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. By 1988, 114,000 hectares of land were drained. However, since it received nearly no maintenance for a long time, the infrastructure continued deteriorating until 2012.

Up until 2011, four state-owned companies in different regions of the country provided amelioration services. In 2011, these companies were merged into Georgian Amelioration (GA) Ltd., which operates under the Ministry of Environmental Protection and Agriculture (MEPA) and is the sole provider of irrigation and drainage (I&D) services in the country. GA manages and carries out rehabilitation works of the amelioration infrastructure.

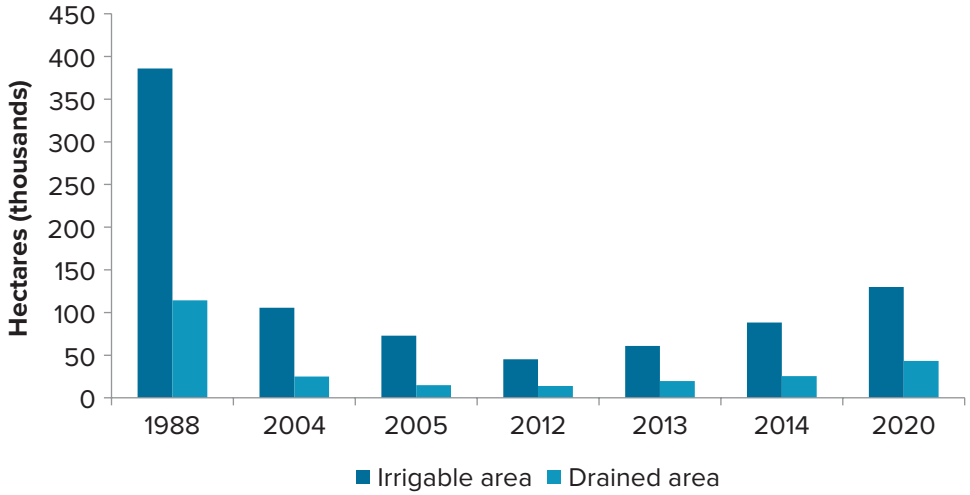
Since 2012, I&D areas have increased. In 2012, the agricultural sector was identified as one of the key priority sectors for the country's development. Consequently, with support of donor organizations such as the World Bank and the International Fund for Agricultural

Development (IFAD), the government has been actively investing in the development of I&D infrastructure. Between 2016 and 2020, roughly GEL 125 million (approximately US$39.56 million)[7] were invested in infrastructure projects with World Bank funding under the Land Market and Irrigation Development Project. IFAD invested around GEL 19 million (approximately US$6 million) over the same period.

According to GA, 123 irrigation schemes were being used in 202. Most are gravity schemes. The public irrigable area increased from 2012 to 2020 to about 130,000 hectares (see figure 4.6), of which about 6,500 hectares are served by pumping systems. According to GA, the total public irrigated area is about 65,000 hectares. The share of irrigable land to total agricultural land is about 16.5 percent,[8] but any land that does not have "other" status has the status of agricultural land, including land where agriculture is not possible. Most command areas covered by the irrigation schemes are around 100 to 500 hectares, while only 14 command areas cover more than 5,000 hectares (figure 4.7).

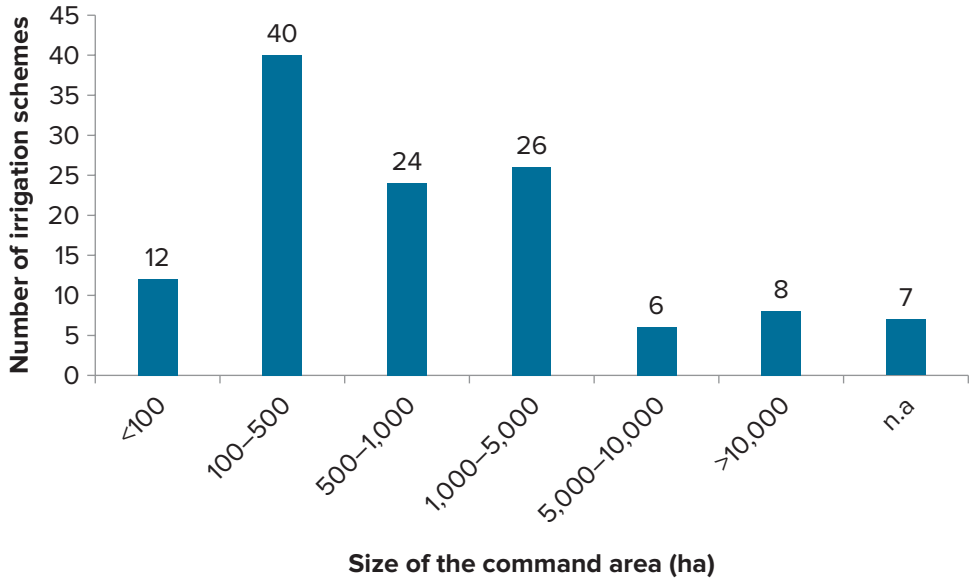
Most of the GA-operated irrigation schemes are in Kakheti (35), Shida Kartli (29), and Kvemo Kartli (24). The largest irrigated region is Kvemo Kartli (27,658 hectares), followed by Kakheti (16,787 hectares) and Shida Kartli (16,417 hectares). See table 4.1 for more details on the irrigation schemes.

FIGURE 4.6 Area Covered with I&D Infrastructure in Georgia, 1988–2020



Source: Authors.
Note: For data 1988–2011, refer to ISET (2016). For data 2012–2020, refer to GACo (2021 (accessed in June 2021).

FIGURE 4.7 Distribution of Command Areas of Irrigation Schemes in Georgia, 2021



Source: Data provided by Georgian Amelioration in 2021.
Note: n.a. = not applicable.

This presentation provides only a partial overview of the irrigation situation because some farmers have developed individual water withdrawal systems and are supplying their irrigation needs mainly with groundwater. However, no data on private irrigation were available for the preparation of this note. Although there are 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 has increased over the years. The details are discussed in section 4.4.

Until recently, the Georgian irrigation sector has relied on supplemental irrigation to complement mainly rainfed agriculture (Georgia, MEPA 2017a). The irrigation strategy states that local water delivery scheduling is based on farmer demand, relayed to a ditch-level regulator working for GA, and aggregated upward (Georgia, MEPA 2017b). Farmers judge crop water needs visually, and they often try to delay irrigation to avoid paying irrigation service fees—relying instead on rainfall—until an extended drought makes irrigation unavoidable. In practice, farmers sharing a ditch often have informal arrangements to take turns sharing irrigation. Generally, little maintenance is carried out at this level. At times, farmers may clean the ditch, or they may request assistance for a particular repair or cleaning from GA. Thus, the predominant supplemental nature of irrigation in Georgia has contributed to farmers' reduced incentive to join public irrigation schemes and subscribe to GA services.

TABLE 4.1 Characteristics of Irrigation Schemes Operated by Georgian Amelioration in Each Region, 2020

Size of the command area (ha)	Region						
	Imereti	Kakheti	Kvemo Kartli	Mtskheta Mtianeti	Samtskhe-Javakheti	Shida Kartli	
<100	3	3			1	5	
100–500	3	10	7	2	10	8	
500–1,000	2	7	4	3	2	6	
1,000–5,000	1	4	9		5	7	
5,000–10,000		2	2	1		1	
>10,000	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 area of water supplied (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: Data provided by Georgian Amelioration in 2021.
Note: n.a. = not applicable.

This situation results in lower revenues for GA and a slower expansion of command areas under surface irrigation. The irrigation strategy cites this as a major risk to the development of the irrigation sector. 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*" (Georgia, MEPA 2017b, 61).

Because of recent unpredictable changes in temperature and precipitation patterns caused by climate change, farmers have become 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 Georgian Farmers' Association (GFA). An increasing number of farmers who were previously uninterested about irrigation opportunities, including owners of smaller land plots, are considering connecting to public irrigation services or developing independent irrigations solutions. The final choice depends on the cost 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 relying more on adequate and timely surface irrigation, because climatic extremes are reducing their ability to rely on rainfall as their main source of water for crop production.

4.4 Current Conditions of Irrigation Systems

Georgia's irrigation infrastructure was adapted to Soviet farming practices (*kolkhoz* and *sovkhoz*[9]), conducted on large land plots. After the first wave of land privatization in the 1990s, agricultural plots were substantially segregated and divided into smaller plots. The infrastructure was originally designed for large plots that had a demand for water at the same time. The systems evolved toward very small plots with water needs that could differ between contiguous plots due to crop rotation choices. Today the infrastructure is no longer adapted to the new agrarian context and cannot meet farmers' modernization needs.

Scarcity of water resources can be critical in some places during the summer. The GA manages 16 reservoirs, and 18 reservoirs are managed by other organizations (not specified by whom) (Georgia, MEPA 2017b). However, storage capacities are limited; only six reservoirs are operational for irrigation and managed by GA (see table 4.2). A prefeasibility study for the development and rehabilitation of dams, based on a sample of 25 reservoirs,[10] will be carried out from 2021 to 2022 under the Georgia Irrigated Land Markets Project (GILMDP), with the support of the World Bank.

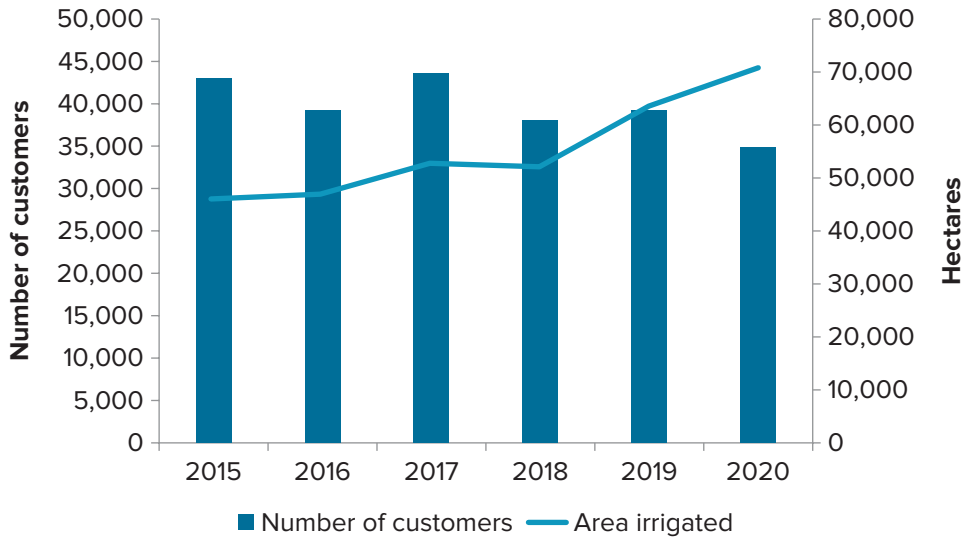
To address the challenges of availability of water resources and efficient provision of irrigation services, GA has focused on rehabilitating irrigation systems. However, limited financial resources have prevented it from intervening in all secondary and tertiary systems, making it impossible to restore 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

TABLE 4.2 Reservoirs Used for Irrigation and Managed by Georgian Amelioration, 2021

Reservoir	Municipality	Irrigation scheme	Reservoir vol. (Mm^3)	Potential irrigated area under full capacity (ha)
Sioni	Tianeti	Zemo and Kvemo Samgori	325.00	69,400
Tbilisi	Tbilisi	Zemo Samgori	308.00	22,500
Algeti	Tetritskharo	Tbisi-Kumisi, Marneuli	65.00	14,500
Jandara Lake	Gardabani	n.a.	54.28	8,000
Iakublo	Dmanisi	Dmanisi-Gantiadi	11.00	5,000
Pantiani	Dmanisi	Mashavera Systems	5.30	1,000

Source: Data provided by Georgian Amelioration in 2021.
Note: n.a. = not applicable.

FIGURE 4.8 Number of Customers of Georgian Amelioration and Irrigated Area, 2015–20



Source: Data provided by Georgian Amelioration in 2021.

compared to 130,000 irrigable hectares, according to GA). The number of customers have been decreasing since 2015 (figure 4.8). 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 in box 4.1.

BOX 4.1 Groundwater Scenario in Georgia: Case of Two Schemes in Kakheti Region

Groundwater in Georgia is abundant and good quality, but largely underutilized. Natural fresh groundwater resources amount to 573 cubic meters per second (about 49.5 cubic megameters per day) in four large hydrogeological systems, but are unevenly distributed. Sixty-two percent is in western Georgia; eastern Georgia, 25 percent; and southern Georgia, 13 percent (Gaprindashvili and Gaprindashvili 2014). Groundwater abstraction is about 500 million cubic meters per year. Around 60 percent of Georgian drinking water comes from groundwater (OECD 2021a). Groundwater is a strategic resource for the water supply of Tbilisi.

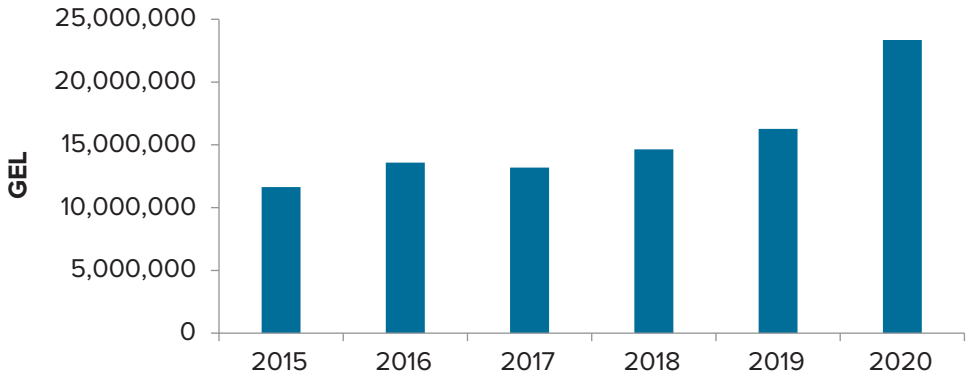
Global warming is expected to have negative impacts on the availability of groundwater resources, especially in eastern Georgia. Irrigation development should be considered but with caution. There are little data on the use of groundwater for irrigation, but interviews with stakeholders suggest there is an increase in the use of this resource. For this reason, it is not clear whether the situation illustrated in figure 4.8 linked to changes in the rules of contracting between GA and farmers (e.g., the obligation that the parcel be registered, or the attempt to aggregate contracts by farmer rather than by land plot), land consolidation, cleaning up customer databases, and the development of boreholes and pumping systems make it possible in some instances to move from a public collective system to a private individual one.

Based on data from GA, this change in contracting has been actively happening in Zemo Alazani and Lagodekhi-Kverli systems. In Zemo Alazani scheme, the privately irrigated area using groundwater has increased from 173 hectares in 2015 to 272 hectares in 2020 and already represents 11 percent of total irrigated area. In Lagodekhi-Kvareli, system growth is even larger: from 72 hectares in 2016 to 413 hectares in 2020, or 30 percent of total irrigated area. Although these changes are still small on a country scale, they indicate 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.

As of 2017, the income from I&D services or other water services covered only 40 percent of the O&M costs (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 functioning). In 2020, income from irrigation services covered an

even lower 25 percent of GA costs. As a consequence, GA is nearly fully dependent on government subsidies and cannot engage new investments without government support, and the level of subsidies has increased over the years (see figure 4.9). O&M costs have been growing over the past five years, approaching GEL 25 million (approximately US$8 million) in 2020 (see table 4.3).

FIGURE 4.9 Government Subsidies to Georgian Amelioration, 2015–20



Source: Data provided by the Ministry of Finance in 2021.

TABLE 4.3 Georgian Amelioration O&M Expenditure and Income, 2017–21

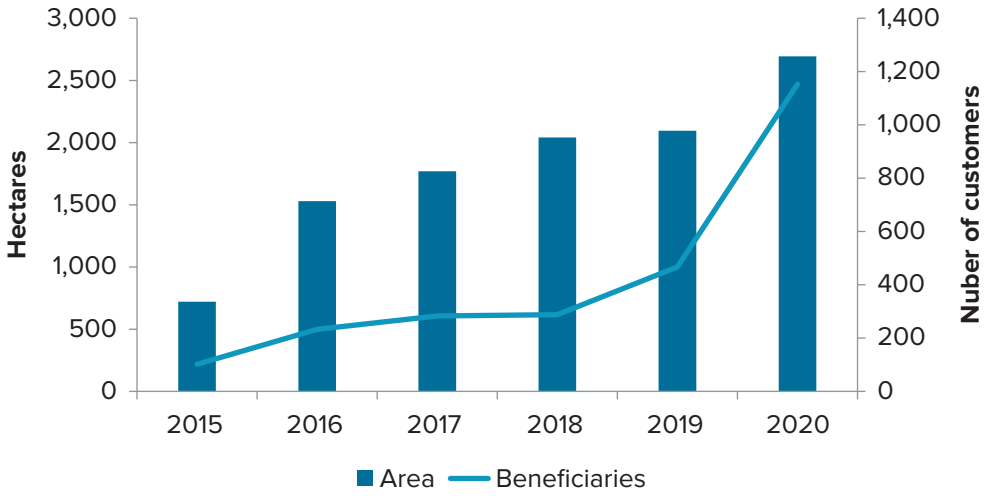
GEL

	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**	**n.a.**
I&D services	3,476,422	4,047,082	4,707,454	4,831,391	n.a.
Technical water (fisheries, HPP, etc.)	1,775,663	1,189,216	1,254,921	1,348,402	n.a.
Net total (2) – (1)	**–39,447,915**	**–44,263,702**	**–47,037,625**	**–38,820,207**	

Source: Data provided by Georgian Amelioration in 2021.

Note: HPP = hydropower plant; I&D = irrigation and drainage; n.a. = not available; O&M = operation and maintenance.

FIGURE 4.10 Drip-Irrigated Area per Year under Plant the Future Program and Beneficiaries in Georgia, 2015–20



Source: Authors, based on data provided by the Rural Development Agency in 2021.

In addition to providing public funds to subsidize GA O&M costs and for infrastructure investments, the GoG provides farmer support to purchase drip and sprinkler irrigation systems. Since 2015, in scope of the project Plant the Future, which provides funding for the development of orchards, the MEPA's Agricultural and Rural Development Agency (RDA) has equipped roughly 11,000 hectares of land with drip and sprinkler irrigation systems. The area has increased over the years (see figure 4.10). This is the largest scale effort of the GoG for increasing water efficiency in the Georgian irrigation sector.

4.5 Regulatory and Legal Framework Governing I&D

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 Georgian National Energy and Water Supply Regulatory (GNERC) issued a decree setting fixed tariffs for the provision of amelioration services (for irrigation: GEL 75 per hectare for eastern Georgia and GEL 45 per hectare for the west; for drainage: uniform GEL 40 per hectare for the country). This was intended as a provisional decree to fill the gap until the I&D sector reforms were completed (implementation of the tariff reform and a new irrigation tariff level and structure). According to the newly adopted law of water user organizations (WUOs) (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. As a consequence, one of the key issues for GA is policy uncertainty.

Over the past few years, Georgia has been working on a long sequence of reforms related to the adoption of European Union (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), which 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, considering 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 to ensure (a) the covergence of the water bodies toward the good qualitative status; (b) continued availability of drinking water and access to sanitation to the population and access to water to all potential water users (including irrigation water users); and (c) efficient allocation of water resources among the water users.

4.6 Vision for Sector Development and Upcoming Reforms

In 2017, the GoG adopted the 2017–25 irrigation strategy, which identifies major directions and priorities for the sector's development (Georgia, MEPA 2017b). In scope of the rehabilitation and modernization of the irrigation infrastructure, MEPA and GA intend to increase the irrigated land area to 200,000 hectares by 2025, in addition to equipping at least 10 percent of irrigated land with drip irrigation infrastructure. These efforts are estimated to cost roughly US$360 million. The government aims to transform GA into a unified entity that manages primary irrigation systems (main channels) while operating at a financial break-even point, not intending to provide the government with return on investments in the irrigation sector. For the local level, or secondary channels, the strategy stipulates that WUOs will manage operations. The WUOs will have an exclusive authority to distribute bulk water to individual farmers.

According to the strategy, the government intends to reform the irrigation tariffs. The vision 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

BOX 4.2 Background of WUOs in Georgia

Georgia experimented with establishing WUOs in the past. After independence, around 200 amelioration service cooperatives were created for operating a command area of 200,000 hectares. These cooperatives failed and management was transferred to village councils. In 2001, 259 water user associations (WUAs) were established. With the support of the World Bank, 50 amelioration associations were formed across the area formerly managed by the cooperatives.

According to national and international consultants interviewed, 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 O&M of irrigation schemes were introduced several times but not sustained. According to MEPA and international consultants, the main reasons were 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 appointing and training 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 irrigation strategy (Georgia, MEPA 2017b).

water users. Individual irrigators will pay the retail tariff set by the WUO to cover O&M costs of the secondary and tertiary canals. GNERC will regulate GA with its monopoly structure. The strategy stipulates that GNERC will serve as an institution for dispute resolution based on irrigation contracts between GA and WUOs.

In 2019, the law on WUOs 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.

The Agriculture and Rural Development Strategy of Georgia 2021–27 (Georgia, MEPA, 2019) 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 I&D 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 for 2018–27 was prepared in 2017 (Georgia, MEPA 2017a). The draft stipulates the need for (a) rehabilitation, (b) improved O&M, (c) funding, and (d) 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 (Georgia, MEPA 2017a). During consultations with stakeholders, we note that most officials interviewed were not aware of such a document.

Notes

1. See the Geostat database, https://www.geostat.ge/en.
2. Data on gender should be considered with caution as their reliability is uncertain, according to the National Agency of Public Registry.
3. Geostat <https://www.geostat.ge/en>.
4. High-value agricultural products are those typically yielding high return on the market (such as fruits and vegetables).
5. Geostat <https://www.geostat.ge/en>.
6. See the FAO Aquastat database web page "Country Profile–Georgia, Year 2008," https://www.fao.org/aquastat/en/countries-and-basins/country-profiles/country/GEO.
7. US$1 = GEL 3.16 (exchange rate is taken as an average monthly exchange rate for June 2021 according to the National Bank of Georgia).
8. Total agricultural land in 2014: 787,700 hectares (Geostat) <https://www.geostat.ge/en>
9. *Sovkhoz* is a large, state-owned farm in the former Soviet Union and *kolkhoz* is a farming collective.
10. Thirteen are new and 12 have some construction at various stages of advancement.

5

Roadblocks and Constraints in Achieving Sustainable Irrigated Agriculture

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 as eight constraints that emerged as major issues in the irrigation sector in Georgia (figure 5.1). Figure 5.1 discusses possible ways forward. Constraint 0 (C0) refers to the cross-cutting constraint: slow implementation of the irrigation strategy.

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

FIGURE 5.1 Constraints to Sustainable, Efficient, and Resilient Irrigation Systems in Georgia: What Is a Possible Way Forward?

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 functions for irrigation management, a clear leadership.

SERVICE PROVIDER
able to perform
a service:

SUSTAINABLE:
with regular operations 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.

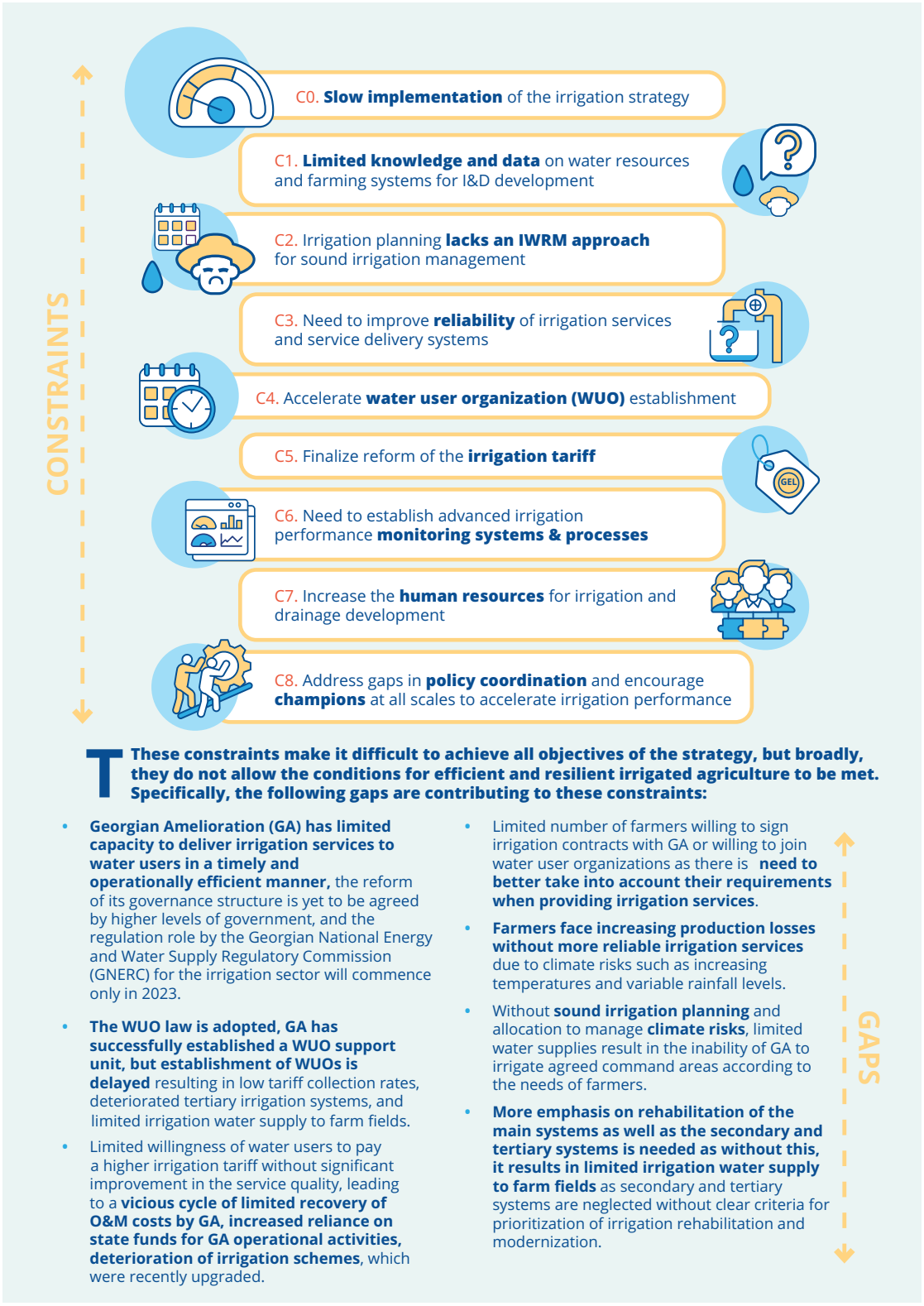
RELIABLE:
irrigation water service is delivered on a timely and reliable basis, water resources are adequate, infrastructures are adapted to the needs and in good state, water delivery service meets the demand; financial and human resources are sufficient.

CAPACITY & WILLINGNESS
to pay the fee

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

(figure continues next page)

FIGURE 5.1 *(Continued)*



Source: Stéphanie Fischer/BRL Ingénierie, for World Bank.

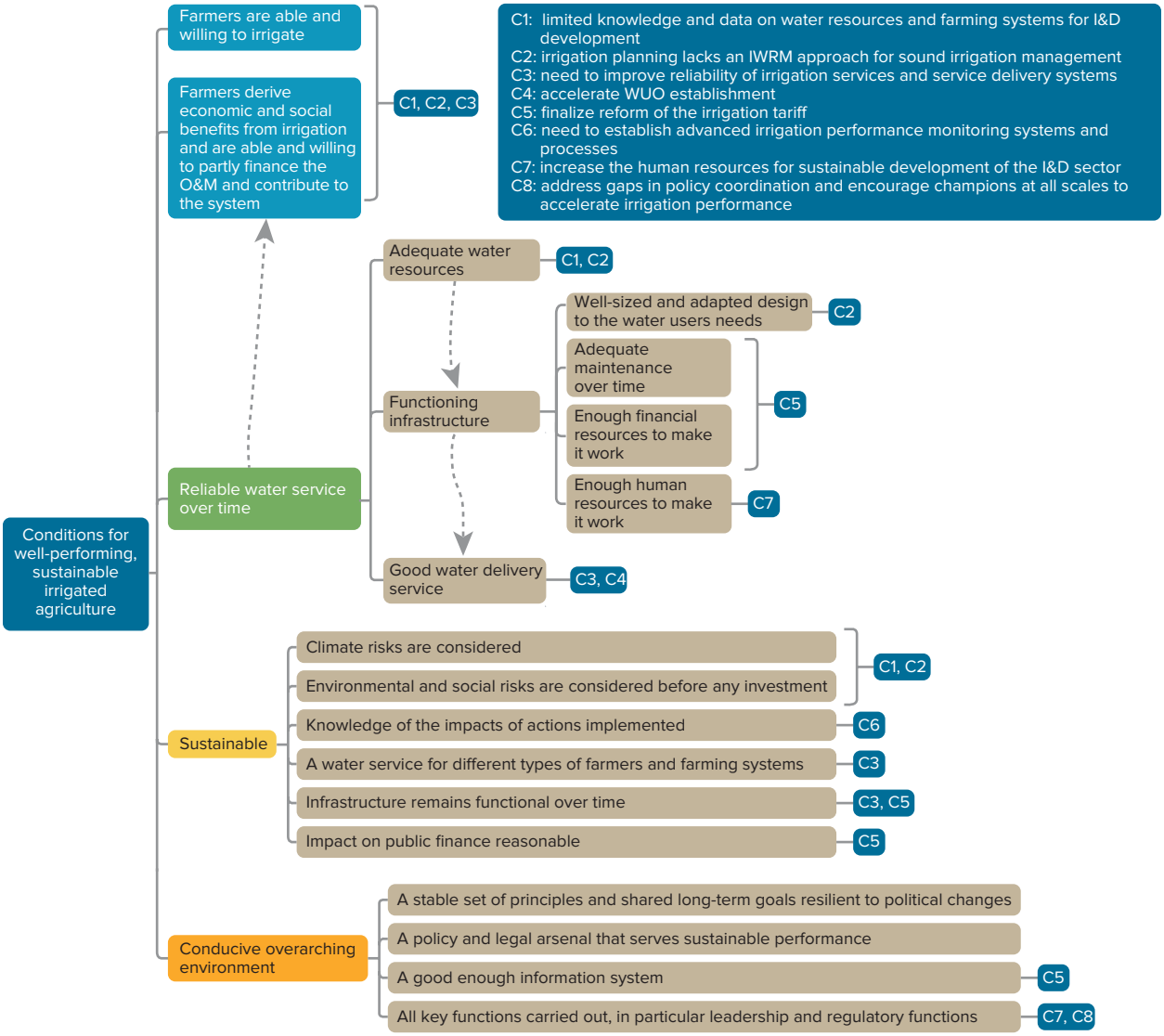
Table 5.1 summarizes how we determined these eight constraints by illustrating which stakeholders highlighted these concerns during interviews. We summarized stakeholder responses into broad themes and presented the frequency with which each organization mentioned these constraints during the interview with an *X*. The interviews identified a cross-cutting constraint (C0) related to the slow implementation of the irrigation strategy. This is not a stand-alone 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.

TABLE 5.1 Core Constraints in Georgian Irrigation Sector Identified in Interviews

	C1	C2	C3	C4	C5	C6	C7	C8
MEPA	×	×	×	×	×	×	×	×
GA	×		×	×	×		×	
GA-WUO support unit	×		×	×	×	×	×	
Agricultural and Rural Development Agency[a]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
GNERC	×				×			
National Agency for Sustainable Land and Land Use Monitoring	×							
Ministry of Economy and Sustainable Development								×
Ministry of Finance					×			
GFA			×					
Rural and Agricultural Policy Development Institute			×		×	×	×	×
Farmers		×	×					
Community of donors	×	×	×	×	×	×	×	×
International consultwants	×	×	×	×	×	×	×	×

Source: World Bank.
Note: 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 I&D development; C8: address gaps in policy coordination and encourage champions at all scales to accelerate irrigation performance. GA = Georgian Amelioration; GFA = Georgian Farmers' Association; GNERC = Georgian National Energy and Water Supply Regulatory; I&D = irrigation and drainage; MEPA = Ministry of Environmental Protection and Agriculture; n.a. = not applicable; WUO = water user organization.
a. The agency mentioned that irrigation policy and conditions of the irrigation sector is not in its competences thus the agency cannot make any statement.

FIGURE 5.2 Constraints in Georgia Toward Achieving Well-Performing, Sustainable Irrigated Agriculture



Source: Authors.

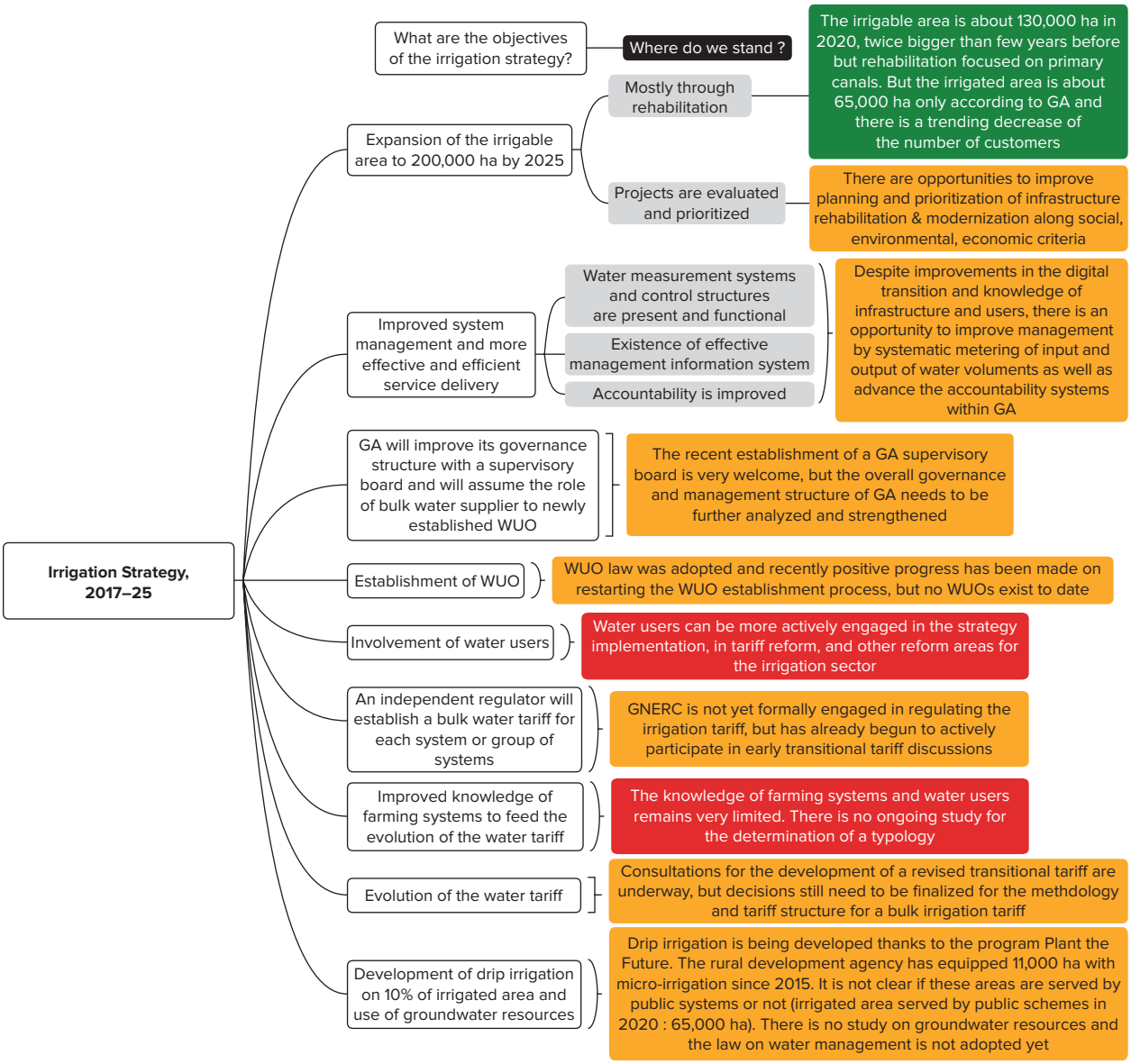
Building on figure 3.3, which presented the *conditions for well-performing and sustainable irrigated agriculture* (chapter 3), we present the eight core constraints in figure 5.2 as they relate to ideal conditions. Each constraint is explained in detail in the following sections.

5.1 C0: Slow Implementation of Irrigation Strategy

Several stakeholders, including donors and Ministry of Environmental Protection and Agriculture (MEPA), emphasized the slow implementation of the irrigation strategy. The delays are even prompting some to consider that the strategy framework is outdated and that a new

strategy, better suited to the needs of the sector, is needed. The 2017 irrigation strategy has shown mixed results. Irrigable areas have been expanded and progress is very positive, but other components in the strategy show little progress. Figure 5.3 summarizes the objectives of the strategy (or work areas) and where we stand now. Green boxes illustrate where progress has been made, yellow boxes indicate partial progress, and red boxes illustrate no progress made (based on traffic light metaphor).

FIGURE 5.3 Georgia's Status as Per Irrigation Strategy, 2017–25



Sources: Georgia, MEPA 2017b; Authors.
Note: Green boxes illustrate progress, yellow boxes indicate partial progress, and red boxes illustrate no progress.
GA = Georgian Amelioration; GNERC = Georgian National Energy and Water Supply Regulatory Commission; WUO = water user organization.

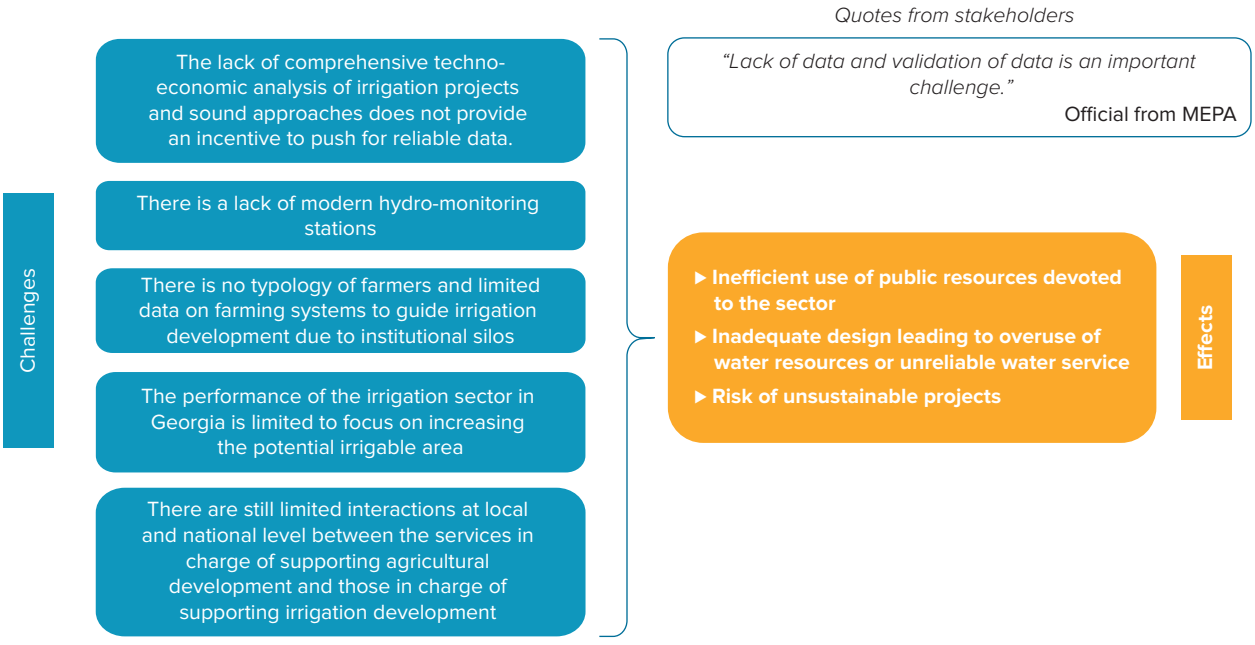
5.2 C1: Limited Knowledge and Data on Water Resources and Farming Systems for I&D Development

Figure 5.4 presents a problem tree summarizing results from the stakeholder interviews. This led to the identification of C1: limited knowledge and data on water resources and farming systems for I&D development.

This constraint relates to the ability of the Georgian authorities to identify and prioritize irrigation projects by using state funds efficiently to meet 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 at US$361.2 million (Georgia, MEPA 2017b). 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 objectives should be based on identifying the sector's needs and of an ex

FIGURE 5.4 C1: Limited Knowledge and Data on Water Resources and Farming Systems for I&D Development



Source: Authors, based on stakeholder interviews.
Note: Blue boxes are challenges related to the core constraint, as identified by the stakeholders, and the orange box shows the effects of the challenges.

ante understanding of how they contribute to higher-level objectives such as addressing rural poverty, stimulating high-value crop production, or increasing incomes for agricultural producers. However, donors, individual consultants, and Georgian Amelioration (GA) staff reported limited data on water resources and farming systems prior to irrigation planning and investment in operations and maintenance (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, because 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 favor the identification of diverse farm typologies to better understand farm irrigation needs and dissemination of data related to hydrological and socioeconomic conditions of the irrigated areas**. Despite positive attempts to break the silos between irrigation and agriculture by a combined agriculture, environmental protection, and irrigation focus under MEPA, several interviews with stakeholders (donors, consultants, GA) 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 hectares is questionable. 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 multidimensional irrigation master plan 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 better determine how many hectares it makes sense to irrigate. This master plan can result in a more objective justification of the targets and goals for irrigation development.

Detailed data on water resources are missing. The Georgian hydrological and climatological monitoring system provides only a partial view of the state of the water resource and 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 National Environment Agency (NEA),[1] only about 50 stream gauging stations are still in operation. The lack of a modern

hydrological monitoring system affects the availability of reliable data for hydro-agricultural infrastructure design studies and effective integrated water resources management (IWRM) and does not allow the feeding 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 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 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 (e.g., types of crops, farm sizes).[2] 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 types 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 match the needs of groups of farmers, transforming potential demand into actual demand.

Data validation 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 I&D planning, investment, and management.

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 regulatory changes to ensure irrigation investments do not result in negative externalities to the environment. According to individual consultants, technical standards 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 basins where the schemes are located. In addition, the determination of minimum ecological flow is not regulated by law. Environmental and sanitary flows are taken to be 10 percent of annual average river flow (Georgia, MEPA 2017b). This value is based on a practice from the Soviet era. There are limited 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, under consideration, aims to provide clear guidance and norms to address this

issue—if the required investments are made. Another provision under the proposed water management law could be 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 highlights the need to have a detailed understanding of 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 in the irrigation agency to guide irrigation development and to identify and design projects supporting a more reliable water service for farmers. However, these aspects are 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. Investments could be unsustainable in the medium term for supporting growth in irrigated agriculture.

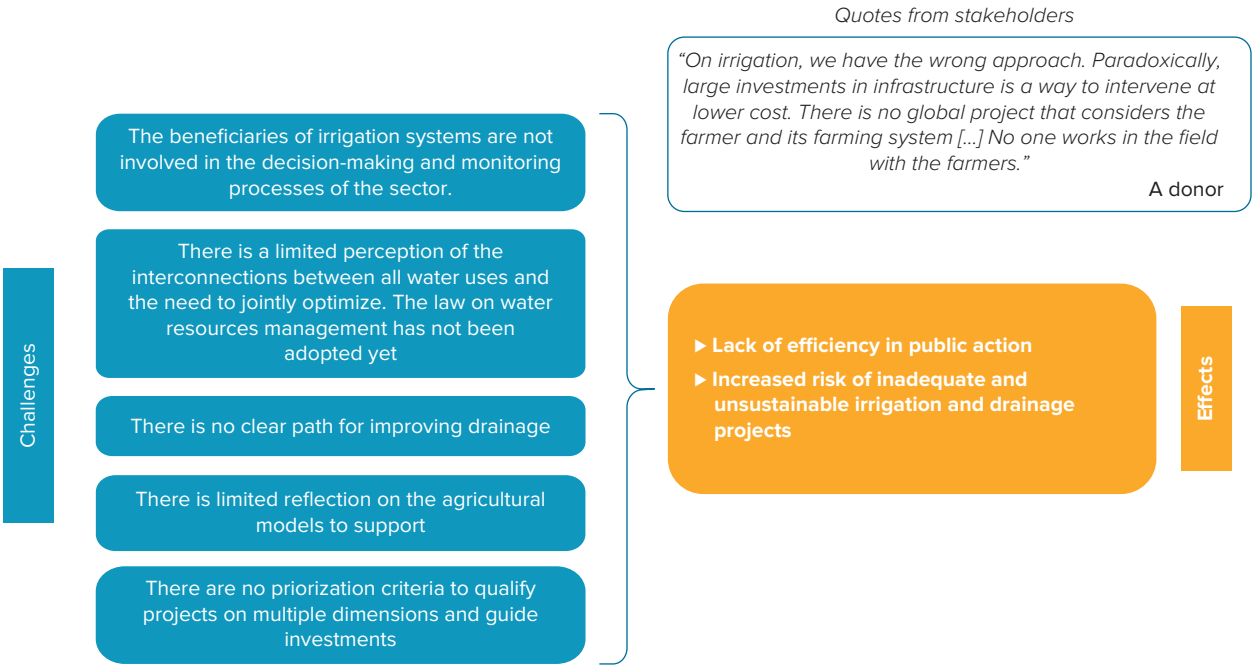
5.3 C2: Irrigation Planning Lacks an IWRM Approach for Sound Irrigation Management

Figure 5.5 presents a problem tree summarizing results from the stakeholder interviews. This led to the identification of C2: irrigation planning lacks an IWRM approach for sound irrigation management.

The performance objective of the irrigation sector in Georgia is to increase the potential irrigable area by rehabilitating existing irrigation schemes. The implication is that increasing this area would be sufficient to improve performance. However, interviews with Georgian farmers (box 5.1) 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, or other economic activities.

To improve the performance of irrigation, it is essential to incorporate a 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 socioeconomic drivers of irrigation (Graveline and Grémont 2021) (see box 5.2 for a case study from France for understanding drivers of irrigation choices). Figure 5.6 summarizes factors that contribute to a land user's choice of farming system and choice to irrigate or not, stemming from the summary of interviews with 21 farmers.

FIGURE 5.5 C2: Irrigation Planning Lacks an IWRM Approach for Sound Irrigation Management



Source: Authors, based on stakeholder interviews.
Note: Blue boxes are challenges related to the core constraint, as identified by the stakeholders, and the orange box shows the effects of the challenges.

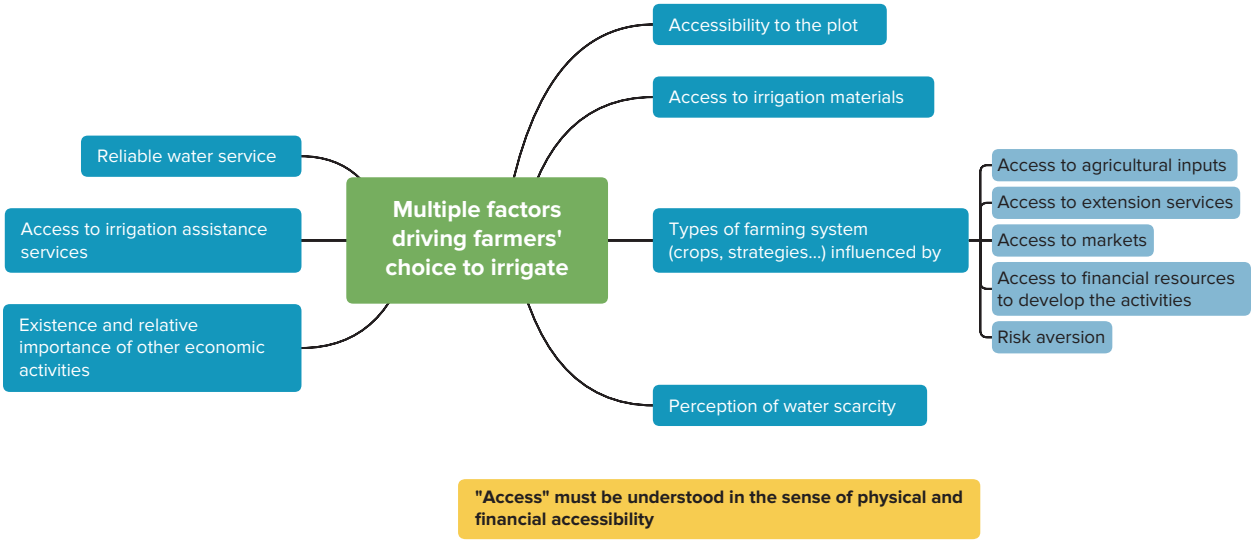
BOX 5.1 Georgian Farmers' Input on Irrigation Drivers

Georgian farmers interviewed stressed the importance of irrigation for their cropping systems but highlighted that water availability is not the only driver to irrigate or not. Twenty-five percent of the 21 interviewed mentioned difficulties of affordable access to finance (agro-credits). Fourteen percent 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 farmers own land plots remotely from their living area, and to reach this land they 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 be a challenge, and several farmers mentioned that after drip irrigation systems were introduced, they experienced yield losses due to misuse of the system. Thirty-three percent pointed out the challenge of accessibility to the market. They do not always have access to a local market to sell their produce, which is one of the driving forces behind the choice to irrigate or not and to develop their plots more intensively.

BOX 5.2 Irrigation Drivers and Policy-Making Factors in Southeast France

A study in southeastern France aimed to understand the conditions of the adoption of irrigation for vineyards (Graveline and Grémont 2021). Results of 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 socioeconomic drivers include farmers' perceptions of water stress, age, risk aversion, or objectives. Perceptions of water scarcity seem to drive future irrigation projects much more than real water scarcity. About a quarter of farmers were not interested in irrigation even if they have or will have access to irrigation schemes. *The policy implications 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 socioeconomic drivers of irrigation*** (Graveline and Grémont 2021). Identifying and carefully considering these drivers will help avoid inefficient investments in the irrigation sector.

FIGURE 5.6 Multiple Factors Driving Georgian Farmers' Choice to Irrigate



Source: Authors.
Note: Results based on interviews with 21 farmers between June and July 2021.

Water users—the beneficiaries of irrigation systems—are not involved in the decision-making and monitoring processes of the sector. Nor are they part of the advisory and decision-making framework for the irrigation sector. According to the discussions with farmers and the Georgian Farmers' Association (GFA), they are rarely consulted and have limited means to influence the decision-making processes related to key irrigation sector, yet they are confronted with the outcomes. Some farmers mentioned that they were not consulted for a rehabilitation project, and the new design was not adapted to their needs. This situation should evolve with the adoption of the water law. Water user councils will be created at basin scale, supporting an increased involvement of the users in the decision processes and project monitoring.

According to the community of donors and the consultants involved in the European Union Water Initiative Plus (EUWI+), **integration between irrigation and water issues and environmental dimensions is very limited**. 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 has not been implemented because there is no legal framework. Once the law is enacted and basin-level management is implemented, this will affect how the irrigation sector is developed. Having water, agriculture, and the environment under one ministry can create trade-offs between increasing irrigation development versus maintaining environmental flows and ensuring high water quality. Box 5.3 provides examples of how EU countries manage similar concerns between environmental sustainability and irrigation expansion.

There is no clear path for improving drainage despite an existing draft drainage strategy prepared in 2017. Drainage is closely linked to irrigation and is often mentioned as an issue in strategic or regulatory documents. According to GA 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. In consultations with donors, the government has refocused 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 agricultural models to support modernized irrigation development. Sector development is generally based on current agricultural activity or even past systems because there are no or few detailed studies of water users. Several individual consultants interviewed stressed the importance of questioning the desired agricultural

BOX 5.3 New Approaches for Irrigation Development from the EU and International Donors

With the growing awareness of environmental issues and climate change, combined with factors behind failed irrigation projects, international donors and public bodies involved in irrigation development in Europe have reframed their approaches. 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 water user organizations [WUOs]) respond to calls for projects launched by local authorities and are evaluated according to such criteria as cost per hectare, water savings, and impact on the agricultural sector.

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.

models and practices over several decades in relation to the life span of the infrastructures. The desired long-term agricultural model should meet the needs of Georgia's rich and diverse agriculture sector. Stakeholders interviewed in the Food and Agriculture Organization (FAO) and members from the FinExCoop Georgia project[3] suggested opportunities for young farmers should be considered when implementing an irrigation project, which often involves land redistribution. 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 MEPA stakeholders we interviewed stressed challenges related to the lack of prioritizing criteria (e.g., cost per water savings, value of water for irrigation) to qualify irrigation projects. Georgia lacks well-sized designs adapted to water users' needs. Planning based on multiple dimensions grounded in answers to the following questions is *not common* in Georgia: 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?

Critical conditions for well-performing and sustainable irrigation systems are not being met, potentially leading to lower efficiency in public action and increased risk of inadequate project design. However, there are ample opportunities and pathways for the Georgian government to reform irrigation development priorities.

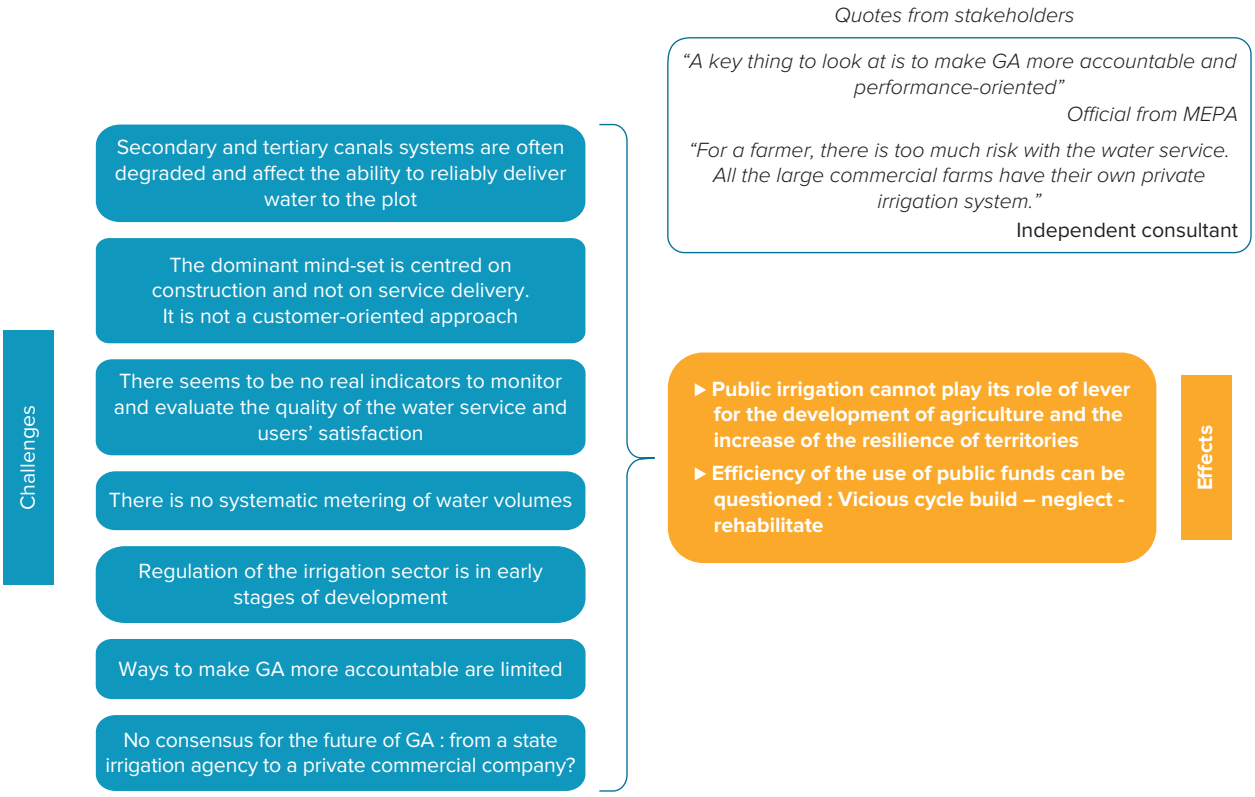
5.4 C3: Need to Improve Reliability of Irrigation Services and Service Delivery Systems

Figure 5.7 presents a problem tree summarizing results from the stakeholder interviews. This led to the identification of C3: need to improve reliability of irrigation services and service delivery systems.

Irrigation service delivery is a key component of irrigation performance. A reliable water service contributes to creating the conditions for a better valorization of the farming systems by mitigating the risks linked to inadequate water supply for crop production. Improved irrigation service delivery requires setting up the conditions for the objectification of the reliability of the service in an irrigation command area. It is also 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 service providers are increasingly interested in customer-oriented approaches to improve facility performance and make service more efficient (Burton 2010; Malano and Van Hofwegen 2006; Renault, Facon, and Wahaj 2007). 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. The water service must therefore be modernized to match users' needs and support agricultural development.

Despite significant investments in the rehabilitation of irrigation systems, water service reliability is still an issue. Rehabilitation mainly focuses on primary systems, according to the MEPA and GA, because of limited financial resources. Secondary and tertiary canal systems

FIGURE 5.7 C3: Need to Improve Reliability of Irrigation Services and Service Delivery Systems



Source: Authors, based on stakeholder interviews.

are often degraded and affect the ability to reliably deliver water to plots, especially those further away from the main canals.

The dominant mindset is not centered on service delivery but on construction (as highlighted by interviews with the community of donors and the MEPA). This mindset results from the irrigation strategy, which plans an extension to 200,000 hectares of irrigable area (Georgia, MEPA 2017b). Therefore, GA is focused on expanding irrigable areas. GA also attaches great importance to the issue of uninterrupted service provision to farmers. 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 GA and most stakeholders interviewed, the main indicator for performance is the irrigable area. This indicator is relevant because of the objectives of the irrigation strategy (Georgia, MEPA 2017b) but does not provide information on the quality of the water service (see box 5.4 for feedback from farmer interviews regarding quality of irrigation service delivery).

BOX 5.4 Georgian Farmers' Opinions on Water Service

All of the 21 interviewed farmers stated that it is very easy and convenient to communicate with their local GA service center, which is always very helpful. However, there is no formal process to monitor and evaluate the quality of the service and provide a systematic feedback to the top management. 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, and design of the systems) is lower, leading about 70 percent of the 21 farmers interviewed to declare they have issues with their irrigation service.

Out of 21 interviewed farmers (including phone surveys and focus groups), 13 (62 percent) 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. Forty-seven percent claimed 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 a farmer cannot get water if the neighboring farmer does not irrigate the land. The situation becomes tricky when neighboring farm plots have different crops.

Sixty percent of interviewed farmers raised an issue of polluted water (all those farmers were from Sagarejo municipality). In the Sioni Dam, from which the farmers get water, there is a lot of waste. Garbage gets stacked in the pipes or in the filters, which hinders water flows.

Because of the polluted water, development of drip irrigation systems becomes problematic. Garbage can get stacked in the system. One farmer had to develop a settling pond in his land plot and must wait one day before using the water to avoid damaging his drip system.

Fifty percent of interviewed farmers stated that some farmers 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. According to some farmers, leaks can deteriorate road infrastructure. 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 user 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, because many countries around the world have implemented different solutions to address water user concerns. Box 5.5 provides an example of a customer feedback approach used by an irrigation service provider in the south of France.

BOX 5.5 Case Study of French Irrigation Service Provider BRL

BRL was created in 1955 by government decree to develop irrigation in the south of France (130,000 hectares). It is a trading company but with majority public sector shareholding (77 percent) (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 infrastructures were transferred from the state to the local authorities (the Region) in 2008.

The Region is the majority shareholder of BRL (49 percent). BRL and the Region work closely 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 made up of representatives of public and private institutions and 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 in the Region oversees the monitoring of BRL's activities full-time and organizes monthly meetings. Irrigation tariff is regulated by the concession contract between BRL and the Region. The Region is the regulator and is fully involved in monitoring and guiding BRL's activities.

Benchmarking performance. The BRL Group's performance is assessed against such indicators as 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 (kilowatt-hours per cubic meters distributed), service interruptions, operations and maintenance (O&M) costs, investments made and planned, asset management,

(box continues next page)

BOX 5.5 (*Continued*)

customer satisfaction, measures of support to the agricultural sector especially for young farmers, and quality of employment in BRL. To monitor these indicators, BRL has made a digital transition. Several tools enable decentralized management of monitoring and evaluation (M&E). Each employee uses these tools to be active in monitoring. For example, a database of all the clients and their characteristics is linked to GIS software, which contains infrastructure data, O&M software, and a remote sensing tool to monitor all the infrastructures in real time (see figure B5.5.1).

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 in BRL.[a] Efficient water service has continuity, water quality, and responsiveness to water user needs. BRL conducts annual satisfaction surveys in addition to the complaints monitoring system.

FIGURE B5.5.1 Screenshots of BRL Monitoring Software

Source: BRL.

(box continues next page)

BOX 5.5 (*Continued*)

The board of directors helps to define and validate BRL's orientations. The board can intervene in BRL organization. BRL is therefore accountable for its activities to 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. 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. Differences between the subscribed flow rate, subscribed pressure, and reality (lower flow rate or pressure) cannot exceed four hours per day. In case of failure, the repair debt is 10 percent of the subscription per day of failure, without exceeding 100 percent. Seven consecutive days of interruption never happen because of the strong pressure from the farmers.

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 that of BRL, while financing their own O&M costs. BRL can be contracted by some WUOs to operate and maintain their infrastructure or intervene for specific works.

a. The BRL's 2021–25 strategy focuses on customer satisfaction and providing user-specific solutions, water, and energy saving. The 2020 activity report of BRL recalls these strategic orientations; see the BRL website, https://www.brl.fr/dl?type=file&module=Kiosque&verifkey=cfc221b5e370c9d921df6b4617cd806e85cb7b12.pdf--82&f=1.

Water quality is not assessed in Georgia, resulting in negative outcomes. Drip systems at the plot can become clogged, and distributors may face issues with agricultural productions that require a certification for the national or international market. Some farmers interviewed mentioned the problem of water quality as a constraint.

There is no systematic metering of water volumes because of the lack of financial resources, according to GA. GA collects daily volumes and quantities of water discharged in main canals. There is a plan to install volumetric water meters on relevant schemes in parallel with WUO establishment, but there is limited knowledge of what enters and leaves the system and how water is used in 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 difficult to identify where water losses are particularly high. Establishing a metering system is critical for the advancement of tariff reform.

Regulation of the irrigation sector is in very early stages of development. The Georgian National Energy and Water Supply Regulatory Commission (GNERC) should oversee

regulation of the irrigation sector (Georgia, MEPA 2017b). 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 it cannot regulate the quality-of-service provision by GA as it does for other regulated sectors. For the energy sector, GA has different mechanisms, including a 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 its role for the regulation of tariffs, GA needs a very detailed understanding of the costs of the irrigation water service. This topic is discussed in the constraint related to irrigation tariff reforms in Georgia.

> *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 and Brinkerhoff 2016, P275)*

Ways to make GA more accountable are limited. GA does not have a mission statement with goals that are evaluated and updated annually. A supervisory board, consisting of three members, was established in 2019 to supervise activities and ensure that strategic decisions are closely linked to the mission statement and will achieve effective results. However, 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, with unsatisfactory performance of GA in the field, there are no clear paths for individual farmers, communities, or the Georgian nation to hold GA accountable and influence its decision-making processes.

GA lacks a strategic roadmap to drive its operations and ensure financial sustainability. Making an irrigation service provider profitable is a challenge. There are very few global success stories when countries attempt to fully privatize irrigation services (see box 5.6 of an example from Morocco and Spain). Irrigation's potential 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. Multipurpose use of infrastructure is one factor 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 I&D services. The operational cost of GA was approximately GEL 25 million in 2020 (US$ 7.78 millions) and 65,000 hectares were irrigated. This means that GA should invoice at least GEL 385 GEL (US$125) per hectare, about five times higher than the actual cost. The farmers would then have to pay additional fees to WUOs for the O&M of secondary and tertiary canals, which is standard practice among WUO members across the world. Yet GA would not have the capacity to invest in rehabilitation, extension, or equipment to improve the service.

BOX 5.6 Examples of Irrigation and Privatization in Morocco and Spain

Due to irrigation's common issues of low performance, low water productivity and financial scarcity, many international donors and governments have considered the potential role of the private sector in large-scale schemes. International experience shows that public-private partnerships (PPPs) in irrigation are highly context-specific and varied. But **there are few examples of successful PPPs in large public irrigation systems**.

In Morocco, the government tried to build on the El Guerdane PPP to reform the management of large irrigation schemes, but studies show 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 Sanchis-Ibor 2019). Private companies are often reluctant to take on the risks associated with I&D management. Commercial, climatic, and political risks are 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 nonpayment that are hydraulically practical and socially acceptable are rarely met. When privatization has been implemented, such as in Spain, it may have led to social and economic risks for farmers, who faced significant cost increases and a lack of transparency from service providers (Sanchis-Ibor, Boelens, García-Mollá 2017). The successful cases of privatization of water services appear in areas with **intensive agriculture and high-value crops**. But privatization has increased 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 assumed much of the initial investments and in some cases set up loss compensation systems for the private operator. The risk is borne mainly by the state, yet profits are privatized. When involving the private sector, an **active regulator** is needed to balance the power between the private company and the water users.

By focusing on a bulk water supplier role, GA would very likely have lower operating costs, which the government is considering as it reforms the irrigation tariff.

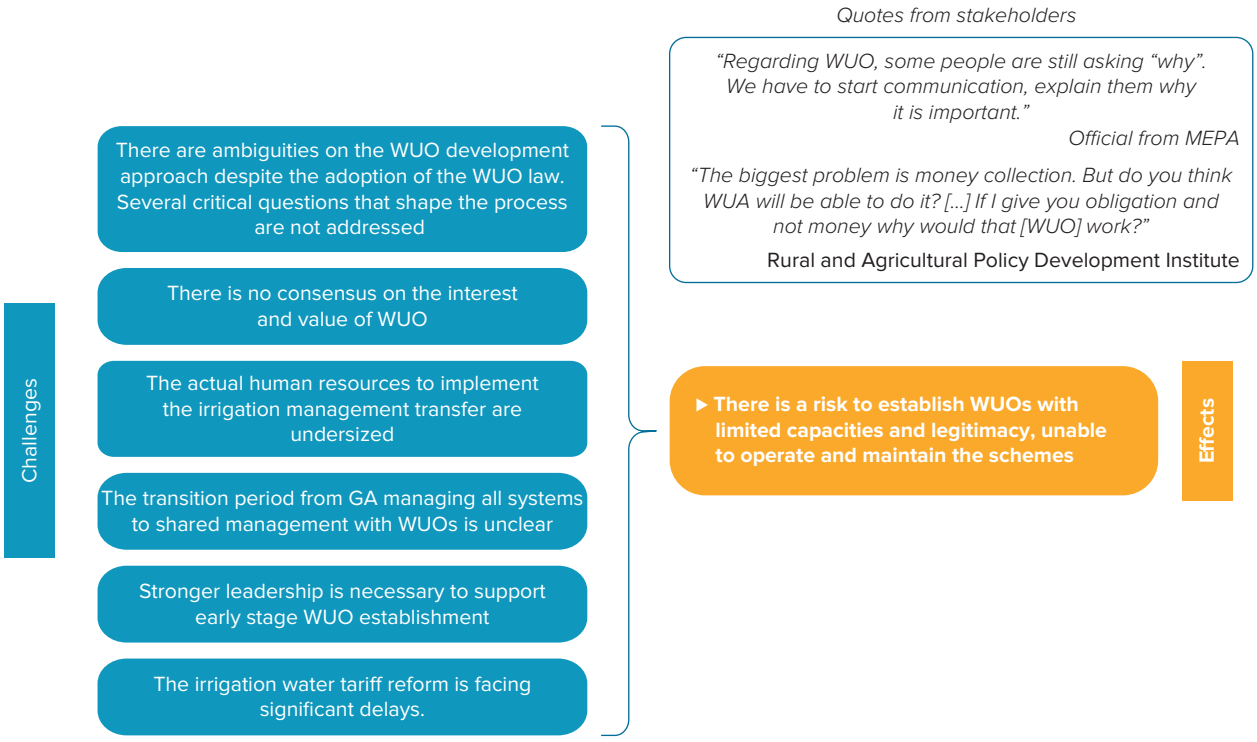
Providing irrigation water to a vast number of farmers in large territories is not just a commercial activity because it often plays a strategic role as an engine of rural development and food security and helps improve IWRM. These public services are hard to quantify and should not be financed only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

Performance-based service delivery is key for a well-performing irrigation sector. Constraints in achieving a reliable water service have different effects. So-called "public" irrigation will not be able to be a lever for the development of agriculture and increase the resilience of territories to climate change. This will have negative impacts for the agricultural sector and rural territories and 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 access to water, which may result in privatization through financial and technical means. There would be a fiercer competition with other water users because managing and coordinating water use will become more complex. The efficiency of the use of public funds will be affected, leading to the vicious cycle of build-neglect-rehabilitate-neglect.

5.5 C4: Accelerate WUO Establishment

Figure 5.8 presents a problem tree summarizing results from the stakeholder interviews. This led to the identification of C4: accelerate WUO establishment.

FIGURE 5.8 C4: Accelerate WUO Establishment



Source: Authors, based on stakeholder interviews.
Note: WUO = water users organization.

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 over water management at the tertiary or even secondary network level. A WUO support unit was established and gradually staffed in 2018 in the World Bank Project Implementation Unit. Since April 2020, it has been a structural unit of GA. The WUO support unit is guided by a comprehensive action plan developed by a World Bank consultant and is periodically updated.

Despite the adoption of the WUO law in 2019 and clear guidelines in the irrigation strategy, **there are ambiguities on the WUO development approach** (Georgia, MEPA 2017b). WUO establishment is slow and delayed by a lack of leadership, according to some interviewed donors and international consultants. Stakeholders stated that several critical questions that shape the process of WUO establishment are not being addressed (not asked 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 capacities, this management varies in complexity. What is feasible for farmers in one system may not be feasible in another. Therefore, the approach must consider the hydraulic characteristics of the system to be transferred.

Should WUOs be created throughout the territory, including where there is no clear will of the farmers to organize? The interviews with 21 farmers highlighted that many farmers have little awareness of WUO establishment (see box 5.7). In general, WUOs should be established where and only when farmers want to organize themselves and when technical and financial conditions for successful irrigation management transfer (IMT) are met (see box 5.5). The law states that a WUO is established based on a decision made by most landowners or possessors in a service area, as specified by MEPA, whose land plots make up more than 50 percent 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 IMT to WUOs. 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, 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.

BOX 5.7 Georgian Farmers' Opinions of WUOs

Most of the 21 farmers interviewed were not aware of the establishment of WUOs, and most had no knowledge of WUOs. Only 14 percent had been members of WUOs. However, none thought that this system was efficient, and they do not wish to become members of such entity in the future. Of farmers who have *never* been a member of WUOs, 40 percent might join one if it were established in their municipality; 30 percent were against becoming a WUO member, and 30 percent had never thought about it and avoided answering the question. Those against becoming WUO members did not give reasons. Lack of understanding and preconceived notions related to echoes of past experiences could explain this attitude. Therefore, stakeholders involved in WUO establishment are being prudent in planning and implementing any activity. Three of the 21 farmers interviewed think that efficient irrigation systems would be possible only if they are fully managed by a private company, which can rely entirely on income from customers.

Are the deadlines and means for implementing reform compatible? The irrigation strategy is not clear whether the 2025 deadline was for the establishment of WUOs nationwide or only in pilot areas (Georgia, MEPA 2017b). 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.

According to some MEPA officials, the value of WUOs is being questioned. They see establishment of WUOs would be 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 increasing people's awareness on WUOs' contributions and benefits to improve irrigation service delivery in the country. We argue that the lack of a comprehensive assessment in establishing WUOs is increasing doubt about their purpose and benefits from stakeholders in 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 IMT is that farmers have a **direct** interest in effective irrigation management. When they have the resources, authority, and sufficient incentives to act collectively, they are more likely to improve irrigation operations and achieve a better cost efficiency than public bodies or private companies. **Better** and **cheaper** irrigation delivery services would improve yields for farmers, reduce conflicts among farmers, and improve irrigation tariff fee collection.

However, depending on the local context and strategies used, IMT has had mixed results. Here are some of the main findings and lessons from an analysis of the outcomes of IMT (Garces-Restrepo, Muñoz, and Vermillion 2007). Text in **bold**, indicates lessons learned with respect to the Georgian strategy of development of WUOs:

- IMT has reduced the cost of government allocations toward 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 programs require 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 and considered the local context. When 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 want to adapt 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 IMT programs paid attention to the financial capacity of WUOs and their strategies for financing irrigation management. 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 need to establish WUOs at a critical size. But some issues will be probably encountered because about 50 schemes have a command area of less than 500 hectares (GA data). MEPA and GA want to support the newly established WUOs through defining an adequate tariff that farmers would be willing to pay but would also support GA in recovering O&M costs.**
- Successful IMT programs included assistance to the state irrigation agency, and measures were implemented to support the staff. **MEPA and GA leadership have authorized the appointment of GA staff as full-time WUO support unit staff in the regional centers. They have received technical and onboarding training of how to support WUO establishment in their areas.**

- Rehabilitation of the infrastructures *before* IMT was critical for success. **The interviews showed ambiguities on this subject because rehabilitation before transfer implies long delays and will prevent IMT for many irrigation schemes and the lack of funds for rehabilitating secondary and tertiary systems. However, the ongoing World Bank–supported Georgia Irrigation and Land Market Development Project (GILMDP) is rehabilitating some schemes down to the tertiary level in areas where WUOs are planned.**
- M&E systems permitted progressive learning throughout the implementation process. **According to the community of donors and MEPA, M&E systems in GA can be modernized and improved to enable progressive learning.**

Human resources to implement IMT are undersized. Well-performing WUOs are critical for the success of IMT and to ensure the sustainability and operability of rehabilitated and modernized irrigation systems. However, the resources deployed by GA are insufficient for this support—understanding users' issues, convincing, negotiating, training WUO executives, and other activities—because the WUO support unit has only seven full-time staff (four at central level and three at regional level). However, recent efforts by the government to increase the number of regional support unit staff in GA is a step in the right direction.

The transition period from GA managing all systems to shared management with WUOs is unclear. The IMT should be done by 2025 in the pilot schemes (Georgia, MEPA 2017b), 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 GA will create and support associations. **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, and 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 I&D sector are not clear. The sector is mainly structured around GA, GNERC, and MEPA. Other stakeholders, such as municipalities, are mentioned in some documents (Georgia, MEPA 2017a), but their role is not 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 WUO establishment. If there is no clear 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

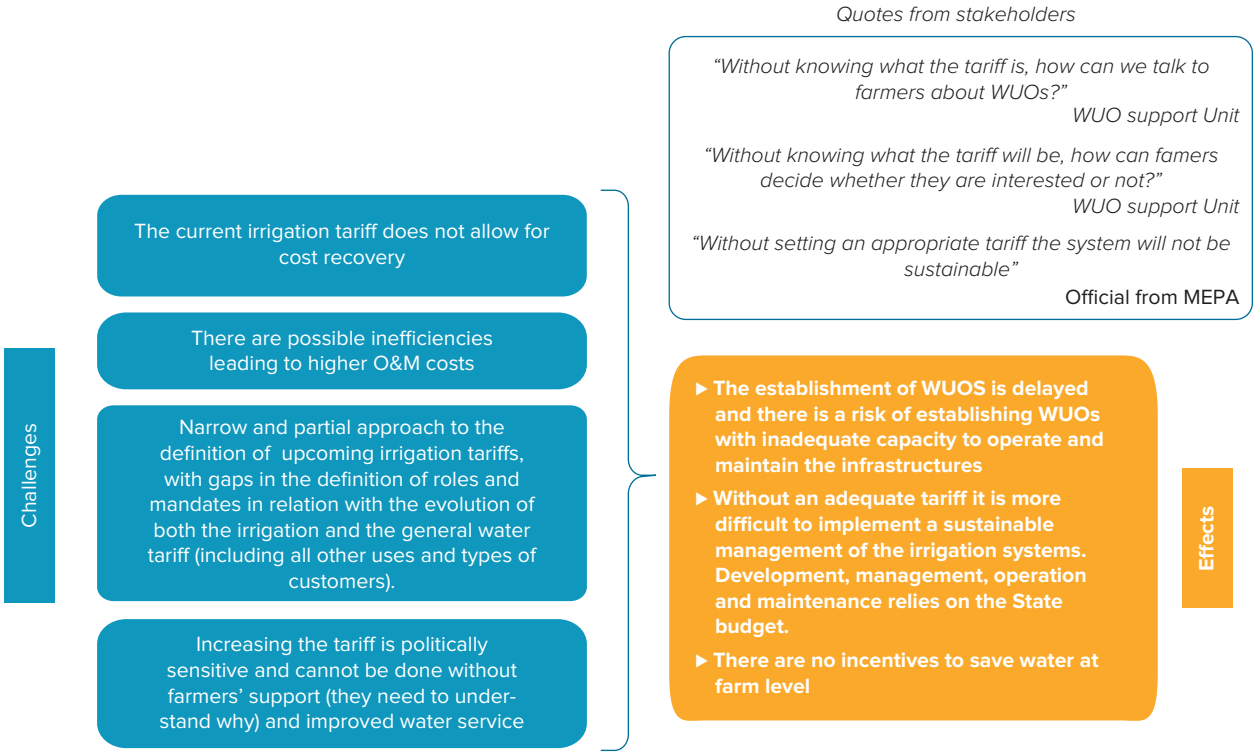
(WUOs or whatever else suits the local conditions), Georgia may face significant irrigation management problems, such as increased difficulties to address water users' needs, in the short and medium term, with direct impacts on agricultural performance and sustainability of water resources. Annex 5A presents potentially useful examples from the lessons of WUO establishment and IMT in other countries.

5.6 C5: Finalize Reform of the Irrigation Tariff

Figure 5.9 presents a problem tree summarizing results from the stakeholder interviews. This led to the identification of C5: finalize reform of the irrigation tariff.

Irrigation tariffs can support 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) (Cornish et al. 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

FIGURE 5.9 C5: Finalize Reform of the Irrigation Tariff



Source: Authors, based on stakeholder interviews.

the importance of the tariff to farmers, and the expected variation of O&M costs at the scheme level, it is crucial that tariffs 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 allow the government to assess 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 adequate targeted subsidies, as needed. 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 (Cornish et al. 2004). Tariffs farmers pay for the provision of irrigation services. These were set by GNERC in 2010 to GEL 75 per hectare for eastern Georgia and GEL 45 per hectare for the west.

The irrigation **tariff does not allow for cost recovery**. It is so low that GA can never break even, let alone invest in capital improvements, without financial support from the state. According to GA data, the area serviced by the four GA regional centers is less than half the officially rehabilitated area (64,519 hectares serviced in 2020, compared to 130,000 hectares officially rehabilitated, according to MEPA in December 2019), which exacerbates the problem of cost recovery. Without expanding the contracting and servicing coverage of GA, covering supply costs might remain problematic even if the tariff were raised.

On the positive side, according to GA management, tariff collection rates have increased dramatically over the years, from about 50 percent in 2016 to 80 percent to 90 percent in the last years. This implies that expanding the contracted area and increasing the tariff, while maintaining high collection rates, might contribute to increasing GA revenues.

The tariff methodology should be changed because **it does not discourage wasteful water use**.[4] As irrigable area increases and climate change reduces water availability,[5] competition between irrigation, hydropower plants, other technical water uses,[6] and drinking water use will intensify, and overuse of water will increase economic costs. Because fees are based on area irrigated rather than volume consumed, irrigators have little financial incentive to prudently use water and adapt cropping systems.

GNERC representatives and national and international experts interviewed supported moving to a volumetric fee, which could improve the efficiency and sustainability of the irrigation sector. This is consistent with the 2017 strategy document (Georgia, MEPA, 2017b). Experts and some MEPA representatives agreed that this could minimize the risk of conflicts with nonirrigation water uses. A tariff based on actual water consumption that also captures the true opportunity cost of water could reduce water consumption for irrigation (relative to what would happen without a tariff reform) and increase efficiency in water usage. This would help farmers internalize the true (higher) opportunity cost of water and lead to the most efficient

possible outcome (Johansson et al. 2002). However, as the literature shows (Chohin-Kuper et al. 2014; Molle and Berkoff 2007; 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 as 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). Regulators could then 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 and Sanchis-Ibor 2019).

Tariff revision is a blocking point, and **the responsibilities of the stakeholders engaged in the reform process are unclear**. However, initial consultations are underway to initiate a transitional irrigation tariff. GNERC is 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. GA and GNERC are focusing 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, 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. GNERC cannot regulate the quality of service provision by GA, as it does for other regulated sectors, because 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. GNERC representatives raised the concern over the lack of a mandate to regulate tariffs for nonirrigation services provided by GA. This, while not in the GNERC mandate, is vital to avoid cross-subsidization issues.

Although no official estimates of the new tariff exist, all main stakeholders agreed that it is likely to be higher than the current one. **The introduction of a higher tariff is a sensitive issue** because, although it is a necessary step, not all farmers might be able or willing to pay for it, and reform acceptance by farmers is key to its success. A key assumption in the discussions about the introduction of the new irrigation tariff is that most 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 5.8), 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, 20 out of 21 farmers contacted are against a tariff increase (the remaining one is not receiving water from GA, but claimed he would pay any amount to receive it).

Several stakeholders highlighted the **importance of preparing and directly consulting with farmers about proposed reforms to the tariff structure**. They want farmers to be part of the rehabilitation process and 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**. The final tariff would

BOX 5.8 Georgian Farmers' Opinions on a Tariff Increase

The 21 interviewed farmers have diverse views regarding the existing tariff and changes in tariff level or structure. Ten (48 percent) reported that the existing tariff is acceptable and there should not be any change or increase in tariff level or tariff structure. They stated that an increase of the tariff is unacceptable. Eight of those 10 farmers (80 percent) stated they receive very good service, and it is impossible to get better irrigation service—even if there were an increased tariff. Two of those 10 farmers (20 percent) said that they sometimes faced difficulties, but GA cannot set a tariff that will be affordable, and the tariff cannot solve all of the existing problems. None of those 10 farmers stated they would switch to the volumetric tariff structure.

In contrast, remaining 11 out of 21 interviewed farmers (52 percent) stated that the existing tariff is too cheap and would not allow GA to improve the service or provide enough water to the customers when required. Thus, they would prefer to pay increased tariff and get more reliable service. Only three of those farmers specified the maximum they would pay. They were ready to pay maximum GEL 500 per hectare, GEL 300 GEL per hectare, or GEL 200 per hectare. Four farmers (out of the 21 interviewed) agreed to have a volumetric tariff.

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

be achieved through a gradual and announced increase over an agreed transition period. All 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 I&D activities. Because the provision of these services potentially benefits all the property owners in the serviced areas, part of O&M costs could be covered by adopting alternative tools, such as an ad hoc (local) property tax. Box 5.9 briefly discusses how this approach is applied in Italy.

BOX 5.9 Italian Plan to Consider Taxes to Cover O&M Costs

In Italy, I&D services are provided by Consorzi di Bonifica (Reclamation Consortia, or RC). RCs are legal entities of public law, with an associative and self-governing structure, administered by consortium members through democratically elected bodies. All private and public entities and individuals owning immobile property (land or buildings of any kind) in the area served by the RC and benefiting from their activities are members of the RC and participate to the election of board members. RCs 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:

- Ensuring 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
- Monitoring and protecting the hydrogeological stability of mountainous and hilly areas through hydraulic regulation works
- Maintaining thousands of kilometers of country roads
- Ensuring water distribution for irrigation and other uses

To acquire the resources necessary to maintain and manage the system, RCs have 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 RC activities, based on predefined rules.

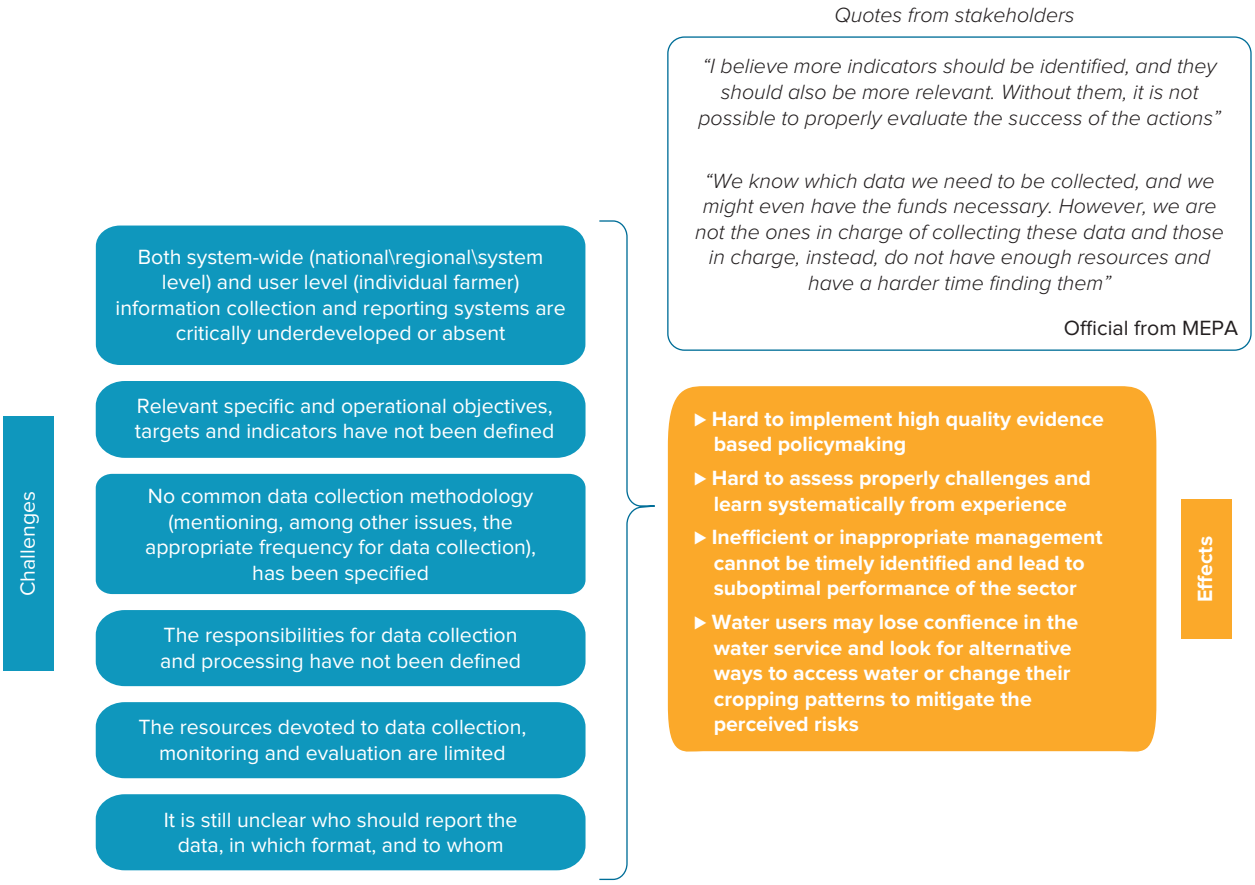
ANBI is a national association of RCs, whose members serve more than 50 percent of the Italian territory. The association is a member of the European Union of Water Management Associations and of Irrigants d'Europe.

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

5.7 C6: Need to Establish Advanced Irrigation Performance Monitoring Systems and Processes

Figure 5.10 presents a problem tree summarizing results from the stakeholder interviews. This led to the identification of C6: need to establish advanced irrigation performance monitoring systems and processes.

FIGURE 5.10 C6: Need to Establish Advanced Irrigation Performance Monitoring Systems and Processes



Source: Authors, based on stakeholder interviews.

Having a **systemwide 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. It allows policy makers 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, if necessary. Data are needed on key indicators about water availability and water flows (including water in reservoirs and channels, and precipitation and transpiration), area irrigated (potential compared to contracted and served), performance of the irrigation service (including efficiency of water delivery, water losses, reliability, timeliness of delivery, consumer satisfaction), O&M costs, and revenues (including information about collection rates and reasons for failure to collect). Data should be collected rigorously, at a predetermined frequency, and at the most disaggregated level possible. This process is key for future evaluation efforts, when the impact of the initiatives will be assessed. Data about land use and the performance of irrigated and nonirrigated agriculture (e.g., type of crops, productivity per hectare, employment) at a disaggregated level should be collected, too. 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 accountability toward individual users and having the enforcement capacity 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 Georgia, MEPA (2017b). **Several issues have been identified during our analysis or highlighted by stakeholders** (MEPA representatives and national and international experts), particularly related to M&E of the irrigation service.

General strategic goals about increasing potential irrigable area, the number of projects that GA should be ranking in order or priority, potential financing, and the establishment of a new unit to mobilize farmers and facilitate consultation and dialogue have been defined. However, more specific monetary, quantitative, or qualitative operational targets and indicators, such as targets for total revenues from fees, cost recovery level, actual serviced area, water delivered, and consumer satisfaction, have not been defined or agreed on.

Despite the progress over the last years, GA does not yet have a fully operational modern system of data-based management allowing decentralized data collection (e.g., on water supply and water usage in the rehabilitated schemes, a need highlighted in Georgia,

MEPA [2017b, 63]). This would allow efficient data aggregation and analysis at the centralized level and let GA officials 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 and M&E are limited and dispersed. According to interviews with GA and MEPA stakeholders, no single unit in GA or MEPA is tasked with gathering and analyzing relevant data and information generated across outside of the organization, and no common data repository exists. MEPA and GA stakeholders were unsure 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 available at the centralized level).

Each department collects data related to its responsibilities, based on internal priorities, with its own methodology (including, for example, possibly setting its own desired data collection frequency and selection of relevant indicators), and stores them separately from all other departments. For example, GA commercial and financial departments monitor the evolution of revenues and turnover, and the Department of Audits and Accounts assesses how efficiently money is spent and whether expenditures are on predetermined items and according to law. This makes it harder to get an overall picture of the system's performance, profitability, or impact, and implement a meaningful aggregate M&E.[7]

Although GA produces yearly reports that become part of the MEPA yearly reports (which include achievements of MEPA, NEA, and all units 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 efficiency of water delivery (including estimates of water losses), reliability of the system, consumer satisfaction, overall contracted area (compared to serviced area), or fee collection rates. Some of this information is available at the department level, but not easy to access. Other information is 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 hard or impossible to obtain data that are not under the specific responsibility of a department because they are not collected systematically (not even by MEPA). However, such data are potentially interesting for the assessment of the performance of the system, such as data about crop productivity in irrigated areas before and after rehabilitation, or to monitor its evolution, such as data about independent irrigators.

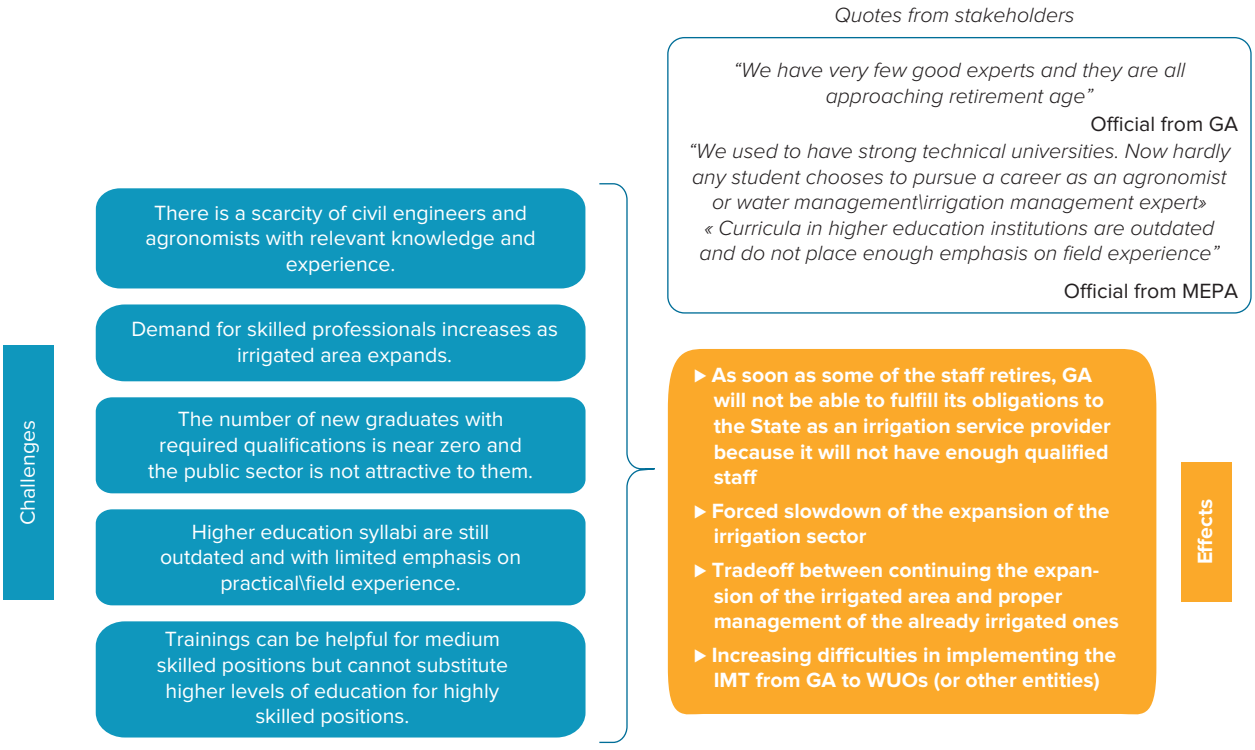
In this situation, it is harder to ensure that resources devoted to the functioning of the collection and reporting system (e.g., skills of personnel) are commensurate with the challenges in GA (training of GA personnel so that it is able to implement a modern data management system) and in MEPA. it is difficult for the government to monitor and evaluate the performance of the irrigation systems, which may contribute to a suboptimal management of water resources and a reduced ability of the government to respond to challenges in irrigation performance. 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.

5.8 C7: Increase the Human Resources for I&D Development

Figure 5.11 presents a problem tree summarizing results from the stakeholder interviews. This led to the identification of C7: increase the human resources for I&D development.

GA will need to strengthen the staffing and expertise to adequately manage I&D systems as they expand. Irrigation is a complex sector that cannot be managed effectively and

FIGURE 5.11 C7: Increase the Human Resources for I&D Development



Source: Authors, based on stakeholder interviews.

efficiently without well-trained specialists. According to all stakeholders we interviewed, the sector has a scarcity of civil engineers and agronomists with relevant knowledge and experience. Those with requisite expertise were trained in the Soviet period. These professionals are nearing retirement. Demand for their services is expected to increase with the rehabilitation of secondary and tertiary channels and with the establishment of WUOs. Staffing might become even more challenging when 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 be transferred to WUOs).

Without decisive actions to increase the recruitment of specialists, the scarcity of skilled personnel will become a major constraint to the development of the irrigation sector. 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 current experts as they retire. The main issues 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 that lack an applied focus on in-field or vocational training.

Actions to increase the availability for support personnel include the development of training programs for specialists who will be supporting WUOs and staffing GA field operations. Some trainings of GA staff have occurred. However, training of existing staff cannot be a substitute for 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 I&D system. Expertise needs to come from potential candidates who have graduated from properly upgraded and modernized higher education (MA, MSc, and PhD) programs.

Emphasis on gender-related expertise in water resources management is necessary. According to the results of a preliminary study conducted by the World Bank, EU, and FAO (2021), women in the sector, both as customers (farmers) and service providers (GA staff), are limited. Most staff in GA or MEPA have not had proper gender sensitization trainings to better understand how to approach and support female farmers.

Ensuring the availability of skilled water resources management professionals in key irrigation sector agencies is crucial to ensure the good performance of irrigated agriculture. They are needed to ensure the increased reliability and efficiency of the irrigation services through better design and O&M of I&D systems, and support water users in adopting water saving practices at the plot level.

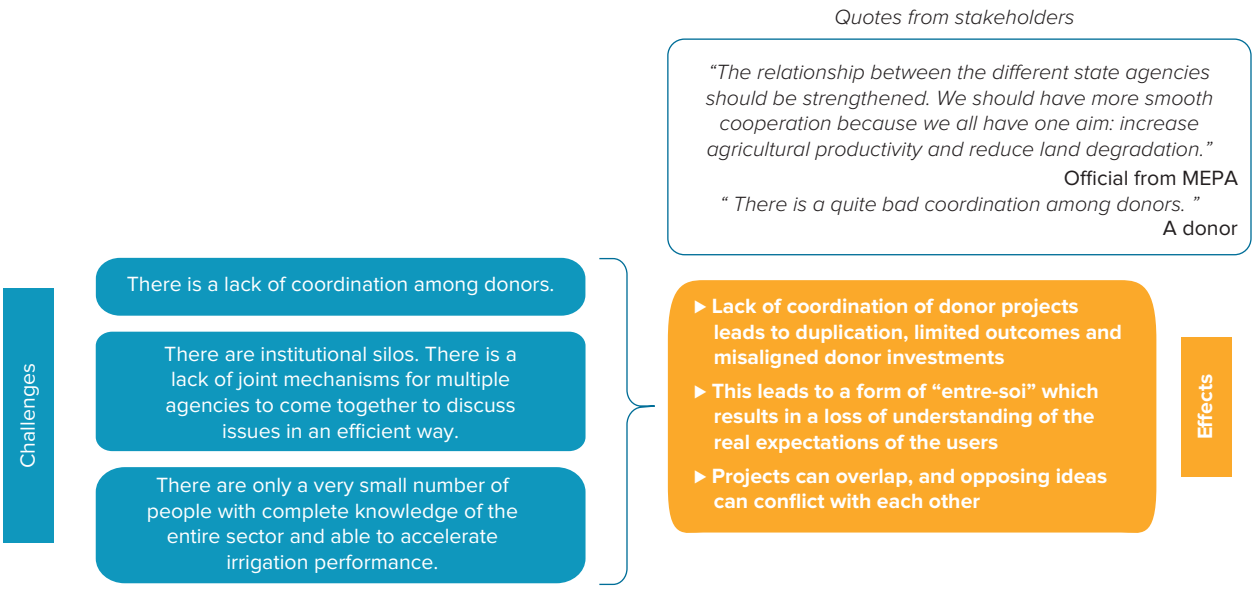
5.9 C8: Address Gaps in Policy Coordination and Encourage Champions at all Scales to Accelerate Irrigation Performance

Figure 5.12 presents a problem tree summarizing results from the stakeholder interviews. This led to the identification of C8: address gaps in policy coordination and encourage champions at all scales to accelerate irrigation performance.

The implementation of public policies at the scale of such a sector requires coordination of stakeholder actions and 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.

Donors lack of coordination. MEPA is at the center of interactions with the different donors. Relations between donors can be improved. Communication is haphazard, resulting in a loss of efficiency and effectiveness for the donors and the ministry. For example, very similar initiatives might 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 positive developments through ongoing donor coordination meetings with the World Bank, the Asian Development Bank (ADB), and

FIGURE 5.12 C8: Address Gaps in Policy Coordination and Encourage Champions at All Scales to Accelerate Irrigation Performance



Source: Authors, based on stakeholder interviews.

Agence Française de Développement (AFD). There are plans to hold a wider coordination meeting on irrigation investments between donors and MEPA and the Ministry of Finance.

According to MEPA and the community of donors, **only a few 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 supported the need to institutionalize knowledge of all aspects related to I&D and IWRM in the government.

Several donors mentioned as issues institutional silos, lack of policy coordination, and lack of joint mechanisms for multiple agencies to come together to discuss issues efficiently. 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 involved in irrigation sector discussions despite their close links with the agricultural sector. Access to land is an issue raised by stakeholders related to agricultural development and the performance of the irrigation sector. However, actors involved in agricultural development or agricultural academics are not part of the irrigation sector discussions, as highlighted in interviews with the FAO and national and international consultants. Mechanisms in other countries could be considered to address this issue (see box 5.10).

BOX 5.10 Assembly for Discussing Water Issues in France

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. The assembly represents local stakeholders in the public debate and integrates their priorities and interventions in a coherent, shared strategy. The mission is to define strategic orientations for the water sector, create action plans, examine the coherence of projects in agriculture, formulate advisory opinions, and analyze the progress made in implementing the guidelines and the results. The public body is made of representatives of public entities, water users, service providers, and entities involved in water management. Despite the difficulties in bringing together many actors and going beyond simple discussions to propose operational goals, this new body allows regular exchanges between actors in a formalized framework. It encourages debate of ideas, feeds the construction of public policies and design of new projects, and puts 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, because the ministry must regularly adapt its approach to the individual requirements or characteristics of its interlocutors. MEPA is not in the best position to develop its approach. Therefore, 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 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.

Annex 5A: Benefits of WUO Engagement for Improved Irrigation Management—Feedback from International Experience

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

Albania

In Albania, most of the infrastructure had deteriorated after the collapse of the central government in the early 1990s. 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 hectares of irrigation systems and 153,000 hectares of drainage systems collapsed. Very similar to the situation in Georgia, land privatization led to very small farms with an average size of 1 to 4 hectares. In 1994, Albania adopted an IMT process with the support of the World Bank. The objective was to decrease the burden for the state budget and improve irrigation management. Water user associations (WUAs) were established and irrigation systems rehabilitated with the WUAs helping to plan, supervise rehabilitation, collect water fees, and pay part of the rehabilitation works. Until 1998, the state-owned enterprise was in charge 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. However,

results were below expectations, and after 20 years of tentative efforts to improve the sustainability of WUAs operations, the government abolished the WUAs and transferred 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 is questioned.

Armenia

The Government of Armenia adopted an IMT policy in 2002. It transferred responsibility for managing irrigation systems from state agencies to WUAs. The reform was based on the water code, the law on WUAs, and unions of WUAs. The law authorized the formation of WUAs of 1,000 to 6,000 hectares (*cadastral*) to take over O&M from existing entities in charge of tertiary canals. In two years, about 54 WUAs were established nationwide and registered. They were responsible for about 132,000 hectares (out of a total of 208,000 hectares of irrigable lands). WUAs were restructured in different steps from 2008 to 2016 to reduce the number of entities and improve their operational capabilities. In 2018, 15 WUAs were operating, with sizes from 5,000 to 20,000 hectares. A total of 148,000 hectares were 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 company 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 WSAs (including energy cost). The WSA receives government subsidies for major repairs not reflected in the yearly O&M budget. Because of government willingness to improve the water service, salary costs for the WSA increased to recruit and retain qualified specialists, and O&M costs followed the same trend to improve the reliability of the water service. These entities are involved in irrigation management:

- The State Environmental Inspectorate 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, and 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

State Environmental Inspectorate identifies cases of water pollution, it is not able to immediately alert the water users mainly because the Water Resources Management Agency (WRMA) does not have overseeing functions.

- The Regulatory Board of WUAs functions on a public basis. Its major objective is to coordinate the activities of WUAs 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 WUAs 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 Armenia in the 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 (Renault, Facon, and Wahaj 2007), IMT in Armenia resulted after fewer than 10 years in an (a) increase of O&M costs to farmers and to government; (b) increase in the efficiency of fee collection; (c) increase in equity of water delivery and reliability of the water service; (d) the same quality of maintenance; and (e) increase in irrigated areas and crop yields.

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. There was no comprehensive support for district officials to enable them to change their position from direct managers of the schemes to advisers in the service of associations, which was a major shortcoming of the program (Khadra and Sagardoy 2019). Other difficulties:

- Irrigation systems were not improved before the transfer to the WUAs
- Poor participation of beneficiaries
- Lack of resources for supporting the establishment of the WUAs (training and equipment)

- Financial difficulties resulting from the tariff structure and collection rate
- Unclear interface between the bulk water supplier and the WUA

Turkey

Turkey has centralized O&M for irrigation systems. The billing rate and collection rates are very low. The water consumption is very high, and there is limited interest from farmers in protecting the infrastructures, leading to deterioration. In 1993, to reduce the burden for the state budget and address the concern of irrigation management and O&M in the expanding irrigated systems, Turkey initiated an IMT program with the support of the World Bank. In three years, 1 million hectares were transferred to irrigation management organizations.

WUOs covered different cases, from irrigation associations to village legal entities, cooperatives, and municipalities. These organizations oversaw the secondary and tertiary systems, and the central water agency was responsible for the primary infrastructures. The program was undertaken by the staff of the General Directorate of State Hydraulics (DSI), who were extensively trained and oriented to the program, and a sense of competition was instilled among the field staff for championing the change. A distinctive feature of the program was its reliance for implementation by its staff rather than grassroot nongovernmental organizations (NGOs). Another feature was to transfer the management to existing locally controlled organizations, such as municipalities. The size of the irrigation units averaged 6,500 hectares 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 the DSI and associations. The contracts do not define the obligations of the DSI, which can unilaterally cancel them. 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 demonstrated that (a) the process has evolved into 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 had collective action experience for O&M; this initial momentum was used to create a competition among regional staff to upscale, and they did not see emerging irrigation associations 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 irrigation associations were not overloaded with functions from the start and had lot of assistance from the DSI; (e) the fee collection for O&M improved considerably; and (f) conflict resolution mechanisms are in place and seem to function well (Ul Hassan, Qureshi, and Heydari 2007).

In 2016, more than 90 percent of the areas, for which the DSI was responsible in the past, were transferred to WUOs. DSI still supports the WUAS and conducts performance M&E to ensure a correct O&M.

However, the reform has not been supported by appropriate legal reform, which has caused some problems for the sustainability of WUO operations. Starting in 2005, there were attempts to reform the IMT by improving the legal framework, and the irrigation association law was adopted in 2011. The irrigation associations gained clear status, but in 2018, amendments to the law resulted in a restoration of government control through the DSI. In addition, several studies state 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 an FAO study (Renault, Facon, and Wahaj 2007) and other studies (Kadirbeyoglu 2008; Kiymaz, Ozekici, and Hamdy 2006), IMT 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 percent in 2005.
- Increase in the efficiency of fee collection from less than 40 percent to more than 80 percent.
- Budgets of WUAs 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 percent of WUAs (DSI survey, 2017).

For water efficiency, the first years were successful, but the rate is now quite similar as before the transfer (40 percent) (Topcu, Kibaroglu, and Kadirbeyoglu 2019). The irrigation tariff structure did not evolve a lot because of the constraints of measurement of water consumption at farm level. Most irrigation associations use 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 (still a work in progress). As a result, some government policy makers developed a negative view of irrigation associations. They introduced amendments to strengthen government control and considered other options of IMT, 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).

Notes

1. Interviewed in 2020 by the World Bank authors during a study for AFD (BRLi, AFD, 2020).
2. See the Geostat website, https://www.geostat.ge/en/modules/categories/196/agriculture.
3. FinExCoop Georgia is an EU project implemented by Agence Française de Développement (AFD). The project aims at improving access to finance and agricultural extension services for small farms and cooperatives in Georgia.
4. Both current consultations and past analysis of the irrigation sector (ISET Policy Institute 2016) suggest water wastage is largely because of inefficient irrigation methods (e.g., flood irrigation).
5. Most stakeholders (MEPA representatives, GA representatives, farmers, national and international experts) underlined trends toward a reduction in precipitation and water availability and expressed concerns about the future. This is in line with data (NEA reports a decline in average precipitation rates in Georgia from 2017 to 2019, from 1,509 millimeters to 1,068 millimeters per year, respectively), and with what the World Bank had predicted in 2014 (Ahouissoussi, Neumann, and Srivastava 2014). The World Bank report highlights the challenge of estimating changes in precipitations over the long term, yet suggests 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.
6. *Technical water* refers to water that is collected, generated, or managed onboard for uses other than potable water; see the Law Insider web page, https://www.lawinsider.com/dictionary/technical-water.
7. Challenges 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 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, such as the NEA-generated data about actual river discharges, temperatures, and precipitation. Moreover, during our consultations, it emerged that resource availability is 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.

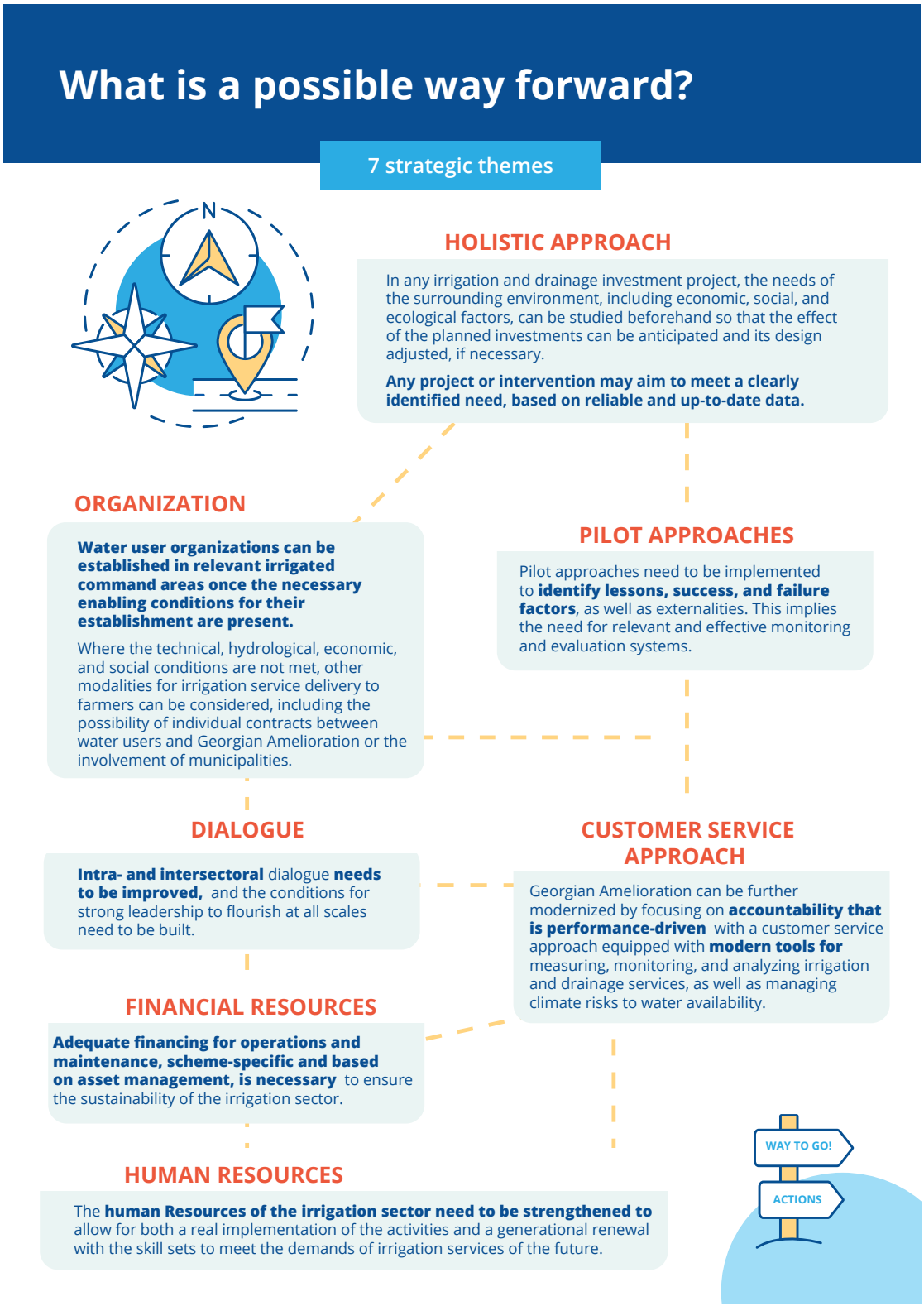
6

Recommendations and Actions to Improve Irrigation Sector Performance

Considering the constraints 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 (figure 6.1).

- **In any irrigation and drainage (I&D) investment project, the needs, constraints, and requirements of the farmers or water users and 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. 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 irrigation, land, agriculture, and environmental sectors is necessary to allow a better understanding of farmers' expectations and their binding constraints in accessing irrigation water and growing crops, and to work at the service of farmers, especially young people.

FIGURE 6.1 Strategic Reform Directions to Improve Irrigation Sector Performance



Source: Stéphanie Fischer/BRL Ingénierie, for World Bank.

- **After the conditions for water user organizations' (WUOs') establishment are met, they should be established in relevant irrigated command areas**. If the technical, hydrological, economic, and social conditions are not met, other modalities for irrigation service delivery to farmers should be considered, such as individual contracts between water users and Georgian Amelioration (GA) 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, 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 irrigation management transfer (IMT) to future WUO members.
- **Adequate financing for operations and maintenance (O&M), 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, and O&M costs (depending on exposure, durability, risk, and so on). This assessment is fundamental in developing irrigation service fees, which underpin the financial sustainability of systems, and for providing a business-oriented service to water users. It is highly pertinent to customers and service providers in the context of improved irrigation service delivery performance (Waalewijn et al. 2020).
- **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 (M&E) systems**.
- **Intra- and intersectoral dialogue** must be improved, and the conditions for **strong leadership** to flourish at all scales must be built.
- The quantity and quality of skilled **human resources in the irrigation sector must be strengthened** to allow for implementation of the activities and a generational renewal.
- GA can be modernized by focusing on **accountability** that is **performance-driven** with a **customer service approach equipped with modern tools for measuring performance, monitoring, and analyzing I&D services, as well as managing climate risks to water availability**. The objective should be to achieve the performance level of the private sector but in the service of the public. Accountability implies the development of robust **regulatory capacities** for the sector. However, these should be

underpinned by a comprehensive and transparent monitoring of system performance that takes a shift away from measuring investments made toward monitoring results of irrigation schemes, as well as subsidy policies and water allocation.

To support these strategic reform directions, we propose several practical recommendations. These recommendations are limited to six in the short term and four in the medium term to facilitate their discussion and endorsement by the irrigation sector decision-makers.[1] See figure 6.2 for a roadmap.

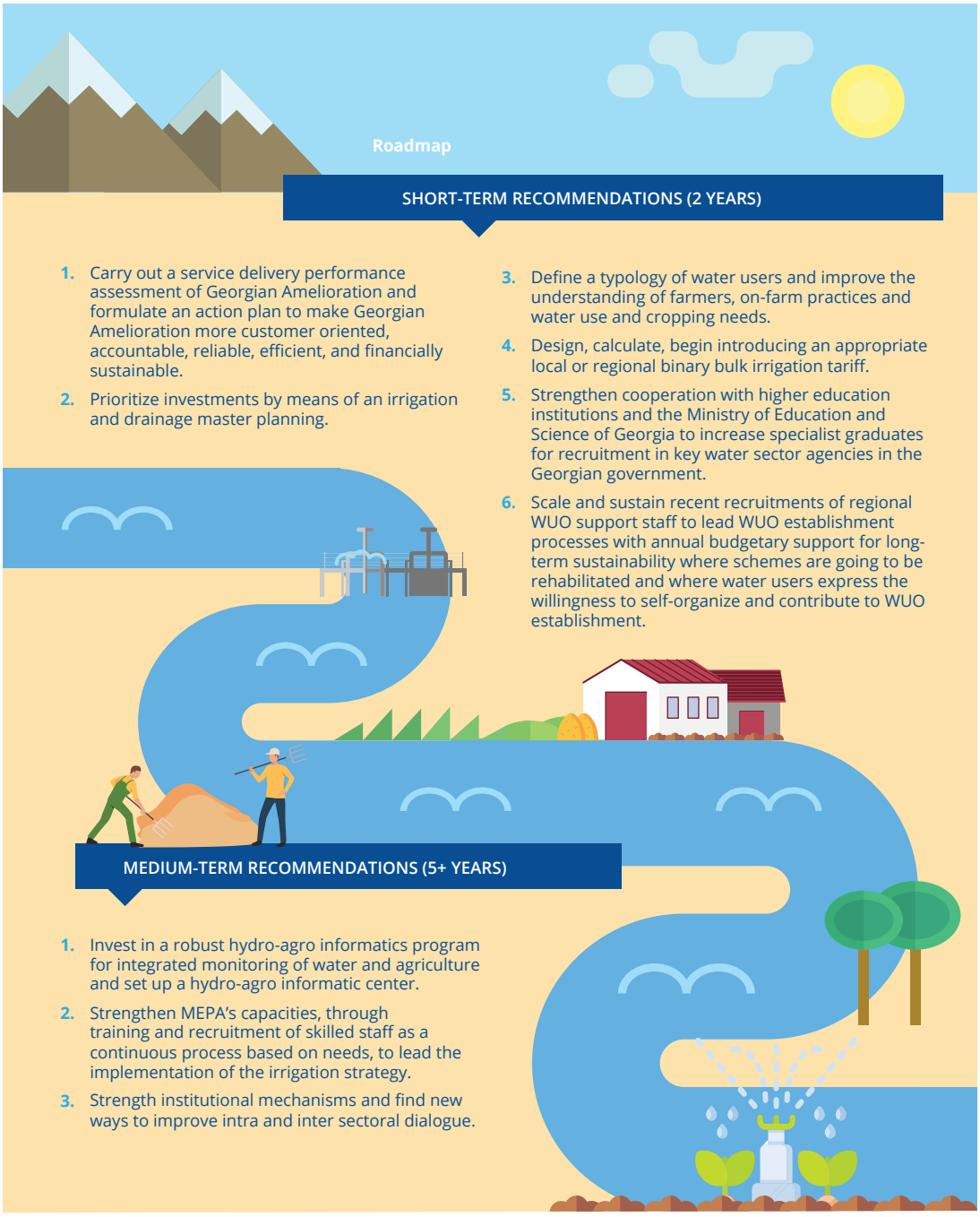
6.1 Short-Term Recommendations (Two Years)

Carry out a service delivery performance assessment of Georgian Amelioration (GA) and form an action plan to improve services. Assess the efficiency of its full suite of I&D activities. Identify potential reorganization needs, human resource and capacity building needs, legal and financial models, 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 (M&E) 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. See table 6.1.

Assess interest and ways to have a board of directors with representatives of public sector and water users. Propose legal evolution of GA—as a legal entity under public law or corporatized entity or other—with analysis of best types of public-private partnership (PPP) models that suit the needs of Georgian irrigators. **The role of a regulator (Georgian National Energy and Water Supply Regulatory [GNERC]), the means to reinforce its control capacities, and the ways to measure GA performance will require attention to regulatory roles and responsibilities agreed between GNERC and the Ministry of Environmental Protection and Agriculture (MEPA) for oversight of the irrigation sector**. Ways to introduce more effective accountability should be considered (e.g., participatory budgeting, user involvement in execution, redress tools such as functional complaint mechanisms, and easier access to legal recourse).

Design and calculate an appropriate local or regional binary (fixed and volumetric component) bulk irrigation tariff for future WUOs in close consultation with water users for areas with WUOs. Design and calculate an appropriate local irrigation tariff for areas without WUOs, **including a transition path (implementation plan of the tariff policy)** toward cost recovery of at least the revised O&M costs for the main systems after secondary and

FIGURE 6.2 Roadmap to Reform in the Irrigation Sector of Georgia



Source: Stéphanie Fischer/BRL Ingénierie, for World Bank.

TABLE 6.1 Recommendations for GA, Impacts, and Costs of No Action in Georgia

High-level objective: Make GA more accountable, more focused on water users, more reliable, efficient, and financially sustainable to deliver timely and adequate I&D services to users			
Main constraints 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 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 and 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 or lower benefits than possible for society • GA unaccountable to users and state for irrigation services

Note: GA = Georgia Amelioration; I&D = irrigation and drainage.

tertiary systems have been handed over to future WUOs. The tariff should ensure not only the financial sustainability and efficiency of GA and WUOs but also 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 were too high for a particular scheme, e.g., if pumping or the system were in poor condition, a targeted subsidy to the WUO could be considered. Revise legal documents to require GNERC to set tariffs for water service provision from GA to all types of water uses from irrigation infrastructure.[2] Invest in low-cost volumetric measuring devices in main canal systems that are being rehabilitated under ongoing donor-funded projects to allow for volumetric measurement of water users and calculation of the water fees accordingly. Consider revising the drainage tariff to better cover costs of providing adequate drainage services by GA to end users. See table 6.2.

Promote farmer-to-farmer training and peer-to-peer capacity building model for establishing successful WUOs in partnership with MEPA, GA, Agricultural and Rural Development Agency (RDA), and Georgian Farmers' Association (GFA) in key irrigation

TABLE 6.2 Recommendations for Future Irrigation Schemes, Impacts, and Costs of No Action in Georgia

High-level objective: increasing financial resources for management and O&M of existing and future irrigation schemes			
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 paying irrigation tariff is reduced • GA unable to upgrade and modernize human resources and monitoring systems • Decline of overall irrigable area

Note: GA = Georgia Amelioration; I&D = irrigation and drainage; O&M = operation and maintenance.

command areas. Consider merging or find ways for local GA and MEPA service centers to work jointly for enhanced service delivery to customers. Provide skilled staff and financial resources to these centers so they can implement comprehensive support to farmers, especially targeting female and young, entrepreneurial farmers, to increase the adoption of sustainable agricultural practices. See table 6.3.

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 I&D master planning exercise. Developing a national I&D master plan (separate or joint) may include the clear definition of the role and mandate of the main actors, after conducting a needs assessment study for the sector. In addition, multiple prioritization criteria should be considered, including better understanding of why a specific investment is needed, expected benefits, cost, water balance (including the impact of climate change), environmental and social considerations, and modernization and technological innovations. Based on this master plan, more detailed studies will be carried out, which is why the level of detail will have to be adapted to inform the decision-makers while considering all the studies that may

TABLE 6.3 Recommendations to Support Farmers and Water Users, Impacts, and Costs of No Action in Georgia

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 kickstart and ensure WUO establishment is owned and led by farmers jointly with GA staff	Comprehensive support to farmers, leading to better performance of farming systems and innovation	• Lack of functional WUOs established • Underperformance of the agricultural sector

Note: GA = Georgia Amelioration; WUO = water users organization.

result from it. A transparent prioritization is needed, which may include the need for 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 relevant irrigation schemes. For instance, the master planning exercise can explore options for on-demand irrigation water delivery to irrigated fields with controlled water application and the use of new technologies and approaches (e.g., efficient irrigation methods, smart phone apps, drones, moisture probes). These may require modernization interventions, such as storage reservoirs close to where the water is needed, which can be part of the planning exercise. See table 6.4.

Define a typology of water users and improve the understanding of farmers, on-farm practices, water use, and cropping needs. Assess the motivation of farmers for joining a WUO and paying water tariffs, and create the conditions for improving irrigation service delivery. This assessment should be conducted before any new investment projects in irrigated areas and should consider gender issues and young farmers. See table 6.5.

Strengthen institutional mechanisms and find new ways to improve intra- and intersectoral dialogue. Establish a committee of stakeholders from multiple agencies to pilot and follow up the development of the irrigation sector. This committee would include

TABLE 6.4 Recommendations for Strategic Planning and Policy Implementation, Impacts, and Costs of No Action in Georgia

High-level objective: Having a sound framework for strategic planning and policy implementation of I&D 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 • Clear vision for the I&D 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 I&D services by water users

Note: I&D = irrigation and drainage; IWRM = integrated water resource management.

TABLE 6.5 Recommendations to Support Agricultural Development, Impacts, and Costs of No Action in Georgia

High-level objective: Meeting the needs of water users to support agricultural development and establishment of sustainable WUOs			
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

Note: I&D = irrigation and drainage; IWRM = integrated water resource management; WUO = water users organization.

representatives from the MEPA (Agriculture *and* Environment), GA, GNERC, the community of donors, National Land Agency, rural development, and GFA. It would meet, for example, every three months to discuss ongoing projects, progress, strategic decisions, and difficulties. External participants could be invited at the request of committee members. This committee can be replicated at a local level in 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. For example, binding agreements between agencies with implementation action plans and joint indicators of performance could be planned. It also important to actively engage users into direct forms of consultation on ongoing projects. This can include participatory budgeting, users' involvement in execution, and redress tools such as functional complaint mechanisms. See table 6.6.

6.2 Medium-Term Recommendations (Five-Plus Years)

Scale and sustain recent recruitments of regional WUO support staff to lead WUO establishment processes with annual budgetary support for long-term sustainability in which schemes are going to be rehabilitated (primary, secondary, and tertiary systems)

TABLE 6.6 Recommendations to Support Leadership, Impacts, and Costs of No Action in Georgia

High-level objective: enhanced leadership capacity and coordination of donor actions to benefit the agricultural sector and ensure coherent vision and reform of I&D 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 issues of policy incoherence and weak coordination and leadership	Joint and multisectoral approach to I&D policy reforms, leading to improved policy implementation	• Inefficiencies due to overlapping projects or projects with contrary objectives implemented with donor support • Delays in implementation of projects • Delays in irrigation strategy implementation

Note: I&D = irrigation and drainage.

and in which 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 and necessary specialists in GA (including abroad, if necessary) to jumpstart or accelerate improvements of the irrigation system and training of WUO staff. Consider using the services of the GFA to support GA staff in local areas for WUO establishment. See table 6.7.

Invest in a robust hydro-agro informatics program (HAIP) for integrated monitoring of water and agriculture and set up a hydro-agro informatic center (HAIC). HAIP will be the foundation that Georgia needs for filling constraint 1 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 in which 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 applications will work with 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 I&D service delivery.

TABLE 6.7 Recommendations for Expanded WUOs, Impacts, and Costs of No Action in Georgia

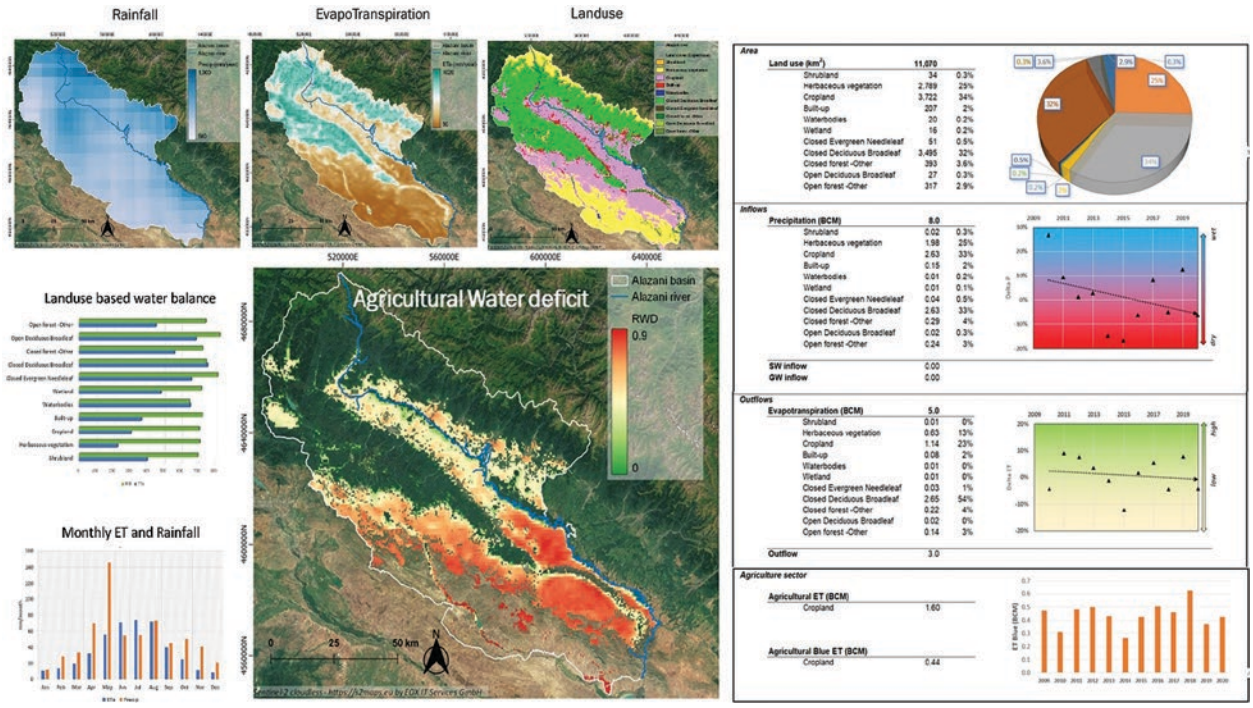
High-level objective: Establish successful and sustainable WUOs that take ownership of the O&M of secondary and tertiary irrigation systems			
Main constraint to be addressed	**Why?**	**What will be the impact?**	**What is the cost of no action?**
C4: accelerate WUO establishment	To address the issue of human resources in GA who are responsible 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 use irrigation services

Note: O&M = operation and maintenance; WUO = water users organization.

A HAIC can be established in MEPA as the custodian and service provider of the HAIP with universities and knowledge centers. The HAIC will closely collaborate with departments and units tasked with data collection and will upgrade and develop their hardware and software capacities for monitoring. The HAIC will roll out a bundle of decision support system tools such as **water accounting**, **drought and flood monitoring**, **irrigation and crop monitoring system, and basin management reports to provide actionable information across the scales from farm to basin**.

The World Bank, the Georgian National Environment Agency (NEA), and GA, have developed a remote sensing study of the potential of a water accounting tool for the Alazani River Basin (see figure 6.3). Water accounting supports decision-making in the irrigation sector. It is a systematic quantitative assessment of the status and trends in water supply, demand, distribution, accessibility, and use. It enables users to make sense of how much water is available and how to use it. 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, assess whether there is improved water

FIGURE 6.3 Typical Output of Water Accounting Application Using Global Remote Sensing Data for the Alazani River Basin in Georgia



Source: World Bank.

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 use of new technologies and approaches (e.g., efficient irrigation methods, smart phone apps, drones, moisture probes) may require 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. See table 6.8.

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. Encourage enrollment in higher education and professional programs to train water sector experts, including training a future generation of gender-aware I&D and water resources management specialists. See table 6.9.

Strengthen MEPA 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 I&D sector means, define a

TABLE 6.8 Recommendations for Climate Resilience and IWRM, Impacts, and Costs of No Action in Georgia

High-level objective: Enhance the climate resilience of irrigation systems and ensure water resource management planning is in an IWRM framework			
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 targeted toward 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

Note: I&D = irrigation and drainage; IWRM = integrated water resource management.

TABLE 6.9 Recommendations for Increased Human Resources, Impacts, and Costs of No Action in Georgia

High-level objective: have qualified officers and technicians in key water sector agencies in the Georgian government implement public policies and 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 scales 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 policy makers and experts	Impossibility of implementing reforms on the ground and deterioration of sector performance

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 by deploying new remote sensing technologies. See table 6.10.

6.3 Ministry of Environmental Protection and Agriculture Endorsement And Prioritization of Proposed Actions and Recommendations

An initial draft of this policy note was presented for comment and feedback to MEPA and GA in detailed sessions to give decision-makers the opportunity to review its constraints and recommendations. 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 6.11 in order of priority, as reported by MEPA and GA.

TABLE 6.10 Recommendations for Reshaping Irrigation Policies, Impacts, and Costs of No Action in Georgia

High-level objective: Be able to monitor, evaluate, and reshape policies and 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

TABLE 6.11 Recommendations and Actions Endorsed for Priority Action by MEPA, Rationale, and Plan in Georgia

Recommendations and actions endorsed for priority action by MEPA	Rationale	Action plan
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 be an agency at the service of public policies in the sector • The tools used by GA, procedures, and way in which performance is assessed and activities are monitored need to be modernized in the short term, both internally (how GA monitors and evaluates its own activities) and externally • MEPA is monitoring GA, but 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	MEPA is drafting a terms of reference for a donor-funded consultancy to assess the service delivery performance of GA

(table continues next page)

TABLE 6.11 *(Continued)*

Recommendations and actions endorsed for priority action by MEPA	Rationale	Action plan
Prioritize investments by means of I&D 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, 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 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, and introduce an appropriate regional binary bulk irrigation tariff	The issue of financial resources for the sector and covering O&M costs is crucial. The difficulty lies not so much in calculating an appropriate tariff as in the steps to implement a new tariff	This activity is ongoing. GNERC is working on the tariff definition and the World Bank is supporting the government in providing technical assistance for an international expert to work on the definition of a revised irrigation tariff

(table continues next page)

TABLE 6.11 *(Continued)*

Recommendations and actions endorsed for priority action by MEPA	Rationale	Action plan
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	• Generational renewal in the I&D sector, regardless of the actor involved, should be 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 resources 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 because 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 a strong stake in the success of this pilot approach and in identifying all the conditions for scaling up	MEPA aims that some WUOs can be established under the ongoing World Bank–funded GILMDP, but the interest of this project is to clearly identify associated costs and good practices to be able to replicate the approaches and enable the establishment of associations in other territories
Recommendations and actions endorsed as important for medium-term implementation	**Rationale for endorsement and prioritization**	

(table continues next page)

TABLE 6.11 *(Continued)*

Recommendations and actions endorsed for priority action by MEPA	Rationale	Action plan
Invest in a robust HAIP for integrated monitoring of water and agriculture and set up a HAIC	• Modernizing the sector through new technologies, based on remote sensing and earth observation tools, is of great interest, as with land issues, but decision-makers must consider related costs • Pilot approaches can help decision-makers assess the relevance and costs associated with these new tools	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 GoG, in partnership with MEPA and NEA
Strengthen MEPA's capacities	The assessment of ongoing personnel and skills needs in 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 intersectoral dialogue	• Intra- and intersectoral 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 or group of stakeholders would be appropriate to engage stakeholders in more fruitful exchanges and lead to better outcomes	

Source: Authors, based on feedback from MEPA and GA.
Note: GA = Georgian Amelioration; GILMDP = Georgia Irrigated Land Markets Project; GNERC = Georgian National Energy and Water Supply Regulatory Commission; GoG = Government of Georgia; HAIC = hydro-agro informatic center; HAIP = hydro-agro informatics program; I&D = irrigation and drainage; MEPA = Ministry of Environment Protection and Agriculture; NEA = National Environment Agency; WUO = water users organization.

Notes

1. Although it would have been relevant to mention other actions, we considered them out of the scope of this policy note because they would be obligatorily undertaken in the short or medium term by the Georgian government (e.g., the adoption of the law on water resources management).

2. The definition of the water tariff could be established in two stage. Stage 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 the creation of conditions for effective monitoring or estimation of volumes consumed. The tariff should consider the types of water uses (industry, fish farm, small gardens in peri-urban area, and hydropower). Stage 2: The level of tariffs is progressively increased to cover, initially, a larger share of O&M costs with the objective of covering at least the full O&M costs in the long term. The definition of the tariff must consider the IMT process and the new relations that will result between GA, water users organized in WUOs, and individual water users. The role of GNERC must be clarified to consider the diversity of possible relationships between GA and water users. Finally, the definition of the water tariff must consider the new basin management approach and possible implications of IWRM principles.

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Appendix A Questionnaires for Interviews and Focus Groups

The following questions guided 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 planned questions were not asked because they no longer seemed relevant.

MEPA, Dept. of Policy Analysis, Dept. of Agriculture, Food and Agricultural Development; Dept. of Hydroamelioration and Land Management

Objectives of Strategies and Main Constraints

1. 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 five issues or constraints? Can you prioritize them?
2. What could be improved in 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?

3. What are the major obstacles (from your perspective) in implementing the strategy (at a national scale, basin scale, scheme scale, farm scale)?
4. What are the main ongoing and future projects dealing with the improvement of the irrigation sector?

Data, Evidence-Based Decision-Making

5. How does the planning happen? What is the basis for decision-making in service planning and development process?
6. Is an information system in place? Do you think it is capable of supporting properly the implementation of the I&D strategy?
7. Do you collect and analyze data to make accurate decisions for irrigation management? Which ones? Do the data to understand and manage the sector exist, and can they be regularly updated? If no, can you explain why? What should be done to ensure that all relevant data are available?
8. Are data and projections on water demand for irrigation available and guiding decisions? If yes, how reliable do you think they are?
9. Are key data publicly available and communicated?

Monitoring and Evaluation

10. Are there evaluation mechanisms in place to systemically and regularly assess performance or effectiveness, gaps, and overlaps in the regulatory framework? Do formal requirements exist for monitoring and evaluation?
11. Is there an M&E system in place for the follow-up of the implementation of the strategy? If yes, who is in charge of that monitoring?
12. Are there agreed-upon key performance indicators? If yes, what are the main indicators? What is the follow-up frequency? Are there any indicators other than defined ones that would allow more efficient evaluation of the performance?
13. Is there an assessment of the impacts of decisions on water management and irrigation performance?
14. Are benefits regularly evaluated and showcased to decision-makers and key stakeholders?

15. 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?
16. Are there provisions or incentives for civil society monitoring?
17. Are there financial resources available to train civil society organizations in project monitoring?

Observed Outcomes and Impacts

18. What has been implemented as part of the irrigation strategy?
19. Do you observe some impacts of these actions? If yes, what impacts? If no, why, according to you?
20. What has not been implemented? Do you know why?
21. How do you explain the delays in the implementation of the irrigation management transfer?
22. Why is the WUA law not being implemented?
23. Why is the drainage strategy not validated? Should this strategy be combined with the irrigation strategy?

Risk Management

24. What are the main risks related to the irrigation sector and to the implementation of the strategy? How can these risks be mitigated?
25. Is there a risk management process in place? If yes, how is the risk management process structured?
26. What are the data to consider for risk management?

Stakeholder Involvement and Interactions

27. 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 fulfill their tasks? Are there still gaps?

28. How well do the stakeholders interact? To what extend can they cooperate successfully? Do they share the same objectives? Do their objectives sometimes conflict?
29. How would you describe the current relationship between the water service providers and water users?
30. Do you think water users can or 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?
31. Do you think that the sequence of activities to undertake is clear to all stakeholders, whatever the scale? If no, can you detail?
32. 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?
33. 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

34. What are the existing mechanisms to ensure compliance with water use rules? Do they work? Are they efficient?
35. What is the level of accountability of service providers to water users?
36. Are the roles and responsibilities for the implementation of the irrigation strategy clearly defined?
37. 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?
38. 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 and Reflections for Improvement

39. 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?

40. Are there ongoing 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?
41. 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 ?
42. Has the strategy been discussed at national level only or have consultations also been carried out at local level?
43. Is the pathway for improving the irrigation sector clear in the I&D strategy?

Institutional Coordination and Strategy Implementation

44. Is the irrigation strategy promoting institutional reforms? What are the main ones?
45. How do you see the interaction between the IRBM and the I&D strategy?
46. Do you think something could be improved in the way tasks are shared?
47. Are there contractual arrangements for the implementation of the strategy? Two potential directions: (a) are there contractual arrangements currently in place for the implementation of the strategy? and (b) do you think there are contractual arrangements that should be put in place for or during the implementation of the strategy ?
48. 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?
49. 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?
50. Are there conflict mitigation and resolution mechanisms? How complex is this process and what is the scale of this process?
51. Are there intra- and intersectoral dialogue platforms and networks of professionals for experience and knowledge sharing?

Water Tariff and Its Components

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

53. 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?
54. Are the capacity to pay and willingness to pay of water users evaluated through solid economic analysis and dedicated surveys?
55. What are the main constraints to the reforms in the water tariff?
56. Are water accounts separated to ensure traceability of the water money?
57. 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

58. The strategy emphasizes the need for innovation. What is understood by "innovation"?
59. Do incentives exist to produce, disclose, and use water-related data and information through innovative ways?
60. Are there any public bodies or accredited bodies fostering innovation in the irrigation sector?
61. Do innovative tools and processes to build capacities exist? Raise awareness? Engage stakeholders? Share information? Engage in and across organizations?

MEPA, Division of Water Resource Protection

Institutional Coordination and Strategy Implementation

1. At what stage of development is the IRBM system?
2. 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?

3. 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?
4. Do you think something could be improved or clarified in the way tasks are shared?
5. 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?
6. 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?
7. Are there conflict mitigation and resolution mechanisms? How complex is this process, and what is the scale of this process?
8. Are there intra- and intersectoral dialogue platforms and networks of professionals for experience and knowledge sharing?
9. 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 and Reflections for Improvement

10. 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?
11. 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

12. What do you think of the water tariff for irrigation?
13. What do you think of a bulk water tariff?
14. 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?
15. Should water tariffs be differentiated by basin?

Ministry of Finance

Data, Evidence-Based Decision-Making

1. Do you monitor the evolution of GA and, more generally, of the irrigation and drainage sector needs?
2. 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?
3. Have you set any targets or thresholds that should not be passed or that, if passed, would require stricter monitoring or corrective actions?

Risk Management

4. What is your attitude (how do you feel) toward the financial obligations associated with the development of the I&D sector in the coming years?
5. What are the main risks related to the irrigation sector and to the implementation of the strategy? How can these risks be mitigated?
6. Is there a risk management process in place? If yes, how is the risk management process structured?
7. What are the data to consider for risk management?

Suggestion and Reflections for Improvement

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

Georgian Amelioration

General Director, Operation Director, Technical Director, Dept. 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 five issues or constraints? Can you prioritize them?

3. How would you rate the performance of the irrigation sector on a scale of 0 to 5 (0 = very bad and 5 = excellent)?
4. Along which dimensions would you define the performance of the irrigation sector? Indicate at least five 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 five?
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 five.
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?
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 operations 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 operations 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 who 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 who 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 the annual objectives of Georgian Amelioration? How are these objectives set? What kind of indicators do you use to monitor and evaluate your activities?
25. What are the main ongoing 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 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 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 consider climate risks? Are these risks considered in the design of policies and projects?
32. Do you 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 or 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 or could this be implemented?
36. What could be improved in 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 ongoing 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 in 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 evaluation mechanisms in place to systemically and regularly assess performance and effectiveness, gaps, and overlaps in the regulatory framework?
50. Do you think that some actors (who should be) are not considered 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 us 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 Dept.

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 five issues or constraints? Can you prioritize them?
3. How would you rate the performance of the irrigation sector on a scale of 0 to 5 (0 = very bad and 5 = excellent)?
4. Along which dimensions would you define the performance of the irrigation sector? Indicate at least five 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 five?
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 the annual objectives of Georgian Amelioration? How are these objectives set? 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 to systemically and regularly assess performance and 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? What are the criteria used for the selection of places where projects will be implemented? How does the planning happen? What is 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 five.
14. What are your main constraints in the department? Indicate at least five.
    What are the main strengths of GA?
15. If your monitoring and auditing activities highlight issues in the strategy implementation, what do you do? How efficient is the monitoring process?
16. What main targets and indicators are you 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 or 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 five issues or constraints? Can you prioritize them?
3. How would you rate the performance of the irrigation sector on a scale of 0 to 5 (0 = very bad and 5 = excellent)?

4. Along which dimensions would you define the performance of the irrigation sector? Indicate at least five 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 five?
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? What are the criteria used for the selection of places where projects or WUOs will be implemented? How does the planning happen? What is 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 five.
15. What are the main strengths?
16. What are your main constraints as a WUO support unit? Indicate at least five.
17. Do you think you have enough resources?

18. According to your knowledge of the irrigation sector and strategy, what are the main changes promoted by the strategy? What are the objectives?
19. Are there targets and indicators you must report on and are responsible for?
20. Do you think the strategy, as defined, will enable policy makers 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 consider the climate risks? Are these risks considered in the design of policies and projects?
24. Do you 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 or should be improved?
28. Do you have annual objectives? How are you evaluated?
29. Do you think water users can or 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 or could this be implemented?
30. What could be improved in 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 ongoing 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 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?

Dept. of Environmental Supervision

1. What is your role in the department? 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 five issues or 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 to 5 (0 = very bad and 5 = excellent)?
5. Along which dimensions would you define the performance of the irrigation sector? Indicate at least five possible performance indicators.
6. What are the main constraints in your activities? Indicate at least five.
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? What criteria are used for the selection of places where projects will be implemented? Are environmental

data 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 consider 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 to systemically and regularly assess performance and effectiveness, gaps, and overlaps?
22. Do you think that some actors (who should be) are not considered 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 the irrigation and 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 or 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 relationship between the water service providers and water users?
6. How would you assess the technological development of I&D technologies on farm levels? Are there differences in terms of farm sizes? What are those differences?
7. What current projects are you implementing for access to irrigation technologies? Are data on these projects accessible?
8. Do you have any data or assessment regarding farmers' attitude toward 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 in the irrigation sector? What could be the main constraints?
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 strategy has not been finalized?
14. Are there mechanisms to monitor the degree of advancement of the agricultural strategy, rural development strategy, or irrigation strategy? How are decisions 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 consider the climate risks? More generally are these risks considered in the design of policies and projects?
17. What could be improved in the irrigation strategy?
18. Are there other policies that could improve the performances of the irrigation sector? Can you describe them?
19. Do you 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 intersectoral 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 constraints do farmers face in land registration?
4. What programs are implemented for incentivizing land registration?
5. Are there any land-related conflicts that you are aware of related to I&D or access to water? How do you resolve these conflicts?
6. Are you aware of irrigation 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, Dept. of Energy Policy and Investment Projects

1. Are you aware of developments in the irrigation sector? What is your awareness about the irrigation strategy? What do you think about its feasibility? Are any constraints problematic for development of energy sector?
2. Are there any water-related conflicts between irrigation and energy sectors? How are they normally resolved?
3. Are investors interested in investing 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. Has a power plant investor participated in the development of irrigation project? If so, what was the arrangement of water use? Did you provide any specific benefits?

5. Discuss the 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 committee to discuss at national or local level issues related to water use?
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 it 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 intersectoral dialogue platforms and networks of professionals for experience and knowledge sharing?

GNERC, Tariff Department Water Dept.

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 I&D strategy clearly defined?
3. Is there 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 case of GNERC?
6. Are you ready to start regulating irrigation and drainage sectors? What is level of readiness? What else has to be done?
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 favor of the establishment of a 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 the 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 in 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 or improvements in the system that could make the tariff increase acceptable? If yes, which? If no, why?
6. What is the share of farmers who 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 or 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 or 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 in 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 us 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 intersectoral 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 five issues or 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 to 5 (0 = very bad and 5 = excellent)?
8. Along which dimensions would you define the performance of the irrigation sector? Indicate at least five 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 five?
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 operations 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 operations 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 is 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 ongoing 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 consider the climate risks? More generally are these risks considered in the design of policies and projects?
26. Do you 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 in 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 ongoing 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 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 us 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 an 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 and effectiveness, gaps, and overlaps in the regulatory framework?
44. Do you think that some actors (who should be) are not considered 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 the 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 be resolved? What are the main policy interventions or findings? What do you think will be the impact of implementing your recommendations on irrigation sector?

Consultants In Charge of Value Chain Policy Note

Irrigation and Agricultural Development and Performance of the Agricultural Sector

1. How is the current state of the I&D sector affecting the development of the agricultural sector?
2. 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 and when they need it?
3. Where do farmers integrated in successful value chains take water from?
4. How are farmers in successful value chains irrigating their fields (technology)?
5. Is this related to the current performance of the irrigation system and water availability?
6. Do you know whether farmers are considering changing their irrigation technology or crops, depending on the evolution in the irrigation system (e.g., higher reliability)?
7. Is it only a minority of smallholder irrigating farmers that are engaged in high-value crops?
8. 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

9. 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 five issues or constraints? Can you prioritize them?
10. What are the main ongoing and future projects dealing with the improvement of the irrigation sector?

Suggestions and Reflections for Improvement

11. 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

12. What do you think of the water tariff for irrigation? What do you think of a bulk water tariff?
13. Irrigation tariffs need to be increased to ensure the self-sustainability of the irrigation system. Are there any specific changes or improvements in the system that could make the tariff increase acceptable? If yes, which? If no, why?
14. What do you think is the maximum water tariff increase that would be compatible with the development of the agricultural sector?

Risk Management

15. What are the main risks related to the irrigation sector and to the implementation of the strategy? How can these risks be mitigated?
16. Is there a risk management process in place? If yes, how is the risk management process structured?
17. 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 or 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 and 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 or water availability? Have you considered changing your irrigation technology 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 or 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 have an 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 be improved most urgently? How reliable is the service?
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 or 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 obstacles you face?
21. Are you in favor 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 B
Stakeholders Interviewed

TABLE B.1 Stakeholders in Georgian I&D Interviewed

Entity	Name	Date (2021)
MEPA	Otar Shamugia (deputy minister)	May 27
MEPA, Dept. of Policy Analysis	Lasha Zivzivadze (head of policy coordination division)	April 22
MEPA, Dept. of Hydromelioration and Land Management	Gizo Chelidze	April 28
MEPA, Dept. of Hydromelioration and Land Management	Ekaterine Sanadze	April 30
MEPA, Div. of Water Resource Protection	Marina Makarova	April 20
MEPA, Dept. of Finance	Tamar Zedgenidze	April 28
GA	David Tsitlidze (general director)	May 21
GA	Tengiz Lakirbaia (technical director)	April 26
GA, Project Coordination and International Relations Dept.	Levan Tabatadze, Nata Khutsurauli, Mikheil Margvelashvili	May 7

(table continues next page)

TABLE B.1 (*Continued*)

Entity	Name	Date (2021)
GA, WUO support unit	Davit Kajaia	May 7; May 10
Agricultural and Rural Development Agency	George Jibladze	May 31
National Agency for Sustainable Land Management and Land Use Monitoring	George Misheladze	May 20
Ministry of Economy and Sustainable Development, Dept. of Energy Policy and Investment Projects	Tornike Kazarashvili	May 20
Ministry of Finance	Shota Gunia	May 17
GNERC, Tariff Dept.	Gocha Chitidze, Giorgi Kelbakiani	May 20
GNERC, Water Dept.	Giga Nadiradze	May 20
GFA	Rati Kochlamazashvili, Edvard Shermadini	April 23
World Bank project, GILMDP	Giorgi Kalandadze	May 17
USAID	David Tsiklauri	May 20
AFD	Raphael Jozan, Tanguy Vincent	May 10
ADB	Avtandil Tskhvitava, Frank Radstake	May 24
EIB	Seejore Jatin	May 20
FAO	Javier SanzAlvarez	May 10
FinExCoop	Christophe Cordonnier	May 28
GILMDP	Onno Schaap, Davit Kajaia- Gevorg Michikyan, Stephen Hodgson (consultants in charge of WUO development)	March 31; June 9
Contractor	Salome Deisadze (consultant in charge of land policy note	April 23
EUWI+, Georgian Office	Zurab Jincharadze	May 7
Rural and Agricultural Policy Development institute	Ilia Kvitaishvili	May 5
Contractor	Mark Svendsen (external expert)	May 5
Contractor	David Tuchschneider (external expert)	May 11


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