SUPPORTING THE DEVELOPMENT OF AN IRRIGATION STRATEGY FOR SERBIA

Brief 2: Governance

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October 2020

Terms of Reference

Prepare a brief and a detailed presentation on: the governance structure around irrigation and water management in the country, including a detailed analysis of the national and international policy framework concerning: (i) water use and management such as catchment management plans and the objectives of the European Union Water Framework Directive; and (ii) climate change adaptation needs and strategies reported in the National Adaptation Plan and the Nationally Determined Contributions. This brief will include a comparative analysis of the Serbian situation with successful institutional and governance set-ups in similar contexts (e.g. in specific European countries and Turkey). It will also include proposals for improvements and capacity development.

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1 Introduction

Serbia's Water Strategy, adopted in 2016 by the government of Serbia[1], set out the legal, institutional and strategic planning framework for water. This document brings the picture up to date in the light of new legislation and changed ministerial responsibilities, adds new information on the two critical topics of irrigation management and climate change, and identifies key issues that this new Irrigation Strategy must address.

Section 2 looks at *Institutional responsibilities*, in particular the line of command from the *Ministry of Agriculture, Forestry and Water Management* and its *Water Directorate*, through the Public Water Company *Srbijavode*, to the Water Utility Companies that implement irrigation, drainage and flood control, and the Public Communal Enterprises that provide water supply and sanitation. Parallel arrangements apply to some of these stages in the Autonomous Province of Vojvodina, and at least seven other ministries have some responsibilities related to water.

Section 0 summarises the

[1] Official Gazette, 6/2017.

Legal framework, starting with the foundational "Law on Waters" under the *Ministry of Agriculture, Forestry and Water Management*. It also briefly describing some twenty other laws with relevance to water.

Section 4 addresses the topic of *Climate change*, setting out Serbia's international commitments to climate change mitigation and describing how they are implemented and monitored. The lead ministry for climate change matters is the Ministry of Environmental Protection.

Section 5 explains the concept of *Integrated water resources management* and how it is applied here as Serbia increasingly harmonises with EU legislation including the "Water Framework Directive".

Section 6 discusses the *Management of irrigation and drainage* and the five main forms currently found in Serbia. It presents a few examples of international practice and identifies key issues to take into account when planning the organisational form of a new or reformed system.

Section 0 concludes by identifying five

Key issues that should be discussed by the Working Group and might be addressed in the Irrigation Strategy.

This document uses hyperlinks, marked in blue text. Click on any of these to jump to the referenced section. To return to the previous position, press **Alt + <left arrow>** (Windows) or **Command + Option + Z** (Mac OS).

2 Institutional responsibilities

Overall responsibility for almost all aspects of water management rests with the Ministry of Agriculture, Forestry and Water Management, with some aspects devolved to the Autonomous Province of Vojvodina[2]. This system is explained below, followed by a short overview of the ways in which other ministries and institutions contribute to governance of the water sector.

2.1 Institutions with primary responsibility for water

The devolved government system in Serbia results in three parallel reporting lines for water:

- Republic-level institutions based in Belgrade are responsible for national policy and strategy, and for implementation in Central Serbia.
- A largely parallel set of institutions are responsible for policy and implementation in the Autonomous Province of Vojvodina
- The City of Belgrade has a condensed reporting line for water-related matters that are devolved to the City Government.

A different reporting structure applies to municipal water supply and sanitation, as explained later in this section.

[2] Previously, some of these responsibilities were delegated to Beogradvode within the territory of the City of Belgrade. The 2016 Law on Waters deprived Beogradvode of the right to manage waters, and it now functions in the same way as other Water Utility Companies around the country.

The fact that the boundary between Central Serbia and Vojvodina is defined by two rivers, the Sava and the Danube, has implications for water management that are discussed in section 7.1 below.

Administrative level	**Republic of Serbia and Central Serbia**	**Autonomous Province of Vojvodina**
Government	Government of the Republic of Serbia	Government of the Autonomous Province of Vojvodina
Ministry	Ministry of Agriculture, Forestry and Water Management	Provincial Secretariat for Agriculture, Forestry and Water Management
Directorate	Republic Water Directorate	-
Water fund	Water Fund for Central Serbia	Water Fund for Vojvodina
Public water company	*Srbijavode*	*Vode Vojvodine*
Implementation: Flood protection, drainage & public irrigation systems	Water Utility Companies	
Implementation: Water supply & sanitation	Public Communal Enterprises*	
**Most report to local self-government units (Municipalities & Cities) under the Ministry of Local Self-Government & Public Administration, though some implement parts of the regional water supply system.*		

Government level

All institutions ultimately report to the Government of the Republic of Serbia, with certain specific functions devolved to the government of the Autonomous Province of Vojvodina.

Ministry level

National water policy and international commitments are the responsibility of the Ministry of Agriculture, Forestry and Water Management; this responsibility includes water resources policy and integrated water management, as well as issuing permits and conditions for water use, discharges and other activities that affect water quality or flow. Responsibility for environmental protection has at various times been assigned to this ministry, but currently rests with the Ministry of Environmental Protection; regulation of effluent discharges to water courses is therefore under the Ministry of Environmental Protection.

The Provincial Secretariat for Agriculture, Forestry and Water Management exercises similar responsibilities for the province of Vojvodina, excluding country-wide policy and international commitments.

The city of Belgrade has more limited policy functions, but full responsibility for implementation within its territory.

Directorate level

The Republic Water Directorate is a part of the Ministry of Agriculture, Forestry and Water Management, focussed specifically on water. In accordance with the Law on Ministries, it performs state administration and professional tasks related to: "water management policy; multipurpose use of water; water supply, except water distribution; water protection; implementation of water protection measures and planned rationalization of water consumption; regulation of water regimes; monitoring and maintenance of the watercourse regime that forms and crosses the border of the Republic of Serbia, inspection supervision in the field of water management, as well as other activities determined by law". The Water Directorate is the national authority responsible for coordinating activities within the International Commission for the Protection of the Danube River (ICPDR). The Directorate is also responsible for transposing numerous EU directives related to water into national legislation, as well as for preparing and coordinating the implementation of agreements for bilateral, surrounding and multilateral cooperation, especially with the countries in the Sava, Tisza and Danube basins.

The Provincial Secretariat for Agriculture, Forestry and Water Management is responsible for water policy in Vojvodina and does not have a direct equivalent of the Water Directorate. The Secretariat prepares planning documents related to Vojvodina, which must be approved by the Republic Water Directorate.

Within the City of Belgrade, water policy is managed by the Sector for Water Management, under the Secretariat for Economy of the city administration.

Water funds

Water-related investment is supported in Central Serbia and in Vojvodina by their respective Water Funds. Srbijavode and Vode Vojvodine submit their financial proposals for the following year as part of the annual budget process, and receive allocations under the Annual Programmes adopted by the Government of the Republic of Serbia and the Provincial Government of the Autonomous Province of Vojvodina, respectively.

Water-related investment in the City of Belgrade is funded from its general budget.

Public Water Companies

Implementation of water policy is managed by two state-owned "Public Water Companies" (*Javne vodoprivredne preduzece*): *Srbijavode* for Central Serbia and *Vode Vojvodine* for Vojvodina. They are responsible for large-scale water infrastructure, such as flood defences and long-distance conveyance of water for drinking, irrigation and drainage. Their responsibilities also include issuing opinions on draft legislation related to water and maintaining the water information system in their respective territories.

Implementation of flood protection, drainage and public irrigation systems

The two Public Water Companies contract out most of the practical work to "Water Utility Companies" (*Vodoprivredne preduzece*) licensed by the Republic Water Directorate. The conditions that companies must meet in order to be licensed are set out in the Law on Waters, and include having appropriate technical equipment, organisation and personnel. Previously these were all public companies but many have now undergone transformation so there is currently a mixture of public and private Water Utility Companies, with 77 different companies licensed around Serbia.

Further detail on the operation and funding of these companies is given below, in section 5.2 on *Wider strategic framework*.

Implementation of water supply and sanitation

Water supply and sanitation follow the reporting lines presented above, as far as the two Public Water Companies. However, implementation is carried out by "Public Communal Enterprises" (*Javne komunalne preduzece*).

In smaller municipalities, these organisations are also responsible for other local infrastructure and services such as rubbish collection, street lighting and maintenance of public parks.

In cities and larger municipalities, these responsibilities tend to be split, with one specialist company dealing with water supply and sanitation (*Vodovod i kanalizacija*) and another dealing with other public infrastructure and services.

These Public Communal Enterprises report to the local self-government unit (municipality or city), which in turn reports to the Ministry of Local Self-Government & Public Administration. They are sometimes also referred to as "Public Utility Companies".

In order for a Public Communal Enterprise to carry out work in water supply and sanitation, it must be licensed by the Republic Water Directorate in line with the Law on Water. There are currently 128 licensed "Public Utility Companies"; this list does not appear to overlap with the list of licensed "Water Utility Companies" carrying out flood protection, drainage and irrigation. Of these 128 licensed companies, around 40 % are specialised in water[3] whilst the other 60 % provide other infrastructure services instead of or as well as water supply and sanitation.

2.2 Other ministries with specific responsibilities for water

Water affects many aspects of public policy and so directly involves the following seven ministries in addition to the Ministry of Agriculture, Forestry and Water Management. A number of other ministries have indirect links to water through their responsibilities for scientific and supporting institutions (see section 2.3 below).

2.2.1 Ministry of Public Administration and Local Self-government

This ministry, through its Department for Local Self-government, supervises local self-government units.

Local self-government units

These 169 units comprise 139 Municipalities, the City of Belgrade and five other cities (Novi Sad, Užice, Požarevac, Niš, Vranje), and 30 City Municipalities. Their responsibilities include water supply and sanitation, implemented through Public Communal Enterprises as described above.

These units are defined in the "Law on Territorial Organisation of the Republic of Serbia" (see section 3.3).

[3] i.e. their name includes "Vodovod" or "Vodovod i kanalizacija".

2.2.2 Ministry of Environmental Protection

The responsibilities of this ministry include protecting the quality of groundwater and surface water in the natural environment, including transboundary rivers. Its responsibilities include performing activities related to “protection of water from pollution in order to prevent deterioration of surface and groundwater quality; determining the conditions of environmental protection in spatial planning and construction of facilities” and inspection supervision in this area.

Monitoring of water quality is carried out by the Environmental Protection Agency:

Environmental Protection Agency

The Environmental Protection Agency (EPA) is the implementing agency of the Ministry of Environmental Protection, with responsibilities including include "Implementation of state monitoring of water quality, including the implementation of prescribed and harmonised programs for quality control of surface water and groundwater".

2.2.3 Ministry of Health

The Ministry of Health is responsible for monitoring the quality of drinking water at the tap (quality in water courses and though the water supply system is the responsibility of the Republic Water Directorate). Domestic drinking water standards are in compliance with the World Health Organization guidelines and the EU Drinking Water Directive.

Institutes of Public Health

Monitoring of drinking water quality is carried out by a network of local “Institutes of Public Health”, reporting to the Ministry of Health.

2.2.4 Ministry of Construction, Transport and Infrastructure

This is the parent ministry of the water utility companies; it has no specific directorate in charge of water utilities but does have a department for inspection supervision. This ministry is also responsible for navigation on the Danube and Sava rivers, which are both international waterways, and represents Serbia in the “International Commission for the Protection of the Danube River” and the “International Sava River Commission”.

2.2.5 Ministry of Mining and Energy

The Ministry of Mining and Energy is concerned with water in various ways, including water use for hydropower generation and for cooling of thermal power stations, and for avoiding flooding of mines and pollution of water by mines and mineral working. These issues became very prominent in the floods of 2014, which threatened to inundate the main Belgrade power station and actually flooded the lignite mine that supplies.

This ministry is also responsible for preparing groundwater balances.

2.2.6 Ministry of Interior

The responsibilities of this ministry include disaster preparedness, warning systems and response, including the risk of flooding.

2.2.7 Ministry of Finance

The Ministry of Finance agrees the budgets for all government ministries, and also has the final say on water tariffs, as proposed by water utility companies and adopted by local self-governments, in accordance with the general price policy.

2.3 Supporting institutions involved with water

Several institutions play a supporting scientific role in relation to water management and irrigation:

2.3.1 Republic Hydrometeorological Institute

This institute is responsible for meteorological, climatological, agrometeorological and hydrological measurements and observations, and for weather forecasting. It reports to the Ministry of Agriculture, Forestry and Water Management.

The Hydrometeorological institute is responsible for monitoring only quantitative aspects of surface- and groundwater, with quality monitoring falling under the Environmental Protection Agency.

2.3.2 "Jaroslav Černi" Institute for Water Management

This is a design and consultancy institute formed by the progressive merger of the Hydrological Institute, Hydraulic Laboratory, Hydropower Institute and Institute for Water Management. It covers all aspects of water management and infrastructure, including water supply and wastewater treatment, hydropower and water in mining, flood protection, irrigation and drainage. It is now a company with 92 % of its shares owned by government; the Ministry of Science proposes the members of its management board, which must be confirmed by the government.

The "Jaroslav Černi" Institute did the design work for many of Serbia's irrigation and drainage systems and for several of the proposals that are currently under discussion[4]. It also led the preparation of the 2016 Water Strategy, in cooperation with other stakeholders.

2.3.3 University faculties

A number of universities have faculties concerned with various aspects of irrigation and water management. These include the following:

[4] Other organisations that are active in the design of irrigation and drainage systems include the companies "Energoprojekt" and "Hidrozavod DTD".

- **Belgrade University (*Univerzitet u Beogradu*)**
  - ***Faculty of Agriculture*** (*Poljoprivredni fakultet*)
    - Department for Land Improvement (*Odsek za melioracije zemljišta*)
    - Institute for Land and Land Improvement (*Institut za zemljište i melioracije*)
  - ***Faculty of Construction*** *(Građevinski fakultet)*
    - Department of Hydraulic and Environmental Engineering *(Katedra za hidrotehniku i vodno ekološko inženjerstvo)*
    - Institute of Hydraulic and Environmental Engineering *(In*stitut za hidrotehniku i vodno ekološko inženjerstvo)
  - ***Faculty of Mining and Geology*** *(Rudarsko-geoloski fakultet)*
    - Department of Hydrogeology *(Departman za hidrogeologiju)*
- **Novi Sad University (*Univerzitet u Novom Sadu*)**
  - ***Faculty of Agriculture*** *(Poljuprivredni fakultet)*
    - Department for Water Management (*Departman za uređenje vode*)
- **University of Kragujevac (*Univerzitet u Kragujevcu*)**
  - ***Faculty of Agronomy Čačak*** *(Agronomski fakultet u Čačku)*
    - Department for Land and Mechanizatio: Subject-Land Improvement *(Katedra za zemljiste I mehanizaciju-predmet-melioracije*
- **University of Nis (*Univerzitet u Nišu*)**
  - ***Faculty of Civil Engineering and Architecture*** *(Građevinsko arhiktetonski fakultet)*
    - Department of hydrotehnology (*Katedra za hidrotehniku*)
    - Department for water management *(Katedra za vodoprivredu)*

2.3.4 Agricultural Advisory and Professional Services

The national agricultural extension system is implemented in Central Serbia though 22 “Agricultural Stations”, reporting to the Ministry of Agriculture, Forestry and Water Management and coordinated by the “Institute for the Application of Science in Agriculture” (IPN). In Vojvodina there are 12 Agricultural Stations plus one dealing with wine; these report to the Provincial Secretariat of Agriculture, Forestry and Water Management but cooperate closely with IPN.

IPN itself is a scientific organisation, jointly funded by the Ministry of Agriculture, Forestry and Water Management and the Ministry of Education, Science and Technological Development.

The extension system provides advice and training on all aspects of agriculture, including irrigation and the production and marketing of irrigated crops. Neither IPN nor the Provincial Secretariat have specific advisory departments for irrigation and drainage, though some of their field staff are specialised in this area, so advice on irrigation forms part of the overall support to crop production and marketing.

2.4 Institutional coordination

An organigram in the Water Strategy shows a “Water Council” with a presumed role in inter-institutional coordination. This council has not yet been formed, but work is underway to establish a National Water Conference, as discussed in section 5.1 below.

3 Legal framework

The legal framework for water management in Serbia is extremely complex, as it cuts across so many issues and ministries. The central piece of legislation is the Law on Waters, but more than twenty other laws also have relevance to water, either through dealing directly with water-related issues or by providing the legal basis for various aspects of water management planning and implementation.

The following list of legislation has been updated from that in the 2016 Water Strategy.

3.1 Law on Waters

SG [5]No. 30/2010, 93/2012, 101/2016, 95/2018 and others.

The basic legal act in the field of water is the Law on Waters, which "regulates the legal status of water, integrated water management, management of water facilities and water land, sources and method of financing water activities, as well as other issues important for water management". The provisions of this law apply to all surface and groundwater in the territory of the Republic of Serbia, including boundary and transboundary rivers, thermal and mineral waters, and extraction of river sand and gravel. The principal exceptions are water containing extractable minerals or used for geothermal energy, which are the responsibility of the Ministry of Mining and Energy and are covered by separate legislation.

According to the Law on Waters, waters are of general interest and are state-owned. Water must be used rationally and economically, and the right to use, except for certain purposes, is acquired by a water permit or on the basis of a contract.

3.2 Laws on drinking water and wastewater

Regulation on Hygienic Regularity of Quality of Drinking Water

OG FRY No. 42/1998 and 44/99; OG No. 28/2019

This long-standing regulation governs quality control of drinking water.

Law on Communal Activities

OG No. 88/2011, 104/216 and 95/2018

This law regulates the purification and distribution of drinking water, and the drainage and treatment of atmospheric and wastewater, as communal activities of general interest.

3.3 Laws on government, administration and public finance

Law on Ministries

This law assigns competences to ministries, resulting in the division of responsibilities outlined in section 2 above.

Law on Territorial Organisation of the Republic of Serbia

OG No. 129/2007, 18/2016, 47/2018 and 9/2020 – other law

[5] OG = Official Gazette of the Republic of Serbia (*Službeni Galsnik Republike Srbije*).

This law also contains provisions on communal activities of purification and distribution of drinking water and purification and drainage of atmospheric and wastewater, which are within the competence of local self-government.

Law on Financing of Local Self-Government

OG No. 62/2006, 47/2011, 93/2012 and 99/2013[6]

This law determines revenues and defines the competence of local self-government in their formation and use, including communal activities in the field of water.

Law on Determining the Jurisdiction of the Autonomous Province of Vojvodina

OG No. 99/2009 and 67/2012 – Decision of the Constitutional Court

Known as the "Omnibus Law", this is the legislation that transfers a wide range of powers to the Autonomous Province of Vojvodina for actions within its territory. In the field of water, this includes responsibility for water management planning and implementation, defence against external and internal waters, and management of water resources and watercourses. It provides the legal basis for the operations of *Vode Vojvodine* and for inspection supervision of water management on the territory of Vojvodina.

Law on Public Property

OG No. 72/2011, 88/2013.105/2014, 104/2016, 108/2016, 113/2017 and 95/2018

This law establishes the legal basis for public property rights, including water resources and publicly-owned water facilities. The law defines three forms of ownership:

- Property rights of the Republic of Serbia (state property);
- Ownership by an autonomous province (provincial property); and
- Ownership by a unit of local self-government (municipal or city property).

Law on Public Enterprises

OG 15/2016, 88/2019

This law regulates the work of public enterprises in performing activities of general interest, including water management and water utilities. It provides the legal basis for the work of the public Water Utility Companies and Public Communal Enterprises which carry out most of the day-to-day tasks of water management.

Law on Public-Private Partnerships and Concessions

OG No. 88/2011, 15/2011 and 104/2016

This law defines public-private partnerships (with or without elements of concessions) as long-term cooperation between public and private partners, in order to provide financing, construction, reconstruction, management or maintenance of infrastructure and other facilities of public importance and provision of services of public importance. This provides the legal basis for private companies to be involved in water management (though the Water Management Strategy does not support the use of public-private partnerships in the field of water supply).

[6] Specific amendments to budgetary amounts are given in OG No. 125/2014, 95/2015, 83/2016, 91/2016, 104/2016, 96/2017, 89/2018, 95/2018, 86/2019 and 126/2020.

3.4 Laws on environmental protection

Environmental protection of waters and protection against pollution are regulated by four laws under the responsibility of the Ministry for Environmental Protection:

Law on Environmental Protection

OG No. 135/2004, 36/2009, 36/2009 – other law, 72/2009 – other law, 43/– Decision of the Constitutional Court, 14/2016, 76/2018, 95/2018 – other law & 95/2018 – other law

Law on Environmental Impact Assessment

Law on Integrated Prevention and Control of Environmental Pollution

Law on Strategic Environmental Assessment

OG No. 135/2004 and 88/2010

3.5 Other relevant laws

A further eight laws were identified in the Water Strategy as having some bearing on water management:

Law on Disaster Risk Reduction and Emergency Management

OG 87/2018

This law deals with emergencies and natural disasters, include floods and icing of watercourses. It provides the framework for the operation, declaration and management of emergency situations and the system of protection and rescue of people, material and cultural goods and the environment from natural disasters. It also defines the competencies of state bodies, autonomous provinces, local self-government units and the participation of the police and the Serbian Army in protection and rescue, as well as rights and duties other entities in connection with emergencies.

This law replaces the previous Law on Emergency Situations (OG No. 111/2009, 92/2011 and 93/2012).

Law on Navigation and Ports on Inland Waterways

OG No. 73/2010, 121/2012, 18/2015, 96/2015, 92/2016, 104/2016, 113/2017, 41/2018, 95/2018, 37/2019 and 9/2020

This law prescribes the conditions and competencies for ensuring safe navigation on inland waters, the manner of categorising and maintaining waterways, the conditions of use of river banks and land along waterways, and the construction of ports, piers and other facilities on waterways.

Law on Planning and Construction

OG No. 2/2009, 81/2009 - correction, 64/2010 - Decision of the Constitutional Court, 24/2011, 121/2012, 42/2013 Decision of the Constitutional Court, 50/2013 Decision of the Constitutional Court, 98/2013 Decision of the Constitutional Court, 132/2014, 145/2014, 83/2018, 31/2019, 37/2019 and 9/2020

This law prescribes the conditions and manner of spatial planning, the arrangement and use of construction land and the conditions for construction of facilities, including water facilities and facilities that may have an impact on water. It provides the legal bases for construction permits issued by the ministry in charge of planning and construction (now the Ministry of Construction, Transport and Infrastructure), and sets out a detailed process for pre-feasibility studies of potential new systems.

Law on Public Health

OG No. 72/2009

This law deals with the preservation and improvement of the health of the population, within which the preservation of the environment is a significant activity. A new version is now under preparation, though water quality regulations under this law deal only drinking water and not with water for irrigation

The following laws also have some relevance to water management:

Law on Sanitary Supervision

Law on Forests

Law on Agricultural Land

4 Climate change

Climate change affects the legal basis for water management (the previous section), through Serbia's international commitments for climate change mitigation, and forms part of the context for integrated water resources management (the following section).

Climate change is relevant to Serbia's irrigation and drainage sector in two respects:

- *Mitigation*: Agriculture globally is a significant contributor to greenhouse gas emissions, and the ways in which land is drained and irrigated can affect these emissions. Development of the sector must respect Serbia's international commitments for climate change mitigation.
- *Adaptation*: Climate change will alter patterns of precipitation. This will affect both the total amount of rain and snowfall landing on the country and the inflow from trans-boundary rivers, as well as their seasonality and variability. These in turn will affect the direct water supply to crops, the amount of water available for irrigation, the risk of flooding and the challenges of drainage. Global warming will also bring higher temperatures, affecting some crops directly as well as increasing evapotranspiration; this will lower the yield of many rainfed crops and increase irrigation requirements.

4.1 International framework for climate change mitigation

Global warming is a global problem requiring global solutions, so there is an international framework under which individual countries work to combat climate change and report on their progress. The EU has its own framework for Member States, into which Serbia, as a Candidate Country, is becoming progressively integrated.

United Nations Framework Convention on Climate Change (UNFCCC)

The core international agreement is the United Nations Framework Convention on Climate Change (UNFCCC), which was adopted in 1992 and opened for signatures at the Rio "Earth Summit" later that year. Its members commit to reducing the emissions of all greenhouse gasses, other than those already control under the "Montreal Protocol" on ozone-depleting substances.

There are currently 197 members or "parties" to the convention, of which 43 are "Annex I" parties. These industrialised countries and economies in transition initially committed to stabilise their greenhouse gas emissions at 1990 levels by 2000. Of these 43 parties, the 24 that are also members of OECD became "Annex II" parties to the UNFCC, accepting additional responsibilities to support developing countries and economies in transition in their efforts for climate change adaptation and mitigation.

The Federal Republic of Yugoslavia became a ratified "non-Annex" party to the Framework Convention in 2001, a status which the Republic of Serbia inherited.

The UNFCCC has a permanent secretariat established in Bonn, Germany.

Kyoto Protocol and Doha Amendment

In 1997, the Kyoto Protocol to the Convention introduced legally binding obligations for all developed country members to reduce their greenhouse gas emissions over the period 2008-12. As the next stage, the Doha Amendment introduced a second round of commitments to further reduce emissions over the period 2013-20.

The Kyoto Protocol was ratified by all Annex I parties to the Framework Convention, apart from the US, though Canada later withdrew. All remaining parties to the Kyoto Protocol fully met their initial commitments, and 37 made second-round commitments.

As a non-Annex party to the Framework Convention, Serbia has not made specific commitments under the Kyoto Protocol.

Paris Agreement

When the parties to the Framework Convention met at Durban in 2011, they expressed grave concern that current efforts were inadequate to limit global warming to less than 1.5-2.0°C above pre-industrial levels. Therefore, at the 2015 the UN Climate Change Conference in Paris, all parties to the Framework Convention committed to the aim of limiting global warming to no more than 2.0°C above pre-industrial levels, and to try to limit the increase to 1.5°C. The resulting "Paris Agreement" came into effect in late 2016 and has now been signed by the large majority of Framework Convention members, including Serbia.

The mechanism for achieving this aim is a set of "ambitious" and "progressive" Nationally-Determined Contributions (NDCs) made by each country. These commitments are not legally binding under international law but carry considerable political weight. Serbia pledged, over the period 2021-30, to reduce its total greenhouse gas emissions by 9.8 % compared to emissions in the base year of 1990.

The Paris Agreement requests countries to revise and update their NDCs periodically, starting from 2020, and to progressively increasing their emission reduction commitments, taking into account national circumstances and capacities. Every five years, parties report their contributions to the UNFCCC secretariat. A guide for NDC implementation was released by the "Climate and Development Knowledge Network" (CDKN).

Other agreements

IFCCC parties meet at annual UN Climate Change Conferences. In addition to the Kyoto Protocol and Paris Agreement described above, these conferences have also resulted in the Bali Action Plan (2007), the Copenhagen Accord (2009), the Cancún agreements (2010) and the Durban Platform for Enhanced Action (2012). These agreements and declarations represent a progressive strengthening of the parties' commitment to combat climate change.

International Panel on Climate Change (IPCC)

In order to provide objective scientific, technical and socio-economic information on climate change, two UN organisations – the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) – established the International Panel on Climate Change in 1988.

The IPCC has produced a number of influential Special Reports and also publishes "Guidelines for National Greenhouse Gas Inventories", of which the latest edition was released in 2006.

4.1.1 UNFCC implementation in Serbia

Serbia ratified the Framework Convention (UNFCCC) on 12th March 2001 and ratified the Paris Agreement on 25th July 2017. The Ministry of Environmental Protection is the national focal point for implementation of the Framework Convention and the Kyoto Protocol, and is responsible for reporting to the UNFCCC Secretariat.

Serbia has a commitment under the Paris Agreement through its first Nationally Determined Contribution (NDC), submitted on June 30th 2015, to "reduce greenhouse gas emissions by 9.8 % until 2030 compared to emissions in 1990".

Reports prepared by Serbia so far

- The "First National Communication of the Republic of Serbia under the United Nations Framework Convention on Climate Change" was made in August 2014[7].
- The "First Biennial Update Report under the United Nations Framework Convention on Climate Change" was submitted in February 2016[8].
- The "Second National Communication of the Republic of Serbia under the United Nations Framework Convention on Climate Change" was submitted in August 2017.
- The "Low Carbon Development Strategy with Action Plan" is currently in its adoption phase[9].
- The "Second Biennial Update Report under the United Nations Framework Convention on Climate Change" has been drafted and is now under discussion.
- The "Third National Communication of the Republic of Serbia under the United Nations Framework Convention on Climate Change" is being drafted and is expected to be completed in mid-2021.

4.1.2 EU frameworks for climate and energy

In addition to its international commitments under the UNFCC, Serbia's EU accession path will also shape its decisions on climate change mitigation.

EU 2030 Climate and Energy Framework

The EU *2030 Climate and Energy Framework* sets three key targets to be achieved across the EU overall by 2030: at least 40 % cuts in greenhouse gas emissions (from 1990 levels); at least a 32 % share from renewable energy; and at least a 32.5 % improvement in energy efficiency. From the date of accession, Serbia will be fully subject to the EU's climate commitments under the Paris Agreement and other accords, as well as to actions the EU takes to meet its self-set targets. Some of these actions may also have earlier impacts as Serbia harmonises with relevant EU legislation.

[7] https://unfccc.int/files/national_reports/non-annex_i_parties/biennial_update_reports/application/pdf/serbur1e.pdf

[8] https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Serbia%20First/Republic_of_Serbia.pdf

[9] http://www.serbiaclimatestrategy.eu/wp-content/uploads/2019/12/Low-Carbon-Development-Strategy-with-Action-plan_eng.pdf

Energy Community

Serbia is also a member of the EU-focussed Energy Community, which aims to extend the EU internal energy market to nine territories of Southeast and Eastern Europe[10]. Under this agreement, Serbia is committed to implementing the relevant EU energy *acquis Communautaire*, to developing an adequate regulatory framework and to liberalising its energy markets in line with the *acquis*.

All members of the Energy Community, including Serbia, are committed to monitoring and reporting in the areas of renewables, energy efficiency, and greenhouse gas emissions as well as other information relevant to climate change. The Paris Agreement further defines the climate change related reporting obligations for the period after 2020 by establishing an enhanced transparency framework for action and support. In this context, the Energy Community adopted a Recommendation 2018/01/MC-EnC on preparing for the development of "National Energy and Climate Plans" addressing the five dimensions of the Energy Union by the Contracting Parties of the Energy Community.

However, Serbia does not currently have specific obligations to reduce greenhouse emissions under the Energy Community Treaty.

4.2 Climate change adaptation

Adapting to the challenges of climate change is primarily a national issue rather than an international obligation, but one that will receive increasing prominence in Serbia's strategies and action plans.

Serbia adopted its "First National Climate Change Adaptation Plan" in 2015[11]. The climate model assumptions summarised in the plan are for a gradual rise in temperature over the period 2011-2040, accompanied by a slight overall increase in precipitation. From 2040 to the end of the century, temperature will rise more rapidly and precipitation will start to decline. Effects on crop yields are expected to become pronounced from mid-century onwards.

The plan proposes four kinds of measures to help Serbia's agriculture adapt to climate change:

- Irrigation
- Drainage
- Agro-technical measures such as new plant varieties and rotations
- Weather forecasting

[10] Albania, Bosnia and Herzegovina, Georgia, Kosovo under UN Security Council resolution 1244, Moldova, Montenegro, North Macedonia, Serbia and Ukraine.

[11] https://www.klimatskepromene.rs/wp-content/uploads/2017/04/NAP-UNDP-2015.pdf

5 Integrated water resources management

Integrated water resources management is an approach set out in the EU's "Water Framework Directive". It is implemented in Serbia through a hierarchy of strategic and planning levels, in line with the country's overall strategic planning framework, and is funded through mechanisms established by the Law on Waters.

5.1 Implementation of the EU Water Framework Directive

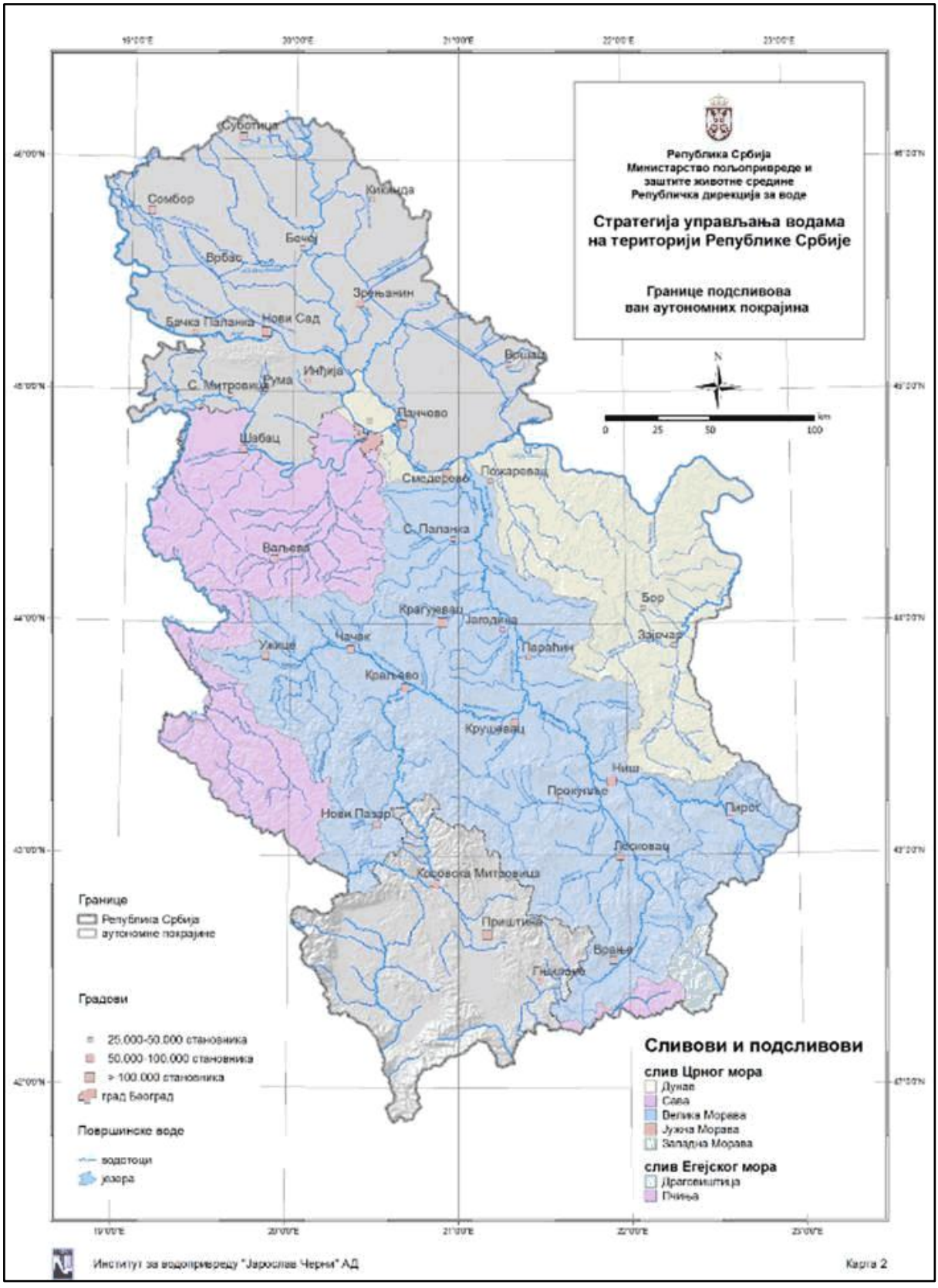
As an EU Candidate Country, Serbia is in the process of harmonising its laws and institutions with the *acquis Communautaire*, including the Water Framework Directive that was adopted in 2000. This requires all Member States to apply the principles of "Integrated Water Resources Management" for the rational use and protection of water, as well as for protection from the harmful effects of water. They must define "River Basin Districts" and draw up and implement "River Basin Management Plans" for each district.

Serbia is well advanced in adopting this legislation, and has designated five River Basin Districts:

- Sava River Basin District*
- Danube River Basin District*
- Morava River Basin District
- Ibar and Lepenac River Basin District
- Beli Drim River Basin District

**These districts include territory in both Central Serbia and Vojvodina*.

Figure 1: Map of River Basin Districts in Serbia



Source: Water Strategy, 2016

The structure of integrated water resources management in Serbia is based on the legal framework outlined in section 0 above, and involves the following levels:

- International framework (*International Commission for the Protection of the Danube River*, *International Sava River Commission*, and other bilateral and multilateral agreements affecting the Sava, Danube, Tisa and Drina rivers);
- *Water Management Strategy of the Republic of Serbia*;
- *Management Plan for the Danube River Basin* which covers more than 90 % of the total territory of Serbia;
- River Basin Management Plans, which cover water management, flood defence, flood risk management and water protection;
- Planning by local self-government units (cities and municipalities) for second-order rivers and protection against erosion and flooding on their territory.

River Basin Management Plans are currently under development (*see Plan for the Preparation of River Basin Management Plans on the territory of the Republic of Serbia 2021-2017*, prepared by the Water Directorate).

National Water Conference

In line with recommendations of the EU Water Framework Directive, the Law on Waters established a National Water Conference to ensure the involvement of the general public in the process of preparing and adopting water management plans. This will have 14 members representing local self-government units, water users and citizens across all River Basin Districts. The procedure of appointing members is underway, with the Ministry of Agriculture, Forestry and Water Management and its Water Directorate making proposals to the government for adoption.

5.2 Wider strategic framework

Water interacts with many other aspects of society and economy, and so water management strategies and plans must also take account of the country's wider strategic framework, including:

- *Spatial Plan of the Republic of Serbia from 2010 to 2020* (Official Gazette of RS, No. 88/2010), which determines the long-term basis for the organisation, arrangement, use and protection of space in Serbia. In the part related to water resources, special importance is given to their sustainable and strictly controlled use, as well as the protection of water from irrational privatisation, pollution and inadequate use. Large watercourses (Danube, Sava and Tisza) are given a multifunctional role, surface waters should have a special significance for irrigation, groundwater as a public good must be under special control, while other rivers, lakes, swamps and ponds should be protect and use according to international standards.
- *National Strategy for Sustainable Development* (for the period 2009-2017), which promotes the principles of integrating environmental issues into other sectoral policies and the inclusion of environmental costs in the price of products (the "User Pays" and "Polluter Pays" principles). In the water sector, sustainable development implies optimal water management, while preserving and improving water quality and their rational use.

- *National Strategy for Agricultural Development of Serbia* (Official Gazette of RS, No. 78/05), which sees the improvement of the situation in the water sector through the policy of sustainable water management, economic growth and European integration.
- *National Environmental Protection Programme*, which "represents a means for rational solution of priority problems in the field of environmental protection in the country" and covered the period until 2019. For the water sector, estimated funds for the implementation of this programme for the period 2010-2019 amounted to about € 860 million. A draft has been prepared for the period 2020-2022.
- *National Strategy for Sustainable Use of Natural Resources and Goods* (Official Gazette of RS, No. 33/2012), which should provide, together with the Spatial Plan of the Republic of Serbia, strategic planning for sustainable use and protection of natural resources and goods in Serbia.
- *Water Management Basis of the Republic of Serbia* (Official Gazette of the RS, No. 11/2002) which represents, until the adoption of the Water Management Strategy on the territory of the Republic of Serbia, the basic document which determines the strategy of water use, protection of water and protection from water on the entire territory of Serbia for the period until 2021. The underlying concept of the Water Management Basis is that the entire territory of Serbia must be managed uniquely and rationally, with integrated management for use and protection of all resources.

Any relevant regional or local planning documents must also be taken into account in water planning.

5.3 Financing of water management

The Law on Waters regulates the financing of activities of general interest related to water management, including managing watercourses, protection from the harmful effects of water, managing and using water, and construction and reconstruction of regional and multi-purpose hydrological systems. These works are financed from the budget of the Republic of Serbia (for Central Serbia), from the budget of the Autonomous Province of Vojvodina, from user fees paid for water supply, drainage services and concessions, and from other sources of financing such as investors, loans and donations.

Detailed analysis of the current financing structure in provided in the separate briefs on *Budget* and on *Water pricing*.

6 Management of irrigation and drainage

The previous sections have set out the overall legal and institutional framework for water management. This section looks at the practical management of irrigation and drainage systems as it affects farmers, both within Serbia and from international practice.

6.1 Main forms of irrigation and drainage management in Serbia

There are five main forms of irrigation and drainage in Serbia, each with different management issues:

1. Public drainage systems, with or without irrigation
2. Public irrigation systems
3. Tap-water irrigation
4. User-managed irrigation systems
5. Individual irrigation

6.1.1 Public drainage systems, with or without irrigation

Serbia has more than 2 million ha of drained land, the large majority of its discharging into drainage collectors that serve multiple farms and so require public management. In some cases, pumping is required to lift drainage water up rising ground or into a river that may be higher than field level. Overall responsibility for these drainage systems rests with Srbijavode in Central Serbia and with Vode Vojvodine in Vojvodina, but day-to-day management of the collectors and pump stations is contracted out to public or private "Water Utility Companies", as described in section 2.1.

The largest drainage system in the country is the Danube-Tisa-Danube (DTD) hydrosystem in Vojvodina, which also supports irrigation. In irrigated areas, the managing organisations maintain a constant water level in the canals throughout the growing season, and farmers may bring this water to their fields through sub-surface drainage pipes or by pumping water from the canals for surface, sprinkler or drip irrigation.

Part of the drainage system in Mačva, Central Serbia, is currently being converted to two-way drainage, with financing from the Abu Dhabi Fund. However, this is not yet in full function and so formal irrigation from drainage systems currently only takes place in territory covered by Vode Vojvodine.

All farmers in an area served by public drainage must pay an annual drainage fee, which is calculated per hectare and paid to Srbijavode or Vode Vojvodine. Farmers wishing to irrigate from the DTD system must sign a contract with Vode Vojvodina; they may pay either a flat-rate fee per hectare, or a lower area fee plus a volumetric fee for the quantity of water used. Further details of the fees are given in the brief on *Water pricing*.

The link from fees to service is indirect:

Step 1. Farmers pay fees to Srbijavode or Vode Vojvodine;

Step 2. These organisations transfer the fees to the general budget of the state (in Central Serbia) or province (in Vojvodina);

Step 3. Each year, Srbijavode and Vode Vojvodine receive allocations through a budgetary process similar to that for other public institutions;

Step 4. Srbijavode and Vode Vojvodine pay the Water Utility Companies for works performed in line with their contracts.

Farmers do not have formal representatives on the management boards of Srbijavode, Vode Vojvodine or the Water Utility Companies. The Water Utility Companies are formally responsible to Srbijavode or Vode Vojvodine, not to the farmers, and are only obliged to carry out the works specified in their contracts.

6.1.2 Public irrigation systems

Apart from the two-way drainage of the DTD system, there are currently very few examples of public multi-user irrigation systems in Serbia, since most of the large systems now serve a single private farm. The team is working to compile a complete database of irrigation systems in Serbia, and has so far identified the following multi-user systems that are currently in use:

Mali Iđoš

This is a new irrigation canal linked to the DTD system and supplied through a pump station; the first section of canal has recently come into function, and it is planned to extend it several kilometres further. Users sign a contract with and pay to Vode Vojvodine but the farmers are responsible for getting the water from the canal to their fields.

The management and financial arrangements are essentially the same as for farmers taking irrigation water from the DTD two-way drainage system.

Negotinsksa nizija

This is a pressurised system currently covering 1,100 ha in Negotin municipality. Water is supplied by a pump station managed by the "Elixir" fertiliser company, under a deal agreed when the factory was privatised. Currently water is provided free of charge and so there are no contracts or fees.

The government of Serbia has recently agreed a loan with EBRD, under which this system will be modernised and expanded, and supplied by a new pump station not connected to the "Elixir" company. It is expected that the system will be managed by Negotin municipality but the management arrangements and fee structure have yet to be determined.

Resavska celina

This is a planned irrigation system in Svilajnac municipality, also being funded under the EBRD loan. It is not yet in function and, as at Negotin, detailed arrangements have yet to be agreed.

Other irrigation systems under planning or construction

A number of other public irrigation systems are at various stages of development around the country but are not yet in function. This includes a further ten projects financed by the Abu Dhabi Fund, in addition to the Mačva system and Mali Iđoš canal mentioned above.

Management approaches

Where a new irrigation system is to be managed by Srbijavode or Vode Vojvodine (like the Mali Iđoš canal), then it can use management systems and fee structures that are already in place.

Where a new irrigation system is to be managed by the local municipality (as is envisaged for Negotinsksa Nizija and Resavska Celina), then new management arrangements and fee structures will need to be developed.

The fee structure set out in the "Order on the level of water fees" deals with two irrigation cases: direct abstraction by the farmers, and supply by Srbijavode or Vode Vojvodine. It does not yet address the case of water delivery through an intermediary such as a municipality, so an appropriate mechanism will need to be developed.

6.1.3 Tap-water and dual-purpose irrigation

The 2012 Agricultural Census recorded 12,700 irrigating farms who said their main source of water was the public water supply network, "Vodovod". They each irrigated an average of 1,000 m^2, suggesting that this approach is mainly used for small areas of high-value crops such as greenhouses, nurseries, and fruit and vegetables around the house. Water is delivered and billed by the Public Utility Companies in the same way as municipal water supply to homes and businesses.

This approach is currently used by 7 % of irrigating farmers but covers only 1.2 % of total irrigated area. Given the focus on high-value crops, it probably produces a few percent of total irrigated output value.

The Water Directorate has a programme to help municipalities develop dual-purpose systems providing both drinking water and irrigation. This may lead to an expansion of the area irrigated under this model.

6.1.4 User-managed irrigation systems

Many countries have moved to a system whereby farmers manage their own irrigation through "Water Users' Associations" established under specific legislation. Given that there are currently very few multi-user systems outside of the drainage areas, Serbia has not yet had an urgent need to develop a law on water users' associations and so farmers would have to use existing legislation covering cooperatives and farmers' associations.

The team is currently aware of only one functioning irrigation system managed in this way:

Striza Water Users' Association

This system in Central Serbia is structured as a Farmers' Association and run by its members.

The World Bank-funded "Irrigation and Drainage Project" established Water Users' Associations in Paračin, Varvarin, Leskovac, Košumlika and Topola under existing cooperative legislation. However, these associations did not thrive without support once the project ended, and it is understood that they are no longer functional.

6.1.5 Individual irrigation

The large majority of irrigation in Serbia, whether measured by area or by number of farms, is "individual irrigation" where one farm has full responsibility for abstracting, conveying and applying the irrigation water. Almost all of the large irrigation systems built during the Yugoslav period served a single Agrokombinat or cooperative farm; most of those that are still in function now serve one private farm and so constitute "individual irrigation", which is institutionally and financially much simpler than public multi-user irrigation systems.

To use water in this way, farmers should apply for a permit from Srbijavode or Vode Vojvodine and pay abstraction fees as set out in the "Order on the level of water fees". In practice this is almost never done; the 2018 Farm Structures Survey recorded 166,174 irrigating farms in Central Serbia, of which 6 are understood to have contracts and pay fees to Srbija Vode.

For Vojvodina, the survey recorded a total of 20,057 irrigating farms. Vode Vojvodine estimates that, in addition to some 65,000 ha covered by formal irrigation or drainage contracts, there are also around 35,000 boreholes in the province operating without permits.

The Irrigation Strategy will address the issue of licenses and abstraction fees; as far as this section is concerned, the main point is that individual irrigation systems do not raise complex management issues as full responsibility rests with one irrigating farmer.

6.2 Quality of service

The only type of multi-user system that currently covers any substantial number of users is the drainage and two-way drainage provided by Srbijavode and Vode Vojvodine. Whilst any public system inevitably has its share of complaints, the main issue raised by farmers is that they pay a significant amount of money in drainage fees but do not receive good service, in part because not all of the money reaches the companies that manage the systems. Problems can also arise after periods of very heavy rainfall that exceed the capacity of the drainage system.

The fact that there is limited formal consultation of users may contribute to both the perception and the reality of poor service.

6.3 International practice in irrigation and drainage management

This section reviews regional and international practice in water management at the two main levels: integrated water resources management at the strategic level, often comprising one or more river basin districts; and local management of irrigation and drainage systems with direct service to farmers.

6.3.1 Strategic management of water resources

The Serbian approach, whereby strategic water management is carried out by public organisations covering specific territories (i.e. Srbijavode and Vode Vojvodine), is quite common across the Western Balkans. For example:

- Both **Croatia** and **Republika Srpska** continue to apply the same former-Yugoslav model as Serbia, through the public water companies "Hrvatske Vode" and "Vode Srpske".
- The **Federation of Bosnia and Herzegovina** has two "Water Agencies", one covering the Sava river basin and one for the Adriatic sea basin.
- **North Macedonia** has established public enterprises known as "Water Economies", with farmers represented on their management boards.
- **Albania** has recently established four "Irrigation and Drainage Directorates" to manage large-scale infrastructure such as flood defences, large reservoirs and pumping stations, and inter-municipality irrigation and drainage canals.

- **Kosovo**[12] has established a "National Public Company", which has infrastructure in seven municipalities and supplies water to regional networks as well as directly to irrigation, hydropower and industry.

The formal involvement of farmers in the management boards of North Macedonia's "Water Economies" is still more the exception than the rule.

Moving further afield, there are many different models of water management, including:

- In **Portugal**, water is the overall responsibility of the Ministry of the Environment, with regional management by Regional Environmental Agencies. Individual irrigation systems or groups of systems are managed by operators, such as public companies, with whom the farmers have contracts.
- In **Spain**, irrigation comes under the Ministry of Agriculture, Fisheries and Food, with infrastructure developed by "SEIASA", the State Society for Agricultural Infrastructure. Water users that receive water from the same outlet or concession are obliged to form "User communities" as bodies of public law linked to the basin organisations. If these consist entirely of irrigating farmers they are known as "Irrigators Communities". Most irrigation in Spain is managed by these Communities, which aim for the good and equitable use of water.
- In **Israel**, agricultural cooperatives manage the allocation of water between their members, under a system of water quotas. In years of reduced water supply they will seek to find the least damaging way of cutting back on irrigation, for example, by producers of short-season crops agreeing to skip one production cycle so that perennial crops can receive enough water to avoid long-term damage. Irrigation water is drawn from multiple sources including lakes, rainwater harvesting, treated wastewater and desalination, and the volumetric tariff depends on the source and quality of the water. Farmers are particularly discouraged from using potable water for irrigation where alternative sources are available.

6.3.2 Local management of irrigation and drainage systems

There is considerably more variation in local management of irrigation and drainage system, but the two main models are:

- Management by local government or other public institution;
- Management by farmers through an association.

Public management

In some cases the strategic management organisation retains operational responsibility right up to the farms, as with the "State Agency for Water Resources" in Ukraine. In other cases it retains overall responsibility but contracts out the day-to-day management to public or private companies.

Management by local municipalities is also quite common and is now the standard practice in Albania after the failure of Water Users' Associations there. In North Macedonia the initial Water Users' Associations (known as "Water Communities") also proved rather unsuccessful and were largely replaced by public "Water Economy Enterprises", though it is understood

[12] "Kosovo" refers to the Province of Kosovo and Metohija under UN Security Council resolution 1244.

that in some cases the final distribution of water to users is once again being carried out by the "Water Communities".

Within Serbia, management of irrigation systems in Vojvodina follows the first of these two approaches, whilst the new pressurised systems being developed in Central Serbia are expected to use the municipality model.

Management by farmers

Through the process of "irrigation management transfer", various countries around the world have transferred management from public bodies to users, typically by establishing specialised Water Users' Associations (WUAs). Where the necessary legal basis does not exist, more general farmers' associations or cooperatives are often used. The main difference is that membership of a farmers' association is voluntary, whereas once a WUA is formed, all farmers in its command area automatically become members with a right to vote and an obligation to pay fees. This can be controversial and is sometimes an obstacle to adoption of a WUA law, but once accepted by farmers it helps to make the WUAs more financially sustainable and successful in the long run.

One of the key principles of a WUA is that is should be run by farmers, for farmers, and that they set the budget, deciding what level of service they are willing to pay for and setting water fees accordingly.

Over the last 20 years, WUAs were widely established in Albania and Macedonia but their functions have since been transferred to the municipalities or water enterprises. A few small irrigation associations are currently operational in Bosnia and Herzegovina, using a general legal basis.

Other examples can be found around the world, with varying degrees of success. WUAs have been widely formed and proved quite successful in Mexico. In Armenia, where low summer rainfall makes crop production highly dependent on irrigation, the entire state system was converted to WUAs, with international support and assistance. However, government still provides the bulk water supply through its "Water Supply Agency" and also regulates the tariff that WUAs can charge their members, making up part of the difference through subsidy. Whilst the subsidy is welcome, this approach can be perceived as undermining the WUAs' independence, as well as making them susceptible to budget cuts and thus threatening their long-term financial sustainability.

Selecting the best management structure

There is no one management system that is right in every case. Important factors in choosing the institutional form include:

a) ***Size***. Large systems spanning several municipalities normally require some form of overall public organisation or company, even if local management is delegated to local organisations. This is clearly the situation with the DTD hydrosystem.

b) ***Complexity***. Complex systems require considerable technical capacity that may be lacking in local municipalities or recently-formed WUAs. Professional companies, whether public or private, may need to be involved for effective operation. The new pressurised systems being developed in Central Serbia will be quite complex and it must be questioned whether municipalities have the necessary technical skills to operate them. One issue currently under consideration is to delegate operations and

maintenance to the local Public Communal Enterprises, which already have experience in water supply and sanitation.

c) ***Land fragmentation***. Where many small farms must be served and consulted, participatory organisations such as WUAs or cooperatives may play a vital role. This is particularly relevant in Central Serbia, but even in Vojvodina there are many small farms sitting beside their larger neighbours.

d) ***Legal framework and history***. Serbia does not yet have a WUA law, and its general legislation on cooperatives and associations was designed for different circumstances. A draft WUA law was prepared in 2014 with assistance from the World Bank but did proceed into the adoption process as the government's Legal Secretariat gave an opinion that associations of water users could be established under existing legislation. The Ministry of Agriculture, Forestry and Water Management is currently working on a new draft Law on Water Users' Associations.

e) ***Government financing***. Where a system cannot be viable without ongoing public support, that finance is more likely to be provided regularly to a public-sector organisation than to a private company or independent WUA. At the municipality level, the local self-government may be more willing to fund its own Public Communal Enterprises than to give subsidies to a WUA, but not necessarily at the level needed for adequate maintenance and periodic replacement of equipment.

   The world does not yet know the full cost of Covid-19 but it will clearly be large and will place public budgets under pressure for many years to come. This should be taken into account both when deciding which systems will be built, and in designing their management and financial arrangements.

A key issue for a multi-user system of any form is to ensure that users are properly involved and adequately served. WUAs achieve this by their very structure but it is often a weak point for public organisations and companies. Options for a better interface with users include bringing their representatives onto the management board, establishing farmers' associations for information exchange and discussion, and using websites and other digital solutions to give farmers easy access.

7 Key issues

This section identifies five issues in the governance of irrigation and drainage that the Working Group might wish to discuss and potentially address in the new strategy.

7.1 Administrative boundaries vs river basin boundaries

The division of water management between the three Public Water Companies means that in a number of cases the left bank of the Sava or Danube is managed by Vode Vojvodine, whilst the right bank is managed by Srbijavode.

In addition, the boundary and transboundary nature of the major rivers mean that management responsibilities are inevitably shared between multiple countries. This issue is addressed through bilateral and multilateral arrangements, including the "International Commission for the Protection of the Danube River" and the "International Sava River Commission".

7.2 Law on Water Users' Associations

The Ministry of Agriculture, Forestry and Water Management is in the process of preparing a draft law on water users' associations, since the earlier draft prepared in 2014 with World Bank assistance was not adopted. A good law on water users' associations could benefit Serbia in at least two ways:

- It would add another management option for local multi-user systems, as a possible alternative to management by local municipalities. Given the wide variation in the sizes and types of irrigation users across Serbia, it may be important to have a range of options available;
- It could provide a means for stakeholder representation and increased involvement in the management of the large systems run by Srbijavode and Vode Vojvodine, in line with the recommendations of section 6.3.2 on *Local management of irrigation and drainage systems*.

7.3 Usage of irrigation and drainage fees

Currently the irrigation and pubic fees paid by farmers do not go directly to the organisations that maintain and operate the systems but is instead routed via the state budget and Srbijavode or Vode Vojvodine, as described in section 6.1.1. Part of the rationale for this is that the fees should contribute to national management of water resources, but it it is also due to applying the common approach now used for all kinds of pubic fees. There is thus not an automatic link between the fees collected and the operating budget, and farmers sometimes allege that not all of the money they pay is spent on running the systems.

If it is confirmed that this problem exists at a significant level, then a number of solutions could be considered, such as:

1. Ensure that all fees collected are routed to irrigation and drainage, either by:
    a. Transferring them directly to the Water Utility Companies without passing through the general budget, or

b. Putting a regular line in the budgets of Srbijavode and Vode Vojvodine for "Return of user fees", and stipulating that it should be set equal to the amount of fees actually collected.

In either case, it might be necessary to deduct an agreed amount for the strategic work of Srbijavode and Vode Vojvodine.

2. Changing the system so that farmers pay directly to the Water Utility Companies and have a say in how these use their money, probably by putting farmer representatives on their management boards. Thought would have to be given to how this would interact with the tendering process through which contracts are awarded to Water Utility Companies, since a given area will not necessarily be managed by the same company every year.
3. Establishing Water Users' Associations to collect fees from their members and then select, contract, pay and oversee Water Utility Companies to carry out operations on their behalf. These associations would also pay agreed fees to Srbijavode or Vode Vojvodine for the bulk water and services that they provide.

If farmers did take a more direct role in funding and managing irrigation and drainage services, this could have implications for future public subsidies, since it might be considered that farmers had accepted full financial responsibility for these systems.

7.4 Institutional capacity for irrigation development

The development of new and improved irrigation and drainage systems will be led by the Water Directorate and the Provincial Secretariat for Agriculture, Forestry and Water Management. The Law on Planning and Construction Assessment requires a rigorous pre-feasibility study of potential schemes. The prescribed methodology includes the generation and analysis of alternative options, followed by detailed economic and financial appraisal, and this work is normally carried out by specialist institutions or consultancy companies.

However, in practice political decisions may already have been taken and commitments made to before the economic and financial analysis is carried out, potentially placing the analysts under pressure to come to the desired conclusion. Thorough analysis requires consultation with local stakeholders, so it is almost inevitable that expectations will be raised at this stage. It would therefore be very beneficial to establish a system of rapid pre-appraisal or "triage" of potential projects, so that only those that are likely to be technically, financially and economically viable proceed to full consultation and analysis.

Whilst the calculation methodology for economic and financial analysis is relatively standard and uncontroversial, analysts have to make assumptions on several critical issues, including the extent and pace at which farmers will switch to irrigation, the mix of crops that they will grow, and the yields and margins that they will achieve. These all require making predictions about an uncertain future, and relatively small changes in these assumptions can make the difference between a scheme appearing profitable or loss-making.

Serbia would benefit from having a monitoring and evaluation system that measures what farmers actually do when given access to irrigation and feeds these results into assessments of other potential projects. Evaluation should focus on lessons learned from previous successes and failures and ensure that these are used to improve the design and selection of

future projects. Monitoring and evaluation should be run by an independent unit that is not linked to the design or operation of irrigation and drainage systems.

The Ministry of Agriculture, Forestry and Water Management might wish to consider establishing a permanent analytical and monitoring unit to support irrigation and drainage development. A number of international organisations might be able to provide technical or financial assistance with this, as well as in developing institutional capacity as set out in the next section.

7.5 Institutional capacity to manage local irrigation systems

Once the decision has been made to construct a new irrigation system, the next decision is how it should be managed and financed. Section 6.3.2 outlines a range of management solutions found in Serbia and the region, whilst section 7.2 recommends that Serbia should develop and adopt a Law on Water Users' Associations to add this option to the mix.

Where systems will be managed by Srbijavode or Vode Vojvodine, either directly or through one of the established Water Utility Companies, then the necessary technical and managerial capacity should already exist. However, when a new system is to be managed locally, whether by a municipality, Water Users' Association (WUA) or other structure, it will generally be the case that these organisations do not have previous experience of irrigation management. International experience of irrigation management transfer has shown that it is almost essential to establish a "WUA Support Unit" to make the process more successful. The roles of such a unit would normally include:

- Raising awareness and providing information about Water Users' Associations;
- Assisting in WUA formation, including developing model statutes and contracts that WUAs can take and adapt to their specific needs;
- Providing training and advice, and facilitating exchange of experience between WUAs;
- Helping to resolve disputes between WUA members or between members and management.

Serbia may choose to take a more mixed approach, where some systems form WUAs, some are run by municipalities and others are managed by farmers' associations or cooperatives. In this case, the "WUA Support Unit" might instead become an "Irrigation Support Unit" offering similar services to a wider range of management structures. The lack of sustainability of the Water Users' Associations established during the World Bank-funded "Irrigation and Drainage Project" demonstrates the need for some kind of ongoing support but may also indicate some underlying problems with the WUA approach; the reasons for these failures should be analysed carefully before deciding to make WUAs a major part of the Serbian approach to irrigation management.

In countries that do commit heavily to WUAs, it is also common to establish a separate "WUA Supervisory Unit" under the WUA Law. The task of this unit is to ensure that WUAs comply with their legal obligations, to check their annual accounts and to make sure that tariffs are correctly set and implemented. Supervisory mechanisms already exist for municipalities, registered cooperatives and farmers' associations, so this unit might only be required for WUAs established under the new law.

Usual practice is to establish both units under the ministry responsible for irrigation, which is normally the ministry of agriculture.