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Water Resources Management in South Eastern Europe

Volume I

Issues and Directions

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IBRD 32290	Per Capita Water Resources
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IBRD 32296	Water Quality of the Danube and Tributaries, 1995

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List of Acronyms and Abbreviations

BCM	Billion cubic meters
CARDS	Community Assistance for Reconstruction, Development and Stabilization
CAS	Country Assistance Strategy
ECA	Europe and Central Asia
ESR	Environmental Sector Report
EU	European Union
FAO	United Nations Food and Agriculture Organization
FYR	Former Yugoslav Republic
GDP	Gross Domestic Product
GEF	Global Environment Facility
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Assistance Agency)
HRMEPP	Hazards Risk Mitigation and Emergency Preparedness Project
IBRD	International Bank for Reconstruction and Development
ICPDR	International Commission for the Protection of the Danube River
IDA	International Development Association
IFI	International Financial Institution
INWEB	International Network of Water-Environment Centres for the Balkans
KfW	Kreditanstalt für Wiederaufbau (German Project Funding Agency)
LOCP	Lake Ohrid Conservation Project
MoAWMF	Ministries of Agriculture, Water Management and Forestry (Bosnia and Herzegovina)
MoEW	Ministry of Environment and Water
m ³	Cubic meter
NGO	Nongovernmental Organization
OECD	Organization for Economic Cooperation and Development
REC	Regional Environment Centre
REReP	Regional Environment Reconstruction Programme
SAPARD	Special Accession Program for Agriculture and Rural Development
SEE	South Eastern Europe
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
USAID	United Nations Agency for International Development
USD	United States Dollar
WRM	Water Resources Management
WWF	World Wide Fund for Nature

Geographic Glossary*

Balkan Peninsula	Balkans
Balkan Mountains	Balkans, Stara Planina
Bujana River	Buna River
Butrint Lagoon	Butrinto Lagoon
Cres Island	Cres, Otak
Drava River	Dráva, Drau River
Drin River	Crni Drim, Drini, Drim River
Krast	Kras, Carso
Iskur River	Iskar River
Lake Doiran	Doiran
Lake Ohrid	Ohridsko Lake
Maritsa River	Maritza, Meriç, Marica, Évros, Hebros, Hebrus River
Mura River	Mur River
Nestos River	Mesta, Néstos River
Prespa Lake	Prispansko, Prespansko Lake
Resvaya River	Rezovska, Rezva, Mutlu River
Skadar Lake	Shkodra, Schkodër, Scutari, Skadarsko Lake
Struma River	Strimón River
Timok River	Timoc River
Tisza River	Tisa, Theiss River
Vardar River	Axius, Axiós, Axious River
Vijosë River	Viosa, Voyutsa, Vijose, Vjosë, Vijosa River

* This list provides the default names of the key transboundary geographic features that will be used throughout the report. Other given names of the transboundary geographic feature are also presented in the list.

Executive Summary

Effective water resources management (WRM) is essential for sustainable growth and poverty reduction. Poor river basin management increases economic damage and loss of life from floods, droughts, landslides and erosion. Low water quality carries health risks, damages fisheries, tourism and recreation industries and leads to loss of ecosystems. Poor drinking water service delivery affects the wellbeing of local communities, while unreliable irrigation water leads to loss of livelihoods. Weak inter-sectoral allocation of water can result in insufficient supplies for irrigation, hydropower, municipal water supply and ecosystem maintenance. Inadequate water policies, institutions and pricing regimes drain central and local government budgets and lead to poor WRM and service delivery.

The year 2003 has been declared the Year of Fresh Water by the United Nations community, and water was the theme of a major international conference in Kyoto, Japan in March of this year. In February, the World Bank approved a new corporate Water Resources Strategy, which argues for an increased commitment by the World Bank not only to improved water management, but also to water resources rehabilitation and investment where there is a demonstrated development need. Sub-regional and transboundary water management are also increasingly recognized as important development issues in the Europe and Central Asia Region (ECA), especially in Central Asia, the Caucasus and South Eastern Europe (SEE). The ECA Region is finalizing a Water Resources Strategy.

This two-volume report aims to summarize key issues and strategic directions for improved WRM at the national and transboundary levels for the SEE region. It serves as a contribution to the World Bank's work on sub-regional issues in SEE, and as background to a conference on "Sustainable Development for Lasting Peace: Shared Water, Shared Future, Shared Knowledge," that is being hosted by the Government of Greece during its Presidency of the European Union and by the World Bank in Athens in May 2003. The conference will discuss management of transboundary water resources in the SEE and Eastern Mediterranean. The report identifies key water resources issues faced by the SEE countries,^{1,2} documents the approach adopted by them to address water challenges, identifies ways of strengthening WRM policies and programs and international cooperation, and makes recommendations for future action. The need for enhanced partnerships between SEE countries and with the principal international financing agencies is emphasized.

The report has been developed within the framework of the recently approved World Bank Water Resources Strategy (see Annex A). This framework distinguishes between:

1 The "countries of focus" are: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, FYR Macedonia, Romania, and Serbia and Montenegro. Neighboring countries—Greece, Hungary, Moldova, Turkey and Slovenia—are included where relevant. Moldova, which shares social, economic and cultural characteristics with the region, is also considered part of South Eastern Europe and participates in the Stability Pact for South Eastern Europe. However, it is not within the study focus of this paper because it is hydrologically independent from the other countries (with the exception of Romania).

2 In this report, the terms Serbia and Montenegro should be understood to be synonymous with the pre-existing Federal Republic of Yugoslavia. Where relevant, the report makes reference to the two member states of Serbia and Montenegro—Serbia and Montenegro—and to the province of Kosovo. For reasons of brevity and style, these are referred to as Serbia, Montenegro and Kosovo.

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- ❖ Policies and investments that affect WRM broadly, at river basin or tributary level (e.g., infrastructure for multipurpose storage, flood management, water quality and source protection, water allocation, river basin institutions and management instruments); and
- ❖ Policies and investments that affect water users (e.g., irrigation and drainage, water supply and sanitation, environmental services, industry and hydropower generation).

The report focuses primarily on the first set of policies and investments. There are of course many overlaps, especially when one water user (such as irrigation) affects water management and allocation at the basin level. The World Bank's Water Resources Strategy also distinguishes between the following: WRM issues that are poverty targeted (e.g., watershed management in degraded areas), and those that have broader impacts (e.g., institution building and public sector management, flood management); and water service delivery measures that are poverty targeted (e.g., rural water supply and sanitation) and those that have broader impacts (e.g., urban utility reform).

An ECA Strategy for Water Supply and Sanitation has recently been prepared, and the ECA Rural Strategy outlines the main irrigation issues.

Water Resources Challenges in the SEE Region

Broadly, the SEE region has adequate water resources, though they are unevenly distributed among and between countries; some countries face localized water shortages. Most of the major rivers are transboundary. There are challenges in flood and drought management, and in inter-sectoral allocation and water quality, particularly in regard to balancing the cost of municipal and industrial wastewater treatment with the benefit of improved water quality for recreation, fisheries and ecosystem functions. All countries are working to put in place institutional frameworks, regulations and economic incentive regimes that reflect multi-stakeholder consensus, and at the same time provide for efficient use of water and adequate service delivery. All countries have also faced difficulties of deteriorating infrastructure for water and sanitation, irrigation and water regulation, linked in part to weakness of public sector institutions and broader fiscal and governance issues. These key issues are summarized below.

The SEE countries of focus have a land area of 61.4 million hectares and a population of 55 million, of which 55 percent live in urban areas. Per capita GDP varies widely, from about USD900 in Albania to USD5,100 in Croatia, as does the structure of the countries' economies. Agriculture accounts for 10 percent of GDP in Croatia and 55 percent in Albania. In general, poverty levels are higher, and access to services poorer, in rural areas than in urban ones.

The topography of the SEE region consists of mountains and hilly plateaus, with altitudes falling quite sharply to the Adriatic and Mediterranean, and the broad floodplain of the Danube and its major tributaries running through the center. Climate varies considerably between coastal and interior regions and precipitation becomes lower and more variable towards the south. Some parts of Albania, Bulgaria, and Former Yugoslav Republic (FYR) of Macedonia have also been affected by a decline in average precipitation over the last thirty years, and an increase in the frequency and severity of droughts.

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Total renewable water resources are estimated at 580 billion cubic meters per annum, with large seasonal and annual variations. Water availability is classified as “low” for Bulgaria and FYR Macedonia and “medium” for Romania, and Bosnia and Herzegovina. Ninety percent of the SEE countries’ territory falls within transboundary river basins, and in addition to the Danube, which flows into the Black Sea, there are twelve smaller transboundary river basins flowing into the Adriatic, the Aegean and the Black Seas. More than half of the transboundary basins have three or more riparian states. Groundwater resources are important beneath the floodplains for the major rivers and in karstic aquifers along the Adriatic coast. Groundwater is the principal source of domestic and industrial water supply.

Water quality is of concern, with many major rivers unfit for bathing without substantial treatment. Nutrient runoff from agricultural, municipal and industrial sources in the Danube basin is the principal cause of eutrophication in the Black Sea. However, the SEE region also has a number of ancient, tectonic lakes, as well as coastal lagoons and wetlands, which contain unique ecosystems; the Danube Delta is one of the largest and least developed wetland ecosystems in Europe.

Industry (including cooling water) is the principal water sub-sector in most countries, accounting for 60 percent of water withdrawal, though irrigation is the most important water use in Albania and FYR Macedonia. Utilization of irrigation infrastructure declined precipitously in Bulgaria, FYR Macedonia and Romania following the breakup of the former collective and state farms; in Albania support to water users’ associations has helped to reverse the decline and has played an important part in the recovery of agriculture. Overall water consumption, whether for domestic, industrial or irrigation use, has declined over the past decade, for a number of reasons related to economic transition and, in some countries, to war—declining industrial production, falling incomes, deteriorating government services—as well as due to economic instruments such as the introduction of prices reflecting the real cost of service delivery.

Access to piped water supply networks is available to about 75 percent of the total SEE population, with a marked difference between urban and rural populations, at 94 percent and 51 percent, respectively. The same urban/rural disparity exists in regard to sewer service, coverage of which is 84 percent in urban areas and only 17 percent in rural areas. Because wastewater treatment is generally non-existent or non-functioning, the discharge of wastewater is a major source of pollution for both surface and groundwater sources.

Groundwater resources, many of them transboundary, represent as much as 30 percent of total internal renewable resources. Shallow aquifers are at risk of pollution from point and non-point sources. This is a serious concern since the countries in the region depend heavily on groundwater resources for drinking water supplies.

Hydropower accounts for 47 percent of total electricity production in the region, with Albania, Bosnia and Herzegovina and Croatia highly dependent on this renewable source. Navigation on the Danube and its major tributaries is now resuming after its interruption following the bombing of infrastructure in Serbia and Montenegro.

During the past decade most of the SEE countries have made efforts to establish legal and institutional frameworks for WRM. However, arrangements vary among countries and sometimes within countries (e.g., Bosnia and Herzegovina). While a variety of tools is used to provide economic incentives for improved WRM, introduction of pricing reforms alone will not result in effective WRM and water service delivery; in-

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stitutional reforms and accountable public or private sector organizations are also needed. Lack of funding has led to deterioration of infrastructure and thus service, both for urban water supply and for irrigation. Most countries still do not have an institutional framework for integrated WRM. The Water Framework Directive of the European Union (EU), which requires development of multi-stakeholder river basin management plans by 2009, as well as improvements in water quality to ensure all waters meet “good status” by 2015, provides for this framework; but making this a reality will take time.

National Water Resources Management Issues

Key WRM challenges vary by country, but there are some common themes. For effective water resources management and service delivery, sound institutions and legal and regulatory frameworks are necessary. These need to reflect multiple interests, provide transparent guidelines on cross-sectoral allocations, and set the framework for economic and financial incentives to use water efficiently and maintain water quality. Furthermore, water infrastructure and water delivery institutions need to provide reliable services. If demand management measures such as economic instruments are put in place but infrastructure is poorly maintained or institutions are weak, these measures will not be effective. WRM challenges are also related to climate, in particular overall rainfall and the frequency of extreme drought and flood events.

Albania faces a range of challenges, including watershed and flood management, the need for continued improvements in water/sanitation and irrigation/drainage, and better management of lakes, wetlands and coastal areas. It currently lacks an institutional framework with broad stakeholder ownership for WRM, and water service delivery institutions are still weak although water users associations have been successful in many areas. **FYR Macedonia** also has yet to develop a sound institutional framework for multi-sectoral WRM and irrigation, and like other SEE countries faces financial difficulties in investing in wastewater treatment. There are also difficult choices to be made in meeting demands between sectors, and sustainable management of FYR Macedonia’s lakes and their watersheds presents a unique challenge. For **Bosnia and Herzegovina**, the key challenges are rehabilitation of water and wastewater systems, flood management, water quality and ecosystem management, and development of sound institutional frameworks.

For **Croatia**, where water management institutions are stronger, the priorities are maintenance of good quality coastal waters, essential to the sustainability of the tourism industry, and flood management. For **Serbia and Montenegro** the challenges are fragmented responsibilities for WRM, rehabilitation of water and wastewater treatment systems, maintenance of coastal water quality, and flood and watershed management. **Kosovo** lacks an institutional framework for water management; reliable water and sanitation and irrigation service delivery are challenges.

Bulgaria and **Romania** have adopted water management legislation consistent with EU requirements, but face institutional and financial challenges with implementing the legislation. In particular, meeting EU water quality standards will require major investments.

For **Bulgaria**, rehabilitation of irrigation infrastructure is a priority if the country’s agricultural potential is to be realized. Flood and drought mitigation is a third challenge; average runoff was 7 percent less in the period 1961-1999 than 1935-1984, and 40 percent less in 1985-1995 compared with 1935-1984. Water rationing has been

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necessary in many towns over recent years. Bulgaria is committed to improving water quality and wetlands along the Danube and the Black Sea coastline.

For **Romania**, floods and unsafe dams and mine tailings facilities pose high economic, human and environmental risks. Rehabilitation of water and wastewater systems and irrigation infrastructure, where economically justified, is another top priority. Rural water supply and sanitation services are among the poorest in Europe. Romania harbors unique wetlands in the Danube Delta and lower Danube, but faces difficulties balancing the need to maintain the Danube as a navigation route with controlling coastal erosion.

Transboundary Issues

Besides the country-level issues faced individually by the SEE countries, they also share transboundary water resource problems with each other and with their neighbors of Greece, Hungary, Moldova, Slovenia and Turkey. Many of these problems are the same in nature as the country-level issues. They include:

- ❖ Water quantity management (e.g., water sharing between Bulgaria and Greece on the Nestos River, and balancing the needs of FYR Macedonia in maintaining Lake Prespa's water quality and quantity and Greece's irrigation requirements);
- ❖ Navigation (e.g., on the Danube and Sava Rivers);
- ❖ Water quality management in transboundary rivers and lakes (e.g., Lake Ohrid and the Vardar River);
- ❖ Balancing conflicting interests to ensure ecosystem and biodiversity conservation (e.g., the Neretva and Drin River Basins and Deltas); and
- ❖ Management for emergencies including flood forecasting and mitigation requiring information networking and sharing (e.g., on the Sava and Tisza Rivers).

These issues are particularly complex because of the differences in socio-economic conditions, geography, WRM institutions and laws among the countries; and because action by one riparian country may not benefit that country directly. Nevertheless, there are substantial benefits, as has been demonstrated in the experience on other shared water bodies, including the Rhine River, the Baltic Sea and the Swiss Lakes.

The earliest example of interstate cooperation may be navigation on the Danube, which is governed by agreements going back to the nineteenth century. In the southern part of the SEE region, there are difficult trade-offs between consumptive (irrigation and municipal uses) and non-consumptive uses (water management for tourism and biodiversity), and between upstream and downstream riparians. Compromises between countries on acceptable balances between these needs, with in some cases river regulation or maintenance of natural flows to achieve agreed objectives, can benefit all riparians.

As the major wetlands are generally associated with transboundary river floodplains or shared deltas, there is a clear need for cooperation on their conservation. The benefits of such conservation are regional or even global. The Lower Danube Green Corridor Initiative envisages a corridor of wetlands and natural ecosystems along the Danube; the first investments under this program are underway in Bulgaria and Romania.

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Water quality management is a classic example of externality—the impacts of actions by upstream polluters are felt primarily by downstream countries and receiving waters, such as the Black Sea. The most pressing problem, nutrients, is now being addressed in part by the Black Sea/Danube Basin Strategic Partnership Program funded by the Global Environment Facility (GEF). A transboundary diagnostic analysis concluded that excessive nutrient loads from municipal and industrial wastewater and agricultural runoff result in annual tourism, biodiversity and fisheries losses estimated at USD1 billion to the Black Sea countries.

Information sharing is critical to transboundary cooperation; enhanced capacity for hydrometeorological forecasting also provides opportunities for cooperation. In Poland, the ongoing World Bank supported Flood Reconstruction Project includes support for weather forecasting systems, which could be shared with other countries.

Transboundary cooperation is already well advanced for the Danube Basin and for protection of the Black Sea, with the signing of conventions and establishment of Commissions to carry out studies, prepare plans and facilitate coordination between countries. Arrangements need to be made so that Bosnia and Herzegovina and Serbia and Montenegro can participate fully while legal issues are being resolved. For the smaller transboundary rivers in the SEE region, which flow into the Adriatic, the Aegean or the Black Seas, mechanisms for transboundary cooperation are, for the most part, not yet in place.

The GEF-funded Lake Ohrid Conservation Project provides a useful model for cooperation around a shared water body, where the potential availability of grant funding was a strong incentive to reach agreement. A similar approach might be extended to Lake Prespa and Lake Skadar, the Vardar and Maritsa Basins, and the Neretva Delta. Cooperation on the Sava and the Tisza has expanded; cooperation is often most effective when it takes place around a shared investment and a water management program.

World Bank Assistance to Water Resources Management in the SEE Region

World Bank assistance to overall WRM in SEE countries has been quite limited in scope to date, but there has been considerable assistance with improved delivery of water services. Urban water supply projects (with some wastewater components) have focused on development of financially sustainable institutions and improved service delivery in a number of countries.³ Irrigation projects (in Albania and FYR Macedonia) have sought to decentralize responsibility for irrigation maintenance to local user associations and are now beginning to address broader system management. Poverty targeted investments in areas such as rural water and sanitation or watershed management were limited until recently. Support to investments in rural water and sanitation, combined with support to local communities and local governments to maintain services, is increasing, with operations ongoing in Romania and Albania, and a community watershed operation now under preparation in the latter. Support for broad hazards risk mitigation investments and management instruments has been limited thus far to Romania.

³ The Eastern Slavonia Reconstruction Project in Croatia, which also addresses modest water resources objectives (Box 1), is an example of a broader approach.

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Broad support for improved macro-economic management, governance and public sector reform in most countries also benefits WRM and service delivery. More transparent public sector institutions, a more effective civil service and improved tax regimes and revenue collection, together provide a framework for strengthened, better funded and more transparent water management and service delivery institutions.

The GEF-funded Black Sea/Danube Basin Strategic Partnership Program leverages investments in improved wastewater treatment, agricultural pollution reduction and wetland restoration with grant funding to lower the costs of these investments to the Danube and Black Sea riparian countries. To date two operations have been approved, one in wetland restoration (for Bulgaria) and one in agricultural pollution reduction (for Romania); several others are under preparation. The grant funding provided, however, is small compared with the investment required to make a substantial impact on the quality of the Black Sea.

GEF support to Lake Ohrid has provided a catalyst for more substantial investments in wastewater treatment. GEF support is also being sought for improved management on Lake Skadar and on the Neretva River. Fiscal deficits as well as International Development Association (IDA) credit constraints limit the investment funding that could complement such support, and highlight the need for assistance from European and bilateral financing institutions.

In some of the newer Country Assistance Strategies (CAS) on which the countries and the World Bank have agreed as a framework for overall engagement there is a broader WRM focus. The Romania program includes a project for flood mitigation and safety of mine tailings dams, and support for the reform of the irrigation sector.

Future challenges for the World Bank include: building WRM capacity at the national (and, eventually, transboundary) level; addressing competing needs between sectors in the most water-scarce countries (especially FYR Macedonia and Bulgaria); extending successful emergency preparedness models to additional countries; expanding poverty-linked approaches, like watershed management; and reaching out to potential grant co-financiers. The World Bank should also continue to support improved water service delivery, policies and institutions for both municipal and irrigation water.

EU Assistance to WRM in SEE

The SEE countries all wish to join the EU and the latter is providing substantial support to the pre-accession countries, Bulgaria and Romania. For the remaining countries of focus, the Stabilization and Association Process provides the cornerstone of EU policy, promoting stability in the region whilst also ensuring closer association with the EU. Under that process, the Community Assistance for Reconstruction, Development and Stabilization (CARDS) is the main vehicle for assistance, with an emphasis on improving governance; it totals more than €500 million per year. For the last two years, assistance related to WRM was a modest 3-4 percent of the total but with an upward trend, especially in the regional component that can include transboundary issues. The Regional Environment Reconstruction Programme (REReP) is the major EU vehicle for regional cooperation on environment, with an annual budget of €32 million, and is coordinated by the Regional Environment Centre (REC)

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for Central and Eastern Europe.⁴ For the future, the EU Water Initiative promises to be a major program with a regional component giving priority first to urban water supply and sanitation and second to integrated WRM (including transboundary river basin management).

The EU Water Framework Directive and other EU environmental directives are of central importance to the SEE countries. On the one hand, they provide essential guidance on developing policies, laws and institutions for countries seeking to modernize their approach to WRM. On the other hand, their requirements in technical areas like water quality are quite ambitious at this stage of development, implying levels of investment that will be very challenging for countries in the region to meet in the near term without substantial external support.⁵

Recommendations

The recommendations below apply to the majority of the SEE countries. Additional country-specific recommendations are given in Chapter 4. The table below shows schematically the actions needed at the national and transboundary levels for both the short and medium term. Transboundary recommendations are divided between the Danube Basin, which accounts for the bulk of the region and for which planning is more advanced, and the remaining basins, where there are ongoing preparatory actions and further planning is urgent. The recommendations are balanced between resources management and service delivery.

Setting Priorities for WRM in SEE Countries

Level	Short Term (1 to 2 years)	Medium Term (3 to 5 years)
National	<ul style="list-style-type: none"> • Clarify responsibilities and improve cooperation between agencies • Expand rehabilitation of infrastructure, including demand management measures • Develop poverty focused programs (rural water supply and watershed management) • Promote the role of civil society 	<ul style="list-style-type: none"> • Develop WRM policies • Strengthen WRM agencies • Analyze trade-offs • Improve information systems • Expand investment programs • Develop innovative funding methods
Transboundary Danube Basin	<ul style="list-style-type: none"> • Strengthen Danube and Black Sea Commissions • Facilitate agreements on tributaries • Test technological solutions 	<ul style="list-style-type: none"> • Implement action plans and projects • Expand funding mechanisms for externalities
Transboundary Elsewhere	<ul style="list-style-type: none"> • Develop cooperative arrangements for smaller basins and lakes • Prepare management plans and projects 	<ul style="list-style-type: none"> • Implement action plans and projects • Expand funding mechanisms for externalities

⁴ Water figures prominently in the REReP, which includes a set of projects for monitoring the quality of the Vardar River, support to wastewater projects in Albania, management and wastewater studies for Lake Doiran and participation in a number of GEF projects. The overall budget, however, is modest.

⁵ Analytical work has indicated that for Bulgaria to meet the EU water-related directives would require at least a 200 percent increase in the current bill for urban households and at least a 400 percent increase for rural households.

Issues and Directions

- ❖ **National Level – Short Term.** For many countries, there is an urgent need to clarify responsibilities, especially for overall WRM. Associated with this is a need for sectoral water agencies to share information and cooperate in carrying out their respective mandates. The larger countries need to consider devolving day-to-day water management to river basin authorities. Indeed, institutional strengthening is closely linked to better demand management, service delivery, quality and resources management. The bulk of investments, as in the last decade, will continue to be rehabilitation of existing infrastructure, whether for urban water supply and sewerage, irrigation and drainage, flood control or power generation, provided that steps are taken at the same time to improve management as well as financing, so that operation and maintenance needs are fully met in the future. A short-term priority is also improved wastewater treatment in tourist areas. Where water consumption is excessive by international norms and water charges are low, demand management should be an integral part of projects.⁶ Countries should focus increasingly on programs to meet the needs of the poor, for example, by expanding water supply networks and basic sanitation to poorer urban communities and to rural areas; by improving watershed management; and by controlling erosion and flooding from upper watersheds. Further steps are needed to promote the role of civil society, through improved public awareness and access to information as well as consultation with stakeholders. Additional efforts are also needed to promote the role of the private sector and NGOs in water resources planning and management.

- ❖ **National Level – Medium Term.** While there is a strong need to develop policies and build institutions for integrated WRM throughout the region, realistically this cannot be achieved quickly, given other urgent problems. Nevertheless, it is important that SEE countries begin to supplement their sector-specific planning and project development with policies that can examine trade-offs between alternative uses, including environmental uses (e.g., minimum flows, wetlands and deltas). Agencies with responsibility for overall WRM will need to be strengthened and procedures developed. Investment programs should extend beyond rehabilitation and include emerging needs such as: affordable wastewater treatment and disposal; disaster preparedness and flood management, including both structural and non-structural measures; watershed management in poorer upland areas; conservation of ecosystems (especially wetlands); irrigation modernization; and river basin monitoring and information systems. None of this is likely to occur unless new funding mechanisms can be developed in the context of overstretched government budgets and limited consumer ability to pay. Solutions may include combinations of increased user charges (including possible tourist taxes in some areas), local borrowing, government subsidies and external support with a high concessional element. Flood insurance may provide a way to pay for improved flood protection.

- ❖ **Transboundary Level in the Danube Basin – Short Term.** Recognizing that, for the Danube Basin, much of the preparatory work of building agreements and institutions, collecting and analyzing information and preparing programs and projects has already been done, the time is now ripe to begin to implement action plans with investments. Planning at the sub-basin level, as is now starting for the Sava and Tisza, can be deepened and extended to other tributaries. Major programs to address transboundary issues like water quality management are focusing on pilot operations, such as the projects under the Black Sea/Danube Basin Stra-

6 This will be more easily achieved in urban water systems, especially when metering is introduced.

tegic Partnership, but these need to be expanded to have a real impact on water quality. Planning in new areas, like flood management and accidental spills, should be undertaken.

- ❖ **Transboundary Level in Other Basins – Short Term.** Outside the Danube Basin, shared river basins are smaller and there are quantity and allocation issues especially in the semi-arid southern and poorer part of SEE. This presents many challenges. The Danube solution of an international convention and commission is probably inappropriate; an approach similar to the Memorandum of Understanding for Lake Ohrid may have wider applicability. Plans and projects can be developed consistent with expected financial resources. This process is likely to require considerable support and concessional financing.
- ❖ **Transboundary Level – Medium Term.** For all basins, the next step should be full-scale implementation of agreed action plans and projects. However, that is likely to quickly run into the constraint of externalities, that the more immediate benefits are received by countries other than those making the investment. The GEF is providing critical support in eliminating this bottleneck for the present generation of pilot projects but new financing mechanisms will be needed to begin full-scale programs, given their investment requirements. Sources might include basin funds, supported by burden sharing and funding mechanisms, or highly concessional external funding.
- ❖ **Partnerships.** Partnerships will be essential if progress is to be made, both at the national and transboundary levels. Cooperation between the SEE countries will be fundamental for addressing transboundary problems and can greatly benefit national programs as well, through technical exchanges and information sharing.⁷ Cooperation between SEE countries and the international aid community is already well established, and cooperation between donors is improving. Grant donors, like the EU, have a fundamental role in supporting the development of policies, laws and institutions but can also address the problem of affordability by softening the terms of international financial institution (IFI) lending. IFIs need to look beyond simple rehabilitation projects to more innovative approaches on a broader range of WRM issues, especially in the more water-scarce areas of the region. Priorities vary by country and by basin, and improved management is limited by financial and institutional constraints. Chapter 4 provides indications of the suggested priorities by country and river basin.

⁷ The International Network of Water-Environment Centres for the Balkans (INWEB) is a promising example.

INTRODUCTION

This two-volume report seeks to examine key issues and strategic concerns regarding water resources management (WRM) at the national and transboundary levels in the South Eastern Europe (SEE) region, documents the approach adopted by the SEE countries to address their water challenges, identifies ways of strengthening both WRM regimes and international cooperation to optimize resources management, and makes recommendations for future action.

The report builds on the 2002 World Bank Water Resources Strategy¹ and the Europe and Central Asia Region Water Resources Management Strategy currently under preparation. Most of the analysis and assessment included in the report is based on the brief Country Water Notes and Country Water Fact Sheets presented in Volume II. WRM includes crosscutting issues, such as river basin management, flood and watershed management monitoring, institutional management, inter-sectoral water allocation and water quality management. This is distinguished from, though linked with, water service delivery, municipal water supply and wastewater systems, irrigation, hydropower and ecological services.

The SEE region in its broadest geographic definition can be considered to comprise the countries of the Balkan Peninsula, lying between the Black and Adriatic Seas and extending south to the Mediterranean and Aegean Seas. In political terms, the SEE region may be defined as the territory comprising Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, the Former Yugoslav Republic (FYR) Macedonia, Moldova, Romania, Serbia and Montenegro, Slovenia and European Turkey. However, for the purpose of this report, the region of focus includes Albania, Bosnia and Herzegovina, Bulgaria, Croatia, FYR Macedonia, Romania and Serbia and Montenegro.^{2,3} Since it is difficult to discuss water resources without including neighboring countries, Greece, Hungary, Moldova, Slovenia, and Turkey are included in the discussions when and where relevant.

Volume I comprises four chapters. Chapter 1 is a description of the water resource base at the regional level. It includes an assessment of past and present trends in water use by sector. Chapter 2 is an analysis of the key water issues in each of the focus countries, emphasizing problems of common concern. Chapter 3 presents the main water issues at the transboundary level and some emerging trends. Following the national and regional analysis of water resources, Chapter 4 presents key recommendations for improved water management at the national and transboundary levels.⁴

1 See Annex 1 for the conceptual framework on water resources management and for the linkages between improved water resources management and poverty reduction/economic growth.

2 As defined in footnote 2, in this report, the term Serbia and Montenegro should be understood to be synonymous with the pre-existing Federal Republic of Yugoslavia. When relevant, this report makes reference to the two member states of Serbia and Montenegro – Serbia and Montenegro – and to the province of Kosovo. For reasons of brevity and style, these are referred to as Serbia, Montenegro and Kosovo.

3 As defined in footnote 1, Moldova—which shares social, economic and cultural characteristics with the region, is also considered part of South Eastern Europe and participates in the Stability Pact for South Eastern Europe—is not within the study focus of this paper because it is hydrologically independent from the other countries (with the exception of Romania).

4 The report focuses on water resources management. It does not seek to provide in-depth information on the macro-economic context or political economy of each country. These issues are covered in other reports.

CHAPTER 1

Geography and Water Resources in the SEE Region: Socio-Economic Characteristics

The SEE region has a total land area of 61.4 million hectares and a total population of about 55 million inhabitants, of which 55 percent live in urban areas (Table 1). During the 1990s, the population in the region declined by 2 million inhabitants, and a declining trend is expected into the future. By 2020, the region will be somewhat more heavily urbanized, with more than three-fifths of its inhabitants living in urban areas.

Table 1. Socio-Economic Indicators of the SEE Countries in 2000 ^a

Indicator	Albania	Bosnia and Herzegovina ^b	Bulgaria	Croatia	FYR Macedonia	Romania	Serbia and Montenegro
Population (million)	3.1	4.0	8.0	4.7	2.0	22.4	10.6
Urban (%)	42	43	67	58	59	55	52
Rural (%)	58	57	33	42	41	45	48
Gross Domestic Product (GDP)							
Per capita GDP (in 1995 USD)	914	1,526	1,544	5,146	2,535	1,489	1,240
Share of Agriculture ^b (%)	55	14	17	10	12	13	25
Share of Industry ^b (%)	26	25	27	33	33	36	38
Poverty Level - 1996-99							
Poverty rate (USD4.3/day) (%)	59	n.a.	18	4	44	45	n.a.
Share of poor rural areas (%)	89	n.a.	43	59	59	67	n.a.

Sources: *World Development Indicators*, World Bank (2002); *Making Transition Work for Everyone*, World Bank (2000); and *Transition Report 2002*, European Bank for Reconstruction and Development (2002).

Notes: a. Most of the indicators represent the situation in 1999-2000, with the exception of the poverty indicators.
b. Figures for 1999 were used for Bosnia and Herzegovina, Bulgaria, Croatia and Serbia and Montenegro.

The seven countries have different levels of economic development. The agriculture sector's contribution to GDP is as high as 55 percent in Albania and as low as 10 percent in Croatia. The contribution of the industrial sector to GDP in turn ranges between 25 percent (in Bosnia and Herzegovina) and 38 percent (in Serbia and Montenegro). During the latter part of the 1990s, one-third of the population was living on less than USD4.30 per day. In general, poverty is concentrated in rural areas. About two-thirds of the poor live in rural area, with Albania and Romania having the largest numbers of rural poor, 89 percent and 67 percent, respectively.

Historically, water resources have played an important role in the economy of the SEE countries. On average, 16 percent of cropped area is irrigated, although this percentage is higher in Albania and FYR Macedonia, and was also in Romania and Bul-

garia before 1990. About 47 percent of total electricity production comes from hydropower, with a higher percentage in Albania, Bosnia and Herzegovina and Croatia. Some of the rivers in the region, in particular the Danube, play an important role in trade. About 50 million tons of freight were shipped along the Danube in 1996.

Topography and Climate

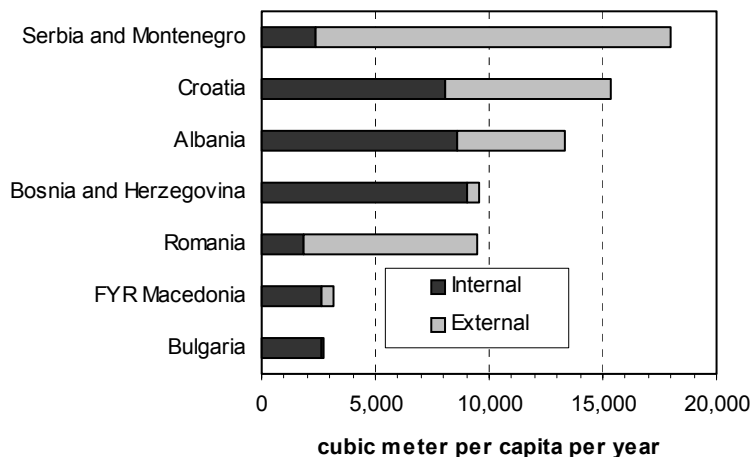
The topography of the region is comprised of mountains and hilly plateaus that separate the river basins from the plains. To the west the Dinaric Alps run parallel to the Adriatic coast. Toward the east, another mountain chain includes the Carpathian mountains in the northwest and the Balkan Mountains in the south. These mountains average 2,000 meters in elevation, but can reach up to 2,800 meters.

The climate in the SEE region varies substantially between the coastal areas and the inland portions of the Balkan Peninsula. The Adriatic coasts of Albania, Croatia, Bosnia and Herzegovina and Serbia and Montenegro have a typical Mediterranean climate, with warm, dry summers and mild, rainy winters. The Black Sea coasts of Bulgaria and Romania vary between temperate and Mediterranean climates. Further from the coast, the SEE countries have a moderately continental climate, with warm, rainy summers and cold winters. At high elevations, the weather is substantially colder, and the winters are quite severe with heavy snow. Yearly average precipitation is above 2,000 millimeters in the mountainous areas, reaching as much as 3,000-4,000 millimeters along the westerly slopes of Croatia and even 6,000 millimeters in Crkvice village in Montenegro. The central part of the Balkan Peninsula, including the Danube plains, is semi-arid, with only 300-400 millimeters yearly precipitation. With a few exceptions, most of the SEE countries have considerable seasonal and annual rainfall variability. There is evidence also that over the last forty years, the SEE region has experienced a trend of declining precipitation and rising temperatures.

Water Resource Base

The total annual renewable water resources in the region are estimated at 580 billion cubic meters (BCM). As shown in Figure 1, Table 2 and Map IBRD 32290, the water resources base in the SEE countries shows large variability in terms of quantity. Annual freshwater resources including internal resources, as well as contributions from

Figure 1. Water Resources Availability



other countries, range from 2,700 cubic meters per capita in Bulgaria to about 18,000 cubic meters per capita in Serbia and Montenegro. The annual average⁵ water availability on a per capita basis is approximately 10,600 cubic meters, which is about twice the average for the whole of Europe. As Figure 1 also shows, several countries receive water from transboundary rivers. On average, the regional dependency ratio is 66 percent. Romania, Croatia and Serbia and Montenegro receive about half or more of their water resources from other countries. Albania, Bulgaria, FYR Macedonia and Bosnia and Herzegovina are less dependent on waters flowing across their borders.

In terms of their relative annual per capita water availability, countries in SEE can be classified as follows: Bulgaria and FYR Macedonia as “low water availability” (2,000 – 5,000 cubic meters), Romania and Bosnia and Herzegovina as “medium water availability” (5,000-10,000 cubic meters), the rest as “above medium water availability” (10,000-20,000 cubic meters).

Table 2. Water Resources Availability in the SEE Countries

Country	Renewable Water Resources						
	Internal		External		Depend- ency Ratio	Total	
	BCM	m ³ /capita	BCM	m ³ /capita		BCM	M ³ /capita
Albania	26.9	8,583	14.8	4,722	35%	41.7	13,306
Bosnia and Herzegovina	36.0	9,052	2.0	503	5%	38.0	9,555
Bulgaria ^a	21.0	2,642	0.3	38	1%	21.3	2,680
Croatia	37.7	8,101	33.7	7,241	47%	71.4	15,342
FYR Macedonia	5.4	2,655	1.0	492	16%	6.4	3,147
Romania	42.3	1,885	169.6	7,556	80%	211.9	9,442
Serbia and Montenegro	25.1	2,379	164.5	15,589	87%	189.6	17,9608
SEE Region	194.4	3,551	385.9	7,049	66%	580.3	10,600

Source: AQUASTAT, Food and Agriculture Organization (2002).

a. This does not account for the freshwater resources of the Danube River.

Despite these differences, water resources of all SEE countries share common characteristics. First, most of the river basins are shared by several countries. About 90 percent of the territory is within international basins, including the Danube, Drin, Krka, Lake Prespa, Maritsa, Neretva, Nestos, Resvaya, Struma, Vardar, Veleka, and Vijose Basins. This is much higher than the world average, where international basins cover 50 percent of total land surface. In addition, out of the twelve basins, seven are shared with three countries or more. Map IBRD 32291 shows the transboundary basins in the SEE region. Second, the hydrological basins of these countries directly or indirectly drain towards seas with little or no tide, slow renewal processes and sensitive ecosystems: the Black, Adriatic, Mediterranean, Ionian and Aegean Seas. Third, most of the renewable water resources come from rivers that have significant hydrological variability (e.g., dry-year annual runoffs are less than one-fourth of the average-year flows).

In order to address seasonal variations of river flows and to generate hydropower, SEE countries have built dams with a total capacity of 38 BCM or 700 cubic meters per capita. As shown in Table 3, storage volume in individual countries on a per capita basis ranges between 329 cubic meters and 1,455 cubic meters. With the exception of Albania, individual countries' storage capacity per capita is below the world average

⁵ Weighted averages are used throughout the report, unless the text specifies otherwise.

(1,100 cubic meters). Total water storage capacity in dams represents 4-27 percent of overall annual renewable surface resources.

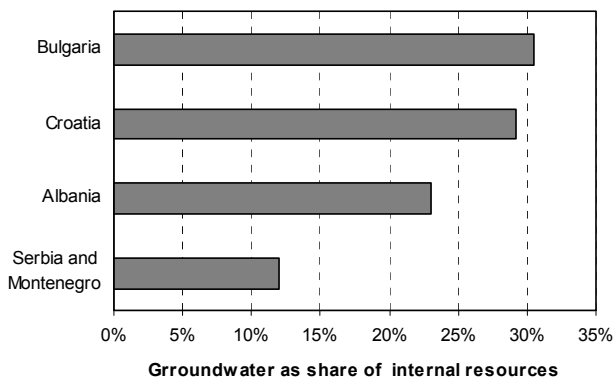
Table 3. Capacity of Dams in the SEE Countries

Country	BCM	m3/capita	As % of Surface Water Resources
Albania	4.56	1,455	12%
Bosnia and Herzegovina	3.85	968	10%
Bulgaria	5.00	629	25%
Croatia	1.53	329	3%
FYR Macedonia	1.70	836	27%
Romania	14.00	624	11%
Serbia and Montenegro	7.78	737	4%

Source: 2002 World Atlas and Industry Guide. The International Journal of Hydropower and Dams.

There is a large presence of karstic aquifers in the SEE region. In Albania, Bosnia and Herzegovina, Croatia, and Serbia and Montenegro, about half of the water that originates in the western Balkan Mountains ends up in underground rivers or “karst” groundwater⁶ formations and flows into the Adriatic Sea. In other countries, groundwater drains into rivers.

Figure 2. Groundwater Availability



For selected SEE countries, as shown in Figure 2, groundwater sources represent as much as 30 percent of total internal renewable resources. Trans-boundary aquifers, as shown in Map IBRD 32294, are considerable in the region. Groundwater monitoring and assessment has been neglected during the past decade and not much is

known at present about the availability of groundwater or potential extraction capacity, although aquifers are the main sources for drinking and industrial water. Groundwater sources are rarely used for agriculture, except in Albania. A particular aspect reported by most countries is that shallow aquifers are at high risk of pollution in the short as well as long term as a result of uncontrolled use of fertilizers and chemicals as well as untreated sewage and leaching from contaminated soils. In some cases, groundwater sources cannot be used without prior treatment. Microbiological contamination is affecting drinking wells in Albania, FYR Macedonia, Bulgaria and Serbia and Montenegro. In some locations of Bulgaria, Romania and Croatia, groundwater cannot be used as a source of drinking water because of high nitrate concentrations.

⁶ The soft limestone soils of the SEE region allows water to seep underground creating subterranean karst channels. They are highly vulnerable to upstream pollution since untreated discharges can filtrate quickly into the ground.

Lack of reliable data and the inadequacy of existing water quality monitoring systems in several SEE countries prevent a comprehensive assessment of river water quality. However, available information suggests that it is a concern. For example, Map IBRD 32296 shows the water quality status of the Danube River and its main tributaries. Although quality has improved considerably over the last decade due mainly to the decrease in industrial activity and the drastic reduction in the use of fertilizers and pesticides in agriculture, still large segments of major rivers are rated as polluted, which severely limits their use for human consumption as well as other uses. In the case of Romania, for example, 11 percent of the total length of watercourses that are monitored are rated as heavily polluted. In Bulgaria, water quality at 24 percent of the monitoring stations throughout the country failed to meet the required criteria. In Serbia and Montenegro, the quality of rivers is considered unsatisfactory, and most of the rivers are only suitable for irrigation and industry. In Albania, many rivers show signs of high pollution by organic matter—they experience a deficit in dissolved oxygen, with high chemical oxygen demand and biological oxygen demand values. In Bosnia and Herzegovina, only 3 percent of all the rivers are clean of pollution, while 30 percent suffer from some degree of eutrophication.⁷ In general, rivers are clean in their upper reaches, but they deteriorate rapidly in the middle and lower reaches, particularly downstream of major urban areas, due to untreated municipal and industrial wastewater discharges. However, there is quite a strong dilution/aeration factor in the more rapidly flowing rivers.

Lakes, Lagoons and Wetlands

The SEE region has a number of valuable lakes, coastal lagoons and wetlands. Important transboundary lakes include Ohrid, Prespa, Skadar and Doiran. Lake Ohrid with a surface area of 357 square kilometers is the largest tectonic lake in the region located in the Crni Drim catchment area on the border of Albania and FYR Macedonia. This lake is more than two million years old and has unique species. Lake Prespa, with a surface of 320 square kilometers, is the second largest tectonic lake, also located in the Crni Drim catchment on the borders of Albania, FYR Macedonia and Greece. It is situated to the east of Lake Ohrid. During the past fifteen years, a significant decline of the level of the lake has been observed, causing environmental and WRM concerns. Lake Skadar, the largest non-tectonic lake on the Balkan Peninsula (391 square kilometers, with a seasonal high of 532 square kilometers), on the borders of Albania and Serbia and Montenegro, is geographically and ecologically connected with other aquatic habitats, creating a large complex of wetlands. It was identified as one of the twenty-four transboundary wetland sites of international importance, known as “Ecological Bricks for Our House of Europe,” by the World Wide Fund for Nature (WWF), as were Ohrid and Prespa Lakes and the Danube Delta.

Lake Doiran, with a surface of 47 square kilometers, is the smallest tectonic lake in the region, located in the Vardar catchment on the borders of FYR Macedonia and Greece. As with Lake Prespa, the water level of this lake is receding quickly as a result of continued dry years and overuse of water for irrigation. After the drought of 2001, the level of the lake was at its lowest point ever: 3.5 meters below its optimal level. This is affecting the biodiversity of the lake.

⁷ When the water body is subject to nutrient enrichment (particularly nitrates and phosphates), this can promote the growth of algae that quickly become dominant in the water, leading to oxygen depletion.

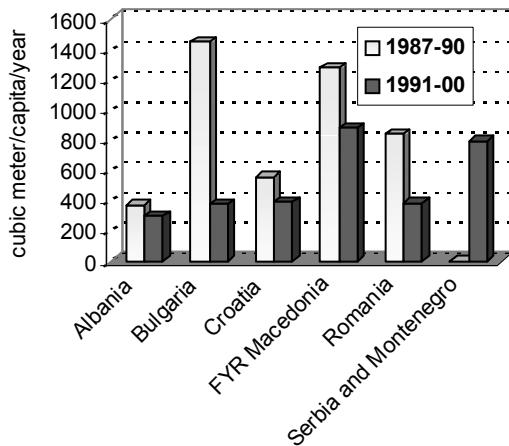
Other important natural lakes in the region are Croatia's Plitvice Lakes, included in the UNESCO World Cultural and Natural Heritage list and Lake Vransko, on the Croatian island of Cres, which is the largest natural freshwater lake in the North Adriatic region. Large lagoons along the Adriatic Sea include Karavasta, Narta and Butrint.

Wetlands in the region support a rich biodiversity, but are threatened by loss of habitats, changes in the hydrological regime, erosion and siltation, and water pollution. These productive ecosystems are mostly found along the floodplains of the Sava, Drava, Mura, Neretva and Danube rivers, in the Danube and Neretva Deltas and in coastal areas at the mouths of rivers where hydrophilic conditions prevail. Several of them are included in the Ramsar list of wetlands of international importance. Map IBRD 32292 shows all Ramsar sites as of the beginning of 2003. The Danube Delta, the largest wetland in Europe, which covers an area of about 0.65 million hectares, has been declared a protected area and a World Natural Heritage Site because of its high biodiversity value. In the past, large wetlands in the Danube and its tributaries were drained and reclaimed to provide land for agriculture. About 80,000 hectares of wetlands that existed in the Danube floodplains one hundred years ago have been lost in Romania. The same process has shrunk the coastal wetlands of Albania, albeit on a smaller scale.

Water Utilization

Although there is a marked difference between the countries in terms of water withdrawals and sectoral allocations, as shown in Figure 3, the following regional trends on water use can be noted. First, the region has experienced a considerable decrease

Figure 3. Water Withdrawal

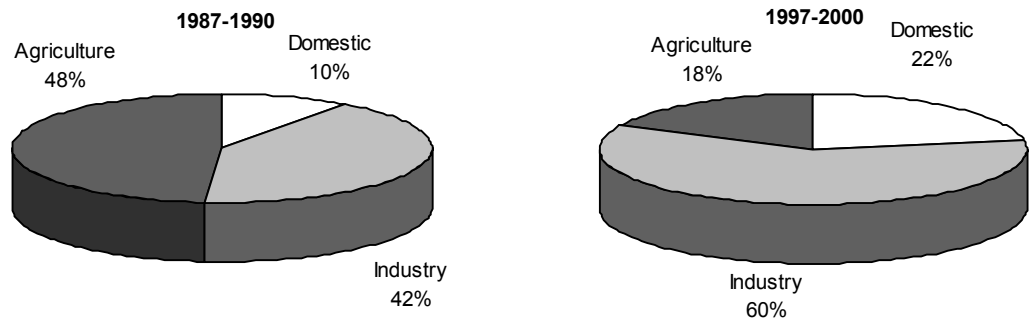


Note: Data for Serbia and Montenegro during the period 1987-90 is not available.

in water use as a result of the process of economic transformation. Countries in the region have decreased water withdrawals and/or consumptive use. On average, water use in the region has declined from 920 cubic meters per capita per year in the period 1987-1990 to 480 cubic meters in the period 1997-2000. Second, most of the decline has been observed in the agriculture sector, where water use for irrigation, fish pond supplies, and livestock experienced a threefold decline. Industrial water use (including cooling) experienced a decline of about 10 percent. Third, as shown in Figure 4, whereas in the past, agriculture was the largest water user, representing 48 percent of total use, today water use in the industry sector has the largest share at 60 percent. Fourth, water withdrawal by the domestic sector has

in water use as a result of the process of economic transformation. Countries in the region have decreased water withdrawals and/or consumptive use. On average, water use in the region has declined from 920 cubic meters per capita per year in the period 1987-1990 to 480 cubic meters in the period 1997-2000. Second, most of the decline has been observed in the agriculture sector, where water

Figure 4. Water Withdrawal during the Periods 1987-1990 and 1997-2000



either remained unchanged or has experienced a slight increase as a result of increase in access to piped water supply.⁸

Irrigated Agriculture

Irrigation is of vital importance to the agriculture sector of this region. Although most of the SEE countries have substantial annual rainfall, most does not occur during the summer crop cultivation period. On average, irrigation infrastructure has been developed for 16 percent of the cropped land that is irrigated in the SEE region, although the share is higher in Albania (49 percent), Bulgaria (18 percent) and Romania (27 percent). Irrigation minimizes the climatic risks that affect agriculture, ensures the stability in production necessary for commercial farming, and encourages farmers to convert to higher value crops such as vegetables. In some areas, however, off-season drainage is also necessary to prevent waterlogging.

During the socialist period, a high priority was given to the construction of irrigation and drainage schemes, often ignoring their economic and environmental implications. By the end of the 1980s, irrigation facilities had been developed for about 5 million hectares. Once the economies of these countries started to decline, many irrigation systems entered into a vicious cycle of inadequate budget allocation, deferred maintenance, system deterioration and unreliable water delivery. Land equipped for irrigation drastically decreased during the 1990s, down to 3.8 million hectares in 2000. The situation today is that only a fraction of the area once irrigated continues to be so. Available information suggests that at the end of the 1990s, the utilization ratio was very low, dropping to about 7 percent in Bulgaria, 17 percent in Romania and 35 percent in Albania. The deterioration of irrigation schemes and resulting sharp decline in irrigated area has led to the dramatic decrease in water use for this purpose.

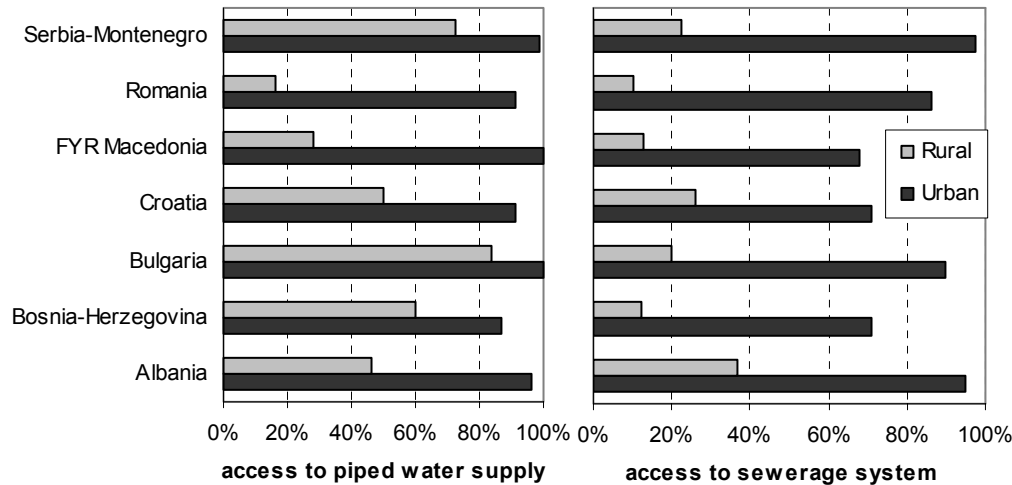
Given that irrigation plays an important role in rural development, rehabilitation of schemes which can economically be irrigated is a priority.⁹ This must be combined with institutional reforms to ensure improved management by users and sustainability.

⁸ This section deals mostly with intake water uses, which includes water for domestic, commercial, institutional and industrial purposes and power plants. However, there are water uses not accounted for here: in-stream uses, which include water for plants, fisheries, waste dilution and recreational purposes; on-site uses, which include water for wetlands, unirrigated crops and evapotranspiration from crops and vegetation. Water use for hydropower is not included here. Unlike other intake uses, hydropower is a non-consumptive use of water resources, since there is no loss as water runs through a hydropower plant. Nonetheless, there are some important environmental impacts of hydropower related to the changes in water flows and water levels downstream from the dams, creating conflicts with other users.

Water Supply and Sanitation

According to available statistics, access to piped water supply networks is available to about 75 percent of the total population in the region, with a marked difference between urban and rural populations. While the majority of urban residents (about 94 percent) is connected to centralized water supply, only 51 percent of the rural population have access to it. In both urban and rural areas there are wide variations in reli-

Figure 5. Access to Piped Water Supply and Sewerage Systems



ability of service delivery. As shown in Figure 5, there are significant country difference in terms of piped water supply coverage. The population not served by a piped supply gets its water from wells, natural springs, and open sources.

With the exception of Bulgaria and Romania, the countries in the region depend heavily on groundwater sources (e.g., springs, aquifers, karsts) to meet their drinking water needs. For example, in Serbia and Montenegro groundwater sources supply 90 percent of domestic and industrial needs and about 70 percent of drinking water needs. In the case of Albania, about 70 percent of the cities in Albania are supplied by groundwater wells. In FYR Macedonia, groundwater is reported also as the predominant source of drinking water. In Bosnia and Herzegovina, 89 percent of total piped water supply come from groundwater sources. A conservative estimate is that 28 million inhabitants or 50 percent of the population in the SEE region depends on groundwater sources. Given this dependence, the SEE countries need to pay particular attention to this water source, especially to its quality.

Sewer systems are available to about 54 percent of the population, mostly to residents of urban areas, where service coverage is 84 percent; in rural areas this figure is only 17 percent. Those without access rely on septic tanks and pit latrines for sanitation. Some of these facilities are improperly designed and situated. Although there is no comprehensive data on access to wastewater treatment, available information indicates low ratios of treated wastewater: zero in Albania, 6 percent in Serbia and Montenegro, 10 percent in Bosnia and Herzegovina and FYR Macedonia, 20 percent in Croatia, 37 percent in Bulgaria and 40 percent in Romania. The large volume of un-

9 Uneconomic irrigation schemes with high pumping height and low demand from farmers should be identified and closed.

treated wastewater is a major source of pollution for both surface and groundwater sources.

Industrial Sector

Although industrial withdrawal has declined during recent decades, the industrial sector is the main water user in the SEE region, accounting for about 60 percent of water use. It is expected that it will be the fastest growing water user in the near future as a result of the recovery of the industrial sector.

Hydropower

As presented in Figure 6, all the countries in the SEE region depend on hydropower to a greater or lesser extent to meet their power needs. On a regional basis, 47 percent of the installed electricity production comes from hydropower. Albania, Bosnia and Herzegovina and Croatia are highly dependent on hydropower, as it accounts for 97 percent, 61 percent and 54 percent, respectively. With

the lack of other fuel resources and limited foreign currency to import fuel, these countries are becoming more dependent on hydropower. Between 1990 and 1999, Albania increased hydropower production by almost 84 percent. In fact, though, because of changes in the hydrological cycle and overall reduction in river flow in the country, hydropower is no longer enough. A large thermal generating plant is being built to supplement electricity generation. Croatia, Romania and Serbia and Montenegro experienced a 50-60 percent increase in hydropower production during the 1990s.

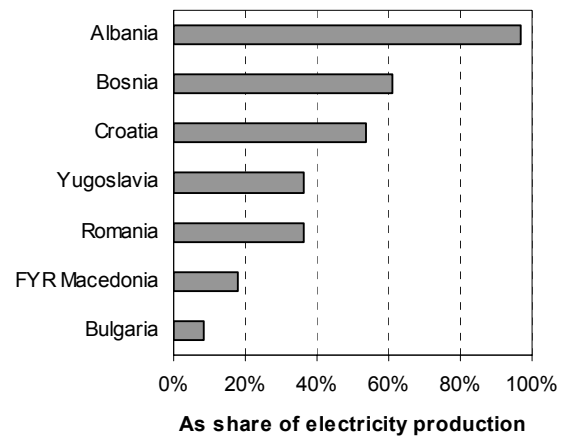
Navigation

Another important use of some of the rivers in the region is navigation. The major waterway in the region is the Danube. The construction of the Rhine-Main-Danube Channel enhanced the role of the Danube River in trade, by offering a link from the Black Sea to Rotterdam. About 50 million tons of freight were shipped along the Danube in 1996 (European Investment Bank, 1999). At present navigation in the Danube is restricted, but there are plans to remove the major bottlenecks to allow for an increase in cargo. The Sava River could also be navigable in Serbia and Montenegro, Croatia and Bosnia and Herzegovina, if sediments are removed.

Floods and Droughts

Floods represent one of the most destructive natural hazards in the SEE region due to their frequency, material damage and human casualties. Its river regime, combined with its geomorphology and climate, makes this region very prone to flood events.

Figure 6. Hydropower Dependency



Map IBRD 32295 shows the specific areas and rivers in the SEE region vulnerable to floods.

There has been a marked tendency toward increased flood levels and frequency over the last couple of decades. During the last 100 years in Romania, floods occurred about 50 percent of the time and during the past decade, floods were recorded almost every year. In the period 1991-2002, floods killed more than 200 people and resulted in material losses estimated in total at over USD1 billion. The damage caused by the floods of 1991 and 1995 represented 0.6 percent and 0.8 percent of GDP. Similarly, Serbia and Montenegro experienced regular and occasionally catastrophic flooding during recent years, the worst of which was the 1999 flood, which affected several basins in the center of the country. Damage was estimated at USD150 million or 0.7 percent of GDP.

Countries in the region have adopted measures for river basins and riverbeds to reduce flood risks. Some countries (Bulgaria and Romania) are also starting to develop early warning systems for floods and accidental pollution. At the regional level, similar efforts are underway along the main stem of the Danube River, coordinated by the International Commission for the Protection of the Danube River (ICPDR).

The SEE countries are also increasingly facing long periods of drought which have negative effects on their economies as well as on river water quality. A tendency toward increased frequency, duration and intensity of droughts has been noted during the past decades. Bulgaria, for example, has experienced several summer droughts since mid-1984. In the summer drought of 1993, crop losses were estimated at 2 percent of GDP. In 1996, annual production of maize and wheat amounted to 44 percent and 50 percent, respectively, of average production during the period 1961-1990. Similar losses were experienced during the 2000 drought. From 1982 to 2000, Romania observed eight years with hydrological droughts, which affected the river basins in the southern part of the country. The runoff of these basins was about 50 percent of the monthly annual average, while in the plains, runoff was only 30 percent of the average. Droughts caused severe damage to the agriculture and energy sectors as well as shortages in the supply of drinking water. Some areas experienced a reduction in agriculture production of 40-60 percent.

Safety of Major Hydraulic Infrastructure

There are many dams in the SEE region— small, medium and large—most of which were built in the last fifty years. Although a comprehensive assessment of infrastructure safety has not been undertaken, the information that is available suggests that a large number of dams are unsafe. Damaged, incomplete or improper construction has led to spills of contaminants as well as a high risk of collapse.

CHAPTER 2

Water Resources Management Issues

This Chapter provides an assessment of the key problems and issues faced by the SEE countries. It also identifies emerging trends and offers some recommendations on areas that should be addressed at the country level.

Policies, Laws and WRM Institutions

During the past decade, most of the countries in the region have made efforts to establish legal and institutional frameworks for WRM. Some of the countries are adapting their national laws and acts as well as their institutions to regulate many areas of WRM in accordance with the European Union Water Framework Directive and other European Union (EU) environmental directives. The countries that have already harmonized their legal framework with that of the EU are Romania and Bulgaria. In these two countries, the frameworks are based on internationally recognized principles of good water management: manage water at the river basin level, address water quality and quantity issues jointly, encourage participation of stakeholders in the decision-making process and apply the “user-pays” and “polluter-pays” principles. They have also embraced the concept of hydrographic basin management and are in the process of issuing regulations on how to organize WRM in terms of river basins.

Institutional arrangements for WRM vary among countries, and are unique to each. The arrangements for each individual country are briefly described below:

- ❖ In **Albania**, the Albanian National Water Committee was established to become the main policy-making body for WRM and development; it is comprised of representatives from various sectoral ministries and is attached to the Prime Minister’s Office. The Committee has so far had difficulty reconciling the different sectoral interests, which have continued to make decisions independently. Its technical secretariat has also been constrained by lack of staff and funds.
- ❖ In **Bosnia and Herzegovina**, the Ministries of Agriculture, Water Management and Forestry (MoAWMF) on the entity level have primary responsibility for the sector. For Federation of Bosnia and Herzegovina, the MoAWMF has delegated overall responsibility for formulation of strategic decisions and planning of water management to two Public Companies for Watershed Areas, one for the Sava River and another for the Adriatic Sea. Cooperation on water quality monitoring and flood protection between these two companies is fostered through a Water Commission. One obstacle to WRM is the absence of a state level body responsible for overall management and coordination of water between the entities. Plans are underway to create an inter-entity river basin agency to address this deficiency.
- ❖ In **Bulgaria**, the Council of Ministers and the Ministry of Environment and Water (MoEW) are the main policy-making and regulatory authorities responsible for developing policies and strategies regarding water resources. The MoEW is also responsible for coordinating and overseeing the functions of the recently created Basin Directorates. These are under the MoEW and are responsible for implementing the water resources strategy and policies with the support of River Basin Councils. The River Basin Councils are consultative committees and include rep-

representatives from the state administration, the municipal administration, the water users and environmental organizations in the basin. The Basin Directorates have limited financial and regulatory autonomy.

- ❖ In **Croatia**, an entity was established, the Croatian State Water Directorate, to have direct responsibility for integrated WRM and for incorporating WRM and development issues within the overall economic development framework. This Directorate supervises the work of the Croatian Water Company, which in turn is responsible for operational functions. It was expected that a parliamentary committee and National Water Council would be established following the 1995 Water Act to discuss policies, strategies and implementation of laws regarding water management. However, these bodies are not active yet.
- ❖ In **FYR Macedonia**, the 1998 Water Law formally charged the Ministry of Agriculture, Forestry and Water Economy, through its Water Administration, with overall management responsibility for water resources. In theory, responsibility for the technical aspects of WRM was to be transferred to the Public Water Management Enterprise and its local branches, whose main responsibilities were irrigation and drainage. This transformation has not yet occurred because the segment of the Water Law that regulates institutions in the sector has not been implemented. Attempts are being made now to transform the water enterprise into autonomous water authorities.
- ❖ In **Romania**, the Ministry of Water and Environmental Protection is the main policy-making and regulatory authority for WRM, responsible for overseeing the National Water Authority and its River Basin branches, which in turn are responsible for implementing the water strategies, policies and regulations.
- ❖ In **Serbia and Montenegro**, arrangements have been established at the republic level for handling all water management issues. The entities responsible for WRM at the republic level are the State Water Management Company in Serbia and the Ministry for Agriculture, Forestry and Water Management in Montenegro. However, there is lack of clarity between functions and responsibilities at the federal and republic levels concerning water protection, cross-border cooperation, flood management and industrial accidents.

The degree of effectiveness of the institutional arrangements varies across countries. Some areas of concern that need to be tackled in the immediate future include: (i) revision of legal frameworks to ensure proper delegation of functions and responsibilities among different institutions and ministries (e.g., FYR Macedonia) and among institutions at the federal and republic levels (e.g., Bosnia and Herzegovina and Serbia and Montenegro); (ii) development of a legal basis for a river basin management approach (e.g., FYR Macedonia); (iii) re-assessment of institutional frameworks that are not working (e.g. Albania, Croatia), and alignment with new realities and policies; (iv) implementation of plans for restructuring of existing water institutions (e.g., FYR Macedonia); (v) adequate resource allocations for water institutions (all); (vi) proper mechanisms for coordination (all countries); (vii) improved, harmonized water quantity and quality monitoring systems (all countries); and (viii) updated water extraction cadastre (all countries); (ix) development of information systems to allow timely public access to water data (all countries); and (x) strengthened public awareness programs related to water issues (all countries).

The EU Water Framework Directive calls for establishment of appropriate administrative arrangements, in particular, the identification and setting of competent authorities within individual river basin districts; adoption of cross-sectoral and cross-border cooperation; and active participation of all stakeholders, including nongovernmental organizations (NGOs) and local communities in water management activities. This will require additional staff as well as considerable efforts to improve the capacity and technical competence of WRM authorities (including water monitoring agencies) at the national and basin levels. Adequate implementation of integrated WRM will require improved cooperation between relevant agencies and levels of government, formulation of coherent policies and objectives for water resources, and improved mechanisms for raising public awareness and involving the public in the decision-making process, particularly in the allocation of revenues generated from the collection of water extraction fees/taxes.

Regulations

The SEE countries have relied predominantly on regulations for managing their water resources. One pre-requisite still missing in the region in order to take full advantage of these instruments is the presence of strong enforcement capacity. A brief update of the most common instruments used in the region is presented next.

Water Use Permits and Discharge Permit Systems

During the 1990s, most of the SEE countries adopted a water use permit system as a means to regulate water withdrawals. Although the system varies between countries, in general, it applies to both surface and groundwater sources. In addition, a discharge permit system has been put in place in order to protect water resources from pollution. Discharge permits are issued for discharging wastewater into sewer systems or into water bodies. In some countries, discharge of untreated effluents into water bodies is allowed as long as it does not increase the pollution level above established standards; otherwise treatment must be carried out prior to discharge. When limits set in the permits are exceeded, penalties and fines for non-compliance are imposed. Enforcement capacity is rather weak in the region because of limited staff, budgets and equipment but, more fundamentally, because of the fragile financial situation of many of the major water users and polluters and limited political support for the regulatory agencies. Monitoring is facilitated by the combination of the license systems with abstraction/pollution charge systems.

Water Quality and Effluent Standards

Most countries are in the process of updating their current systems of environmental standards, in particular for water quality and effluents, in order to make them compatible with EU standards. The challenge for the SEE countries is to account for national circumstances when complying with EU directives, to set up a limited number of realistic standards that can be adequately monitored and enforced and to make sure that the benefits of new (or updated) water-related regulations exceed the cost of compliance.

Minimum Flows

For rivers without control structures, the minimum flow is a function of the prevailing meteorological and hydrological conditions. However, when the river has been

subjected to some modification, then there are regulations or guidelines to ensure a minimum flow is provided to meet downstream water requirements. Most countries have regulations for ensuring minimum downstream flow in rivers in order to maintain multiple ecological and environmental functions such as aesthetics, fish production and natural conditions of aquatic ecosystems, in addition to meeting the water requirements of downstream users. However, definitions of minimum flows and methodologies used for their determination vary considerably between countries. Establishment of a common basis for determination of minimum flow values would facilitate dialogue and understanding between parties trying to reach agreement on transboundary rivers.

Protection Zones

The legal framework in most of the SEE countries regulates the protection of aquifers and wells, by setting up sanitary protection zones around the source of water used for public supply. The situation today is that often the sanitary protection zones around groundwater sources are neglected, resulting in degradation of this strategic water reserve, frequently the sole source of water for poor segments of the population. Legal frameworks for the protection of groundwater should also give consideration to conjunctive use of surface and groundwater sources.

Economic Instruments and Demand Management

Most of the countries have introduced the “user-pays” and “polluter-pays” principles to provide economic incentives for better WRM and improve efficiency of water use as well as to increase revenues for WRM activities. A brief overview of the most common economic incentives established in the SEE countries is provided next.

Water Abstraction Charges

Albania, Croatia, Bulgaria, Romania, and Serbia and Montenegro have introduced water abstraction charges or water resource fees (or tax) for water use. The charge or fee often varies according to the water user, the type of water use and the source of supply. In some cases, location also influences the charge. A marked difference in the level of charges is observed between countries. Figure 7 shows the charges being applied in Romania, Croatia and Serbia and Montenegro.

Figure 7. Water Abstraction Charges in Serbia and Montenegro, Croatia and Romania
(In US cents per cubic meter, unless otherwise indicated)

Serbia and Montenegro (1997)		Romania (2000)	
Water abstraction charges		Extraction charges - inland rivers	
Unprocessed water	0.5	Households, industry and livestock	0.61
Drinking water for companies	0.8	Irrigation	0.05
Mineral water manufactures	0.7	Power plants	0.004
Fishing ponds	4% wholesale price	Extraction charges - Danube river	
Hydropower	2.3% KWh price	All except irrigation	0.07
		Irrigation	0.05
Croatia (1997)		Extraction charges - groundwater	
Water user abstraction charges		Households	0.30
Households	10-15	Industry	0.67
Industrial user	13-20	Irrigation	0.05

Effluent Charges

Similarly, payments for the pollution of water resources have been recently introduced in Romania, Bulgaria, Croatia and Serbia and Montenegro. Often, the level of charge depends on the type and amount of toxic pollutant present in the wastewater that is being discharge into the sewers or into a water body. In some cases the revenues collected are used for investments in WRM, including wastewater treatment (e.g., about 93 percent in Croatia).

Water Prices

The prices of water-related services such as water supply, sewage and wastewater, and irrigation have increased considerably during the past decade in order to remove subsidies. A wide diversity of water prices is observed between countries, as shown in Table 4.

Table 4. Water Prices in Selected SEE Countries: Hungary, Greece and Spain (In US cents per cubic meter)

Country	Domestic	Industry	Irrigation
Albania (2001)	11-20	52-63	...
Croatia (2000)	28-82	58-140	0
FYR Macedonia (2000)	14-53	28-100	...
Bulgaria (1999-2000)	17-78	...	1-8.5
Romania (2000) ^a	18-48
Hungary (1998)	64
Greece (1998) ^b	114	...	2.1-8.2
Spain (1998) ^b	107	106-109	2.7-7.0

Sources: UNECE, *Environmental Performance Reports, Various Countries; Improving Water Management, Recent OECD Experience* (2003).

Notes: a. Combined water and sewage price.
b. Average value is shown for domestic water price.

A few remarks can be made with regard to current water pricing in the region. First, water prices are lower than those found in other European countries and cover only a portion of the operation costs for providing the services. Second, industrial users pay more to compensate for the low price paid by households. Third, irrigation water prices have often been set up without any consideration for the cost incurred. For example, in Romania the same charge applies whether the water is lifted 10 meters or 120 meters, which does not encourage efficient use (a proposed World Bank-funded irrigation project in Romania intends to address this issue.) Fourth, in some cases management and operation inefficiencies translate into high water prices, which consumers and farmers are reluctant to pay (irrigation in FYR Macedonia is an example). Five, sewage and wastewater charges are being set low on the basis that these services generate significant externalities through public health and environmental improvement benefits.¹⁰

Higher prices and introduction of metering partially explain the decrease in water use by domestic and industrial users. Although the order of magnitude of these impacts is not well studied yet in the region, experience elsewhere shows that higher water prices

¹⁰ The capital costs of wastewater treatment are subsidized in many OECD countries, and some major cities even in EU countries still do not have wastewater treatment systems.

and introduction of metering can cause a drastic decline in water consumption in urban areas, reaching in some cases up to 40 percent. For example, between 1990 and 2001, domestic water consumption in the Czech Republic decreased from 174 to 104 liters per capita per day, while the water price increased from 6 to 42 US cents per cubic meter.

Household affordability is a common concern throughout the region in view of future price increases of water-related services as countries upgrade their infrastructure to comply with EU environmental directives. A key challenge is to design water pricing systems and structures that balance economic efficiency, cost recovery, financial sustainability and water conservation objectives and establish transfer mechanisms to protect vulnerable groups. Even so, there are real affordability constraints; investments in the water sector needed to comply with the water-related environmental directives would absorb a substantial share of GDP. Analysis in Bulgaria has illustrated that annual investments will represent 1.0-2.4 percent of forecasted 2015 GDP, which is several times more than the current level of expenditures.

Erosion and Protection of Water Resources

Several of the SEE countries are prone to soil erosion. Although, this is a natural phenomenon in mountainous countries with heavy rainfall, in many instances it has been exacerbated by human activities (e.g. deforestation) and has resulted in large amounts of sediment ending up in reservoirs, rivers and seas. Soil erosion and flash run-off in the upland areas is causing serious problems for Albania's farmers. Irrigation and drainage schemes including reservoirs are continuously blocked and/or damaged by sediment. The situation in FYR Macedonia is even more serious, since large amounts of sediments are ending up in reservoirs and lakes. FYR Macedonia is losing 3 million cubic meters of reservoir storage capacity every year as a result of soil erosion. Serbia and Montenegro faces challenges in this area also. Future projects for rehabilitation and/or restructuring of the irrigation sector should follow a more sustainable watershed management approach and include erosion control measures and reforestation of catchment areas. Local communities should be closely involved in watershed management planning and implementation. Watershed rehabilitation in Turkey provides a good model.

Flood and Drought Management

Another key challenge in the region is to reduce direct and indirect damage caused by floods and droughts by improving strategic planning, and undertaking preventive or mitigation activities.

With regard to floods, countries need to undertake investments to improve the safety of existing flood protection infrastructure and expand it as necessary in order to reduce vulnerability to flood hazards. Consideration should be given to cost-effective and sustainable flood protection measures (e.g., improving dikes, retrofitting dams for safety with larger spillways and gates, enlarging floodways and revising current operating rules of dams). Flood management should be seen within the overall framework of river basin/catchment water management plans. Investments are also needed to strengthen flood monitoring, forecasting and warning systems in order to support more effective flood management operations at the local and regional levels during flood events. Since floods do not respect national boundaries, countries must also improve international cooperation with upstream countries. Ongoing World Bank-

supported projects in Poland and Turkey and an operation under preparation in Romania provide good models.

With regard to droughts, their impacts can be reduced by improving current understanding of precipitation and dryness trends, improving land use consistent with precipitation patterns, improving water management and developing contingency plans for drought situations. Since droughts also do not respect national boundaries and can affect several countries simultaneously, they should be analyzed and studied within a regional context.

Nutrient Pollution

Nutrient loads from municipal and agricultural effluent have caused deterioration in water quality, and led to health problems, loss of tourism, deterioration of coastal and river wetlands and declines in fisheries. The main issue has been that investments in conventional wastewater treatment and nutrient-friendly agriculture, while they benefit the basin as a whole, are frequently not affordable on an individual city or farm level without concessional funding. Cost recovery policies linked to affordability have to be carefully assessed. A key challenge in this region is balancing the costs and benefits of meeting EU environmental directives. The Black Sea/Danube Basin Strategic Partnership supported by the Global Environment Facility (GEF) provides grant funding to leverage investments in nutrient reduction.

Aquatic Ecosystem Conservation and Restoration

Wetlands and coastal lagoons, which support diverse and substantial biodiversity, are constantly threatened by changes in the hydrological regime, erosion and siltation. A key challenge is the protection or restoration of aquatic ecosystems, especially wetlands and karst aquifer environments, and the integration of wetland management within the broad framework of WRM. Such integration is demonstrated in the World Bank-financed Croatia Eastern Slavonia Reconstruction Project (Box 1).

Accidental Pollution

There are several toxic waste storage facilities located on tributaries to the Danube, many of which pose a severe threat to the surrounding human population and the environment. Mining accidents

Box 1. Croatia Eastern Slavonia Reconstruction Project

The Eastern Slavonia Reconstruction Project in Croatia illustrates how a war damage restoration project can be used to further some modest WRM objectives; it also demonstrates the value of a multi-purpose area development approach as opposed to a sectoral one. The project area is in the easternmost part of Croatia around the confluence of the Sava and Drava Rivers, which sustained heavy damage during the hostilities of the early 1990s. The project objective was to repair and rebuild war-damaged infrastructure critically needed to restart the local economy. Three activities were originally selected as having highest priority: rebuilding of the wastewater treatment plant for Vinkovci on the Sava; rehabilitation of drainage channels, pumping stations and flood protection dikes for an important agricultural area between the two rivers; and demining. During the World Bank's internal review process the issue was raised that the rehabilitation of drainage channels could encroach further on the limited remaining wetlands of the region, in particular the Ramsar site, Kopacki Rit, a Nature Park in Croatia. To address this concern, a GEF-financed grant was added to the project with the goal of increasing the biodiversity capacity of the Nature Park. The project, which began in 1998, is proceeding satisfactorily and has enhanced cooperation between the Ministries of Agriculture and of Environment on the challenges of wetland management.

and mine-induced water pollution are issues of serious concern in the SEE region. As proven by two accidents in the northwestern part of Romania in 2000, the failure of mine tailings storage facilities can have devastating consequences. Risk assessment and prevention of pollution accidents, including those of tailings dams, have to be improved. Forecasting and emergency preparedness programs for dealing with accidental pollution (e.g., oil and chemical spills and mine tailings dams) should be developed. A proposed World Bank-financed Romania Hazards Risk Mitigation and Emergency Preparedness Project (Box 2) will develop such a program.

Box 2. Romania – Proposed Hazards Risk Mitigation and Emergency Preparedness Project

Romania is severely exposed to a range of natural disasters, especially earthquakes, floods and landslides, which have caused large economic and human losses across the country. A proposed Hazards Risk Mitigation and Emergency Preparedness Project (HRMEPP) aims to implement risk reduction measures and improve institutional and technical capacity for disaster management and emergency response. Project interventions will include flood forecasting, and flood and landslide prevention and mitigation measures. Among the project components is one specifically aimed at protecting the Black Sea and the Danube River. In the year 2000, two tailings dams (Baia Mare on January 30, Baia Borsa on March 30), weakened by erosion and flooding, released mining waste into tributaries of the Danube, raising international concern over long-term damage to surface waters. To protect the Danube River and Black Sea Basins, the proposed HRMEPP includes a GEF-financed component designed to improve the management of mine tailings facilities and reduce the risk of further release. It should be noted that this is the first example of a “preventive” project in the Europe and Central Asia Region, Poland and Turkey being “post-disaster” interventions.

Improving the Safety and Efficiency of Hydraulic Infrastructure

The hydraulic infrastructure in the region was built several decades ago, and now is badly deteriorated. Improving the safety and efficiency of this infrastructure will be a challenge. Rehabilitation requirements to improve dam safety are large and require urgent attention and systematic dam safety programs should be undertaken. Attention should also be given to revising/updating regulatory frameworks and legislation dealing with dam safety issues. Works to upgrade dam safety should be combined with complementary investments in terms of irrigation or hydropower in order to make full and effective use of the infrastructure.

Rehabilitation and performance enhancement interventions to improve the operation and maintenance of existing dams should be given priority over construction of new dams. Provision of additional reservoir storage should be considered where the intervention is strongly justified on economic grounds and with comprehensive environmental and social impact assessment and mitigation.

With regard to water supply and sanitation, the reliability and quality of services in this sector have deteriorated alarmingly in the last decade. Intermittent service and inadequate functioning of water treatment plants have made drinking water unsafe in many urban centers of the region. The efficiency of water utility operations is very low, with excessive network leakage (50 percent and more is not uncommon), wastage by users, high energy consumption and poor treatment. The situation is similar in the irrigation sector. Provision of adequate funding for rehabilitation of water infrastructure, including loss reduction and efficiency improvements, is recommended; there are afford-

bility constraints, however, on the part of “consumers” and budgetary constraints on the part of municipalities and governments.

World Bank Assistance in WRM in South Eastern Europe

World Bank assistance to WRM in SEE has been quite limited in scope to date, with the spotlight on improved delivery of water services, rather than on broader basin or resources management. There have been urban water/wastewater projects in most countries which have focused on development of financially sustainable service delivery.¹¹ Assistance to rural water and sanitation has been limited so far to Romania. Irrigation projects have been concerned with decentralizing responsibility for irrigation maintenance to local user associations and emergency rehabilitation, and are only now beginning to address broader system management. An irrigation operation is now under preparation in Romania which focuses on institutional reform with limited rehabilitation, but there has been no support to irrigation rehabilitation yet in Bulgaria.

A GEF-supported operation in the Danube Delta in Romania successfully piloted wetland restoration and ecosystems conservation activities. The GEF-funded Black Sea/Danube Strategic Partnership leverages investments in improved wastewater treatment, agricultural pollution reduction and wetland restoration with grant funding to lower the costs of these investments to the Danube and Black Sea riparian countries. Additional concessional financing would enable substantial expansion of this program. To date two operations have been approved, one in wetland restoration (for Bulgaria) and one in agricultural pollution reduction (for Romania) and several others are under preparation. (Box 3). More broadly FYR Macedonia, Serbia and Montenegro and Bosnia and Herzegovina are only beginning to make use of the GEF financ-

Box 3. Nutrient Reduction Projects under the GEF-Funded Black Sea/Danube Basin Strategic Partnership

Wetlands Restoration and Pollution Reduction Project, Bulgaria. The Government of Bulgaria is committed to the restoration of wetlands, and recognizes the multiple benefits they offer in terms of decreasing transboundary pollution, preserving globally significant biodiversity and restoring spawning grounds for fish. Approved in 2002, with a cost of USD13.3 million and a GEF grant of USD7.5 million, the project is assisting the Government of Bulgaria to restore critical priority wetlands in the Danube River Basin and make use of the wetlands in riparian zones as nutrient traps; and to promote protected areas management and sustainable use of natural resources, through management planning, monitoring of water quality and ecosystem health, public awareness and participation programs and environmental education. During the initial phase of the project, about 2,340 hectares of former marshes will be restored in Belene Island within Persina Nature Park, together with the Kalimok/Brushlen marshes within the Kalimok/Brushlen Protected Site. The project will play a critical demonstration role within the region by promoting nutrient reduction investments in other parts of Bulgaria and neighboring countries.

Agricultural Pollution Control Project, Romania. The project, approved in 2001, with a cost of USD10.8 million and a GEF grant of USD5.1 million, supports use of environmentally friendly agriculture practices in Calarasi county of southern Romania, with the aim of reducing nutrient discharges to the Danube River and Black Sea. Interventions include improved manure management, improved crop and nutrient management, conservation and restoration of two polders, and soil and water quality monitoring. The county has a population of 330,000 and arable land of 410,000 hectares. The polders, former floodplain wetlands, comprise 26,000 hectares and include areas of high ecological value. The project is a pilot for others in the Black Sea Basin.

11 An exception is the Eastern Slavonia Reconstruction Project in Croatia.

ing instrument. There are also efforts ongoing to link these operations to the Special Accession Program for Agriculture and Rural Development (SAPARD) program which provides grant funding for a number of activities in EU accession countries.

There has been some limited support for fisheries management. A project in Albania supports fisheries associations and improved resources management, and the GEF-funded Danube Delta project also supported fisheries organizations, resource monitoring and recovery of spawning grounds. Landscape values are important for recovery and development of the tourism industry in the Balkans, but World Bank financing for ecosystem conservation and coastal zone management has been limited.

In some of the newer Country Assistance Strategies (CASs) there is a broader WRM focus. The Romania program includes a project for flood mitigation and safety of mine tailings dams. There is considerable scope for developing programs in participatory watershed rehabilitation and ecosystem management in the Balkans, especially in FYR Macedonia and Serbia and Montenegro but also in Bulgaria. Support for wastewater treatment is still limited by difficulties with financial sustainability, except where there are clear “external” economic benefits which can be “internalized” as with wastewater treatment to maintain water quality in the Adriatic. Analytical work in WRM has also been limited, because WRM in many SEE countries, as elsewhere, is a multi-sectoral challenge and tends not to be addressed through conventional economic and sector work.

The World Bank has often found that support for institutional strengthening, restructuring and policy reform works best in the context of an operation that also improves delivery of water services or basin management. “Capacity building” without investment does not often accomplish much. The Lake Ohrid project with Albania and FYR Macedonia has combined support for improved water monitoring and cooperation in management of this shared resource with small grants in improved watershed management. It has also helped to catalyze investments (by KfW) in improved water/wastewater and solid waste management for the lake’s two main towns. A second major lesson has been that projects with a high degree of local participation have greater chances of success.

CHAPTER 3

Water Resources Management Issues at the Transboundary Level

Many of the issues just discussed at the national level are also of concern at the transboundary level, given the prevalence of shared water resources as described in Chapter 2. Shared resources vary vastly in size, from the Danube Basin at 790,000 square kilometers (including parts of seventeen countries), to much more limited areas, such as the Neretva Delta of 200 square kilometers, shared between Bosnia and Herzegovina and Croatia or the Veleka Basin, with a watershed of 700 square kilometers, between Bulgaria and Turkey.

Solutions to transboundary WRM issues will therefore need to take account of the nature and severity of the problem, the size of the shared resource and the number of countries involved. Also to be considered are the political relations between those countries, as well as the availability of information, technical expertise and financial resources.

Shared groundwater resources add another level of complexity. While many underlie the floodplains of major rivers, others do not correspond to surface watersheds, especially in the karst regions of Slovenia, Croatia and Serbia and Montenegro. In karsts, groundwater flow is rapid and highly vulnerable to pollution; karsts also host rare and endemic species of fauna.

There are unique problems related to water quantity and quality on islands, including in SEE (Box 4).

The following sections summarize some major transboundary WRM issues in SEE, as identified in the Country Water Notes (Volume II).

Water Quantity and Quality Management

Water shortages (reduction of water availability due to use by an upstream riparian) are a transboundary concern in the southern part of SEE, where the climate is semi-arid, with periodic droughts, and intensive agriculture depends on irrigation. Most water use in upper riparian states is non-consumptive (e.g., navigation, power generation, cooling water, and the greater part of urban and industrial use), while consumptive use for irrigation is greater in FYR Macedonia, Albania and Bulgaria. In this context, the 1996 water sharing agreement between Bulgaria and Greece on the Nestos River is noteworthy. Negotiations are continuing on the Struma and Maritsa Rivers. A major concern is the problem of declining water levels in Lakes Doiran and Prespa, shared by Albania, Greece and FYR Macedonia, due to excessive irrigation withdrawals. Joint action by all riparians is needed, a process that is now beginning.

All rivers of the SEE region are subject to flooding (Volume II lists some of the most severe events) and it is likely that annual flood damage will increase, given greater urbanization in floodplains and limited investment in flood mitigation. While flood emergency preparedness is primarily a national problem, it has a transboundary dimension. Real time or near real time sharing of information on rainfall and river stages is essential in limiting damage and loss of life—something which did not hap-

Box 4. Water Problems on Islands

The three island groups of the Adriatic and Eastern Mediterranean—Dalmatian (Croatian), Greek, and Cyprus—have many characteristics in common but some unique experiences in tackling water management problems that could be shared for mutual benefit. Water scarcity is highest in Cyprus and moderate for the Greek islands, while the Croatian islands are relatively water rich. Utilization shows a similar pattern, with a high 30 percent of total resources used in Cyprus and a moderate 10 percent in the Greek islands, with no estimate available for Dalmatia. The islands share a largely limestone geology with some karstic areas, which are especially sensitive to pollution. Among the unique geographic features are the Vranska Lake on Cres in Croatia, with its bottom below sea level, and the Akrotiri lagoon in Cyprus, an important migration stop for flamingos.

Particularly on the smaller islands, rivers are ephemeral, short and steep and opportunities for reservoirs are scarce and expensive. Much of the surface runoff, therefore, runs into the sea. Considerable use is made of groundwater but this is unsustainable in some cases, because of over-exploitation and the threat of saltwater intrusion. The Greek islands have fully utilized their groundwater resources and are expanding the use of surface water. Cyprus has gone further, with all resources fully developed, and conveyor canals linking the main reservoirs, municipal and irrigation users. Desalination plants supply 15 percent of Cyprus' drinking water needs and also those of a few of the Greek islands. Transport of water from the mainland is used on other Greek and Dalmatian islands.

Municipal sewage is fully treated in Cyprus and generally so on the Greek islands but little treatment exists in Croatia. Reuse of treated wastewater for irrigation is now widely practiced in Cyprus, but is non-existent in either of the other two island groups. Cyprus was a pioneer in its integrated approach to WRM, dating from a 1970 Master Plan, and is also a leader in demand management both for irrigation and domestic use.

Tourism is important in all three island groups and is the main engine of future economic growth, while traditional low-yield agriculture is declining. Tourists are naturally very concerned about the cleanliness of their drinking and bathing water. The southern Dalmatian islands, in particular, which have been less impacted by tourism, could learn much from the experience of the other groups.

Future development in all three groups will need to pay close attention to integrated WRM, taking into consideration all conventional and non-conventional sources, demand management, reuse of treated wastewater, reallocation of resources (typically from irrigation to municipal use), greater efforts to protect water quality (which inevitably declines as resources are fully exploited), and preparation of emergency plans for droughts. Community participation in decision-making will become increasingly important, as evidenced by a World Bank loan for wastewater treatment in Limassol, Cyprus, which had to be cancelled due to public opposition to the plant site. When the project was revived, public participation in the environmental assessment allowed an acceptable site to be found, with the added bonus of effluent reuse.

pen along the Sava during the hostilities of the 1990s. In the longer term, basin-wide planning could pay big dividends in developing least-cost solutions to flood mitigation, involving structural solutions (e.g., reservoirs, dikes) and non-structural measures (e.g., floodplain zoning, flood proofing, emergency preparedness).¹²

With a few exceptions, dams in SEE have been built primarily to regulate rivers for navigation and/or for power production.¹³ Most plans for constructing additional dams for these purposes, as well as flood control and irrigation, have been put on hold over the last decade, because of the problems of transition and, in some cases, armed conflict. When such plans are revived, they will be reviewed with much greater scrutiny than in the past, given the growing concern about environmental and social

¹² World Bank projects in Poland and Turkey could provide models, at the national level, of what could be achieved in a transboundary context.

¹³ Greece is the major exception; it has several large dams built primarily for irrigation.

impacts that exists today and also because, with the emergence of many new independent states, the transboundary impacts of new dams may be much greater than when they were first conceived.

Navigation along the major rivers of SEE (Danube, Sava) has been important for centuries and provides perhaps the earliest examples of interstate cooperation,¹⁴ as countries worked together to mark and dike channels, place navigation aids and set the “rules of the road.” Such cooperation remains important—witness the Sava Basin Initiative which gives first priority to restoration and expansion of navigation on that river (Box 5).

Box 5. Recent Developments in Transboundary Cooperation on the Sava Basin

The Sava River Basin contributes about 25 percent of the Danube's discharge from 15 percent of the Danube watershed. About 40 percent of the basin is in Bosnia and Herzegovina; 30 percent in Serbia and Montenegro; 15 percent in Croatia; 12 percent in Slovenia; and less than 1 percent in Albania.

The Sava Basin faces several issues, the first of which is navigation. The Sava channel contains war debris such as unexploded ordnance and collapsed bridge structures, and faces a maintenance deficit in ports, channels and other infrastructure. Commercial traffic cannot resume until rehabilitation of infrastructure has been carried out. A second issue is lack of coordinated environmental protection. Third is the need for coordination of various economic uses—some riparians are interested in further development of the Sava as transport, others in hydropower or irrigation, and in several countries, the Sava Basin includes national parks and important wetlands. Another issue is flooding; the Sava River has inflicted severe floods on its riparians over the years.

In June 2001, the Stability Pact launched the Sava Initiative toward development of a joint program to meet these challenges, one that would coordinate the Sava Basin countries as a sub-regional player within the Danube Commission, ICPDR and other international cooperative processes. The four riparians worked out a Framework Agreement on the Sava River Basin, signed in December 2002, and are developing an Action Plan for its implementation.

Biodiversity

Navigation has had a severe impact on aquatic biodiversity. As diking, straightening and dredging of channels have greatly altered habitats, dams have changed scour and temperature regimes, and pollution has poisoned sensitive species. The extensive wetlands along the Danube and its tributaries have been reduced, through a combination of navigation dikes and drainage, to create more farmland. Nevertheless, the SEE region still contains unique wetlands in the Danube and Neretva Deltas, along the floodplains of the major rivers and by coastal lagoons. Wetlands conservation brings international as well as local benefits. As the environmental movement grows and the importance of wetlands as aquatic ecosystems is increasingly recognized, efforts to restore and even expand such habitats will undoubtedly multiply. Similar challenges are faced by other European rivers that have been extensively regulated, such as the Rhone and the Rhine.

¹⁴ The Danube Convention of 1948 builds on a series of earlier agreements dating back to the nineteenth century.

Water Quality

As at the national level, water quality in transboundary rivers and lakes is of concern: they are unfit for bathing or drinking, without extensive treatment, and in most cases, declining still further (Map IBRD 32296). The transboundary cooperation between Albania and FYR Macedonia regarding Lake Ohrid is one example of attempts to protect the natural resources and biodiversity of a transboundary lake (Box 6). For decades, rivers were used as convenient sinks for urban and industrial wastewater and agricultural runoff was discharged untreated into them, with impacts felt by people far downstream, often in another country. Apart from Bulgaria and Romania, investments in municipal wastewater treatment and regulation of industrial effluents and agricultural runoff have been limited. Recent studies show that the consequences of this neglect have been less in the major rivers, given their absorptive capacities, and more in the receiving bodies, such as the Black Sea.¹⁵

Nutrients (e.g., nitrogen and phosphorus) were identified as the principal contaminants of concern in the Danube and Black Sea Environmental Action Plans. They are causing severe eutrophication in the Black Sea, especially along its northwest shelf, which is the primary spawning area for fish. Consequently, fish catches have declined by 90 percent since 1980. Agricultural runoff, and municipal and industrial wastewater are all important sources, as is atmospheric deposition. This is a classic case of an externality, as the harmful impacts of such pollution are felt essentially only by the receiving water body downstream. This has provided the rationale for the pioneering Black Sea/Danube Basin Strategic Partnership Program (Box 7), supported by GEF, which provides incentives to projects for reducing nutrient inflows.

Other major transboundary pollutants identified in the Action Plans include oils, phenols and other industrial chemicals but, to date, little action has been taken to regulate them. Municipal wastewater pollution is mainly a local or national issue, given the capacity of the larger rivers to neutralize biochemical pollutants. The main transboundary impact is the contribution of nutrients (see above), which are not greatly reduced even by secondary conventional wastewater treatment.

¹⁵ The same effect can be observed in miniature in the semi-enclosed bays and coastal lagoons of the Adriatic, for example, Kastela Bay (Croatia), Kotor Bay (Serbia and Montenegro) or Karavasta Lagoon (Albania).

**Box 6. Joint Management of Lake Ohrid by
Albania and FYR Macedonia**

Lake Ohrid is a transboundary lake located in the east of Albania and the southwest of FYR Macedonia. It covers 34,900 hectares: 34 percent of its surface belongs to Albania and 66 percent to FYR Macedonia. It is one of the oldest lakes in Europe. Because of its high biodiversity value (many endemic and relict species) and its rich and unique culture heritage, Lake Ohrid is a lake of tremendous local, national and global significance. In 1996, in an attempt to protect the lake from anthropogenic pressures, both countries came together and adopted the Lake Ohrid Conservation Project (LOCP) financed by GEF and executed by the World Bank.

The LOCP demonstrates the principle of joint management of water resources. The primary objective of the project is to conserve and protect the natural resources and biodiversity of Lake Ohrid and its watershed by developing the basis for the joint management of the lake by Albania and FYR Macedonia.

The project has been instrumental in fostering transboundary dialogue through its support for establishment and operation of the bi-national Lake Ohrid Management Board. Albania and FYR Macedonia are committed to move ahead rapidly with Lake Ohrid-specific land use planning and the establishment, by international agreement, of a lake management agency through which they would cooperate and coordinate their policies, programs and laws and regulations to ensure the lake's protection and sustainable development.

The bi-national Monitoring Task Force, established under the project, has produced a State of Environment Report, which is the first comprehensive report that has been drafted jointly by FYR Macedonian and Albanian technical experts. The report constitutes an important milestone for future developments in the lake's watershed.

Project assistance has allowed many interest groups in the lake's watershed to organize themselves and has considerably strengthened the capacity of many existing and newly established NGOs. Small competitive grants have enabled local NGOs to carry out numerous well targeted activities including: media campaigns, special event such as "Hug the Lake" and "Day of the Lake," summer camps and promotional products. The Green Centers Network established with support from the project is fully operational and will continue to play a key role in reporting environmental violations, providing information to civil society and promoting transboundary cooperation and information exchange.

The project has also introduced a Competitive Grant Program for pilot projects and catalytic measures and is financing small-scale environmental mitigation projects that are implemented by local NGOs and communities. More broadly, the project has done much to bring local authorities on both sides of the lake together, and has helped to mobilize substantial investment assistance. Germany's KfW is committed to financing sewerage improvements and treatment in Pogradec, expanding the coverage of the sewerage system along the FYR Macedonian shore of Lake Ohrid and improving the wastewater treatment facility in Struga. Germany's GTZ is beginning work on solid waste management on the Albanian side of the lake and the Swiss Government has committed to financing improvements in the Pogradec water supply system. The World Bank-financed Albania Fisheries Project will contribute to improved fisheries resources management in cooperation with LOCP.

Box 7. The Black Sea/Danube Basin Strategic Partnership

The environment of the Black Sea/Danube Basin has become degraded over the past four decades. Pollution of the waters of the Black Sea and its tributaries, notably the Danube, has caused significant losses to riparian countries through reduced revenues from tourism and fisheries, loss of biodiversity and increased water-borne diseases. Extensive studies conducted during the 1990s have shown that over-fertilization of the water bodies by nitrogen and phosphorus discharges from municipal, industrial and agricultural sources were the most significant cause of the ecological degradation that the Black Sea and the Danube River have experienced.

The GEF Black Sea/Danube Basin Strategic Partnership has been established with the cooperation of the World Bank, the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP) and other multilateral and bilateral financiers and the basin countries. The Partnership aims to promote investments and capacity building to return the Black Sea/Danube Basin environment to its 1960s condition. The two elements of the Partnership are:

- ❖ The World Bank Investment Fund for Nutrient Reduction in the Black Sea/Danube Basin to help finance investment projects in industrial and domestic wastewater treatment, wetland restoration and environmentally friendly agriculture (See Box 3 for two projects under implementation).
- ❖ Two UNDP/UNEP projects designed to enhance the capacity of individual riparian countries and their commissions (Black Sea Commission, Danube Commission) and improve the policy framework to address Black Sea and Danube pollution.

Accidental spills of industrial chemicals or petroleum products into transboundary rivers are now recognized as one of the greatest environmental threats in Europe, though generally under-appreciated until the Sandoz spill into the Rhine in 1986. That incident caused enormous damage to aquatic ecosystems and major economic damage to downstream water users.

Mine tailings dams exist throughout SEE, wherever there is hard rock mining (e.g., cadmium, chromium, gold, lead, manganese, zinc), and few countries have properly assessed the hazards they present,¹⁶ or established programs to minimize such hazards. Hazardous waste dumps present similar, largely undocumented risks. In 2000, failure of a mine tailings dam in Romania's portion of the Tisza River Basin received wide international concern when it released sediment, heavy metal sludge and cyanide into the lower Danube Basin. While environmental damage was severe immediately downstream of the spill, it was more manageable further downstream. Nevertheless, public concern was very high throughout the affected area. Transboundary cooperation on the Tisza has expanded as a result of this incident (Box 8). In January 2003, a phenol spill from a hydropower plant was also reported in the Ibar River.

Information Sharing and Institutional Cooperation

Emergency management—whether for accidental spills, floods, earthquakes or other disasters—depends critically on the timely flow of information, both within countries and between them in the case of larger, transboundary problems. WRM planning at the basin level also requires the free exchange of information on meteorology, hydrology and water quality. Within the SEE region, such exchange is now taking place, particularly under the Danube Convention of 1988, but much more needs to be done. Impediments include political barriers—a tradition of treating all information as a state secret and downright hostility between some of the SEE countries until re-

¹⁶ The proposed HRMEPP in Romania is planning to address this.

Box 8. Transboundary Cooperation on the Tisza Basin

Transboundary cooperation on the Tisza River addresses a range of complex, inter-related problems. The Tisza River, located near the center of Europe, is the longest of the Danube's tributaries and its basin the largest Danube sub-basin. Yet in each of the five countries that share it, the basin is far from the national capital and, as a peripheral region, tends to be overlooked. Flooding in this basin is a major transboundary problem. In the last decade, the Tisza and its tributaries have flooded repeatedly, particularly affecting the poor of Romania, Ukraine and Hungary. A second transboundary issue is pollution. Point and non-point pollution is significant in the Tisza, and includes municipal waste, erosion caused by deforestation, waste from mining and oil extraction, agricultural pollution, and eutrophication in reservoirs and oxbow lakes where the waters are stationary. In the early 1990s, water quality generally improved as a result of the region's recession but a deteriorating trend was once again observed in 1997. Besides chronic pollution, the river is at risk of catastrophic polluting incidents.

The ICPDR provides the basis for all water management cooperation in the Danube River Basin, including that within the Tisza River sub-basin. Among several ongoing initiatives is one supported by the European Commission, the Tisza River Project, which has the aim of saving water resources and ecological values and introducing the Water Framework Directive of the EU in the countries of the Tisza Basin. A second initiative is the Tisza River Basin Sustainable Development Program, initiated by the UNDP and REC to promote sustainable development in the basin.

cently—as well as technical limitations, such as the deterioration of data collection and processing systems, storage of data in hard copy rather than electronic form, and the lack of standard formats and protocols for transferring information.

Institutional Roles

Transboundary WRM institutions in SEE, of which the Danube and Black Sea Commissions are noteworthy examples, are still at an early stage of development. Located in Budapest and Istanbul respectively, these Commissions are now involved in data collection and dissemination, management of studies, staff training and coordination of national programs. Institution building is necessarily a slow process and requires strong political support, as well as modest financial contributions, from the beneficiary countries. Lake Ohrid provides a good example of management of a smaller shared resource, where Albania and FYR Macedonia have signed a Memorandum of Understanding, providing for a joint Management Board of senior officials, together with task forces from each country to actually implement agreed activities.

International NGOs, principally the Regional Environment Centre (REC) in Budapest, are beginning to play a valuable role in the solution of transboundary WRM issues. REC is supporting the Sava Basin Initiative (Box 5) and the Tisza Basin Integrated Sustainable Development Programme (Box 8), where their combination of technical skills and political neutrality is especially valuable. While the private sector is beginning to play a role in WRM at the national level, especially in managing water utilities and in participatory management of irrigation, it is difficult to foresee a private sector role in the solution of transboundary issues at this time.

International Agreements

Annex B shows which states have signed or ratified the principal conventions related to WRM—the Transboundary Watercourses Convention (and its Protocol on Water and Health) of the United Nations Economic Commission for Europe (UNECE), the Danube and Black Sea Conventions, the Ramsar Convention (wetlands of interna-

tional importance), and the Biodiversity Convention. The general picture is a positive one: all states have signed, and nearly all have ratified, the Ramsar and Biodiversity Conventions and the three SEE Black Sea states have ratified the Black Sea Convention. However, Serbia and Montenegro has been slow to sign the Danube Convention, as a result of constitutional issues between the Federal and Republic levels, though progress is expected soon. Bosnia and Herzegovina has a similar problem but a state level Committee on Sustainable Development may soon provide a solution. One result is that these states cannot participate fully in the work of the Convention nor receive support under the Black Sea/Danube Basin Strategic Partnership Program.

The evolving constitutional status of Serbia and Montenegro and of Bosnia and Herzegovina has prevented them from participating in, or benefiting from, important international conventions and programs. Pragmatic mechanisms need to be found to allow the full participation of all jurisdictions, while legal questions are being resolved. An example of constructive cooperation in water management is the Joint Commission of Serbia and Montenegro and Hungary which deals with water quality and quantity issues on nine shared rivers (Box 9).

Box 9. Cooperation between Serbia and Montenegro and Hungary

Nine rivers cross the border between Serbia and Hungary, the most important being the Danube and the Tisza. Since 1955, a Joint Commission has dealt with the corresponding water quantity and quality problems. Protocols dealing with flood and ice control have been signed, practiced, and renewed for years (e.g., reaches of mutual interest with corresponding levee systems have been defined, joint flood-control plans renewed, hydrologic data regularly exchanged and flood warning systems established).

During the catastrophic flood of the Danube River in 1965, when several consecutive flood waves superimposed to form a huge wave that lasted four months, specialized Hungarian teams helped to fortify the defense lines in Serbia, and the border was opened to all emergency transports. Levee systems in both countries were analyzed and reconstructed according to agreed solutions. On the Tisza River, the largest-scale joint flood defense was that of 1970. All actions were coordinated, and each side helped the other in emergency interventions. Serbian operatives helped to strengthen defense lines in Hungary. Direct radio lines were established to facilitate rapid exchange of information.

Since then, on many occasions (1969, 1972-1980, 1985) ice-breaking ships from both countries have taken part in breaking ice, including work in each other's territory. In 1976, the Joint Commission adopted a code of practice for river ice control and management in the two countries, revised and renewed in 1991. With ups and downs, Serbian-Hungarian cooperation on water issues has lasted through the tumultuous 1990s up to the present day.

Sources of Conflict

Review of press reports shows that transboundary WRM issues are frequently a cause of public concern, with potential for generating more serious conflicts. Examples range from the Tisza incident, which drew concern from all the downstream countries, to more localized issues of water quantity and quality between neighboring jurisdictions (such as on the Maritsa, Ibar or Timok), hydropower development on the Drava, and releases from Lake Ohrid to alleviate drought conditions in Albania. Significantly, most reported conflicts occur in the southern part of SEE. Some conflicts relate to the interpretation of bilateral agreements from a previous, less democratic, period. Nowadays, a free press can do much to raise public awareness, which is a prerequisite to action and change.

Future Developments

Growing public awareness of the severity of the various transboundary WRM issues outlined above is likely to put pressure on governments to seek multilateral solutions through some or all of the following mechanisms:

- ❖ Strengthening of existing international conventions, through ratification and participation by all eligible countries, and by drafting of technical protocols;
- ❖ Negotiation of new agreements to meet emerging needs;
- ❖ Full support of convention secretariats by participating countries;
- ❖ Development of permanent transboundary institutions, especially for the smaller shared resources, with technical capacity for basin planning and/or project preparation;
- ❖ An enhanced role for NGOs in supporting the above initiatives;
- ❖ Development of basin plans for issues like floods, water quality management and accidental spills; and
- ❖ Mechanisms for financing externalities, recognizing that resolving WRM transboundary issues often means that costs are incurred in one country and benefits received in another.

While the GEF is pioneering the financing of externalities, additional sources of funding will be needed when programs move to a larger scale.

CHAPTER 4

Recommendations

Priorities at the National Level

A first indication of the suggested priorities by country is provided in Table 5 below. These priorities have been identified within the framework of types of water management and investment measures described in Annex A. A distinction is made between broad measures that affect WRM or service delivery, and poverty-targeted measures that affect them. Watershed management is an example of a WRM measure with a poverty focus, and rural water and sanitation is an example of a service delivery measure with that focus. Flood mitigation measures have broad impact, as do information sharing and institutional structuring measures.

Table 5. Suggested Priorities for SEE Countries

Priority Area	Albania	Bosnia and Herzegovina	Bulgaria	Croatia	FYR Macedonia	Romania	Serbia and Montenegro	Kosovo
Water Resources Management with Broad Focus								
Legislation/regulations	✓	✓			✓		✓	✓
Institutional Strengthening	✓	✓	✓	✓	✓	✓	✓	✓
Flood management	✓	✓	✓	✓	✓	✓	✓	
Drought management	✓		✓		✓			
Water resources monitoring	✓	✓			✓		✓	✓
Climate change mitigation and forecasting	✓		✓		✓			
Water quality management	✓	✓	✓	✓	✓	✓	✓	✓
Wetlands management	✓	✓	✓	✓		✓	✓	
Improved safety/productivity of hydraulic infrastructure	✓	✓	✓	✓	✓	✓	✓	✓
Integrated basin management		✓	✓		✓	✓		
Coastal zone management	✓		✓	✓		✓	✓	
Lake management	✓				✓		✓	
Water Resources Management with Poverty-Targeted Focus								
Watershed management	✓				✓	✓	✓	
Groundwater management	✓		✓	✓	✓		✓	
Water Service Delivery with Broad Focus								
Improvements in irrigation and drainage	✓		✓		✓	✓		✓
Improvements in water supply and sanitation	✓	✓	✓	✓	✓	✓	✓	✓
Energy policies/efficiency hydropower infrastructure	✓	✓	✓		✓	✓		
Water Service Delivery with Poverty-Targeted Focus								
Rural water supply and sanitation	✓	✓	✓	✓	✓	✓	✓	✓
Rehabilitation of irrigation and drainage infrastructure	✓		✓		✓	✓		

For **Albania**, the priorities include development of legal, regulatory and institutional arrangements for WRM with broad stakeholder ownership, watershed and flood management, and continued improvements in water and sanitation, especially in small towns and in rural areas. Further improvements in irrigation management, and better management of lakes, wetlands and coastal areas are also priorities.

For **FYR Macedonia**, development of a sound institutional framework for WRM and for irrigation is a priority. As a water-stressed country, FYR Macedonia also has to make difficult choices in meeting competing sectoral demands and achieving sustainable management of lakes and their watersheds. Investment in wastewater treatment to improve river water quality is needed but will require concessional funding and strengthened utility management.

For **Bosnia and Herzegovina**, the priorities are rehabilitation of water and wastewater systems, flood management, water quality management and development of sound institutional frameworks.

For **Croatia**, which has moved further with development of sound institutional frameworks, the priorities are maintenance of good quality coastal waters that are essential to the sustainability of the tourism industry, investments in wastewater treatment and flood management.

For **Serbia and Montenegro**, the challenges are fragmented responsibilities for WRM, rehabilitation of water and wastewater treatment systems, maintenance of coastal water quality, and management of floods, watersheds and ecosystems. **Kosovo** lacks an institutional framework for water management; reliable water and sanitation, and irrigation service delivery are priorities.

Bulgaria and **Romania** have adopted water management legislation consistent with EU requirements, but face institutional and financial challenges with implementing the legislation. In particular, meeting EU water quality standards will require major investments.

For **Bulgaria**, rehabilitation of irrigation infrastructure is a priority, if Bulgaria's agricultural potential is to be realized. Flood and drought mitigation is a third challenge, as well as continued improvement of water quality and wetlands along the Danube and Black Sea coast.

For **Romania**, floods and unsafe mine tailings dams pose high environmental and economic risks. Rehabilitation of water and wastewater systems and irrigation infrastructure where economically justified are a second priority, and rural water supply and sanitation services are among the least well developed in Europe. Romania harbors unique wetlands in the Danube Delta and lower Danube, but faces difficulties balancing the need to maintain the Danube as a navigation route with controlling coastal erosion.

For many countries, there is an urgent need to clarify responsibilities, especially for overall WRM. Associated with this is a need for sectoral water agencies to share information and cooperate in carrying out their respective mandates. The larger countries need to consider devolving day-to-day water management to river basin authorities. Indeed, institutional strengthening is closely linked to better demand management, service delivery, quality and resources management. The bulk of investments, as in the last decade, will continue to be rehabilitation of existing infrastructure, whether

for urban water supply and sewerage, irrigation and drainage, flood control or power generation, provided that steps are taken at the same time to improve management and financing, so that operation and maintenance needs are fully met in the future. A short-term priority is also improved wastewater treatment in tourist areas. Where water consumption is excessive by international norms and water charges are low, demand management should be an integral part of projects.¹⁷ Countries should focus increasingly on programs to meet the needs of the poor, for example, by expanding water supply networks and basic sanitation to poorer urban communities and to rural areas, by improving watershed management, and by controlling erosion and flooding from upper watersheds. Further steps are needed to promote the role of civil society, through improved public awareness and access to information as well as consultation with stakeholders. Additional efforts are also needed to promote the role of the private sector and NGOs in water resources planning and management. It should be emphasized also that many of the broader economic and public sector management reforms underway also contribute indirectly to better WRM, through improved efficiency of public expenditures, institutional transparency and governance.

While developing policies and building institutions for comprehensive and integrated WRM are badly needed throughout the region, realistically this cannot be achieved quickly, given other urgent problems and shortages of funding and skilled staff. Nevertheless, it is important that SEE countries begin to supplement their sector-specific planning and project development with policies that can examine trade-offs between alternative uses, including environmental uses (e.g., minimum flows, wetlands and deltas). Agencies with responsibility for overall WRM will need to be strengthened and procedures developed. Investment programs should extend beyond rehabilitation and include emerging needs such as: affordable wastewater treatment and disposal; disaster preparedness and flood management, including both structural and non-structural measures; watershed management in poorer upland areas; conservation of ecosystems (especially wetlands); irrigation modernization; and river basin monitoring and information systems. None of this is likely to occur unless new funding mechanisms can be developed in the context of overstretched government budgets and limited consumer ability to pay. Solutions may include combinations of increased user charges (including possible tourist taxes in some areas), local borrowing, government subsidies and external support with a high concessional element. Flood insurance may provide a way to pay for improved flood protection.

Priorities at the Transboundary Level

Table 6 below provides a first indication of the suggested priorities by transboundary basin and sub-basin.

For the Danube Basin, since much of the preparatory work of building agreements and institutions, collecting and analyzing information and preparing programs and projects has already been done, the short-term priority is to begin implementing action plans. At the same time, institutions can be strengthened by ensuring secure funding, building technical capability and ensuring participation of all riparian jurisdictions. Planning at the sub-basin level, as is now starting for the Sava and Tisza, can be deepened and extended to other tributaries. Major programs to address transboundary issues like water quality management are beginning with pilot operations, such as the projects under the Black Sea/Danube Basin Strategic Partnership. Planning in new areas, like flood management and accidental spills, should be undertaken.

¹⁷ This will be more easily achieved in urban water systems, especially when metering is introduced.

Table 6. Suggested Priorities for SEE Transboundary Basins

River Basin and Sub-Basin	Water Quality	Water Allocation	Risk Management	Aquatic and Ecosystem Management	Navigation
Danube	✓		✓	✓	✓
Tisza	✓		✓		
Sava	✓		✓	✓	✓
Velika Morava	✓		✓		
Drava Mura	✓	✓	✓	✓	
Banat Eastern Serbia	✓		✓		
Nestos	✓	✓			
Struma	✓	✓		✓	
Vardar	✓	✓		✓	
Drin	✓	✓		✓	
Neretva	✓		✓	✓	
Krka	✓			✓	
Maritsa	✓				
Veleka		✓		✓	
Rezvaya	✓			✓	

Outside the Danube Basin, transboundary river basins are smaller and there are quantity and allocation issues especially in the semi-arid southern and poorer part of SEE. Addressing these issues should be the first step. The Danube solution of an international convention and commission is probably inappropriate in most cases; an approach similar to the Memorandum of Understanding for Lake Ohrid may have wider applicability. Plans and projects can be developed consistent with expected financial resources. This process is likely to require considerable support and concessional financing.

For all basins, the next step should be the full-scale implementation of agreed action plans and projects. However, that is likely to quickly run into the constraint of externalities, that the more immediate benefits are received by countries other than those making the investment. The GEF is providing critical support in eliminating this bottleneck for the present generation of pilot projects but new financing mechanisms will be needed to begin full-scale programs, given their investment requirements. Sources might include basin funds, supported by burden sharing and funding mechanisms, or highly concessional external funding.

Specific priority areas for cooperation at transboundary level include:

- ❖ Continuing with cooperation on water sharing between Bulgaria and Greece on the Nestos River, and between FYR Macedonia and Greece for Lake Prespa and Lake Doiran;
- ❖ Flood control on the Sava River, with the cooperation of Bosnia and Herzegovina, Serbia and Montenegro, and Croatia;
- ❖ Improved navigation on the Danube and its tributaries;

- ❖ Water quality and watershed management for transboundary lakes, including Lake Ohrid, Lake Prespa (FYR Macedonia, Greece and Albania) and Lake Skadar (Albania and Serbia and Montenegro);
- ❖ Balancing competing interests to ensure ecosystem and biodiversity conservation (e.g., the Neretva River Basin and Delta between Bosnia and Herzegovina and Croatia);
- ❖ Safety of mine tailings dams and emergency mitigation measures on the Tisza River (Romania, Hungary, Serbia and Montenegro and Bulgaria);
- ❖ Sharing information on water flows and water quality, on hydrometeorological forecasting and on flood and drought mitigation (all countries);
- ❖ Increased involvement of civil society in transboundary issues;
- ❖ Wetland and ecosystem conservation on transboundary rivers, including developing further the Lower Danube Green Corridor Initiative, which envisages a corridor of wetlands and natural ecosystems; and
- ❖ Continuation and expansion of the Black Sea/Danube Basin Strategic Partnership nutrient reduction program, which provides concessional funding to agricultural pollution reduction, wetland restoration and wastewater treatment to catalyze investments in these areas.

Implementation Mechanisms

Increased investment in improved water resources management and service delivery will require substantial concessional financing, because of the externalities involved, and because of the substantial costs involved for the SEE countries to move towards the water quality standards of the EU. For the World Bank, increased investment is also limited by overall lending limits for the SEE countries; working in partnership with other multilateral and bilateral organizations will be desirable, indeed necessary. Investments in flood and risk mitigation measures similar to the project under preparation in Romania (Box 2), which includes forecasting and management measures, can be very cost-effective but require quite large “upfront” investments. Further development of least-cost approaches to investments, especially in wastewater treatment but also in irrigation and flood protection, will improve affordability.

Partnerships and Strengthened Institutions

Several mechanisms for transboundary cooperation already exist. These can be further strengthened through provision of assured funding for technical cooperation work (e.g., the Black Sea Commission). Formal coordination mechanisms could also be considered for the major tributaries of the Danube such as the Sava and the Tisza, and for other river basins such as the Vardar and the Maritsa or deltas like the Neretva. As mentioned above, information sharing and preparation of joint strategies can also improve development of common solutions to shared problems.

At the national level, stronger, transparent public sector institutions, with clear accountabilities, will strengthen WRM. Strengthened monitoring systems, timely access to information and support to civil society organizations involved in WRM issues will

also increase the effectiveness of WRM programs. Many countries have put into place policies for cost recovery for water service delivery, or have transparent subsidy measures, but implementing these policies requires effective institutions.

Partnerships will be essential if progress is to be made, both at the national and transboundary levels. Cooperation between the SEE countries will be fundamental for addressing transboundary problems and can greatly benefit national programs, through technical exchanges and information sharing.¹⁸ Cooperation between SEE countries and the international aid community is already well established, and cooperation between donors is improving. Grant donors, like the EU, have a fundamental role in supporting the development of policies, laws and institutions but can also address the problem of affordability by softening the terms of international financial institution (IFI) lending. IFIs need to look beyond simple rehabilitation projects to more innovative approaches to a broader range of WRM issues, especially in the more water-scarce areas of the region. Priorities vary by country and by basin, and improved management is limited by financial and institutional constraints. Tables 5 and 6 above provide a first indication of the suggested priorities by country and transboundary river basin.

Closing Remarks

The international community is giving increasing recognition to the role that water plays in human wellbeing and development. The year 2003 has been declared the Year of Fresh Water. Improved access to water services and environmentally sound water management are among the Millennium Development Goals. Improved WRM and water service delivery and better management of transboundary water resources in the countries of South Eastern Europe will contribute to the wellbeing of their citizens and of the region as a whole.

¹⁸ The International Network of Water-Environment Centres for the Balkans (INWEB) is a promising example.

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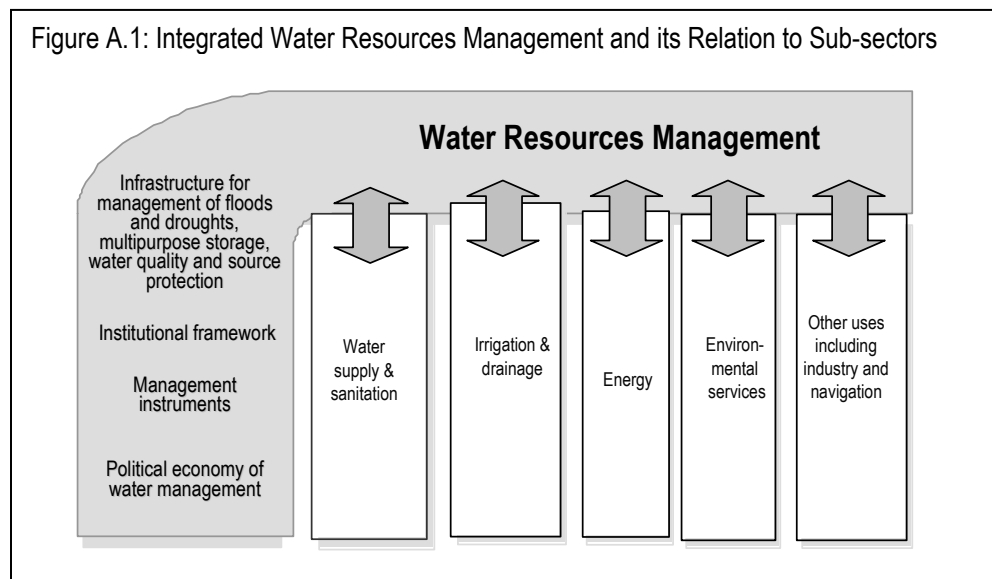
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Annex A

Conceptual Framework: Linkages Between Water Resources Management and Water-Using Sectors

The corporate Water Resources Strategy provides a useful framework for reviewing the linkages between management and broad policies on the one hand, and investments, which affect the development and management of water resources on the other. In brief, the key building blocks of this framework (illustrated in Figure A.1) are as follows:

- ❖ There are inter-linkages between overall resources management (at river basin level) and management of the main water uses (for irrigation; energy; domestic, municipal and industrial use; navigation; environmental services and recreation).
- ❖ The way water is managed in one sector (e.g., energy) also affects the way it is managed in another (e.g., irrigation). There are thus externalities. Management decisions at the river basin level (river regulation and diversion) also have a spatial dimension; they affect all downstream uses and the water quality of the receiving bodies (seas and lakes).
- ❖ Water management has an inter-temporal dimension; pollution or habitat loss may cause deterioration in water quality, which will take decades of investment to correct, while loss of wetland and riverine habitats may lead to irreversible loss of species.
- ❖ While water is regarded as an “economic good,” it has many “public good” features. Decisions in one sector affect those in another; actions in one part of a river basin affect users in another; there are inter-temporal dimensions and environmental dimensions.



How Water Affects Growth and Poverty Reduction

The corporate Strategy has a second useful framework (illustrated in Figure A.2) for assessing how WRM affects growth and poverty reduction. It distinguishes between:

- ❖ **Type 1:** Broad policies and investments that affect development and management of water resources (flood management, large-scale river regulation and diversion, drainage for agriculture);
- ❖ **Type 2:** Poverty targeted investments and policies that affect WRM (watershed management project, wetland restoration in poor rural areas);
- ❖ **Type 3:** Broad policies and investments that affect water services delivery (pricing and institutional reform, rehabilitation, improved technology, water users' associations); and
- ❖ **Type 4:** Poverty targeted investments that affect the management of water services (rural water and sanitation, poverty targeting in price policy for public utilities).

Figure A.2. Types of Water Investments and Their Impact on Growth and Poverty Reduction

		Nature of intervention:	
		Broad	Poverty-Targeted
Affecting water...	Resources management and development	Type 1: Broad region-wide water resource interventions (e.g., multi-purpose river basin development and aquifer management)	Type 2: Targeted water resources interventions (e.g., watershed management in degraded areas with poor farmers)
	Service delivery	Type 3: Broad impacts through water service delivery reforms (e.g., reform of water supply utilities and water users associations)	Type 4: Targeted improved water services (e.g., rural water supply and sanitation projects)

The corporate Strategy concludes that:

- ❖ WRM policies and investments affect the poor in a variety of direct and indirect ways, most of which are important in most contexts.
- ❖ While there has been substantial improvement in the way in which water projects directly address poverty and social concerns, there is still room for more. An appropriate strategy for countries (and for the World Bank) is a blend of all of these interventions: operating on the resource and on water services, intervening in a broad, systemic manner and directly targeting the poor.

Annex B

Relevant International Conventions - Signed and/or Ratified

	Convention on Protection and Use of Transboundary Watercourses and International Lakes		Protocol on Water and Health (to the Transboundary Watercourses Convention)		Convention on Cooperation for the Protection and Sustainable use of the River Danube		Convention on the Protection of the Black Sea Against Pollution		Convention on Wetlands of International Importance especially as Waterfowl Habitat		Convention on Biological Diversity	
	Date Signed	17-Mar-92	17-Jun-99	29-Jun-94	21-Apr-92	2-Feb-71	5-Jun-92					
	Helsinki		London		Sofia		Bucharest		Ramsar, Iran		Rio de Janeiro	
Country	Signed	Ratified[1]	Signed	Ratified	Signed	Ratified	Signed	Ratified	Signed	Ratified	Signed	Ratified
Albania	✓	✓	✓	✓					✓	✓		✓
Bosnia and Herzegovina									✓	✓		✓
Bulgaria	✓		✓		✓		✓	✓	✓	✓	✓	✓
Croatia	✓	✓	✓		✓	✓			✓	✓	✓	✓
Greece	✓	✓	✓						✓	✓		✓
Hungary	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
FYR Macedonia									✓	✓	✓	✓
Romania	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Serbia and Montenegro									✓	✓	✓	✓
Slovenia		✓	✓		✓	✓			✓	✓	✓	✓
Turkey							✓	✓	✓	✓	✓	✓

Note: Includes ratification, acceptance, approval or accession.

Convention/Protocol Websites

Transboundary	http://www.unece.org/
Water and Health	http://www.unece.org/
Danube River	http://www.rec.org/danubepucu/drpc.html
Black Sea	http://www.blacksea-environment.org/
Wetlands	http://www.ramsar.org/
Biological Diversity	http://www.biodiv.org/

Annex C

GEF Water-Related Projects

Projects under Implementation (as of March 31, 2003)

Country	Project	FY	Focal Area ^a	Total Project Costs (USD million)
Albania/FYR Macedonia	Lake Ohrid Conservation Project	1998	IW	4
Bulgaria	Wetlands Restoration and Pollution Reduction Project	2002	IW	13
Croatia	Kopacki Rit Wetlands Management Medium-Sized Project	1999	BD	1
Croatia	Karst Ecosystem Conservation Project	2002	BD	8
Romania	Agricultural Pollution Control Project	2002	IW	11
FYR Macedonia	Power Project	2000	CC	3
TOTAL				40

a. BD=Biodiversity; CC=Climate Change; IW=International Waters.

Proposed Projects (as of March 31, 2003)

Country	Project	Expected FY	Focal Area ^a	Expected GEF amount (USD million)
Albania	Integrated Water & Ecosystem Management Project	2004	MFA	4
Albania	Conservation and Sustainable Development of Karavasta	2003	BD	2
Bulgaria	Pomoriisko Lake Conservation, Restoration and Management	2003	BD	1
Hungary	Nutrient Reduction in Black Sea and Danube	2004	IW	8
Hungary	Rehabilitation and Expansion of Small Hydro Plants on the River Raba	2003	CC	1
Romania	Hazards Risk Mitigation and Emergency Preparedness	2004	IW	7
Turkey	Agricultural Pollution Control Project	2004	IW	6
TOTAL				29

a. BD=Biodiversity; CC=Climate Change; IW=International Waters; MFA=Multi-focal area.

Annex D

World Bank Water-Related Projects

Proposed Projects (as of March 31, 2003)

Country	Project	FY	Total Project Costs (USD million)
Croatia	Coastal Cities Pollution Control Project	2002	250
Romania	Irrigation Rehabilitation and Reform Project	2003	103
Romania	Hazards Risk Mitigation and Emergency Preparedness Project	2004	250
Turkey	Anatolia Watershed Rehabilitation Project	2004	70
TOTAL			673

Projects under Implementation (as of March 31, 2003)

Country	Project	Board Date	Closing Date	Lending Project Cost (USD million)
Albania	Municipal Water and Wastewater Project	01/03	12/09	22
Albania	Irrigation and Drainage Rehabilitation Project II	06/99	03/05	41
Albania	Water Supply Urgent Rehabilitation Project	02/00	03/04	15
Albania	Pilot Fishery Development Project	02/02	09/07	7
Bosnia and Herzegovina	Mostar Water Supply and Sanitation Reduction	06/00	06/05	13
Croatia	Eastern Slavonia Reconstruction Project	06/99	09/03	50
Croatia	Municipal Environmental Infrastructure Project	06/98	06/06	145
Hungary	Municipal Wastewater Project	09/99	12/06	89
Kosovo	Emergency Water Supply and Sanitation	12/00	01/04	6
FYR Macedonia	Irrigation Rehabilitation and Restructuring Project	11/97	09/04	33
Romania	Rural Development Project	02/02	12/06	53
Serbia and Montenegro	Montenegro Environmental Infrastructure	11/01	09/04	3
Turkey	Antalya Water Supply and Sanitation Project	05/95	06/03	245
Turkey	Cesme-Alacati Water Supply and Sewage Project	04/98	12/03	24
Turkey	Participatory Privatization of Irrigation Management and Investment Project	10/97	06/04	59
Turkey	Emergency Flood and Earthquake Recovery Project	09/98	03/03	685
TOTAL				1,490