



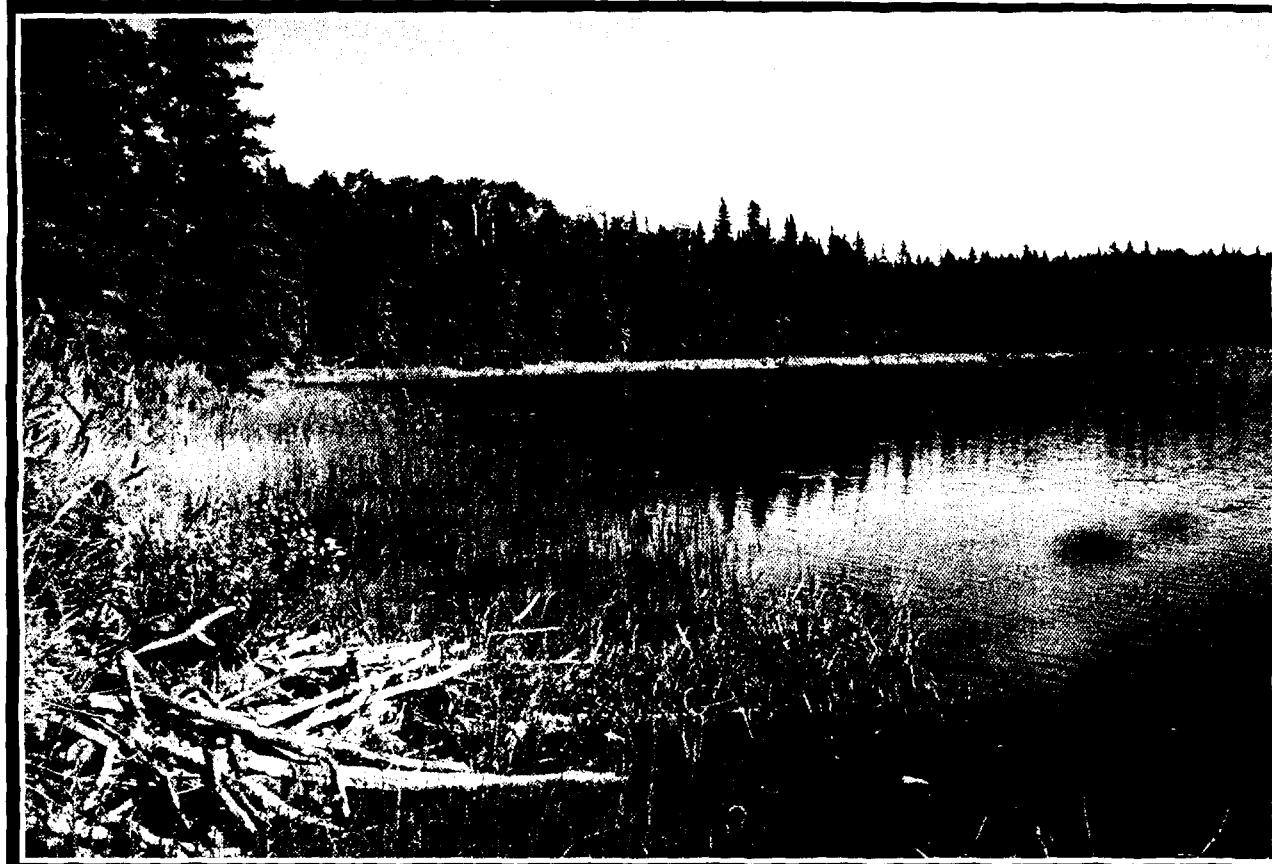
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WORLD BANK TECHNICAL PAPER NO. 485
*Europe and Central Asia Environmentally and Socially Sustainable
Rural Development Series*

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September 2000

Natural Resource Management Strategy

Eastern Europe and Central Asia



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(List continues on the inside back cover)

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Natural Resource Management Strategy

Eastern Europe and Central Asia

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Contents

Acknowledgments	vii
Abbreviations and Acronyms	viii
Executive Summary.....	ix
Principal Natural Resource Challenges and Priority Areas	ix
Strategic Framework.....	xi
Strategy Implementation.....	xiv
Instruments.....	xv
Structure of the Main Report	xvi
1. Sustainable Natural Resource Management Challenges	1
The Baltics, Poland, and Belarus	4
The Danube and the Carpathians	5
The Balkans	6
Russia	8
Turkey and the Caucasus	9
Central Asia	10
Regional Seas.....	11
2. Strategic Framework for Natural Resource Management.....	19
3. The Bank's Evolving Assistance Program	22
Rural, Natural Resources, and Environment Development Strategy up to the Mid-1990s.....	22
Land Management	25
Water Management.....	27
Forestry and Biodiversity.....	32
Governance, Institutions, and Public Sector Management	35
Progress with Improving Natural Resource Management.....	37

4. A Future Assistance Strategy in Natural Resources Management for ECA.....	42
The Baltics, Poland, and Belarus	43
The Danube and the Carpathians	45
The Balkans	46
Russia	47
Turkey and the Caucasus	49
Central Asia	50
5. Instruments	54
Lending	54
Guarantees.....	55
Global Environment Facility.....	57
Economic and Sector Work	59
Partnerships and Alliances.....	60
Annex 1. Key Natural Resource Management Issues in the ECA Region.....	64
The Baltics, Poland, and Belarus	64
The Danube and the Carpathians	70
The Balkans	77
Russia.....	82
Turkey and the Caucasus	88
Central Asia	94
Annex 2. Statistical Tables.....	102
Annex 3. Classification of Assistance Program	125
Annex 4. References and Notes	131
Notes.....	133
Annex 5. Maps.....	135
Charts	
Chart 1. Land Use in the ECA Region.....	3
Chart 2. Water Use in the ECA Region	4

Boxes

Box 1.	Kyrgyz Republic—National Environmental Action Plan, 1995	23
Box 2.	Agricultural Extension—Russia Agricultural Reform Implementation Support Project, 1994.....	24
Box 3.	Turkey—Eastern Anatolia Watershed Rehabilitation Project, 1993	25
Box 4.	Azerbaijan—Farm Restructuring Project, 1996.....	26
Box 5.	Georgia—Integrated Coastal Zone Management Project, 1998	27
Box 6.	Albania—Irrigation Rehabilitation Project, 1993	28
Box 7.	Russia—Volga River Basin Study, 2000	30
Box 8.	Poland—Emergency Flood Recovery Project, 1998.....	30
Box 9.	GEF—Water and Environmental Management Project—Aral Sea Basin Program, 1998	31
Box 10.	Romania—Valuation of the Forestry Sector and Structural Reforms.....	32
Box 11.	Albania—Community-Based Forest Management in a Transition Economy, 1996.....	33
Box 12.	Romania—GEF Biodiversity Conservation Management Project, 1999.....	34
Box 13.	Poland—GEF/Bank Rural Environmental Protection Project, 2000	44
Box 14.	Romania—Agriculture Support Services Project, 2000	46
Box 15.	Romania—Forestry Sector Reform Project, 2002	46
Box 16.	Croatia—GEF Karst Ecosystems Conservation Project, 2001	48
Box 17.	Supporting Improved Public Sector Management and Addressing Private Sector Constraints: Russia—Sustainable Forestry Pilot Project, 2000	49
Box 18.	Azerbaijan—Rehabilitation and Completion of Irrigation and Drainage Systems, 2000	51
Box 19.	Armenia—GEF/IDA Natural Resources Management and Poverty-Reduction Project, 2001.....	51
Box 20.	Uzbekistan—Proposed Karshi Cascade Rehabilitation Project, 2001	52
Box 21.	Uzbekistan—Drainage, 2001	55
Box 22.	Supporting Private Investment in the Forest Sector through Risk Guarantees: Russia—Partial Risk Guarantee Facility for Investors in the Coal and Forest Sector.....	56
Box 23.	Russia: Fire Management in the Amur-Sikhote-Alin Ecosystems.....	58
Box 24.	Partnership for Nutrient Reduction—Black Sea and Danube Program	58
Box 25.	Poverty Reduction Strategy: Access to Land and Water in Tajikistan	60
Box 26.	Armenia: Integrated Water Resources Management Strategy, 2000	61
Box 27.	Sharing International Experience with Forestland Restitution and Certification.....	62
Box 28.	Tajikistan: Lake Sarez Risk-Mitigation Project, 2000	63

Maps

Map 1.	Population	137
Map 2.	Ecosystems and Protected Areas	138
Map 3a.	Climatic Resources (Radiation)	139
Map 3b.	Climatic Resources (Thermal Regime).....	140
Map 4.	Water Resources	141
Map 5.	Predominant Land Use.....	142

Figures

Figure 1.	Arable Land in ha Per Capita, 1997	12
Figure 2.	Area of Forestland in ha Per Capita, 1995	13
Figure 3.	Annual Renewable Water Resources in m ³ Per Capita, 1998	14
Figure 4.	Water Withdrawals By Sector, 1998	15
Figure 5.	Percent Change in Real GDP, 1990–98	16
Figure 6.	Agriculture Value Added, as Percent of GDP, 1998	17
Figure 7.	Share of Poor in Rural Areas	18
Figure 8.	Rural Population, 1998 (Percent).....	18

Tables

Table 1.	Status of Sustainable Natural Resource Management in ECA	38
Table 2.	Future Priority Areas for Improved Natural Resource Management.....	53

Annex 2 Tables

Table 1.	River Flows, Water Withdrawals.....	102
Table 2.	Cropland.....	104
Table 3.	Fisheries	106
Table 4.	Selected Socioeconomic Indicators	107
Table 5.	Natural Resource Endowments.....	108
Table 6.	Livestock.....	109
Table 7.	Forestry and Land Use in ECA.....	110
Table 8.	Forest Industry and Economic Characteristics	111
Table 9.	Social and Demographic Characteristics	112
Table 10.	Protected Areas: Quantitative Characteristics	113
Table 11.	Absolute Poverty Rates of Eastern European and Central Asian Economies ...	114
Table 12.	Protected Areas	115

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Abbreviations and Acronyms

ASAL	Agricultural Sector Adjustment Loan
ci/km ²	Cyanide per square kilometer
CAS	Country Assistance Strategy
CDF	Comprehensive Development Framework
CEM	Country Economic Memorandum
ECA	Europe and Central Asia
EC-IFAS	Committee of the International Fund to Save the Aral Sea
ECSSD	Europe and Central Asia Environmentally and Socially Sustainable Development Unit
ESW	Economic and Sector Work
EU	European Union
EWS	Early Warning System
FAO	Food and Agriculture Organization
FIAS	Farmer Information and Advisory Services
FSU	Former Soviet Union
FYR	Former Yugoslav Republic
GEF	Global Environment Facility
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IDF	Institutional Development Fund
kWh	Kilowatt hours
MAWR	Ministry of Agriculture and Water Resources
MIGA	Multilateral Investment Guarantee Agency
NEAP	National Environmental Action Plan
NFA	National Forest Authority
NGOs	Nongovernmental Organizations
NIS	Newly Independent States
NRM	Natural Resource Management
NTFP	Non-Timber Forest Production
OECD	Organization for Economic Cooperation and Development
PA	Protected Area
PRSP	Poverty Reduction Strategy Program
TEV	Total Economic Valuation
WUA	Water Users' Association
WDI	World Development Indicators
WWF	World Wildlife Fund

Executive Summary

The objective of this paper is to summarize the Bank's strategy for assisting our client countries in Europe and Central Asia (ECA) with sustainable use of natural resources, within the overriding objectives of poverty reduction and economic growth. The paper does not focus on macroeconomic or social policies, which are the focus of complementary strategies covering Rural and Social development, nor does it address pollution and air quality issues, which are addressed by the Environment Strategy. All of the countries have experienced profound political, social, and economic change over the last 10 years. The transition from a centrally planned economy to a free-market economy has been easier for some countries than for others. Natural resources in this paper are confined to "nonmineral" natural resources, land and water, and management of the plant and animal life dependent on them. The strategy must be seen within the context of the region's diversity, in geography, climate, and natural resources, in human well-being, and policy directions. Broadly, the north and west of the region are abundant in forest and water resources but possess agricultural land of only moderate quality; the central belt of the region has abundant arable land, while the south and east face water scarcities and limited usable water and land resources.

Principal Natural Resource Challenges and Priority Areas

Natural resource management issues are dependent on geography and climate and vary across the region. The region is characterized by its diversity, in human well-being and in the policy directions taken by its governments, as well as in the scarcity or abundance of its natural resources. Per capita gross national product (GNP) varies from US\$370 (Tajikistan) to US\$9,780 (Slovenia), and per capita internal renewable water resources from 232 m³ (Turkmenistan) to 29,115 m³ (Russia). Similarly, arable land per capita varies from 0.14 ha (Tajikistan) to 1.99 ha (Kazakhstan) and forestland per capita from 0.1 ha (Armenia) to 5.98 ha (Russia). These differences are illustrated in chapter 2, and illustrated in more detail in Annexes 2 and 3. These changes also are described in more detail in other regional strategy documents.

Overall, the region, with 7 percent of the world's population, has 23 percent of its forest area, 19 percent of its arable land, and 12 percent of its annual renewable freshwater resources. Furthermore, the region is unique in that most of its countries have stable or even declining populations. However, much of the soil in the northern part of the region is of moderate to low fertility and production is limited by short growing seasons. Many of the forests that protect watersheds are inaccessible and

have harsh climates and fragile ecosystems. Russia's rivers, which account for the majority of the region's waters, mostly flow into the Arctic. Furthermore, even when overall resources are abundant, poor resource use at a local scale can lead to unsustainable management. Therefore, although there is less pressure on natural resources in ECA than in some other regions, the region is not as abundant in resources as the figures imply.

The strategy categorizes the region into a number of subregions, based on the principal natural resource management challenges they face. It also summarizes progress in natural resources policy and institutional reforms in these countries.

- In Central Europe and the European Union (EU) accession countries, the main challenges are to establish farming practices that reduce runoff into water-bodies and meet the EU environment requirements for water quality. A second challenge, especially for Poland and Hungary, is flood mitigation and balancing control measures with ecosystems management and economic development. A third issue, especially for the Baltics and Poland, is to help new forest and agricultural landowners manage land sustainably and profitably in the context of a declining rural and farm population. Most of these countries export forest products and must manage forests to meet the certification standards required by West European importers.
- In southeastern Europe and the Balkans, the main challenges include coastal zone and mountain ecosystem management to maximize tourism and conservation values in this region of outstanding natural beauty and diversity, and, in the poorer countries, sustainable resource use in the context of poverty and governance problems. Forest and agricultural land restitution, mostly in smallholdings to owners with little recent experience of management, also pose challenges for sustainable use, especially for Romania and Bulgaria.
- For the fertile black soil belt of eastern Romania, Moldova, Ukraine, and southern Russia, fertility management of arable land is the key issue; soils have been heavily compacted by use of heavy machinery. Lack of soil and moisture conservation measures, together with dramatic declines in input use, threaten the fertility land structure of these soils.
- Turkey's population and economy are growing rapidly. Its coastlines and lower watersheds are threatened by poorly managed tourist and urban development, while resource management issues related to rural poverty and overuse of resources are issues, especially in central and eastern Anatolia. Turkey and the Caucasus are particularly vulnerable to earthquakes; disaster preparedness programs are essential. In the Caucasus rapidly rising poverty and deteriorating governance has put pressure on forests to meet subsistence needs, while collapse of irrigation and drainage infrastructure and regional water shortages also threaten rural livelihoods. The Caucasus, like the Balkans, is an area of great natural beauty and biological diversity, which if carefully managed can contribute to economic growth and poverty reduction.
- In Central Asia the key issue is water resources and salinity management, arising from excessive development of the Aral Sea watershed for irrigation, and poor water and drainage management. Reduced fertility is estimated to cost the Aral Sea Basin countries US\$2 billion annually in

reduced gross domestic product (GDP), while saline drinking water is causing increasing health problems. A second issue is management of the vast rangelands of the north, many of which have been converted into fragile arable lands that are now heavily eroded. Management of the upper watersheds, for flood and sedimentation control, and sustainable resource-based rural livelihoods, is the third issue.

- Russia is characterized by its vast size, accounting for 22 percent of the world's forests. Resource management thus has a global dimension. Restoring sound forest management is the first challenge; its ample forest resources, sustainably managed and attracting reputable investors in resource utilization, can provide livelihoods for 10 million people and generate substantial foreign exchange and public revenues. Fertility and erosion management on agricultural land is the second challenge, while improving water quality management in the major rivers, better to balance different uses, is the third. Russia has a well-established system of protected areas, which is now threatened by increasing budget constraints for conservation management.
- Water quality and water and land resource management in the region's seas and rivers is an issue throughout the region; especially critical are the Aral Sea Basin, the Caspian Sea, the Danube Basin and Black Sea, and the Dnieper and Volga river basins. In all of these rising pollution and nutrient runoff has reduced revenues from fisheries, damaged the tourist industry, and destroyed fragile ecosystems, and increased the incidence of waterborne diseases. In the Black Sea and Danube pollution is estimated to cost US\$700 million annually in reduced fisheries and tourism, and to cause 20,000 cases of water-related illness annually.

Strategic Framework

Much sustainable management is concerned with achieving a balance between different uses while conserving land and water quality and quantity for the future. There are interactions and tensions between population pressure, short-term economic development needs, the way people use scarce (or abundant) resources, and sustainable (or unsustainable) resource management. The pattern of use is in turn affected by policies, including access to resources, the incentive framework for their use, and governance. Natural resources have a number of particular dimensions, which make "markets" work imperfectly and that often require government intervention.

- Natural resource management has an intertemporal dimension; excessive groundwater withdrawals may provide irrigation water in the short run but will over time lead to increased costs of pumping as groundwater tables fall and eventually lead to water shortages. Forests that are logged take 90 years to regenerate in boreal and temperate climates, so conventional discounting techniques are not adequate instruments for making investment or management decisions.

- Natural resource management has a spatial impact; deforestation upstream in a watershed can lead to increased risk of flooding for downstream areas; excessive water withdrawals for irrigation can lead to lakes downstream drying up. These are classic externalities.
- Poor natural resource management may have irreversible impacts, as when species or ecosystems are lost; the region's steppe ecosystems in particular are threatened.
- Some aspects of natural resource management have a global dimension, including the impact of changes of use of Russia's forests, arctic ecosystems, and northern rivers on the global climate.
- Land and water management are closely interlinked; inadequate drainage of water for irrigation can lead to waterlogging and salinity of land; poor farming practices can increase runoff and pollution of water-bodies. And, of course, land without water is barren.

There are thus many public-good aspects to natural resource management, even when land or forests (or water rights) are privately owned, which create a need for public intervention if these resources are to be managed sustainably. Regulations and economic instruments both require sound institutions and good governance to be effective.

In the early years of the transition in ECA there was a hope that as a result of broad policy reforms, private-sector-led growth, and agricultural and income growth, would take off. There has been increasing acknowledgement both that the reforms will take time, especially in the Newly Independent States (NIS) of the former Soviet Union, and that more direct assistance is also needed to prevent further increases in poverty and to manage the natural resource base sustainably. While policy reform helps to create the framework for economic growth, assistance with improved management of water (irrigation or fisheries management), land (seeds, extension, inputs, salinity control) and forests (forests and watersheds) provides more direct support to increase incomes.

This paper examines how the Bank's ECA assistance program for sustainable use of natural resources has met and can help meet strategic development "pillars" described in the present World Development Report on Poverty and Development. These are summarized below as they relate to natural resources.

- **Increased Opportunity** translates into increased incomes and poverty reduction, and improvements in living standards through more sustainable use and management of natural resources (land, water, forests). Rural populations are generally poorer than urban and more dependent on natural resources for their livelihood. Improving natural resource management usually has a key role to play in poverty-focused improvement of rural living standards.
- **Improved Security** translates into reduced vulnerability, and thus more robust production and ecosystems better able to cope with droughts, floods, and other disasters (through better farming methods, increased access to irrigation water, better river basin management, and access to forest, crop, and animal protection services).
- **Increased Empowerment** translates into local participation in decision-making and, thus, improved access to and control over natural resources by local populations. In order for there to

- be real access, the broader governance framework needs to support transparency and accountability.
- **Improved Capability** translates into improved health, primarily through reduction in waterborne diseases In Central Asia increased groundwater salinity has affected drinking water quality, while blowing sand, dust, and salt from wind erosion contributes to poor air quality.

A natural resources strategy or substrategy, within this broad framework would have the following elements. Following an assessment of the natural resource base, it would:

- Help client countries assess their natural resource base and evaluate alternatives for sustainable use, taking into account balances between cost-effectiveness, intersectoral, spatial and intertemporal dimensions;
- Develop plans, investment programs, and environmental assessments for sustainable natural resource management and use, and assure adequate implementation, monitoring, and evaluation;
- Modify regulations and governance of natural resources in order to assure transparent management and modification in the role of the state and the private sector. Clear rules regarding equitable access to resources, and consensus regarding these, are needed. Decentralized, participatory approaches are often more effective but depend also on transparency in local power structures.
- Modify prices, taxes, and incentives that reflect scarcity and more likely lead to sustainable management. Even where resources are abundant, pricing should reflect the costs of renewal.

Most countries in ECA have already carried out extensive programs for natural resource development, and the information base for evaluation of natural resources is good. The difficulty has been to take into account in these plans the dimensions that are necessary for sustainability, and to ensure equitable access. The transition, with privatization of land and other assets, changes in the price regime, and, in many countries, increasing governance problems and social hardship, also poses new challenges.

Central Europe and the Balkans, Moldova, and the Caucasus have in place many of the four pillars of a sustainable natural resource management strategy summarized above, while it has been more difficult in Ukraine, Belarus, Russia, and Central Asia to achieve political consensus for all of these areas. It should be emphasized also that certain elements of sustainable resource use are consistent with a centrally planned approach to economic development, while market economies also do not have a good history of sound natural resource management. The spatial, intertemporal, cross-sectoral, irreversible, and global dimensions of natural resources require government intervention, and carefully adapted, transparent policy.

Strategy Implementation

ECA's strategy addresses the priority issues of the subregions summarized above, within the overriding objectives of poverty reduction, economic growth, and sustainable natural resource utilization.

- Restoration of irrigation and drainage infrastructure and controlling salinity is a central theme in improving water management, while institutional reforms to decentralize management to users and introduce water pricing to cover maintenance costs and provide incentives for resource conservation is another. River basin management has helped our clients balance and prioritize conflicting uses, though the process is only beginning. Flood management and disaster planning and mitigation is a successful area for assistance and helps reduce our client countries vulnerability.
- For forest management our strategy focuses on helping our clients achieve transparent and sustainable resource management, separating “public” and “commercial” functions and assuring clear and equitable rules for access to forest resources by local populations and investors. Adequate resource valuation, and a taxation and incentive system for sustainable use, are additional features. Community-based forest and natural resource management for poverty reduction is a focus in the mountainous areas. We are also supporting ecosystems conservation and management programs that maintain landscape and biodiversity values while increasing access to resources by local populations.
- We are beginning to work on farmer support services that respond to the requirements of restoring soil fertility and helping new owners with sustainable land, livestock, and biological resource management practices, but this process also is at an early stage. It is in improved land management that we will need increasingly to focus our assistance over the coming years.
- Development of integrated river basin and regional seas management programs has been a feature of our assistance since the early 1990s. We are increasingly complementing this by in country investments but are constrained by the financial difficulties of our borrowers.
- We have substantial assistance programs supporting community-based approaches in biodiversity and protected area management. We will need increasingly to complement these with support for integrating ecosystems management with agricultural and forest production systems.
- We are likely to focus increasingly on southeastern Europe and the Former Soviet Union (FSU) countries, rather than on the EU accession countries of northern and Central Europe that will have better access to concessional funding from different sources.

Instruments

Our assistance strategy is likely to combine lending and nonlending instruments, and increasingly to include cross-sectoral alliances as we work towards the poverty-reduction agenda, as well as partnerships with other agencies.

- **Lending:** Lending will be shaped by the willingness of our client countries to borrow for natural resource management activities, many of which have only long-term benefits, and by the contribution of natural resources to the country development agenda. We are likely to increase our assistance to irrigation and drainage infrastructure improvement and salinity management. We would encourage Water Users' Associations (WUAs) and management and financing of operation and maintenance by users. Major operations are under preparation in Uzbekistan and Kazakhstan. We are also likely to increase our assistance with dam safety and flood control. In forest-poor countries in the southeast of the region, we will help with participatory watershed and forest management with a focus on poverty alleviation and sustainable rural livelihoods. In the forest-rich countries we would emphasize improved forest management and utilization, and assistance to new forest owners. In land management we would assist with strengthening agricultural services that support fertility and biological resource enhancement, erosion control, and range management.

Where possible the Bank should pursue cofinancing or complementary financing with other partners or the Global Environment Facility (GEF), especially when supporting projects with externalities or public-good elements.

- **Guarantees:** Program investment guarantees, or guarantees to input providers, help to insure investors against noncommercial risk, including arbitrary changes in the policies and regulations. They can act as a powerful market-based mechanism for encouraging private investment and for encouraging governments to create sound regulatory environments. A guarantee operation for investment in sustainable forest utilization is under preparation for Russia. Guarantees for individual investors can also be provided by the Multilateral Investment Guarantee Agency (MIGA).
- **Global Environment Facility:** GEF has frequently provided us with the opportunity to start working in the forest sector on conservation management, and then to move on to broader areas of reform. GEF has also provided the catalyst for us to work on international waters programs. We hope to broaden our GEF assistance in three ways:
 - (a) through increasingly combining forestry and GEF biodiversity operations in order to match loan/credit and grant funds, respectively, for project activities with local and global benefits;

- (b) through promoting complementarity and mainstreaming between GEF and Bank operations using GEF as “catalyst” funding for international benefits, while focusing on country-specific investments; and
- (c) by providing assistance to Nongovernmental Organizations (NGOs) and local communities, using the medium-size grant window, which has been little used to date in ECA.

Generally, for GEF we will need to build our program especially in Central Asia, where we have limited assistance at present.

- **Economic and Sector Work:** Through Economic and Sector Work (ESW) we can work with client countries to link reforms in natural resource management with broader macroeconomic reforms. This should involve increasingly working across sectors and contributing to Poverty Reduction Strategy Programs (PRSPs), Country Economic Memoranda, Country Assistance Strategies, and Comprehensive Development Frameworks (CDFs), as well as focused and demand-driven subsector work. National Environmental Action Plans (NEAPs) have been useful for reaching consensus on environmental priorities. In general, our sector work is likely to be very operationally focused, and closely linked with the broader poverty-reduction agenda.
- **Partnerships and Alliances:** We will continue to work closely with multilateral and bilateral agencies and NGOs, supporting in particular the exchange of experience between ECA countries, and between relevant Organization for Economic Cooperation and Development (OECD) and ECA countries. We will take advantage of new opportunities for collaboration. The World Wildlife Fund/World Bank Forestry Alliance supports targets for increasing the areas of forest under sustainable management and increasing protected areas, and provides a vehicle for policy dialogue. Debt for Nature Swaps are generally bilateral agreements, but we can help to facilitate these more in ECA than we have in the past, while the Prototype Carbon Fund will provide future opportunities.

Structure of the Main Report

The main report starts by summarizing the principal natural resource management issues by subregion, while chapter 2 describes the broad framework and elements of a natural resources strategy for the ECA region. Chapter 3 describes the evolution of our assistance program in natural resources in the region over the last 10 years and our emerging strategy, while chapters 4 and 5 point to future directions. The report is complemented by a number of annexes, which describe in more detail the principal natural resource management issues, present geographical and socioeconomic data, and summarize our assistance program by subsector.

I. Sustainable Natural Resource Management Challenges

The Eastern Europe and Central Asia region is characterized by its diversity, in geography and climate, in the abundance or scarcity of natural resources, in human well-being, in the policy directions taken by its governments and the constraints facing them. Per capita GNP varies from US\$370 (Tajikistan) to nearly US\$10,000 (Slovenia) and per capita internal renewable water resources from 232 m³ per (Turkmenistan) to 29,115 m³ (Russia). Similarly, arable land per capita varies from 0.14 ha (Tajikistan) to 1.99 ha (Kazakhstan), and forestland per capita from 0.1 ha (Armenia) to 5.98 ha (Russia). While Central European countries, close to West European markets have been able to adapt relatively easily to the economic transition, and have healthy rates of economic growth, it has been much more difficult in Ukraine, Belarus, Russia, and some Central Asian countries to achieve consensus for economic reforms. Several continue to face declining GNP and rising poverty. This paper does not focus on these broader economic and social issues, which are addressed in other sector reports on the region.

Very broadly, the regions in the north and west have abundant water and forest resources but agricultural land of only moderate quality and short growing seasons. Their main natural resource challenges include water quality and flood management, and sustainable forest management and utilization. The central belt, from Hungary through Romania, Ukraine, and southern Russia, has the best agricultural land, and the main issues are land management to sustain soil fertility and moisture and control runoff for high yielding crop production. The south and east of the region, in contrast, are water scarce and face difficulties with sustainable irrigation and drainage management, desertification of arable land and rangeland, and deforestation and erosion in fragile upper watersheds. The region has a long tradition of agricultural and forestry research, which has been distinguished in many areas. It has been slow to adapt, however, to economic and social change and to develop cost-effective “outcome-oriented” approaches, and funding for research has declined sharply.

While most countries have established systems of protected areas, biodiversity conservation has come under pressure from declining budgets and from rural communities that face increasing poverty. In most ECA countries, especially those outside the EU accession countries, the changing role of the state, confusion regarding public and private sector responsibilities, decline in law and order, and falling living standards have increased pressure on natural resources.

Chart 1, which summarizes the distribution of the main categories of productive land use, shows the importance of forestland in Russia and the Baltics, and arable land in the Danube Basin. Arable

land availability varies from 0.65 ha per person in Ukraine to only 0.14 ha per person in Tajikistan (roughly equivalent to Egypt). Chart 2 contrasts water use in the region; in the north and east the predominant water uses are for industry and municipal water, while in Turkey, the Caucasus, and in Central Asia water use for irrigation far outweighs other uses. Turkmenistan is the most water-scarce country with only 232 m³ per capita per year of renewable resources (similar to Jordan) while Russia has 29,115 m³ per capita of water. The maps at the end of the document indicate the geographical distribution of the main land use categories, together with the major rivers and mountains.

The region is rich in biodiversity, and comprises several “global 200” ecosystems, including southeast Turkey and the Black Sea and Volga Delta wetlands; the Caucasus, Carpathian, Balkan, Altai, and Tien Shan mountain ecosystems; the Lake Baikal area; and the Russian Far East (see map and Annex 2, Table 12). Several of the key species that now help to feed the world, including wheat, barley, chickpeas, and lentils, originated in Turkey, and their wild relatives are still found there. Key fruit and nut tree species, including apples, cherries, apricots, walnuts, and pistachios, also originated in the region. The FSU and most central European countries have well-developed protected area systems. Even before the transition, there was some participation by civil society in environmental concerns. The issues have been, rather, biodiversity conservation in the production landscape, threats to ecosystems from pollution, balancing sustainable ecosystem management with urban and tourist development needs (especially in Turkey, the Black Seam, the Adriatic, and the Balkans). Funding for protected area management has declined, and poverty and declining law and order have led to an increase in poaching and utilization of the resources of fragile ecosystems.

Coastlines are another broad consideration. The Adriatic, Black Sea, and Caspian coasts are important resources for tourism and human development. These differences in the natural resource base shape the main issues, and the strategic solutions.

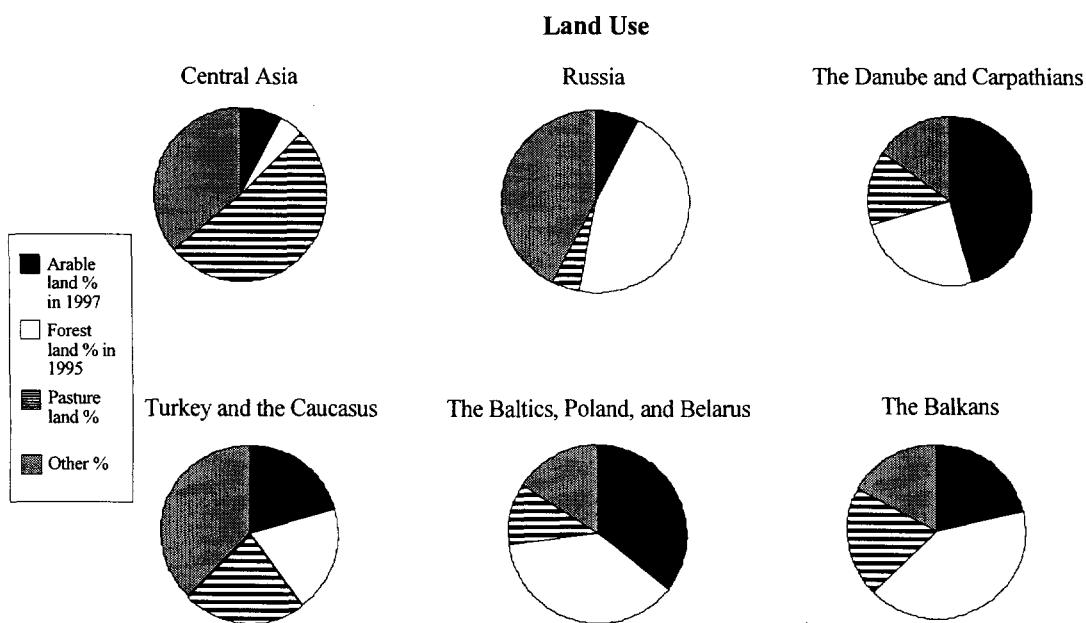
We should emphasize that while the region has a mixed history regarding natural resource management, many OECD countries have faced similar problems. It has proved especially difficult to manage successfully the conflicting claims on river basins; the Colorado Basin has been largely dammed and its waters diverted, with loss of ecosystems and pollution in the lower basin; fragile, drought-prone Australian landscapes have been developed for farming where less intensive uses might have been more appropriate, and until recently large-scale clear-felling of forests even on sloping land was common practice in Canada. In many regions there has been excessive development in river valleys and on coastlines vulnerable to flooding. The experience has been that by recognizing conflicts between different users, and between short-term and longer term benefits, more sustainable solutions can be developed.

Social, economic, political, and geographical issues shape natural resource challenges in the region. These are described in more detail in other reports prepared by the region; but Figures 7 and 8 at the end of this chapter illustrate the proportion of the population that lives in rural areas in each country, and the proportion of poor people living in rural areas. In general, the poor are concentrated in rural areas; the rural population accounts for 35 percent of the total population in Poland but over 60 percent of those living in poverty. In the Kyrgyz Republic 66 percent of the population and 90

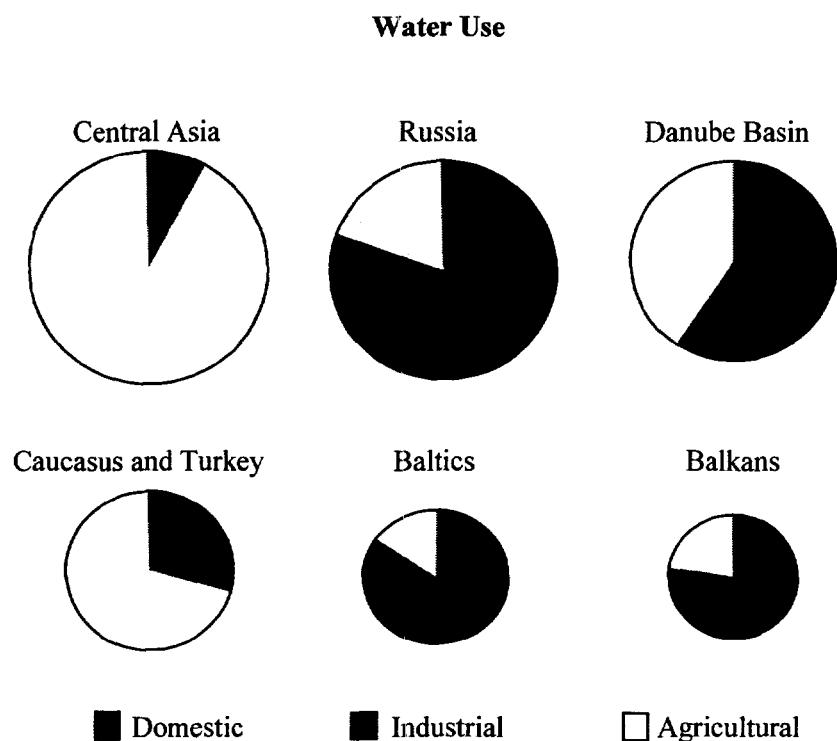
percent of the poor are rural, while in Bulgaria the figures are 31 percent and 43 percent. A strategy focused on poverty reduction and economic growth would therefore need to address natural resource management. Figure 6 illustrates the importance of agriculture (and sound land, forest, and water management) in the economy; agriculture is key, especially in Turkey and the Caucasus and Central Asia, but also in Romania, Moldova, Ukraine, and Bulgaria. Figure 5 illustrates economic growth over the last 10 years. It shows that most countries have experienced sharp economic decline.

We have divided the region into six broad eco-geographical regions: Poland, the Baltic countries, and Belarus; Central Europe (Hungary and the Czech and Slovak Republics), Romania, and Ukraine, which share the Danube Basin and have substantial good quality agricultural land; the Balkans, comprising the former Yugoslav republics, Bulgaria, and Albania; Russia, which by its size and diversity must stand alone; Turkey and the Caucasus (Armenia, Azerbaijan, and Georgia); and Central Asia (Turkmenistan, Kazakhstan, Uzbekistan, Tajikistan, and the Kyrgyz Republic). Annex 1 describes natural resource management issues in some detail. The paragraphs below summarize these. The report describes the resource base in some detail, since it is the first time that the Bank has outlined a Natural Resources Strategy for the region. The charts in and at the end of this chapter also graphically illustrate some of the natural resource management challenges.

Chart I. Land Use in the ECA Region



Source: *World Development Indicators* (WDI). World Bank 1999.

Chart 2. Water Use in the ECA Region

Source: WDI 1999.

The Baltics, Poland, and Belarus

The subregion has a land area of 0.68 million km² and a population of 56 million. All countries except Belarus are well advanced with the reform agenda, and are preparing for EU accession. Agricultural land has been privatized, and in the Baltics a substantial proportion of forestland has been privatized also. These countries are forest-rich, and forests and forest industries play an important economic and cultural role. All countries are net exporters of forest products, and forest industries make an important contribution to employment and exports in Poland and Latvia, which are also developing market-based instruments for sustainable forest management, such as certification to meet the requirements of environment-conscious north European consumers.

All countries have abundant water resources except Poland, and are vulnerable to floods. There are difficult balances to be made between flood protection and environmental conservation, but excessive development in the flood plains, including draining of inland wetlands, may have contributed to the

problem. All countries have extensive wetland and coastal ecosystems, and all participate with the Scandinavian riparians in programs to improve management of the Baltic Sea. Rainfall averages 600 mm to 800 mm annually, climate is moderate and cool, and the terrain is flat or undulating.

Soils are in general of only moderate fertility and acidic, requiring frequent liming to be good for agriculture. Arable land comprises 30 percent of land area except in Poland where it is 46 percent. Cropland is quite intensively farmed and soils have suffered less than most others in the region from declines in input use. Arable land averages 0.6 ha per capita, and livestock, especially cattle and pigs, are important to the rural economy. Livestock numbers have declined less than in most other areas. There are problems of water pollution from agricultural runoff, especially from animal waste. For Poland and the Baltic countries farms are likely to be consolidated, and the proportion of people dependent on farming is likely to decline as the countries prepare for EU accession.

The key natural resource management challenges in the Baltics, Poland, and Belarus can be summarized as follows:

- Providing support services to assist the new private farm and forest owners to manage land profitably and sustainably, within a context of overall population decline; the need to take some land out of agriculture; and increases in the importance of the nonfarm sector;
- Adapting forest policies to the changing requirements of domestic and export markets, within a framework of sustainable forest management and a policy environment that is friendly to investment;
- Continuing to improve water quality, in the rivers and in the Baltic Sea;
- Assuring an appropriate balance in coastal and wetland management between tourism/recreation and industry, and conservation of coastal ecosystems; and
- Flood management for Poland.

The Danube and the Carpathians

This group of countries comprises Ukraine, Romania, the Slovak Republic, Moldova, the Czech Republic, and Hungary, with an area of 1.1 million km² and a population of 102 million. The latter three countries are preparing for EU accession, and all except Ukraine are well advanced with privatization of agricultural land, although Romania is facing difficulties with the transition; although Moldova has advanced with reforms, there is growing poverty, and it is now an International Development Association (IDA) country. Climate is moderate, with precipitation 600-700 mm and generally well distributed throughout the year, though rainfall is as low as 350 mm near the Black Sea.

The Central European countries and Romania are forest-rich; forests are in general well managed ecologically, are rich in biodiversity, and play an important role for forest industries, recreation, hunting, and tourism. Forests, particularly in Romania, have been managed to maintain natural

ecosystems, and Romania harbors Europe's largest populations of several large mammals, including bears and wolves. Forest industry has yet to recover in Romania, one of the 10 largest furniture exporters in the world. Forestland restitution has been accompanied by effective regulations and support services in Central Europe but poses a challenge to sustainable management in Romania.

The Czech Republic and the Slovak Republic are water-abundant. Ukraine and Romania are both downstream riparians of major rivers—with rainfall falling to 350 mm near the Black Sea, irrigation is necessary. The Danube accounts for over 50 percent of the pollution discharge into the Black Sea, and there are serious water quality challenges, with damage to fisheries and coastal tourism estimated at US\$700 million annually. There are also globally significant wetlands in the Danube Delta and along the northern Black Sea coast. Hungary, like Poland, is vulnerable to floods, and vulnerable to accidents and discharges of hazardous waste into tributaries of the Danube from Romania's extensive mining industry upstream of Hungary.

These countries all have extensive arable land, including the most fertile soils in the region, with arable land per capita of 0.28 ha to 0.65 ha. Agriculture accounts for 70 percent of merchandise exports in Moldova, and sound agricultural land management is key to the country's economic survival. Irrigation infrastructure has deteriorated in Ukraine, Moldova, and Romania, and fertilizer use in these countries is now inadequate to maintain soil fertility. Intensive livestock raising was practiced in most of the countries, but livestock numbers have sharply decreased.

The key natural resource management challenges in the Danube and the Carpathians can be summarized as follows:

- Supporting sustainable agricultural land use practices while improving real access of private farmers to land, inputs, and support services;
- Managing natural and man-induced hazards from floods and industrial accidents, and managing development to reduce vulnerability to floods;
- Addressing water quality management in the Danube River and its tributaries, supporting wetland management and recovery, and nutrient reduction and restoration of water quality in the Black Sea;
- Assuring sustainable forest management within the context of restitution to private owners; and
- Developing in Ukraine a local consensus for a basic reform agenda.

The Balkans

The Balkan countries comprise Slovenia, Croatia, Bosnia, the province of Kosovo, Macedonia, Albania, and Bulgaria. Land area is 290,000 km² and the population is at 24 million (excluding Serbia and Montenegro). Several countries are recovering from civil war, which has damaged infrastructure, burnt forests, and caused abandonment of forest and agricultural land because of land mines and

ethnic cleansing. Some, such as Albania, Bosnia, and Bulgaria, face widespread poverty, not necessarily linked to the pace of reform, and several face difficult governance and law and order problems. (Slovenia, in contrast, is the richest country of the region, and is preparing for EU accession). The Balkans are mountainous, with rich ecosystems and extensive and beautiful coastlines. Rainfall varies from 350-400 mm in the drier east and south to 1500 mm or more in the north. A Mediterranean climate exists in the south and near the coast, but it gets colder and more continental inland.

Most countries are heavily forested with a long tradition of good forest management and a rich species mix in the “geographical crossroads” of the Balkan Mountains, which are also tourist attractions. Forestland restitution has been successfully accomplished in Slovenia but poses challenges in Bulgaria. Rising poverty in Albania increases pressure on forests as the population turns to fuelwood for subsistence heating. Coastal forests are also an important tourist asset in the Adriatic, and the sustainability of coastal zone management is also important for Bulgaria. Except for Croatia and Slovenia, these countries are not water abundant. A special feature for Macedonia are a series of mountain lakes with unique ecosystems, and for Croatia its extensive Karst ecosystems. Irrigation is important in Albania, Macedonia, and Bulgaria, and there are regional water shortages; in Bulgaria the irrigation system, developed for large-scale farms, has collapsed following land restitution in small holdings, many of them to landowners no longer with a tie to rural areas; only 10 percent of the original irrigation command area is presently irrigated.

Arable land is relatively scarce except in Bulgaria, because of the mountainous terrain, comprising 0.3 ha or less per capita. Fertilizer use has remained adequate except in Bosnia and Albania, and most countries export high-value crops. Agricultural land has largely been privatized, but farmer support services remain insufficient and land holdings are fragmented. All countries have important livestock sectors, and in Albania community approaches to range and forestland management have proved effective.

The key natural resource management challenges in the Balkans can be summarized as follows:

- Assuring sustainable coastal zone management and forest ecosystems management to conserve fragile landscapes and maintain tourism and recreational values;
- Developing community-based forest, rangeland, and irrigation management in Albania and irrigation and drainage rehabilitation more broadly, and addressing governance issues;
- Providing adequate support services to new agricultural and forestland owners on privatized land to ensure sustainability and provide adequate incomes; and
- Cleansing the land of mines in war-torn areas.

Russia

For Russia, comprising 22 percent of the world's forest area, sustainable natural resource management is of global as well of national importance. Russia has 147 million people and a land area of 17 million km². Difficulties in achieving consensus for reform, problems with governance and public sector management, a broad problem of "nonpayments" leading to widespread tax avoidance and barter transactions between enterprises, declining living standards, and rising mortality rates, especially for men, all pose special challenges for sustainable natural resource use as well as for the economy more broadly.

Russia has 7.6 million km² of forestland, more than any other country (Brazil has 5.5 million km² and Canada 2.4 million km²). Almost all forests are publicly owned, and there is a good understanding of sustainable management, although with declining budgetary resources, forests are vulnerable to pests and fires. There are forest ecosystems of global importance, and forests are important in national culture for recreation and for nontimber products. They account for 2 million jobs and about US\$4 billion annually of export earnings. Timber harvests have declined dramatically because of the economic downturn, but the sector, if well managed, has an important role to play in economic recovery and public-revenue generation. Improved forest resource taxation, including increased stumpage fees, combined with other tax reforms, could increase public revenues while providing an incentive for more sustainable management.

Russia's water management problems are related largely to quality rather than quantity, although the south and parts of the east are vulnerable to drought. Construction of barrages for hydroelectricity has slowed water flow and reduced natural aeration, while industrial and municipal discharges have lowered water quality in most major rivers. Together these have damaged riverine ecosystems and fisheries, including the valuable sturgeon fisheries in the Volga and Caspian, and reduced the quality of drinking water. Marine fisheries are also an important, and poorly managed, resource, especially in the northeastern Pacific.

Much agricultural land is of average to poor quality, though there are fertile black soils in the south of European Russia. Soil and moisture conservation farming methods are rarely practiced, and there are problems with erosion, especially in the drier areas. Fertilizer application is below the level necessary to maintain fertility. Use of heavy machinery has led to excessive soil compaction. Yields of the main crops are very poor, though garden plots, intensively managed, are producing a substantial proportion of output. Although only 4 percent of the land is irrigated, 3 million ha of irrigation and 2 million ha of drainage infrastructure are in need of rehabilitation.

The key natural resource management challenges in Russia can be summarized as follows:

- Improving management of the forests to facilitate poverty reduction, economic recovery, and sustainable resource management;
- Supporting recovery of soil fertility through sound land management practices;

- Facilitating effective access to agricultural land and inputs within a market framework;
- Improving water quality through better municipal and industrial water management and agricultural practices;
- Sustaining fisheries resources through adequate monitoring, controls, and financial instruments;
- Meeting global commitments regarding climate change, international waters, and biodiversity conservation; and
- Improving the governance, taxation, and policy framework to achieve these aims.

Turkey and the Caucasus

Although Turkey is not a transition country, it is included with Azerbaijan, Armenia, and Georgia because all these countries have rich and diverse ecosystems, mountainous terrain, and vulnerability to earthquakes. The Caucasus countries are all IDA eligible and have faced problems of instability and increasing poverty, even though Armenia in particular has advanced well with the reform agenda. The region has a population of 80 million and an area of 0.96 million km². Rainfall varies from over 2000 mm along the Black Sea coast to 350 mm in the central Anatolian Plateau and only 300 mm in the most fertile areas of Armenia and Azerbaijan.

The country group is forest-scarce. Forests are rich in biodiversity, recreational, and watershed protection values, but, except in Georgia, are degraded by overgrazing by livestock, and cutting of trees for fuelwood by poor rural populations. In all, deforestation threatens fragile watersheds and increases the risk of flooding. Forests were managed for protection in Georgia, and increasing sustainable use of these resources presents a special challenge. In Turkey participatory approaches to watershed rehabilitation and irrigation are well established, but in all countries community involvement in forest management is still at an early stage.

Azerbaijan is water-scarce and highly dependent on irrigation. Rehabilitation of irrigation and drainage infrastructure is a high priority for Azerbaijan and Armenia. All the countries also face regional water scarcities, and choices between uses of water for irrigation and for longer term ecosystem conservation and fisheries. There are water quality issues in the lower watersheds. Most of the countries have extensive coastlines, parts of which have been seriously degraded by industrial development. Turkey also faces the pressures of a growing, and rapidly urbanizing, population concentrated in the coastal provinces.

Good agricultural land in all countries is relatively scarce and livestock is important. The countries have highly diverse agricultural sectors, and for the Caucasus agriculture's contribution to GDP has increased sharply over the period.

The key natural resource management challenges in Turkey and the Caucasus can be summarized as follows:

- Managing water resources to balance the needs of irrigated agriculture and increasing farm incomes with municipal and with nonconsumptive needs;
- Watershed management to maintain the fertility of agricultural, range, and forest land and increase the incomes of rural populations;
- Emphasizing the nontimber values of forests while meeting the needs of the rural population for fuel and livelihoods;
- Managing coastlines (except Armenia) to conserve ecological values and provide a sustainable basis for the tourism industry; and
- Maintaining the economic, ecological, and tourism potential of the Black and Caspian Seas.

Central Asia

The Central Asia countries, Turkmenistan, Kazakhstan, Uzbekistan, Tajikistan, and the Kyrgyz Republic have a population of 56 million and a land area of 3.9 million km². They are characterized by widespread poverty, difficulties with proceeding with economic reforms and improving transparency, and by harsh, semi-arid climates. Rainfall averages only 100 mm in the Aral Sea Basin, rising to over 1000 mm in the mountainous southern areas.

Water scarcity and water management issues predominate in the region, whose economies are heavily dependent on irrigated agriculture. The southern part of the region drains into the Aral Sea, and excessive water resource development has led to a reduction in its area by more than half, with widespread environmental consequences. Delta and riverine ecosystems have been lost. Blowing salt and increasingly saline groundwater around the sea have contaminated land and lowered the quality of drinking water. Poor drainage of irrigated lands coupled with deteriorating irrigation and drainage infrastructure in the river basin has over the years led to widespread problems of waterlogging and salinity, reducing yields. Up to 20 percent of the 8 million ha developed for irrigation is affected, with losses estimated at US\$2 billion annually. Although there is agreement between riparians, there are also strains between the relatively water-abundant upper watershed countries and the lower riparians, the major water consumers. Fertilizer use is below the levels necessary to maintain soil fertility. There are issues with dam safety, especially in Tajikistan.

Rain-fed agricultural and rangeland, especially in Kazakhstan, is fragile to erosion; soil- and moisture-conserving farming methods are rarely practiced, and wheat yields are very low. Some of this land should probably be returned to permanent vegetative cover, but communities are now dependent on cropped agriculture. Livestock are important, especially sheep, but there are also difficulties with sustainable management practices as land is privatized, especially in the Kyrgyz

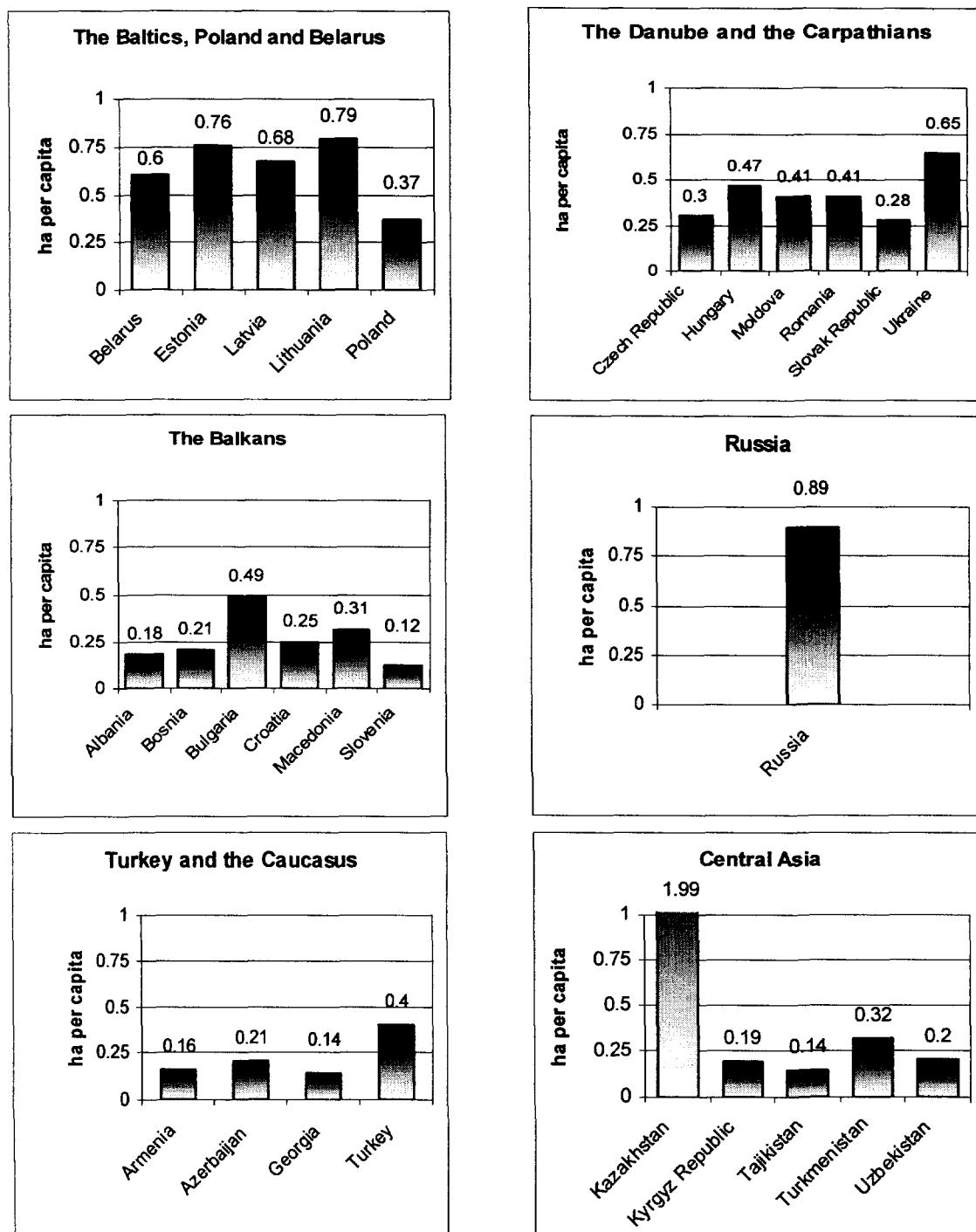
Republic. Kazakhstan's steppe lands are also considered of global importance as a carbon sink. Forestland comprises only a small proportion of land area, and its importance lies in sustainable watershed management and ecosystem conservation rather than timber production.

The key natural resource management challenges in Central Asia can be summarized as follows:

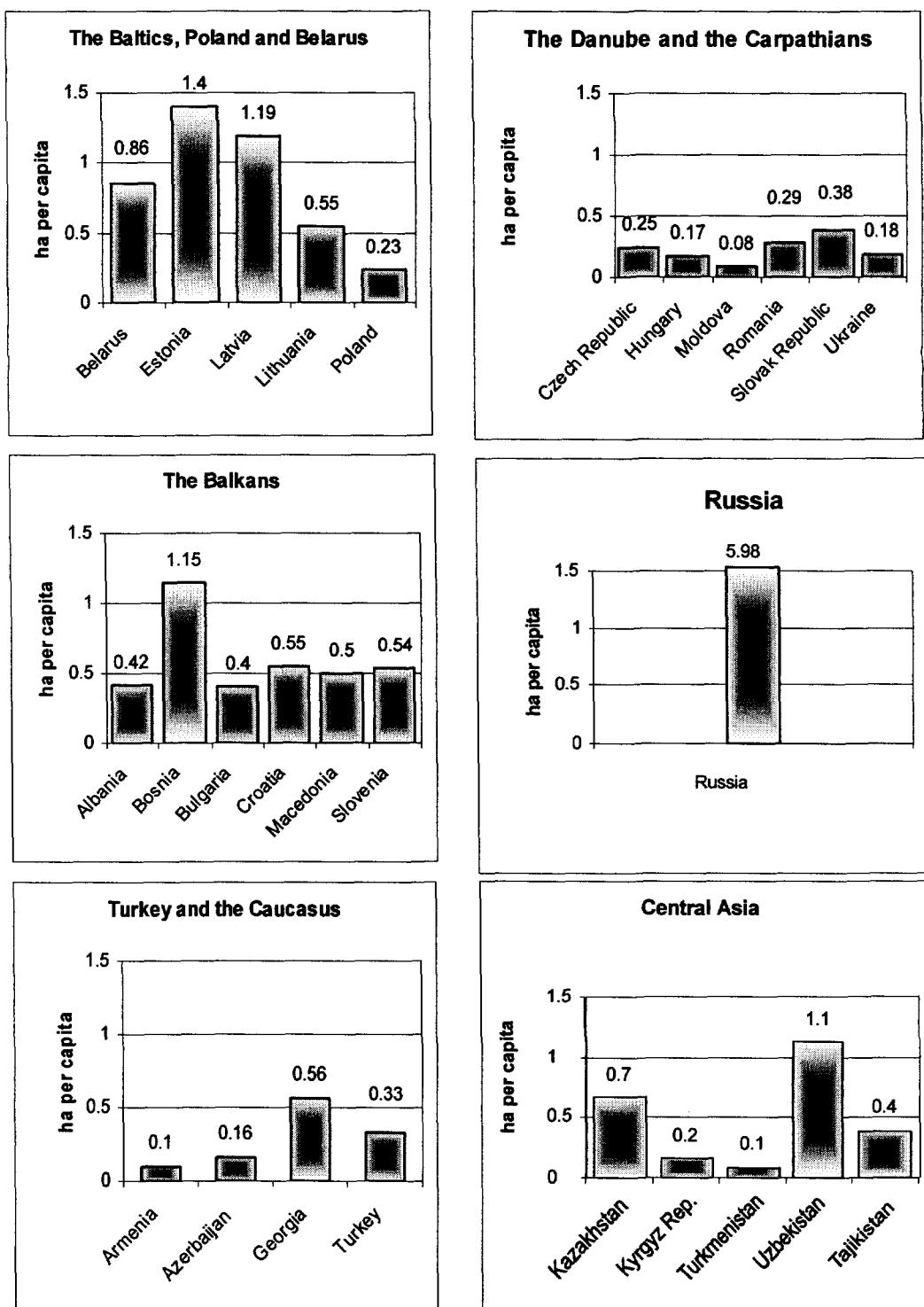
- Improving irrigation and salinity management to conserve water, increase productivity, contain environmental damage, and dispose of salts adequately;
- Managing agricultural and rangeland to maintain soil and moisture levels, restore fertility, and reduce erosion;
- Limiting further shrinking of the Aral Sea in order to contain further ecological disasters, limit health damages, and preserve remaining ecosystems;
- Converting tracts of saline wasteland into shrub, desert rangeland, or other land use with permanent vegetative cover; and
- Managing the upper watersheds to maintain ecosystems and productive vegetation for sustainable livelihoods and reduce runoff and flood damage.

Regional Seas

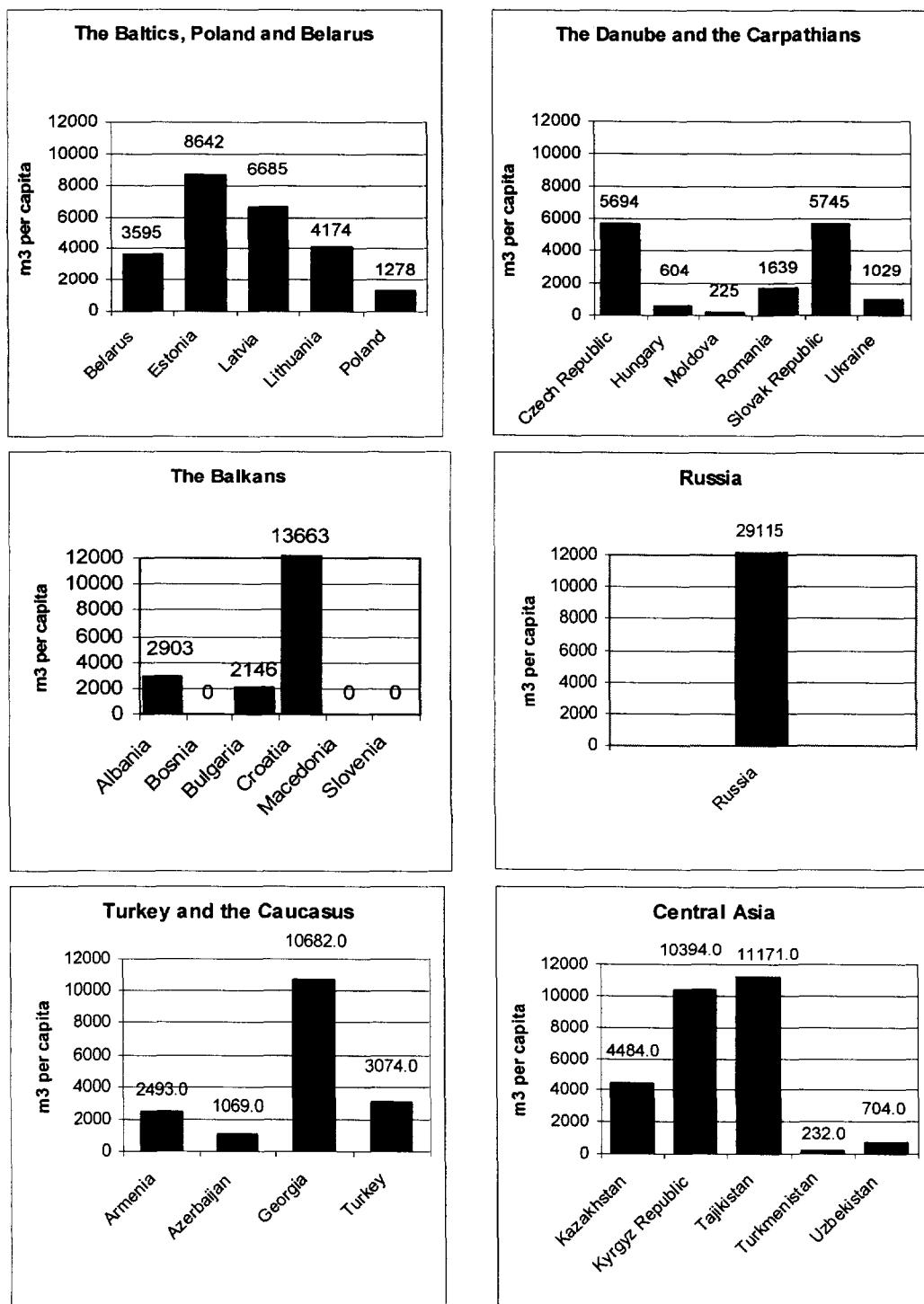
The ECA region has an additional feature: regional seas and rivers whose management poses challenges of cooperation between riparians. The Black Sea is heavily polluted, especially by the outflow of the Danube River, which accounts for 50 percent of the pollution load, and faces in addition challenges in coastal and marine fisheries management. The Baltic has benefited from a program of cooperation between the northern and southern riparians for 10 years, but pollution problems remain. The Caspian Sea faces problems of pollution from the Volga River, which accounts for 80 percent of the pollution load, and loss of fragile habitats in the Volga wetlands. There is coastal pollution from the oil industry, especially in Azerbaijan, and sharp declines in fish resources, especially in the lucrative sturgeon and caviar fisheries. The Aral Sea has already been described; once the fourth largest inland sea in the world, inflow to it has been reduced from 60 billion m³ to between 5-20 billion m³ annually, because of large-scale irrigation development in its watershed, while there are widespread problems of land salinization caused by poor drainage management.

Figure 1. Arable Land in ha Per Capita, 1997

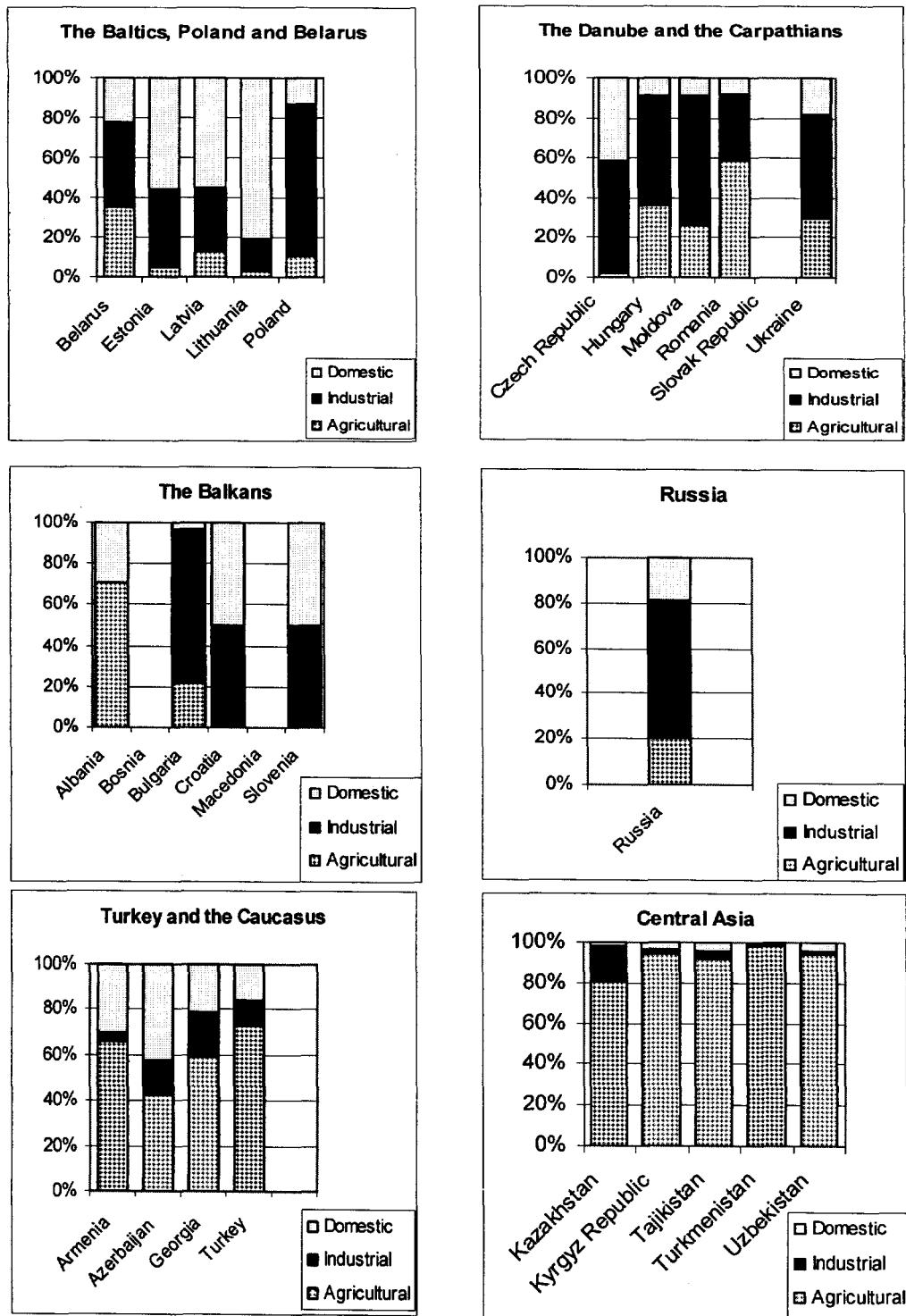
Source: WDI 2000.

Figure 2. Area of Forestland in ha Per Capita, 1995

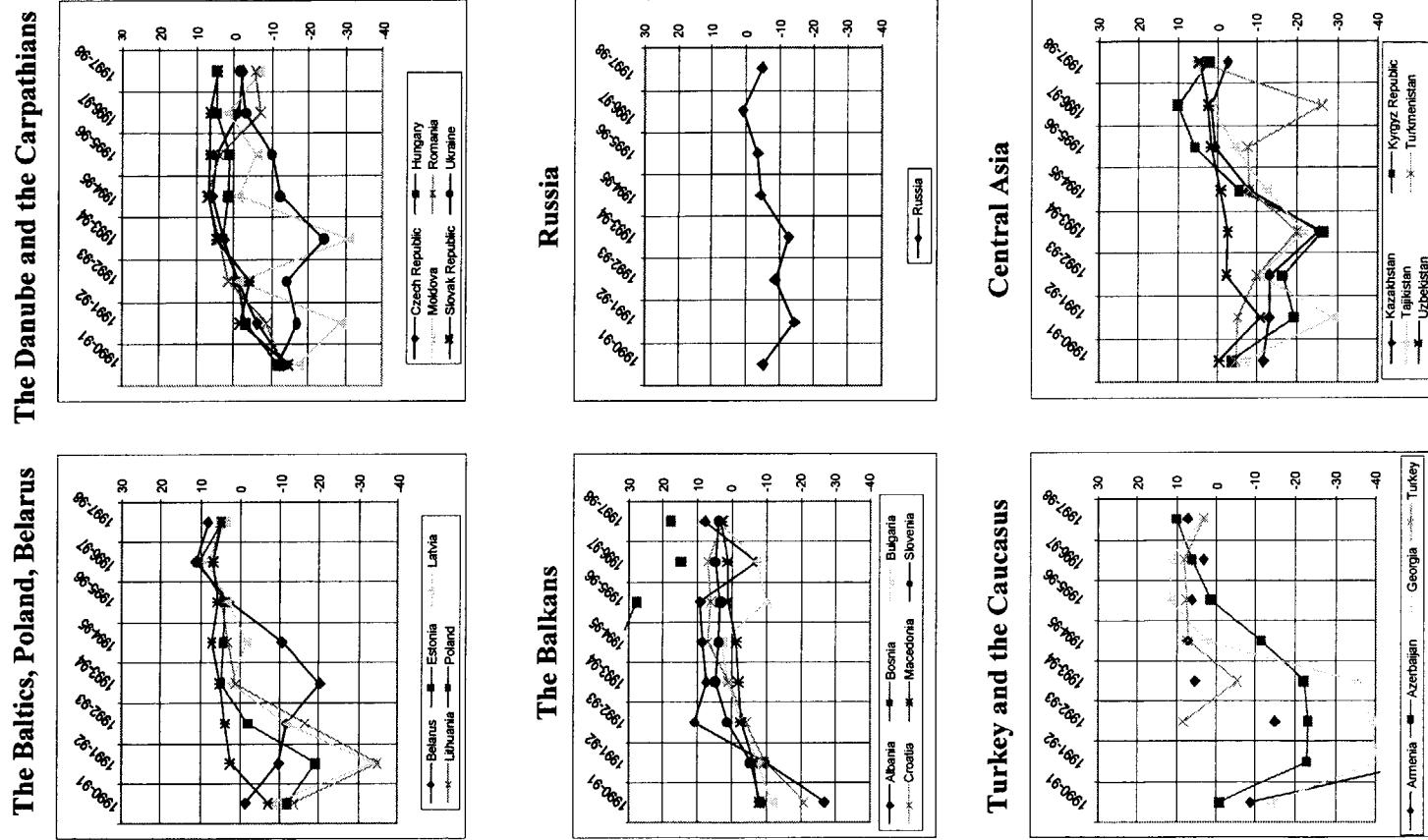
Source: WDI 2000.

Figure 3. Annual Renewable Water Resources in m³ Per Capita, 1998

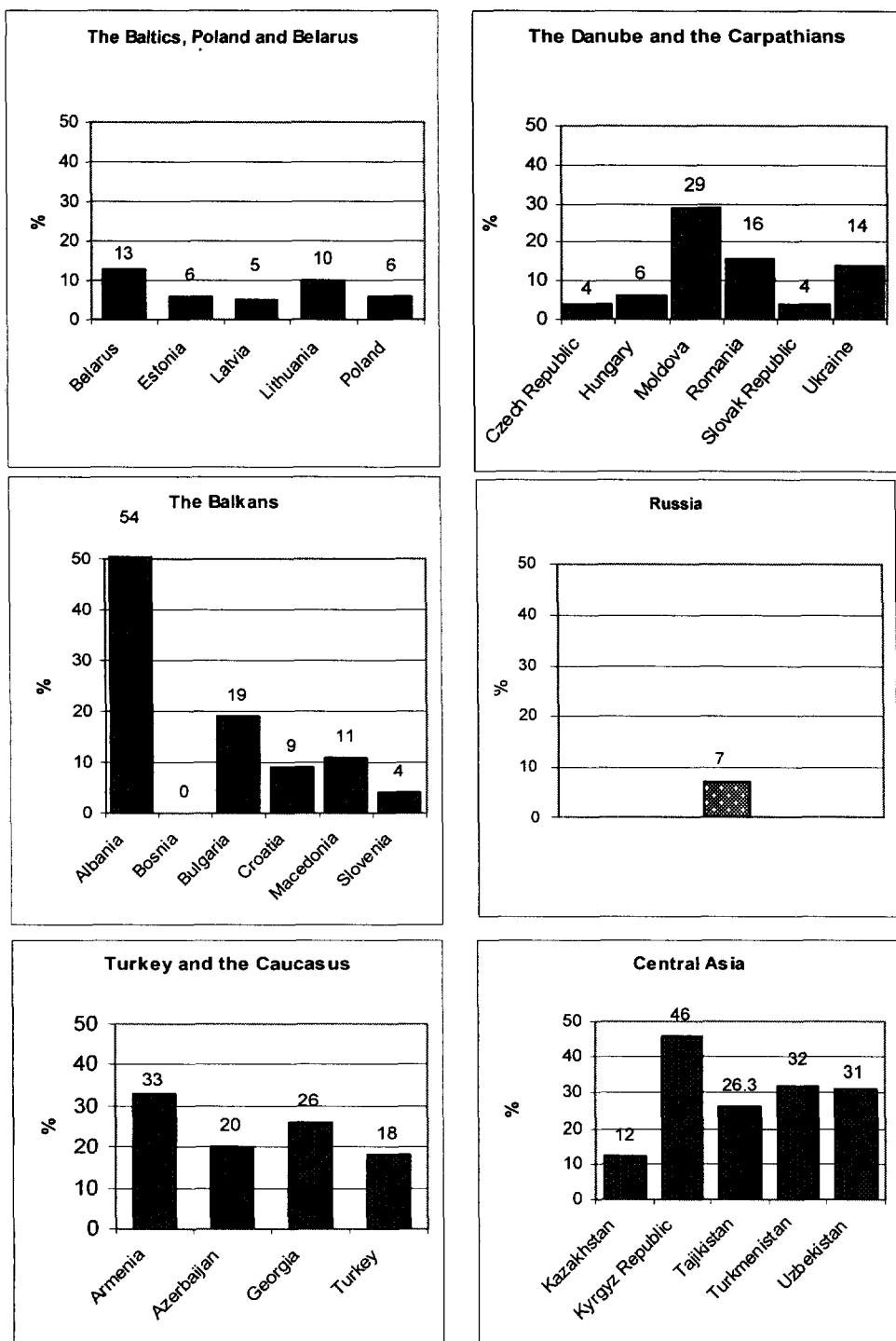
Source: WDI 2000.

Figure 4. Water Withdrawals By Sector, 1998

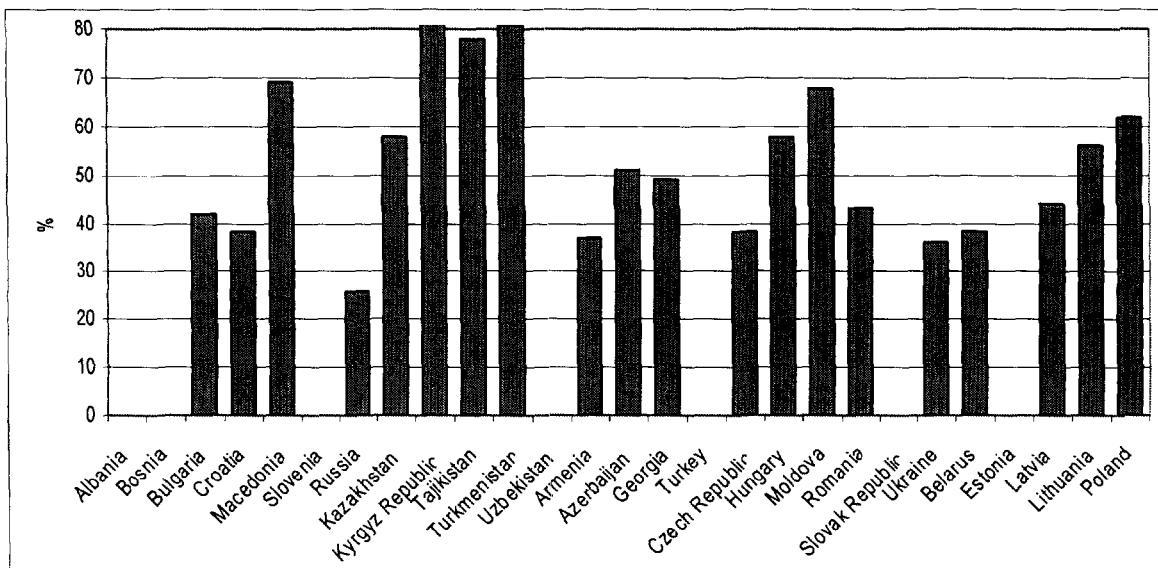
Source: WDI 2000.

Figure 5. Percent Change in Real GDP, 1990–98

Source: Economist Intelligence Unit, 2000; Country Reports, 1996–2000.

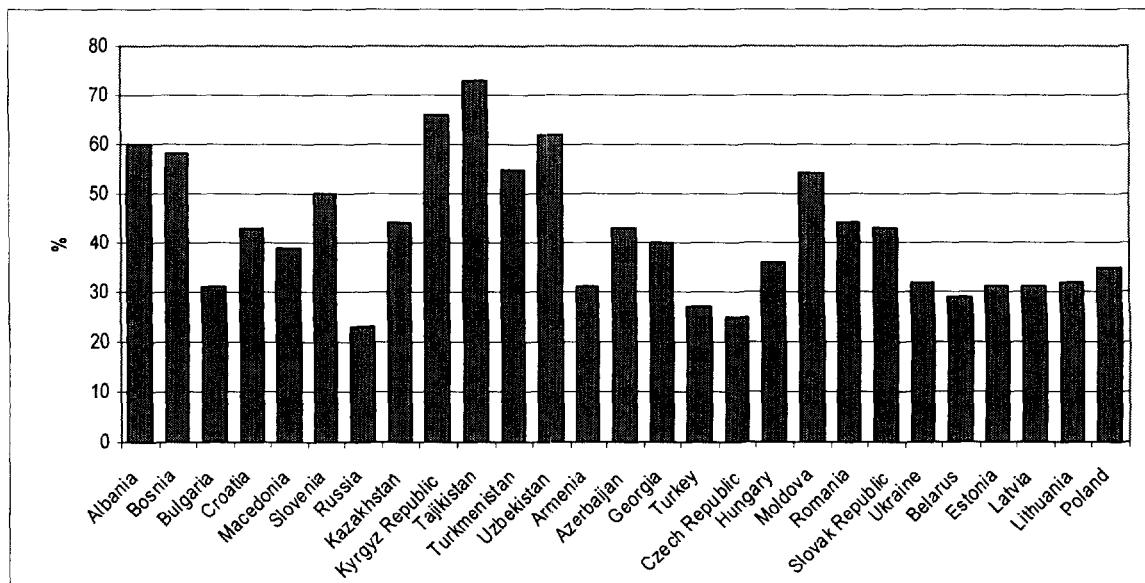
Figure 6. Agriculture Value Added, as Percent of GDP, 1998

Source: WDI 2000.

Figure 7. Share of Poor in Rural Areas¹

Source: World Bank: Europe and Central Asia Region, "Making the Transition Work for Everyone: Poverty and Inequality in ECA." May 2000.

The share of poor people in rural areas is higher than the share of rural population in total population.

Figure 8. Rural Population, 1998 (Percent)²

Source: WDI 2000.

2. Strategic Framework for Natural Resource Management

The region is more industrialized and urbanized than most others, but as illustrated in the charts in chapter 1, in several countries agriculture is a larger share of GDP than in South Asian or African economies. The region has been a focus of Bank assistance for only 10 years. **The focus of this paper is to summarize our strategy for assisting our clients with sustainable use of natural resources, within the overriding objectives of poverty reduction and sustainable economic growth.** It complements three other strategic documents being prepared by ECSSD—the Rural Development Strategy, Environment Strategy, and Social Development Strategy.

Natural resources in this paper are confined to “nonmineral” natural resources, land, and water, and management of these resources includes management of the plant and animal life dependent on them. This includes, for land, farming, forestry, recreation, range and pasture, urban/industrial uses and terrestrial ecosystems. Water uses include irrigation, municipal and industrial uses, and recreation, wetland/aquatic ecosystems, hydropower, navigation, and fisheries. There are close interactions between land and water management.

Much sustainable management is concerned with achieving a balance between different uses, while conserving land and water quality and quantity for the future. There is interaction and tensions between population pressure, short-term economic development needs, the way people use scarce (or abundant) resources, and sustainable (or unsustainable) resource management. The pattern of use is in turn affected by policies, including access to resources, the incentive framework for their use, and governance. Natural resources have a number of particular dimensions, which make “markets.” work imperfectly and that often require government intervention:

- Natural resource management has an intertemporal dimension; excessive groundwater withdrawals may provide irrigation water in the short run but will over time lead to increased costs of pumping as groundwater tables fall and eventually lead to water shortages. Forests that are logged take 90 years to regenerate in boreal and temperate climates, so conventional discounting techniques are not adequate instruments for making investment or management decisions.
- Natural resource management has a spatial impact; deforestation upstream in a watershed can lead to increased risk of flooding for downstream areas; excessive water withdrawals for irrigation can lead to drying up of downstream lakes. These are classic externalities.

- Poor natural resource management may have irreversible impacts, as when species or ecosystems are lost.
- Some aspects of natural resource management have a global dimension, including the impact of changes of use of Russia's forests, Arctic ecosystems, and northern rivers on the global climate.
- Land and water management are closely interlinked; inadequate drainage of water for irrigation can lead to waterlogging and salinity of land; poor farming practices can increase runoff and pollution of water bodies.

There are thus many public-good aspects to natural resource management, even when land or forests (or water rights) are privately owned, which create a need for public intervention if these resources are to be managed sustainably. Regulations and economic instruments both require sound institutions and good governance to be effective.

In the early years of the transition in ECA, there was a hope that, as a result of broad policy reforms, private-sector-led growth, and agricultural and income growth, would take off. While policy reform helps to create the framework for economic growth, assistance with improved management of water (irrigation), land (seeds, extension, inputs, salinity control) and forests (forests and watersheds) provides more direct support to farmers to increase incomes. There has been increasing acknowledgement both that the reforms will take time, especially in the Commonwealth of Independent States (CIS) countries, and that more direct assistance is needed to prevent further increases in poverty and to manage the natural resource base sustainably. Figure 5 at the end of chapter 1 illustrates the economic decline of several of the countries in the region.

This paper examines how the Bank's ECA assistance program for sustainable use of natural resources has met and can help meet strategic development pillars described in the present World Development Report on Poverty and Development. These are summarized below as they relate to natural resources.

- **Increased Opportunity** translates into increased income and consumption, and improvements in living standards through more sustainable use and management of natural resources (land, water, forests). Rural populations are generally poorer than urban and dependent on natural resources for their livelihood. Improving natural resource management usually has a key role to play in poverty-focused improvement of rural living standards.
- **Improved Security** translates into reduced vulnerability, and thus more robust production and ecosystems better able to cope with droughts, floods, and other disasters (through better farming methods, increased access to irrigation water, better river basin management, and access to forest, crop, and animal protection services).
- **Increased Empowerment** translates into local participation in decision-making and, thus, improved access to and control over natural resources by local populations. In order for there to be real access, the broader governance framework needs to support transparency and

accountability. Changing rights and access to land, water, and forests has been a particular challenge in transition economies.

- **Improved Capability** translates into improved health, primarily through reduction in waterborne diseases. In Central Asia increased groundwater salinity has affected drinking water quality, while blowing sand, dust, and salt from wind erosion contributes to poor air quality.

A natural resources strategy developed within this broad framework would have the following elements. Following an assessment of the natural resource base, it would:

- Help client countries evaluate alternatives for sustainable use, taking into account balances between cost-effectiveness, intersectoral, spatial, and intertemporal dimensions;
- Develop plans, investment programs, and environmental assessments for sustainable natural resource management and use, and assure adequate implementation, monitoring, and evaluation;
- Modify regulations and governance of natural resources in order to assure transparent management. Clear rules regarding equitable access to resources, and consensus regarding these, are needed. Decentralized, participatory approaches are often more effective, but depend also on transparency in local power structures; and
- Modify prices, taxes, and incentives that reflect scarcity and more likely lead to sustainable management. Even where resources are abundant, pricing should reflect the costs of renewal.

Most countries in ECA have already carried out extensive programs for natural resource development, and the information-base for evaluation of natural resources is good. The difficulty has been to take into account, in these plans, the spatial, intertemporal, cost-effectiveness and intersectoral dimensions that are necessary for sustainability, and to ensure equitable access. The transition, with privatization of land and other assets, changes in the price regime, and, in many countries, increasing governance problems and social hardship also poses new challenges. Chapter 3 summarizes the evolution of our natural resource management program over the last 10 years, while chapters 4 and 5 discuss the focus of a future strategy within the broad framework summarized above.

3. The Bank's Evolving Assistance Program

Rural, Natural Resources, and Environment Development Strategy up to the Mid-1990s

The initial focus of Bank work in rural development in the transition economies of ECA has been on macroeconomic and agricultural policy adjustment, including price, trade, and market liberalization. Progress with these reforms is described in the Rural Strategy document. A second area of focus was to assist the ECA countries with privatizing agricultural land and developing land markets. The Bank focused less on assisting its clients with sustainable natural resource management except in the forestry sector (see below).

We also assisted with a number of rural finance projects and helped with redefining government roles, for example, in research agricultural extension and seed production. In irrigation we focused initially on support to Water Users' Associations (WUAs), reducing government intervention in and support for irrigation. Our forestry operations also helped redefine public (management planning and regulation, ecosystems conservation, forest protection) and private (harvesting, transport and processing) roles.

In environmental management the initial focus was on reform of environmental and economic policies, particularly focusing on pollution prevention and abatement and on strengthening environmental institutions. Our analytical and strategic work emphasized the Central European countries and environmental and health implications of industrial and transport management. We also addressed EU accession issues, particularly compliance with EU environmental regulations, the global environmental agenda (climate change and biodiversity), and safeguard policies. We assisted with pollution abatement and solid waste projects. Again the focus was not on sustainable natural resource use.

We undertook National Environmental Action Plans (NEAPs) in most countries, which addressed natural resource management issues. The challenge, however, was that while these all had a multisectoral agenda and many involved widespread stakeholder consultations, frequently the environmental agencies took the lead, and there was not always buy-in by the key implementing agencies (in agriculture, forestry, and water) or the core finance and planning ministries, which continued with their own programs. At the same time NEAPs needed to avoid the perception of being continuations of central planning approaches. Their participatory, cross-sectoral approach was in many ways a precursor of the "comprehensive development frameworks" and "poverty reduction

strategy programs" currently being piloted in many World Bank countries. The Kyrgyz Republic's NEAP, completed in 1995, is an example of the comprehensive approach adopted (see Box 1). It has not been updated since. The ECA Environment Strategy under preparation also examines the record with NEAPs, particularly as regards their contribution to addressing urban and industrial pollution issues, including water quality, and to reforming environmental policies and institutions. This report focuses more on the links between sustainable natural resource management and rural development.

Box 1. Kyrgyz Republic—National Environmental Action Plan, 1995

The Kyrgyz Republic is landlocked and mountainous, with an area of 198,000 km², a population of 4.1 million and per capita income in 1995 of US\$830. Sixty-four percent of the population lives in rural areas, and agriculture accounts for about 40 percent of GDP. The Kyrgyz NEAP sought to identify critical environmental issues, agree with the government and the public on priority actions, mobilize external support for implementation, and set out a timetable for periodic updating. It involved wide-ranging stakeholder participation and consensus building.

Using criteria based on threats to human health and welfare, significance for economic recovery, efficient utilization of infrastructure, options for policy change and development of human resources, the NEAP identified five major areas of concern. These were: inefficient water resource management; land degradation due mostly to overgrazing; overexploitation of fragile forest resources; threats of irreversible loss of biodiversity; and inefficient mining and refining practices. Many of these threats were linked to increasing poverty.

The NEAP recommended upgrading of physical infrastructure for water and sanitation; support services in improved land management; community-based forest and grazing management; a biodiversity conservation strategy; improved monitoring and mitigation of health and environmental damages from mining and refining waste; and reducing dust emissions from district heating and power plants. It also recommended revisiting environmental laws, strengthening institutions, and improving enforcement and environmental impact assessment.

Programs are ongoing in several of the areas addressed by the NEAP, including improved water and sanitation. Except for biodiversity, the natural resource management agenda has been less well covered, with agricultural and livestock projects focusing on commercial rather than resource management support services. The ongoing CDF process has not addressed environment or natural resource management. The Kyrgyz Republic is now also facing broader economic reform and governance problems; GDP has declined sharply since the NEAP was undertaken and is now estimated at US\$380 per capita.

We may have been overoptimistic about the speed at which private-sector-led growth would take off, and over optimistic also about the speed at which fundamental social transitions could occur. In some cases we supported policy reforms where the institutional framework was lacking to implement them effectively, or to provide farming populations the support they needed to operate in the new economic conditions. Also, in several countries, even after privatization farmers did not generally have access to defined plots of land. Our agricultural services projects focused on helping newly privatized farms to develop business plans and gain access to financial services. While this was certainly necessary, it would have been useful also to address the land management issues connected

with privatization and the breakdown in the old system of support services. Box 2 illustrates the approach of the earlier Farmer Support Projects.

Box 2. Agricultural Extension—Russia Agricultural Reform Implementation Support Project, 1994**Loan US\$240 million (restructured, now US\$130 million)**

Agricultural extension helps farmers to become aware of and adopt to improved technology to enhance production efficiency and incomes. The process is complex and needs to be adapted to changing farmers' and institutional behavior. Most agricultural projects in ECA have included extension components; an early focus was on financial sustainability. This may have taken precedence over developing effective, publicly funded farmer information services (the pattern in most OECD countries).

Under the Russian Agricultural Reform Implementation Support Project, the Farmer Information and Advisory Services (FIAS) component sponsored creation of extension services centers at 29 oblasts and over 100 rayons. The objective was to provide technical, managerial, legal, environmental, and business information to restructured collectives and individual private farms.

Attention was given to institution building, including training of extension agents, some farmers, and relevant academic institutions. The component had an integrated approach in using various media to provide information, including printed material, seminars, the computer, and the Internet.

The project provided farmers with information on development of business plans, financial analysis, and relevant technical information to increase production and productivity. Initial surveys conducted have indicated satisfactory ratings from the clients of these centers. However, generally these services have reached only restructured collective farms and not individual private farmers, partly because of their size and their former relationship to these centers, and partly because they can afford to have access to computers. As the end of the project is approaching, it is not certain that the Russian government will be able to sustain these centers, although a very small number of them may be able partially to recover operation and maintenance costs.

We underestimated the decline in basic infrastructure and institutions to manage agriculture and the natural resource base as well as the increases in rural poverty in some of our member countries. The ECA contribution to the 1996 Rural Development Strategy Paper focuses on policy reform, public expenditure review, and removal of subsidies, land reform, regulatory frameworks for agribusiness, rural services and natural resources, and rural infrastructure. It notes that rural poverty is not the key issue in ECA countries, and that those with access to land have been able to cope with the crisis. The ECA environment strategy of 1994 focuses on the health impacts of environmental pollution, rather than on poverty reduction.

We have gradually increased our assistance to the poorest countries, even when there have been difficulties with advancing the reform agenda. But progress has been very uneven. Annex 3 summarizes our assistance program, for both lending and nonlending services, classified into the principal subsectors.

Land Management

We are supporting poverty-focused participatory approaches to sustainable watershed management in Turkey and Armenia, and we are supporting improved drainage and salinity management, especially in the Caucasus and Central Asia. These programs improve opportunities for sustainable livelihoods and empowerment by supporting community-based approaches. Much remains to be done, however, in supporting soil and moisture conservation and fertility enhancing measures in rain-fed farming. This may be in part because we are still struggling with the role that publicly financed extension services should play (as opposed to financially self-sustaining extension organizations). The support to land registration for newly privatized land also improves opportunity by addressing issues of effective access to land. Box 3 illustrates an approach to sustainable natural resource management, with a strong stakeholder participation element, that has been effective in Turkey and in countries outside the region.

Box 3. Turkey—Eastern Anatolia Watershed Rehabilitation Project, 1993

Cost: US\$115 million

The project had two principal objectives: restoring sustainable land-use management to degraded watersheds in three provinces of the Upper Euphrates River Basin; and increasing the incomes of the local population living in these areas, which are among the poorest in Turkey.

It introduced two institutional and behavioral innovations: provincial sectoral agencies (agriculture, forestry, and small-scale irrigation) worked together on an integrated basis in small watersheds; watershed rehabilitation programs were developed and implemented with the participation of local populations.

The project reached about 400,000 people living in over 50 watersheds. Integrated management plans were prepared, including improved management and cultivation of fodder, reforestation, soil conservation, improved arable farming and fruit farming, construction of ponds for supplementary irrigation; bee-keeping, and gully protection.

The project has strong support at both local and national level. The approach was extended to six more provinces in southern and southeastern Turkey and will now be adopted in up to 20 more provinces in a follow-up operation. The project has benefited from a high degree of local commitment (it increased local empowerment). It improved opportunity and access to resources through targeted interventions, was cost-effective, and could be maintained despite a difficult macroeconomic environment.

It was modest in its objectives, and this may also have contributed to its success. It shows also, however, that a long-term commitment to interventions of this type is necessary.

The issues in the central arable land belt of the region are different. The problems there have been caused by overuse of heavy machinery, compacting the soil, and insufficient attention to maintaining vegetative cover on soils vulnerable to erosion.. The focus was on short-term production maximization rather than sustainable production over time. Phasing out fertilizer subsidies has led to underuse of fertilizer by cash-short farmers. In these areas to date we have provided little support.

Box 4, however, provides another example of a successful approach that combines support for land privatization with infrastructure rehabilitation and farm support services. Like the Eastern Anatolia Project, it is focused on one geographical area and has thus been able to demonstrate results on the ground. It also included a widespread public information campaign.

Box 4. Azerbaijan—Farm Restructuring Project, 1996

Cost: US\$28.8 million

Agriculture in Azerbaijan has a diverse crop mix. It contributes 26-30 percent of GDP and accounts for 36 percent of employment and is a significant source of export revenues, mostly from cotton and horticulture. Three-quarters of the land is irrigated, and 46 percent of the population lives in rural areas. Most farms were collectives or state farms, but following independence production and input use declined dramatically. Government is committed to restructuring and privatizing the agricultural sector and reducing its role in marketing and agroprocessing, but the process has been slow and difficult.

The project objectives are to provide replicable models for farm restructuring in six farms covering 15,000 ha and 4,000 households in order to increase productivity and farm incomes, and promote an enabling environment for privatized agriculture through:

- Assisting with land registration, surveying, and mapping
- Providing information and advisory services to farmers
- Supporting WUAs
- Providing farm credit using a local bank as an intermediary and land as collateral, for seasonal inputs, machinery, and field irrigation improvement works
- Rehabilitating main irrigation water supply and drainage works
- Supporting community development, including community outreach and establishment of business centers

Experience to date has been very successful. Private farms have been effectively created on nearly 12,000 ha, most of the farmers have joined WUAs, and there has been much progress with rehabilitation of irrigation and drainage works. Land registration is almost complete throughout the country, and the credit program, though cumbersome, is successful. There have been some delays in establishing the farmer information and advisory services.

Key lessons: The project included a massive information campaign to farmers, informing them of their rights and opportunities, and there was political support for farm restructuring from the highest levels. State and collective farm land was redistributed through a lottery system that was perceived as very fair and transparent, and helped create ownership. Provision of credit and infrastructure was critical in making the new farms operational after privatization. All state and collective farm debts were written off, and this was an additional critical feature. Finally, complementing the privatization by land titling and registration helped generate added commitment from farmers.

The project illustrates an approach of addressing all the elements for successful farm restructuring in one geographical area, rather than attempting, often less successfully, one element countrywide.

Integrated coastal zone management is a relatively new approach even in OECD countries. It focuses very much on addressing issues of balance between competing uses, especially difficult along coastlines, which are important for ports and industrial development, as well as for tourism and recreation, and which often harbor fragile ecosystems. Our support to coastal zone management has benefited from concessional GEF financing but is largely limited to Georgia, although we have provided some institutional assistance to Turkey and Bulgaria. Water projects in the Baltics also included coastal zone management components. Coastal zone management, requiring much cross-sectoral coordination and the involvement of several local administrations, presents difficulties in many countries. Box 5 summarizes the objectives of the Georgia project, which is still in an early stage. Coastal zone management generally provides a regulatory and physical planning framework for land use and investment by the private and public sectors. It thus empowers sustainable development.

Box 5. Georgia—Integrated Coastal Zone Management Project, 1998

Cost: US\$7.6 million

Georgia has a land area of 70,000 km² and a population of 5 million. The Black Sea plays a crucial role in the welfare of Georgia's population. Fisheries, marine transport, oil production, tourism, agriculture and forestry activities are all dependent on coastal resources, which at the same time comprise the internationally important Kolkheti and Kobuleti wetlands. Georgia's coastline needs careful management to balance these conflicting pressures. Coastal erosion aggravated by upstream engineering and diversion works, point and nonpoint source pollution, draining of wetlands, overfishing, and risk of oil spills all threaten sustainable management of the coastline.

The project aims to strengthen institutions to manage Georgia's coastal resources through establishing a multistakeholder institutional framework; protecting and restoring critical coastal ecosystems; establishing a monitoring system and information network; assessing alternative solutions to coastal erosion; and developing oil spill contingency plans. The project focuses on the Kolkheti National Park and Konuleti Nature Reserve, and the port towns of Poti and Batumi. The project would need to be complemented by follow-up investments to assure full implementation.

At present project implementation is managed from Tbilisi. A Center of Excellence in Integrated Coastal Zone Management is being created. The objective is to decentralize implementation responsibility to the coast, once local and national government responsibilities are more clearly integrated and defined.

Water Management

During the Soviet period there were ambitious programs to develop irrigation infrastructure. While these helped to increase output, much of the land developed relied on high pumping lifts that cannot economically be irrigated now that energy subsidies have been phased out. Land privatization has posed challenges for redesign of infrastructure to the new smaller farm sizes. Water was also

underpriced in many countries, and excessive use of water led to drainage and salinity problems. Irrigation systems were mostly designed and managed by public agencies without much participation by farmers (though in some cases, such as Macedonia, irrigation levies were quite high). We now have a substantial assistance program under way in **improved irrigation, drainage, and salinity control**. It focuses on the strategic development pillars of "opportunity" by improving access to water and productive land for farmers, and "empowerment" by supporting local water users groups and decentralized management of irrigation and drainage infrastructure. Box 6 depicts our approach to Albania. Support to water users' groups has been a key and generally successful part of our assistance in several countries, including Bulgaria, Georgia, Armenia, and Turkey, with the approach also being adopted in Central Asia. A debate is ongoing as to whether a legal framework for water users' groups should be in place before substantial investments take place, or whether appropriate regulations will follow infrastructure rehabilitation and successful piloting of new approaches.

Box 6. Albania—Irrigation Rehabilitation Project, 1993

Cost: US\$45.7 million

The objectives were to improve rural living standards and increase agricultural production through rehabilitating 90,000 ha of irrigation and 80,000 ha of drainage infrastructure in nine coastal districts in Albania. Although land privatization was progressing rapidly, rural poverty was widespread and Albania had had little experience with market institutions. The project was completed two years, ahead of schedule, and led to a substantial increase in production of high-value summer crops and in family incomes. It supported water users associations, which initially managed tertiary canals, and have moved on to manage secondary and primary distribution systems on 21,000 ha. A second irrigation rehabilitation project is now being implemented.

The project was successful because:

- It established trust between farmers and the project by first rehabilitating canals and then gradually empowering farmers. Water users associations were started first on a pilot basis, when there were already results on the ground, and were provided with the autonomy to determine irrigation charges themselves.
- The project relied on the emerging local private construction sector through implementation of 270 small contracts, and supervising these carefully.
- Senior government officials helped to disseminate the concept of WUAs to farmers, having themselves been convinced by field trips to Turkey.

While WUAs need further strengthening, a legal framework for them needs to be established, and reforms among state-owned water enterprises are still to be made, there is a greater likelihood of these "framework" reforms succeeding as a result of successful implementation at the local level of the new approach. Even if the broader reforms move slowly, the project will still have achieved its objectives.

In some countries, particularly in Central Asia, we were perhaps overinsistent on policy reforms before participating in priority investment programs, rather than quickly identifying urgent investments and using the dialogue created by our assistance as a vehicle for building consensus for reform. We underestimated the speed at which irrigation and drainage infrastructure collapsed, threatening rural livelihoods. We are now adopting a more pragmatic approach. Our planned assistance in rationalizing the irrigation investment program in Turkey by helping to finance completion of priority irrigation investments, however, despite good country dialogue, is constrained by our procurement regulations, which restrict us from financing existing contracts. (The issue in Turkey has been that the government has started to finance a large number of irrigation schemes without the financing to complete them. As a result completion periods may average 12 to 15 years, with tied-up capital and long delays in construction).

Many countries prepared river basin management plans, but the focus, as in the past in many OECD countries, was on maximizing the use of water for development without always taking into account long-term resource and quality implications or competing uses. In **water resource** management we have supported integrated river basin management approaches that address these questions of balance and prioritization in only a few countries (Armenia, the Volga, the Aral Sea Basin). In general, these have been funded through grants and are more effective when linked to investment lending, as in Armenia and the Aral Sea Basin. In a number of countries overall constraints on lending because of the broader country dialogue and reduced country budgets have limited our assistance. Box 7 illustrates our attempts to address integrated river basin management in the Volga, but illustrates also the difficulties. In many other countries, too, while we have been able to support analytical work on integrated river basin management, translating this into investments has been very difficult. The GEF-supported Black Sea and Danube Program, in the 1991-98 period, identified a program of urgent investments to improve water quality in the Black Sea Basin, but very few of these were financed because of the financial difficulties facing the Black Sea riparians. A new approach including multidonor strategic partnerships is now being piloted.

We are building up a program of assistance in **flood prevention and dam safety**, addressing the “security” development pillar. We have financed such projects in Armenia and Turkey. The Poland Emergency Flood Control project illustrates such an approach (see Box 8). In projects of this kind, it is frequently difficult to find a balance between addressing an emergency situation and preparing a well-defined investment and institutional strengthening program for future flood mitigation.

We have largely neglected helping our countries with **inland or marine fisheries management**, though a recent Environment Project for Azerbaijan does include support for rehabilitation of sturgeon hatcheries. Fish catch has declined drastically because of pollution and overfishing in the Black Sea and the Aral Sea, and there are governance issues with marine fishing in Russia that are leading both to unsustainable management and loss of government revenues. We are beginning work on a fisheries project in Albania. The Bank has limited technical skills in fisheries, yet fisheries resource management constitutes a classic public-good where there is a clear role for public sector regulation.

Box 7. Russia—Volga River Basin Study, 2000

The Volga Basin is home to 57 million people, nearly 40 percent of the population of Russia. The Upper Volga covers only 1.36 million km², 8 percent of Russian territory, but encompasses 45 percent of Russia's industrial production, 38 percent of arable land, and 39 administrative regions. The northern part of the basin is heavily forested. Agricultural and meadowland accounts for 46 percent of land use, and about 6 million ha of agricultural land are irrigated, mostly in the south. The Volga Delta is the largest and richest biologically in Europe. The entire length of the main-stem river, 3700 km, is navigable.

Total average stream-flow is estimated at 238 km³ per year, compared with withdrawals of only 7 km³ per year. However, since the 1930s the Volga has been effectively developed into a series of lakes by low-head dams, with a generating capacity of 114 mw. This has reduced the speed of flow and of natural dilution, and water quality issues are serious. Nearly half the municipal and industrial waste is discharged untreated, and agricultural practices do not follow principles for conserving soil, minimizing runoff, and protecting stream beds, and it is estimated that the sturgeon catch has declined by as much as 90 percent.

The Volga Revival Program was established by the Russian authorities with the objective of drawing up an integrated policy and investment program for addressing the multiple needs of the Volga River Basin's population, while restoring the river and delta ecosystems. The Bank has assisted the Russian authorities with developing priorities for basin management, and criteria for evaluating policy reforms and investments against these priorities.

One difficulty has been to match basinwide priorities with financial constraints. A municipal water/waste water project is under preparation, with 12 out of 15 participating municipalities within the Volga Basin. These have been selected primarily on financial eligibility criteria (there are good reasons for this, given the current fiscal crisis). None are in areas identified as a priority on pollution, environmental health, or poverty criteria.

Substantial fiscal decentralization is ongoing. Because of budgetary difficulties at the central level, the federal government on-lends Bank funds to regions at a "spread" that varies but which can be several percentage points. However, because many regions owe money to the federal government, they are considered ineligible to borrow by the Ministry of Finance even at these terms.

Box 8. Poland—Emergency Flood Recovery Project, 1998**Cost: US\$498 million, Loan US\$200 million**

In 1997, Poland suffered devastating floods, the worst in 200 years. Over 400,000 ha were flooded and 15 million people affected. The floods destroyed buildings, infrastructure, crops, and livestock and damaged over 3000 km of dikes. They also exposed weaknesses and institutional rigidities in Poland's flood management and mitigation system. As a downstream country, and extensive development on low lying land, Poland is particularly vulnerable to floods.

The objectives were to restore basic infrastructure in affected communities, to make urgent repairs to the flood management system, and improve the policy and institutional framework for flood management and mitigation, concentrating on the most heavily affected areas of Poland.

The project supports the following investments: (i) rehabilitation of municipal and rural infrastructure; (ii) flood protection/management and hazard reduction, including upgrading of hydrotechnical infrastructure, modernization of flood management systems, and improved flood forecasting and planning; and (iii) administrative support.

The project was designed as an emergency operation; implementation faced initial difficulties because some investment components and procurement procedures were inadequately designed. These issues are now being addressed.

The GEF has helped us to build up a program for improved management of **regional seas**. In the Baltic and the Aral Sea, this has been accompanied by investments on the ground. These are only beginning in the Caspian and Black Sea/Danube program, and are constrained by limited capacity of riparian countries to borrow. The very long planning period, the extensive resources spent on coordination, and the delays in achieving concrete results have raised a number of questions. One particular difficulty is that there may be clear investment priorities, but concessional funding may be more readily available for planning and consultation than for investments. This has certainly been the case for the Black Sea, and also for a small project for improvement of water quality in Lake Ohrid, between Macedonia and Albania, where wastewater treatment and treatment of mine tailings from the Albanian side are the main priorities; but investment financing has been difficult to find. We are increasingly focusing on country-specific investments that may also have regional benefits, including a proposed strategic partnership between the Bank and the GEF on the Black Sea and Danube Basin, rather than on regional programs as such. Box 9 illustrates how water development policies in the Aral Sea focused on short-term production maximization rather than a balance of uses, and illustrates recent efforts to address these past policy failures.

Box 9. GEF—Water and Environmental Management Project—Aral Sea Basin Program, 1998

Cost: US\$21.2 million

The Aral Sea Basin covers 2.2 million km² and is home to 38 million people in five countries. Two major rivers, the Syr Darya and the Amu Darya, drain into it. The waters of these rivers are extensively used for irrigation, now comprising 8 million ha (more than twice Egypt's total irrigated area). As a result, the inflow into the sea has declined from 60 to 5-20 billion m³ annually. The sea's surface has been reduced by half, and there is widespread land and water contamination from blowing salts and saline groundwater, in addition to loss of fisheries and wildlife habitat. Upstream, poor water management has led to waterlogging and salinity, affecting 20 percent of the irrigated area. Since the transition, funding for maintenance of irrigation and drainage infrastructure has collapsed. Losses to GDP from soil salinity are estimated at US\$2 billion annually. The economic and social future of the region is threatened. A further issue is that when all countries were part of the Soviet Union, electricity for the upstream riparians was generated with subsidized fossil fuels in the winter, with water releases for irrigation from upstream reservoirs in the summer. Now, with the removal of energy subsidies, hydroelectricity is generated in the winter, leading to excess water releases in the winter and shortages of irrigation water downstream in the summer.

The objectives of the project are to address the causes of degradation of the waters of the Aral Sea Basin. It would (i) strengthen water and salt management; (ii) raise public awareness regarding water conservation water management issues; (iii) complete a dam safety assessment, address sedimentation, and prepare investment plans; (iv) support improved monitoring of transboundary water flows and quality; and (v) restore wetlands.

The Committee of the International Fund to Save the Aral Sea (EC-IFAS) would implement the project. The Central Asian states had a long history of cooperation during the Soviet period, and have established new agreements following independence.

A number of investment projects in improved irrigation, drainage and salinity management, water supply and sanitation, and wetland management would also bring direct benefits to the population of the Aral Sea Basin.

Forestry and Biodiversity

Chapter 1 has illustrated that most of our client countries have well-established forest institutions and a good understanding of the biological principles of sustainable management. Forest management planning, however, needs increasingly to focus on multiple use and landscape values, while forest institutions and financing need to be adapted to the market economy. In several countries there are problems of transparency and governance; furthermore, restitution of forests to private landowners, while it has improved equitable access to forest resources, poses new challenges for sustainable management.

We have built up a program focused on helping our clients improve forest management and address forest protection and rehabilitation issues. An initial focus was on restoring forests damaged by industrial pollution (Poland), and on reconstruction following civil conflict (Croatia). New issues include sustainability in the context of restitution of forestland to private owners (Romania) or moving from forest management primarily for protection to multipurpose use (Georgia). A project proposed for Russia also aims to help improve the regulatory environment for private sector investment. The public-good element of forestry, while justifying Bank involvement, sometimes makes ministries of finance reluctant to borrow for activities that do not yield direct financial return. This also illustrates the ongoing debate regarding the appropriate role of the state in a transition economy. Sector work in Turkey and Romania has helped illustrate the broader values to the economy of forestry to core government agencies. In the case of Romania, this has supported development of an investment operation (see Box 10).

Box 10. Romania—Valuation of the Forestry Sector and Structural Reforms

There are 6.2 million ha of forests in Romania. Forests have been well managed in the past, with biological functions, watershed protection, and conservation well integrated into the planning and harvesting regime, which has focused on natural regeneration and maintenance of indigenous species. Forests also play an important role in Romania's social and economic development, providing a major source of rural employment and income from logging, wood processing, and nontimber forest products industries. Despite existing inefficiencies, the forestry sector is still a significant contributor to the Romanian economy. The 1997 export value of forest products was US\$860 million, and the sector's contribution to GDP was approximately 5 percent.

The nonmoney values of forests are larger than the financial, but traditional accounting methods have masked this. The Bank commissioned a Total Economic Valuation (TEV) of the Romanian forestry sector³. It indicates that the annual value of all products and services provided by Romania's forests is more than US\$3 billion. The capital equivalent of this annual production (using a 5 percent interest rate) is more than US\$62 billion. These estimates would be higher with the inclusion of downstream value added from the existing wood processing industries, and income derived from tourism, education, and research.

This analysis led to greater appreciation of the importance of the sector and its potential to contribute more to the national economy. It indicated the dangers with restitution to private owners in the absence of a phased approach to establishing institutional arrangements for management of private forests. Strategic investments in the public and private sectors, with adjustments of policy and legislation, could increase both sustainable harvest and value.

The Romanian authorities are now preparing an operation for Bank finance to assist with restructuring during restitution. It would help to finance implementation of regulations and programs to assist new forest owners with sustainable management on restituted land, new approaches to forest resource taxation and financing, and improved technologies for roads and advisory services for forest industries.

The ongoing revision of the Bank forest policy, and new initiatives such as the World Wildlife Fund (WWF)/Bank Alliance and the Forestry CEO forum, have helped us develop an evolving strategy for our assistance to the sector. Assistance to forestry addresses the opportunity pillar by creating opportunities for sustainable harvesting and marketing and benefits from the nontimber values of forests. Support to regulatory reform, transparency in regulations, and public consultations in forest management helps address empowerment. The Albania Forestry Project (see Box 11) illustrates an approach for supporting sustainable community-based forestry and range management in a weak governance environment.

Box 11. Albania—Community-Based Forest Management in a Transition Economy, 1996

Cost: US\$20 million

Albania has a land area of 27,000 km², a population of 3.3 million and per capita GDP of US\$750. Forests account for 38 percent of Albania's land area, and pasture land for a further 15 percent. Broad-leaved forests, mainly oak and beech, predominate, and fuelwood accounts for over 40 percent of recorded timber production. Pasture resources are also key for Albania, for which 60 percent of the population is dependent or partially dependent on pastoralism. Forest and pasture land are owned by the state. Since 1990 Albania has moved quite quickly with market-based reforms, but there have been increasing problems of governance and law and order, including illegal harvesting of timber.

The project had three objectives:

- restoration of degraded state-owned forest and pasture areas and promotion of their sustainable use;
- promotion of conservation of natural forest ecosystems;
- initiation of the transition of the forestry/pasture sector to a market economy, separating commercial from regulatory functions and establishing mechanisms for self-financing of the commercial activities.

In addition to assisting with improving forest management at the local level and reorganizing the forest sector institutions, the project is

- improving trade, marketing, and pricing policies to improve revenue;
- implementing an action plan to reduce illegal harvesting, in collaboration with local governments and the Ministry of Finance Tax Inspection;
- supporting community forestry by providing local communities with legal user rights for communal and forest pastures, assistance to improve their management, and mechanisms to reinvest users' fees into improved management training forest specialists in the public and private sector.

Lessons include the following:

Because of broader poverty, law and order, and governance issues, it has been difficult to control illegal harvesting and improve forest management on publicly managed land. The component supporting transfer of user rights and management to local communities has, however, worked very well; user rights have been transferred for 10 years. Local communities have been assisted with development of management plans, and have invested user fees in improving the resource. This component is being expanded, and may form the basis for a follow-on natural resources and environment project. In other sectors, including micro-credit, community-based approaches have worked very well in Albania.

Chapter 1 has indicated that many countries had well-established systems of protected areas. The challenge since the transition has often been to achieve a balance between ecosystems conservation and equitable access and use in a situation of rising rural poverty and governance problems. The GEF has helped us build up a strong portfolio in biodiversity conservation, and has also frequently provided an “entry point” for broader dialogue on sustainable forest management. GEF biodiversity projects in Russia, Central Asia, Romania, Belarus, Turkey, and Poland all helped us to establish a dialogue in the forestry sector. Projects recently approved in Poland and under preparation in Romania are addressing sustainable land management (see Box 12). They are able to secure GEF funding, however, largely because of the transboundary nature of the agricultural runoff. The earlier biodiversity projects in Central Europe and Russia did not address rural poverty, though involvement of civil society has been a key element in most. In Russia, regional biodiversity conservation programs involve a wide range of groups, including schoolchildren, locally elected deputies, border guards and factories. More recent projects, however, do have a poverty reduction focus, aiming to work with local populations for sustainable management.

Box 12. Romania—GEF Biodiversity Conservation Management Project, 1999**Cost: US\$8.8 million**

Natural temperate forest ecosystems cover 27 percent of Romania's land area. More than half of the forests were managed for conservation objectives, and include some of the largest tracts of undisturbed forest remaining in Europe. There is a full range of European forest fauna, rich and varied meadow and wetland ecosystems and, above the treeline, alpine ecosystems with a high degree of endemism. These ecosystems are under threat with the breakdown of central controls, and changes and uncertainties in regulations and forest management planning adapted to the emerging market economy and private ownership structure. Rural poverty is widespread, putting additional pressure on natural resources for fuel and grazing.

The project supports participatory planning and sustainable management of natural forest ecosystems and associated landscapes at three demonstration sites in the Carpathian Mountains, and replication of these approaches to other conservation sites.

It supports strengthening of the legal and regulatory framework for biodiversity conservation, institutional strengthening in biodiversity planning and monitoring, implementation of management plans, pilot ecotourism and bison reintroduction programs, and public support for biodiversity conservation.

A focus of the project has been a broad participatory approach to project design and implementation by ensuring stakeholder “empowerment,” while the project aims to secure local commitment to sustainable ecosystems management.

The role that the forests play in carbon fixation is linked to their size; valuation studies even in countries like Turkey with 9 million ha of forest have indicated that the carbon fixation value of the forests may outweigh other values. Russia, with 764 million ha of forest and 15 percent of the world's carbon stored in forests, overshadows all other countries in the role it plays in global carbon fixation. Substantial analytical work has been undertaken on global carbon values and expectations have been raised. However, the Prototype Carbon Fund is only starting to assist with financing carbon sequestration from forests, and there is still much progress to be made towards resolving broad political differences between the United States and Europe with regard to implementing the Kyoto Protocol. GEF has recently agreed that carbon sequestration in forests and agricultural ecosystems may be eligible for GEF support (under its new Operational Program no. 12), and this may open new opportunities for ECA.

Governance, Institutions, and Public Sector Management

Each of our client countries is facing social and economic upheaval associated with the transition from a centrally planned to a market economy, and development of democratic institutions. It has in general been easier for the Central European countries to adapt. They are geographically much closer to Western Europe, with easier access to markets and easy transport links; most have had only 50 years experience with centrally planned economies, and many retained elements of market economies (agricultural land remained privately owned in Poland). It has been much more difficult to achieve political consensus for reform in Ukraine, Belarus, and Russia, while even in Former Soviet Union (FSU) countries that have reformed quite quickly (Armenia, Moldova, Kazakhstan), GDP has declined and poverty and inequity have increased dramatically.

Chapter 2 summarized a strategic framework for natural resource management, including in particular its public-good elements, because of spatial, external, temporal, and irreversible issues connected with natural resources. Broad poverty and governance issues are covered in other strategic reports on the ECA region (See "Anti-Corruption in the Transition: Confronting the Issue of State Capture," and "Making Transition Work for Everyone: Poverty and Inequality in Europe and Central Asia"). These issues affect natural resources management in many ways and can be grouped as follows.

- **Sequencing and phasing in institutional reform.** Many countries of the FSU are restructuring the forest sector through the separation of regulatory and commercial functions, decentralization of state forest management, restitution of forestland to private owners, and cross-sectoral governance of forest sector development. In farming, large state farms are being broken up and their assets transferred to private owners. However, land privatization without supporting

regulations on land use, without farmer and forest owner support services, and without infrastructure development adapted to new small farm size can lead to unsustainable management. In Romania new forest owners, unsure of the future and in need of short-term cash, logged much of their newly owned forests; in Bulgaria new farm owners destroyed farm infrastructure in order to avoid paying for it; in Armenia many “privatized” livestock were exported to Turkey for slaughter.

- **Price Liberalization.** Removal of energy subsidies for heating, combined with rising poverty, has led to increased illegal cutting of forests for fuelwood. Higher irrigation water charges, without necessarily better water delivery, and to farmers still short of cash, has led to declines in on-farm maintenance of irrigation and maintenance infrastructure. Higher fertilizer prices have led to dramatic reductions in fertilizer use, to levels insufficient to maintain soil fertility.
- **Declining Governance and law and order.** Institutions and control mechanisms have in many cases collapsed without being fully replaced by accountable, transparent, and efficient institutional mechanisms and regulations. There have been increases in illegal harvesting and poaching in several countries, and widespread “barter” systems have replaced cash payments and taxable transactions in many countries. Civil unrest has been an added difficulty, especially in the Balkans, the Caucasus, and Central Asia.
- **Declining GDP and Budget Management.** As a result of declining budgets, governments have tended to focus on investments with short-term financial returns rather than longer term economic, social, and environmental benefits. Irrigation and drainage infrastructure in many countries has deteriorated dramatically, and there have been growing water quality issues as maintenance of wastewater treatment facilities has also deteriorated. Budgets for forest fire and pest management are too low to permit adequate forest protection. The system of nature reserves (*zapovedniki*) established under the FSU with central budgetary support is now inadequately financed, leading to increasing unmanaged use of their resources. Erosion control measures previously carried out on large state-owned farms have not been continued by new private landowners.
- **Emerging Civil Society and Increasing Transparency.** Community-based approaches to natural resource management have proved successful in many countries despite broader governance problems. Civil society has also begun to play a more active role; in Russia public awareness programs in biodiversity focus on elected representatives and children; in Romania NGOs have supported environmental education programs in the Danube Delta; and in Turkey provincial authorities have worked successfully with local populations in watershed rehabilitation. Water Users' Associations have been broadly successful.

- **Redefining the Role of the State:** In the early years of the transition, the traditional role of the state was sharply reduced without a clear understanding of the need for government intervention in certain areas. Many countries are beginning successfully to redefine the role of the state in natural resource management and to develop transparent, accountable institutions. Russia is undertaking financial and institutional reforms in forestry; the Aral Sea Basin states are addressing public-good issues in water resource management; and Georgia is addressing coastal zone management. This will take time.
- **Changing Access to Resources.** The transition from centrally planned to market economies and its impact on changing roles of the public and private sectors in land ownership and natural resource use is creating both opportunities and problems. The opportunities include empowerment of local users and improved efficiencies of resource use by the private sector. The problems include nontransparent reallocation of ownership and user rights, in many cases creating barriers to traditional user patterns, and rural communities' lack of access to markets.

The issues summarized above, and illustrated through the lessons of experiences described earlier in this chapter, arise mainly because of difficulties in sequencing reforms to reduce transitional economic, social, and environmental disruption.

Progress with Improving Natural Resource Management

In order to provide an illustration of overall progress with reform, we have prepared a summary that indicates progress with the different elements of sustainable natural resource management by our client countries (see Table 1 at the end of chapter 3). The matrix following the table provides an explanation to it. It needs to be emphasized that constructing a table of this kind involves many simplifications. Furthermore, sequencing varies by country; some countries may have advanced far on land restitution but still face difficult governance problems, while others may have sound protected area management but little transparency or public involvement. Nevertheless, the table does provide some useful comparisons. More broadly, as in the rural sector, the Central European countries have progressed furthest with sustainable natural resource management policies, while it has been more difficult to gain consensus for reform in Central Asia, Russia, and Ukraine. The table and its explanatory chart also provide some broad guidelines as to the appropriate next steps of our client countries as they move forward with reform of natural resources policies, and of the role of our assistance and that of other donors in this process.

Table I. Status of Sustainable Natural Resource Management in ECA⁴

	Forests	Biodiversity	Water	Land	Total score
Poland, Baltics, Belarus					
Belarus	3	5	4	4	16
Estonia	7	7	6	7	27
Latvia	7	6	6	6	25
Lithuania	6	6	5	5	22
Poland	7	6	6	6	25
Danube and Carpathians					
Czech Rep.	8	7	7	7	29
Hungary	8	7	7	8	30
Moldova	5	5	5	6	21
Romania	5	6	6	6	23
Slovakia	8	8	8	8	32
Ukraine	4	5	4	4	17
The Balkans					
Albania	4	4	7	6	21
Bosnia	4	3	5	5	17
Bulgaria	5	7	5	5	22
Croatia	4	5	6	6	21
Macedonia	6	6	6	6	24
Slovenia	8	6	6	8	28
Turkey and the Caucasus					
Armenia	3	4	5	3	15
Azerbaijan	4	4	5	3	16
Georgia	4	5	5	6	20
Turkey	4	4	6	6	20
Central Asia					
Kazakhstan	4	2	4	4	14
Kyrgyz Rep.	4	5	5	3	17
Tajikistan	2	2	4	2	10
Turkmenistan	2	2	2	2	8
Uzbekistan	2	4	4	3	13
Russia	5	6	4	5	20

Status of Sustainable Natural Resource Management in ECA⁵

	Framework for Improved Forest Management	Framework for Improved Ecosystems Biodiversity Management	Framework for Adequate Water Resource Management	Framework for Adequate Land Management
1-2	<ul style="list-style-type: none"> -Regulatory, management, harvesting, and processing functions are state-owned and under same organizational structure; -All forestland managed and utilized by the state. -No public discussion of management plans. -Forests managed to maximize timber yields rather than for sustained multiple use. 	<ul style="list-style-type: none"> -No established protected area management or land classification system -No biodiversity strategy and information base on ecosystems/species not developed -No signature of international conventions -Poaching of rare species -Little involvement of civil society in ecosystems management -Little biological resource management in the production landscape -Poorly managed gene banks, weak links with in-situ conservation 	<ul style="list-style-type: none"> -Investment decisions made on narrow production maximization objectives -No adequate water pricing -Centralized institutions & approach to decision-making, with little accountability or community involvement. -Ecological value of water not considered. -River basin planning does not consider multisectoral and downstream impacts. -Research narrowly focused with little regard for improving efficiency. 	<ul style="list-style-type: none"> -Land, production, inputs, technologies managed by the state. -Modern soil/moisture conservation practice not practiced. -Widespread erosion and soil mining. -Crop husbandry and range management poorly linked with maintenance of ecological functions and soil capability. -No land use planning. -Research focused on production maximization rather than longer term maintenance of productivity and fertility. -No cadastre registration.
3-4	<ul style="list-style-type: none"> -Separation of regulatory and management from harvesting and processing. -Forest activities state-owned but some move to commercial management. -Some environmental civic groups active. -Multiple use forest planning accepted in legislation 	<ul style="list-style-type: none"> -Strategy completed and international conventions signed -Protected areas system managed for research or recreation with little community involvement -Database exists but fragmented and not publicly available -Inadequate funding for protected area system from state budgets -Production landscape managed with little regard for biological resources 	<ul style="list-style-type: none"> -Planning considers downstream impacts on salinity/ecosystems. -Political pressure to maximize investment continues. -Debates on pricing regulatory framework begin. -Some piloting of decentralized approaches to operation and maintenance of irrigation & municipal water/wastewater systems. -Data systems maintained. 	<ul style="list-style-type: none"> -Some land privatization but inadequate technical services in soil fertility management. -Inadequate use of inputs, use of inappropriate machinery continues. -Poor range and pasture management. -Research into land capability but results fragmented.

5-6	<ul style="list-style-type: none"> -Privatization of harvesting and wood processing. -Public forest organizations are accountable for sound forest and financial management. -Community-based natural resource and watershed programs beginning. 	<ul style="list-style-type: none"> -Environmental groups, active in PA management. -Alternative approaches to PA funding discussed. -Ecosystem management approach and local participation developing in PA system. -Public discussion of and research into biological resource conservation in production landscape. 	<ul style="list-style-type: none"> -Progress with decentralization and formation of effective water user associations -Investments begin to account ecological, watershed, drainage and salinity impacts -Coordination between water resource institutions and some cooperation on integrated water use -Water monitoring systems shared between institutes 	<ul style="list-style-type: none"> -Farm support services include some support in soil fertility and erosion control management. -Private market developing for inputs. -Demonstration programs for improved land management. -Research ongoing into improved crop nutrient, range, and pasture management.
7-8	<ul style="list-style-type: none"> -Forestland restituted. -Private/community rights to manage forestland supported by government. -Transparent forest leasing arrangements linked to sustainable management. -Transparent, multipurpose forestland-use planning. -Timber price reforms under way and functioning forest resource taxation system. 	<ul style="list-style-type: none"> -Functioning protected area system with emerging multiple sources of public and private funding and local management. -Effective biodiversity information and education programs. -Public accountability of protected area programs. -Adequate regulations, legislation in place and enforced. -Emerging land care programs and partnerships with agriculture. -Support for gene banks & live collections. 	<ul style="list-style-type: none"> -Integrated, inter-sectoral approach to water use with river-basin planning, with public accountability for key water institutions -Water pricing covers operational and maintenance costs -Decentralized, participatory water management -Integrated water monitoring systems in place and used by management -Adequate farmer support system for improved water management in place 	<ul style="list-style-type: none"> -Adequate fertility/land management support services and input availability. -Incentive system & programs under way in biological resource conservation in production landscape. --Decentralized approach to sustainable land management with cooperation between users and community involvement. -Research and information systems widely shared.

9-10	<ul style="list-style-type: none"> -Full Public accountability for forestland-use planning. -Transparent pricing system for timber, and NTFP -Adequately financed, transparent, public forest regulatory institutions. -Forest inventories and management plans publicly available. -Harvesting and processing privatized and accountable to clear rule of law. -Certification/chain of custody systems functioning and providing independent verification of sustainable forest management. 	<ul style="list-style-type: none"> -Civil society broadly involved in ecosystems management. -Policies and programs under implementation for biodiversity conservation in production landscape. -Community participation in protected area management and effective funding mechanisms. -Incorporation of biodiversity values in public sector management and investment decisions. -Information systems in place and widely shared with local and international community. -Gene banks maintained and widely used 	<ul style="list-style-type: none"> -Public accountability in water resource management and investment, -Water pricing reflects costs adequately -Integrated approach incorporates externalities in investment decisions, -Full decentralized responsibility for water management -Adequate river basin, water quantity and quality monitoring in place with information publicly available 	<ul style="list-style-type: none"> -Soil managed to control erosion and maintain fertility and production levels. -Carrying capacity of pasture and range increased, agricultural runoff at acceptably low levels. -Farm practices allow for biodiversity in production landscape. -Integrated crop protection systems in place. -Land capability and land use information systems available to public. -Cadastre in place and used in land markets.
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Source: WDI 2000.

4. A Future Assistance Strategy in Natural Resources Management for ECA

Chapter 1 summarized the main natural resources issues by subregion, and chapter 2 summarized the framework for our natural resource strategy of assisting our client countries to manage and use natural resources sustainably, within the overall development objectives of improved opportunity, health, security, and empowerment. Chapter 3 described how our approach to natural resource management has evolved over the last 10 years. The strategy lies also within the present ECA objectives of

- Increased poverty focus (addressing opportunity and vulnerability);
- Improved public sector management and governance (addressing transparency);
- Decentralization and community development (increasing empowerment); and
- A revised approach to our environment work, in particular regional environment issues (addressing health, opportunity, and long-term security).

The increasing focus on poverty presents challenges, especially in our program with some of our larger clients, which have had the most difficulty with the reform agenda. We are developing Poverty Reduction Strategy Programs for several of our poorer countries, including Albania and the Kyrgyz Republic. Participation in poverty focused work of this kind is likely to be an increasing part of our program in the future, especially in the IDA countries.

The largest number of poor are found in the countries with the largest populations, above all in Russia and Ukraine (and to a lesser extent in Turkey and Poland), even if their average per capita incomes are greater. In Russia and Ukraine there are pervasive problems of nonpayment with both private and public sector employees being paid up to 18 months late. This issue, combined with very low salaries (US\$50 per month for teachers) and payments in kind to compensate for salary delays, further complicate poverty analyses. Poverty is difficult to define, with a large number of people lying either just above or just below the poverty line, depending on where it is drawn. Poverty incidence is addressed in more detail in the Rural and Social Development Strategies and in the report "Making Transition Work for Everyone: Poverty and Inequality in Europe and Central Asia." As indicated in chapter 1, these countries also face difficult natural resource management challenges.

Our strategy comprises the following elements, within the broad poverty reduction framework. Following assessment of the natural resource base, we would help client countries to:

- Evaluate alternatives for sustainable use, taking into account balances between cost-effectiveness, intersectoral, spatial, and intertemporal dimensions.
- Develop plans, investment programs, and environmental assessments for sustainable natural resource management and use, and assure adequate implementation, monitoring, and evaluation.
- Modify regulations and governance of natural resources in order to assure transparent management. Clear rules regarding equitable access to resources, and consensus regarding these, are needed. Decentralized, participatory approaches are often more effective but depend also on transparency in local power structures.
- Modify prices, taxes and incentives to reflect scarcity and provide an economic framework for sustainable management. Even where resources are abundant, pricing should reflect the costs of renewal and provide opportunities for rent capture for public revenues.

While the basic principles outlined above and in chapter 2 remain the same, we have developed differentiated strategies for the different subregions, adapted to their natural resource base, and progress with broader policy and natural resource management reforms. These subregional strategies are summarized below.

The Baltics, Poland, and Belarus

In the Baltics our role is likely to decline, as these countries have access to concessional funding from both the Scandinavian countries and in the EU accession process. Furthermore, they also have increasing access to private sector finance.

Although Poland is one of the most successful reformers, there are still large numbers of rural poor, so Poland should be part of a poverty-oriented natural resources strategy at least for the next few years. An area where we would provide continued assistance, if necessary, would be in flood control and improved river basin management. In Belarus we have already assisted with a forestry project but presently have little role in agriculture or natural resource management. There would be scope for expanding our role. The Belarus authorities have recently asked for our help with updating environmental priorities and defining an assistance strategy.

Our strategy is likely to:

- Assist with broad agricultural and forest policy reforms in Belarus as the dialogue permits, through support services for agriculture like those described above for Romania, and taking a similar approach to Russia for forestry;
- Assist Poland and the Baltics with pilot programs to improve environmentally sustainable agriculture to prepare for EU accession; and

- Assist with flood control and improved river basin management in Belarus and Poland (the Dnieper, much of whose flows originate in Belarus, has been very heavily developed for agriculture, industry, and hydropower).

Box 13 summarizes a project that combines International Bank for Reconstruction and Development (IBRD) and GEF funding to support better management of animal waste and control of nutrient runoff. It illustrates also that, even for a country like Poland, some concessional funding is often necessary to introduce environmentally sustainable farming with public-good, or “external” benefits.

Box 13. Poland—GEF/Bank Rural Environmental Protection Project, 2000**Cost: US\$15.8 million**

Poland has a rural population of 15 million, accounting for 40 percent of the population. Crop and pasture land comprise 60 percent of land area, and livestock over 40 percent of agricultural GDP, which accounts for 25 percent of employment but only 6 percent of GDP. Farm size averages 12-15 ha. Nutrient pollution from agriculture is a major cause of eutrophication of the Baltic Sea. Poland accounts for 40 percent of the agricultural land of the Baltic drainage basin. The main issues are improper storage and disposal of animal waste, rather than excessive fertilizer application.

Objectives:

To reduce organic matter discharges into Poland's surface and groundwater and the Baltic Sea by helping farmers develop environmentally responsible farm management plans. Benefits would include protection of the wetland and marine ecosystems of the Baltic coast and sea.

Components:

(i) Farm environmental investments in cropping, tilling, manure spreading, fertilizer application practices, constructed wetlands, manure storage facilities and buffer strips, and training of agro-environmental advisors; (ii) outreach and management (includes public awareness, monitoring, countrywide replication strategy).

The project focuses on three areas, representative of different farm and soil types: Elbog in the Vistula Lagoon bordering Russia, Lomza on the Pisa River in eastern Poland, and Torun on the Vistula River in the center-north of the country.

The project comprises a combination of GEF, European Union, government, beneficiary, and IBRD funding. Even in a relatively wealthy country such as Poland, subsidies are necessary for farmers to adopt agricultural practices with “external” environmental benefits. Rural environment and forestry programs in most OECD countries also contain packages of financial incentives for local farming populations who adopt such measures.

The Danube and the Carpathians

In the EU accession countries our role is likely to decline. We should, however, be able to work through partnerships to share experiences with later reformers. We also have a role to play in financing nutrient reduction in the Black Sea and Danube River Basin, especially in the poorer client countries of Bulgaria and Romania. Programs here can contribute to sustainable livelihoods and to regional public goods. There is also scope for addressing flood mitigation measures, especially in Hungary, and in control of emission of hazardous substances into rivers.

In Ukraine and Romania, both major agricultural countries, we are only beginning to assist with soil fertility management and erosion control on agricultural land. Improving agricultural information services, including land management practices adapted to the new small farmers, needs to be a part of our future strategy in these countries. In the areas where irrigation is viable (southern Romania and Ukraine, eastern Bulgaria), this needs to include assistance with irrigation and drainage management. For Bulgaria and Romania assistance with reform of forest management institutions, in the context of recent policy changes to restitute 30-50 percent of forestland to small forest owners and local communities, is a key part of the new strategy.

Our strategy should focus on:

- Improved agricultural land management through farm support services projects, which include improvements in environmental practices; such projects should include concessional funding elements where possible;
- Assistance with forest management reforms in legislation, financing, leasing, forest management planning and utilization, and support services for new forest owners through project lending, again with a substantial policy element;
- Ecosystem conservation along the Black Sea, and control of nutrient runoff from the Danube Basin into the Black Sea (with the help of concessional funding).

Boxes 14 and 15 illustrate how two projects in Romania will use complementary approaches to improved services for farmers and new forest owners, to promote environmentally sustainable farming and forestry practices.

Box 14. Romania—Agriculture Support Services Project, 2000

Cost: US\$18 million; loan US\$11 million

Project objectives are to support adoption of improved technologies in agriculture and more efficient use of inputs and use of organic wastes, in order to increase productivity and profits for newly privatized farms.

Project components include on-farm demonstration of new technologies, transfer of existing technologies, use of mass media for dissemination of agricultural knowledge, and a competitive grants scheme to support research and extension.

A key project element is stakeholder participation, involving private-public sector partnerships, mobilizing farmer organizations, and increased responsiveness to farmers' priorities.

Box 15. Romania—Forestry Sector Reform Project, 2002

Cost: US\$25 million

Project objectives include support for reform of public sector institutions, preparation and implementation of a forestland restitution program, and private sector forest industries, with the goal of increasing the contribution to the national economy from the sustainable management of Romanian forest resources.

The project would help the Ministry of Forests, Waters, and Environmental Protection and National Forest Authority to (i) support regulation, supervision, and monitoring of forest activities by strengthening institutions and improving information systems; (ii) develop forest extension support services for new forest owners on privatized forestland, including technical and business advisory services, and support for forest owners associations; (iii) improve the efficiency of the NFA and support better forest infrastructure; and (iv) build public awareness and support for sustainable management of forest resources.

Stakeholder participation would be a key element of preparation and implementation.

The Balkans

In the Balkans we are likely to focus on poverty reduction and improved governance in countries such as Albania and Bosnia, and on conservation of ecosystems for sustainable management of the tourism industry along coasts and in the Balkan Mountains. Environment and natural resource management is a focal area of the new Poverty Reduction Strategy Program for Albania. In countries pursuing successful reform agendas, such as Bulgaria, agricultural and forest policy reforms can form part of adjustment lending. Forestry is important to the economies of several Balkan countries; we should assist with management for land newly restituted to forest owners. Community-based irrigation and forest management also helps resolve governance issues.

Through The South Eastern Europe Stability Pact, the Bank is helping its European partners work with the Balkan countries to rebuild stability and prosperity after the recent conflicts.⁶ Better management of key regional natural resources (the Danube, the Balkan mountain chain, and the Adriatic coast) provides opportunities for building partnerships between the countries.

Our strategy is likely to focus on:

- Conservation management of coastal and mountain landscapes for ecosystems conservation and sustainable tourism management, both through GEF and through lending;
- Poverty reduction and sustainable natural resource management projects using participatory approaches, especially for communally managed forest and rangelands in Albania;
- Assisting with improved forest management to increase its contribution to the economy and employment; and
- Community-based management of irrigation and drainage schemes.

Box 16 illustrates a GEF project under preparation; conservation of landscape, ecosystem, and tourism values is as important to economic development in the subregion as production values from natural resources.

Russia

Assistance to Russia is presently reduced because of broader difficulties with structural reforms, and constraints in working directly with the regions, given the financial difficulties between the federal and regional governments. The recent Country Assistance Strategy focuses on poverty reduction, recovery of economic growth, and improved public sector management. Improved environmental and natural resource management should be seen within this context. Work on reforming natural resource taxation is ongoing.

The importance of forestry both to the Russian economy and to the broader global economy is now well understood. The forthcoming forestry loan, if successful, would help with more suitable sector management and help also to create a better environment for private sector investment in forest utilization. Russia's GEF portfolio is also growing. The environmental NGOs have a key voice in Russia, and several of our operations involve civil society. We will continue to encourage this inclusive process, since it helps to build transparency.

The work on setting priorities in the Volga Basin could lead to an investment operation if the country dialogue improves. There is much to be done both to improve water quality management. Dam safety is also an issue. There is scope also for working with improved land management to control erosion and restore fertility, and improved irrigation and drainage management. We would need, however, to work directly with priority regions in order to have an "impact on the ground."

Box 16. Croatia—GEF Karst Ecosystems Conservation Project, 2001**Cost: US\$5.5 million**

Croatia, with a population of 5 million and an area of 56,000 km², enjoys a rich variety of landscapes and biodiversity due to its geography and geology. Its coastlines, forests, and mountains are of outstanding natural beauty, while the Dinarid mountain range includes karst ecosystems comprising 8,000 caves, sinkholes, subterranean lakes, and rivers that are among the most extensive in the world. As Croatia's economy and tourist industry recover, this area, just behind the coastline, will pose increasing challenges in balancing conservation and development.

Objectives:

The project development objective is to protect the biodiversity of karst ecosystems in Croatia in a way that is participatory, economically viable, and integrated with the country's socioeconomic development goals.

Components:

(i) Development of national capacity to conserve biodiversity, including implementation of effective land use management plans and monitoring and information systems; (ii) improved natural resource and protected area management in the project site, using decentralized, participatory mechanisms; (iii) establishment of regional and international collaboration mechanisms for karst ecosystem conservation; and (iv) project management and monitoring.

The project focuses on two heavily forested, rural counties with a population of 60,000. These include four national parks and one nature park, accounting for almost half of Croatia's protected areas, and include biodiversity and landscapes of global significance.

In summary, we plan to:

- Assist with policy and fiscal reform and improved public sector management through lending and nonlending services;
- Support the contribution of forestry to economic recovery and poverty reduction, and to the global biodiversity and climate change mitigation agenda;
- Maintain the dialogue on improved water management, linking this with international waters programs where possible;
- Build a dialogue on improved land and water management at a regional level, to be able to address resource degradation with local organizations (again GEF could play a role here);
- Should policy-based lending resume, build on the country economic work undertaken to explore the possibility of including policy and fiscal reforms in natural resources in new operations; and
- Ensure wide NGO participation in our dialogue and operations, in order to encourage inclusiveness and transparency.

Box 17 illustrates how the proposed Forestry Project will address key issues of public sector management, governance, and sustainable use while helping to create an enabling environment for the private sector investment for sustainable forest utilization that is key to economic recovery and job creation in the sector. It illustrates also the role of the public sector in forest resource management.

Box 17. Supporting Improved Public Sector Management and Addressing Private Sector Constraints: Russia—Sustainable Forestry Pilot Project, 2000

Cost: US\$74 million

Russia has the largest forested area of any country and a long tradition of forest management. Both forest protection and utilization have deteriorated since the transition, as the economy has declined and government's budgetary situation has deteriorated.

The project focuses on three pilot regions of Khabarovsk, Krasnoyarsk, and Leningrad, representative of forest ecosystems in northwestern Russia, eastern Siberia, and the Pacific Far East, and with a forested area of over 95 million ha, comprising about 8 percent of Russia's forested area. It has three objectives:

- improved public sector management in forestry;
- improved enabling environment for private investment in forest utilization; and
- replication of policy reforms and improved management to other regions.

Policy reforms supported include forest leasing to improve transparency and permit long-term leases conditional on sustainable resource management, improved forest resource taxation and sector financing, development of regional regulations, and pilots certification and fire insurance systems; improved forest management includes an improved and more transparent forest inventory and management planning system, improved forest information management, and better fire and pest management and regeneration; strengthening the enabling environment for private sector investment includes training in business management, and marketing, and in modern, more environmentally friendly harvesting and processing techniques to forest enterprise managers and employees.

The project approach illustrates that where there is a difficult political and economic environment, achieving reforms through results on the ground may be the best approach. It also supports a proposed Forest and Coal Investment Guarantee facility, and contributes to the strategic objectives for Russia of improved public resource management.

Turkey and the Caucasus

In Turkey there is good appreciation of the link between poverty and sustainable natural resource management. However, government is still highly centralized. In general, in smaller countries it may be easier to build on intersectoral links. However, we are constrained in the Caucasus by the difficult financial situation of our client countries. We are likely to provide a mix of lending and nonlending

services in order to assist our clients implement sustainable natural resource programs. GEF will continue to be an important source of funding for activities with partly global benefits. The possibility of assisting with a debt-for-nature swap in Georgia is being explored. Improved natural resource management is well integrated into Country Assistance Strategy (CAS) programs in countries such as Georgia. Environmental issues are also well incorporated into the Azerbaijan CAS. Further assistance with irrigation and drainage and improved water resource management will continue to be key in the countries that are highly dependent on irrigation and drainage.

Our strategy is likely to include:

- Poverty-focused natural resource management in poorer areas of Turkey and the Caucasus, through projects focusing on community participation;
- Improved water resource management through project support to better, more cost-effective delivery of irrigation water and improved drainage management, to poor rural populations dependent on irrigated agriculture;
- Assistance with disaster mitigation and prevention, in particular with floods and earthquakes;
- Restructuring forest policy and institutions to balance better the “public” and “commercial” values of forests through project assistance with policy components; and
- Conservation management of coastal, forest, and steppe ecosystems, both for global benefits, but also because sound management of these areas is key to development of a sustainable tourism and recreation industry.

Boxes 18 and 19 provide examples, together with lessons from experience, first of a project that will improve sustainable management of the irrigated subsector in Azerbaijan, dependent on irrigation for crop production and, second, of a plan to support a participatory approach to improving incomes and natural resource management in poor areas in the upper watersheds of Armenia.

Central Asia

In Central Asia evidence of the cost to rural livelihoods and to the broader economies of poor management of the waters of the Aral Sea Basin has persuaded us that even if reforms are slow, we need to help address these problems. In addition, the increased focus on poverty should enable us to move ahead with assistance programs and use these as a means both for helping to reduce poverty and establishing a dialogue for reform. We will push to expand the GEF program in this region, especially to address land degradation issues in combination with lending finance.

Box 18. Azerbaijan—Rehabilitation and Completion of Irrigation and Drainage Systems, 2000**Cost: US\$46.1 million**

Agriculture accounts for about 20 percent of GDP and 35 percent of employment. With rainfall averaging only 200-350 mm, irrigation plays a key role in the agricultural economy, comprising 1.45 million ha or 80 percent of arable land. Agricultural output has fallen since the transition and irrigation, and drainage infrastructure has deteriorated as the former state-funded institutions have collapsed. Pumping lifts are high over much of the area, but farmers' incomes are insufficient to pay costs with the present level of support services, water delivery, and yields. The estimated costs of rehabilitation of the entire system are US\$700 million.

Project objectives are to achieve a sustainable increase in agricultural production by (i) improving irrigation water delivery and services in the 85,000 ha command area of the Samur-Apsheron Canal (SAC) System; and (ii) reducing waterlogging and salinity over 36,500 ha in the Mill-Mugan Collector Drain (MMCD) area. The project would also improve the quality and reliability of drinking water supplies for Baku.

Project components include (i) rehabilitation and completion of irrigation and drainage infrastructure; (ii) institutional strengthening of the State Amelioration and Irrigation Committee and District Irrigation Exploitation Units; and (iii) project implementation support. The project would benefit about 85,000 farm families.

Box 19. Armenia—GEF/IDA Natural Resources Management and Poverty-Reduction Project, 2001**Cost: US\$15 million**

The project, under preparation, aims to improve natural resource management in the Lake Sevan Watershed by designing and implementing, in micro-watersheds, improved forest, range, and agricultural land management practices. The project would also strengthen capacity at central and local level for improved natural resource management, provide support to community-based income-generating activities through a small grants scheme, and strengthen forestry and protected area management. It would be funded jointly by IDA and the GEF.

Project design has evolved from addressing implementation of the National Environmental Action Plan broadly, to addressing rural poverty in one area of Armenia through a package of measures to improve Natural Resource Management (NRM).

Our strategy is likely to focus on:

- Project support, combined with policy reform, in improved irrigation and drainage management and salinity control;
- Increasing support to sustainable arable land and rangeland management through farm assistance services and assistance with improved soil fertility and erosion control management;

- Poverty-focused natural resource management in the upper watersheds, on the Turkey East Anatolia Watershed Rehabilitation project model; and
- Dam safety and disaster mitigation.

Box 20 illustrates an Irrigation Rehabilitation Project under preparation that should restore key infrastructure for sustainable livelihoods in the area.

Box 20. Uzbekistan—Proposed Karshi Cascade Rehabilitation Project, 2001**Cost: US\$114 million**

Irrigated agriculture is central to the Uzbek economy, accounting for 45 percent of employment and 60 percent of exports. Uzbekistan has been slow to liberalize crop production and marketing. The irrigation and drainage infrastructure has deteriorated dramatically since 1990, leading to declining productivity in the land and water resource base, increasing water losses, land salinization, and declines in crop yields. It is estimated that these losses cost the economy US\$1 billion annually in lost production.

The objectives of the project are to increase the reliability, efficiency, and sustainability of pumped water from the Amu Darya River to the Karshi irrigation area in the Kashkadarya Oblast, improving irrigation water supplies to 400,000 inhabited by 1.5 million people who depend on this water for their livelihoods. The project would rehabilitate critical parts of the pumping system and help create water management institutions in the Karshi irrigation area that would operate in an economically viable manner and sell water to water users.

The project is consistent with two CAS objectives: improving infrastructure resource utilization and addressing the environmental damage from mismanagement of natural resources. The recently completed NEAP also identifies scarcity and pollution of water, salinization of land, and desertification and biodiversity losses as key environmental problems.

The project would increase incomes of local people, including a growing population of underemployed youth, from better water delivery over the next few years, while gradual reforms are made in the farm ownership structure and in input liberalization, permitting longer term restructuring, and a gradual move away from cotton as market conditions permit. It also contributes to broader international objectives of better management of the Amu Darya watershed, and complements other irrigation and drainage projects under preparation in the Aral Sea watershed.

The preceding paragraphs have indicated the broad focus of assistance by subregion. Table 2 at the end of chapter 4 lists the Future Priority Actions for Improved Natural Resource Management, by summarizing this focus in tabular form.

Table 2. Future Priority Areas for Improved Natural Resource Management

	Baltics, Poland, Belarus	Danube and Carpathians	Russia	Balkans	Turkey and Caucasus	Central Asia
Issues						
Institutional and policy support for adequate natural resource pricing or taxation (water, forests, land)						
Adequate regulatory framework for privately owned forests and lease holders						
Decentralized, participatory approaches to NRM						
Governance and public accountability, public awareness of NRM issues						
Need integrated river basin, forest, and land management planning and management						
	Baltics, Poland, Belarus	Danube and Carpathians	Russia	Balkans	Turkey and Caucasus	Central Asia
Likely Focus of Assistance						
Irrigation, drainage, and salinity management projects						
Flood control and dam safety projects						
Improved commercial forest management						
Improved community forest, range, and watershed management						
Improved agricultural, pasture, and cropland management						
Protected area and biodiversity conservation						
Coastal zone management						

Key: white areas = focus of assistance; shaded areas = not a focus.

Source: WDI 2000.

5. Instruments

Our assistance strategies are likely to combine lending and nonlending instruments and, increasingly, include cross-sectoral alliances as we work towards the poverty-reduction agenda and partnerships with other agencies. In chapter 5 we discuss lending, the GEF, economic and sector work, and partnerships, all of which have a role.

Lending

Lending will be shaped by the willingness of our client countries to engage in dialogue or to borrow for natural resource management, for activities that may have only long-term benefits, and by competing claims for resources both within our client countries and within the Bank.

Direct Bank lending is likely to focus on:

- Irrigation and drainage infrastructure improvement, combined with encouragement of water users' associations and management and financing of operation and maintenance by users; in forest-poor countries, participatory watershed and forest management with a focus on poverty alleviation, sustainable rural livelihoods, and decentralization of decision-making, and in forest-rich countries, improved forest management, and assistance with sustainable forest management to new forest owners; and agricultural services including improved agricultural and range land management
- Where possible, the Bank should pursue cofinancing or complementary financing with other partners or the GEF, especially when supporting projects with externalities or public-good elements.

Box 21 illustrates a typical future IBRD loan. It also illustrates the strategy for sustainable natural resource use, using participatory approaches, and the focus on poverty reduction and economic recovery.

Box 21. Uzbekistan—Drainage, 2001**Cost: US\$70.0 million**

Irrigated agriculture is the backbone of the Uzbek economy, comprising 31 percent of GDP, 60 percent of foreign exchange earnings, and 45 percent of employment. Cotton accounts for 50 percent of agricultural export earnings. The climate is arid and agriculture is dependent on irrigation, which covers 4 million ha. Irrigation water is drawn from the Amu Darya, draining into the Aral Sea. Poor drainage practices have led to increasing salinity problems and declining productivity.

The project falls within the framework of the Aral Sea Program. Its objective is to improve the production base for agriculture through improved management of the disposal of drainage water from the irrigation schemes on the right bank of the Amu Darya, thereby (i) reducing river salinity, (ii) facilitating the discharge and disposal of drainage water from irrigated areas, and (iii) laying the foundation for rehabilitation and improvement of the main, interfarm and on-farm drainage systems without causing a further deterioration of the current river water quality.

Components include (i) critical infrastructure for drainage water disposal (reconstruction of main drainage system, rehabilitation of collector and control facilities); and (ii) capacity building programs for MAWR (improvement of operation and maintenance support to WUAs, project management support, and preparation of a follow-on project).

The project design incorporates lessons learned from other operations, including the need to keep project concept, scope, and design simple, and to be realistic regarding the scope and speed of institutional reform. The project would directly benefit 300,000 people living in the rural, low-income area of south Karakalpakstan, and would improve water quality for the 3.5 million people living in the midstream and downstream portions of the Amu Darya Basin. It would also have positive and negative impacts on local land resources. These impacts are being analyzed in an Environmental Management Plan under preparation.

Guarantees

Program investment risk guarantees can act as a powerful market-based mechanism for both encouraging private investment and encouraging governments to create a regulatory environment favorable to private investment. The Pilot Forestry Project under preparation in Russia aims to improve public sector management in forestry and supports a much bigger operation to encourage private sector investment in the forestry sector, the Coal and Forestry Investment Risk Guarantee Operation, also under preparation (see Box 22). Guarantees have been used for Moldova, and these facilities could be used more widely to encourage private investment.

**Box 22. Supporting Private Investment in the Forest Sector through Risk Guarantees:
Russia—Partial Risk Guarantee Facility for Investors in the Coal and Forest Sector**

Cost: US\$100 million

Objectives:

- Encourage environmentally sustainable private sector development of forest industry in Russia by offering guarantees to insure investors against noncommercial risks.
- Increased economic activity and employment in a key sector previously employing over 2 million people and still accounting for about US\$4 billion in exports annually.
- Contribute to poverty reduction, since forest industries are generally located in lower income small towns and rural communities.

Project description:

- Establishment of a Guarantee Agency Unit authorized to issue guarantees on behalf of the Russian government.
- Eligibility criteria: transactions for sale, leasing, and import/export of forest-related goods.
- Credit, not equity or long-term debt, is eligible.
- Risks covered include deprivation of property, limitations on foreign exchange transfers, imposition of new taxes, war/civil disturbance.
- Individual investments would be subject to environmental impact assessment, consistent with the Bank and Russian government regulations.

Potential benefits:

- The project would contribute to recovery and modernization of the Russian timber industry (timber harvests, previously 300, are now 80 million m³), including introduction of modern, less environmentally damaging technologies;
- Incentive for improved public sector management; with sector reforms;
- Recovery of investment at no cost to the government; if reforms waiver, investors would call on the insurance policy at substantial fiscal cost; and
- Facility is a “self-regulating” market instrument.

The risk guarantee illustrates the link between forestry and broader recovery of the economy. Increased forest investment will create paid jobs and reduce poverty. The policy reforms supported under the project increase the chance that investors will have the confidence to take advantage of the protection offered by the guarantee scheme and will invest in the sector. The forestry project is, in bankers’ language, a “letter of comfort.” Guarantees have an advantage in that a well-functioning banking system in the client country is not essential. Guarantees may have scope in other countries embarking on reform, with important forest sectors (such as Romania).

Global Environment Facility

ECA has one of the biggest GEF biodiversity and international waters portfolios in the Bank, although the present pipeline is weak. GEF has frequently provided us with the opportunity to start working in the forest sector on conservation management, and then to move on to broader areas of reform. In Poland, Turkey, Romania, the Central Asian republics, Georgia, and Belarus, our assistance started through GEF and is now broadening to the forestry/natural resource management sector. All of these projects emphasize participation of local communities and other concerned stakeholders in the development and implementation of conservation management programs. GEF has also provided the catalyst for us to work on international waters programs, which for the Aral Sea is now well established.

We hope to broaden our GEF assistance in three ways:

1. Through increasingly combining forestry and GEF biodiversity operations (as in the Armenia natural resources project under preparation) in order to match loan funds for project activities with local benefits with grant funds for those with global benefits.
2. Through promoting complementarily between GEF and Bank operations (as in the Georgia Biodiversity Grant and Forest Development Credit), using GEF as “catalyst” funding for international benefits, while focusing on country-specific investments. An “umbrella program” to address water quality in the Danube Basin and Black Sea is under consideration that would provide a framework for complementarities of this type.
3. By providing assistance to NGOs and local communities, using the medium-size grant window, which has been little used to date in ECA (see Box 23). Medium-size grants can be administered by central, regional, or local governments; NGOs; or academic institutions as long as they are able to keep accounts and implement programs effectively.

More broadly, as indicated in chapter 3, our regional seas programs are likely to focus increasingly on in-country investments that have both local and international benefits (see Box 24). The approach may be similar to that summarized in the box, or there may be a less formal framework and a series of in-country investments. This second approach was quite successful for trans-boundary cooperation in the forest ecosystem of the Carpathians, where there is now good cross-boundary cooperation. It has also worked in the Danube Delta, where GEF has supported two projects, for Ukraine and Romania, and appreciation of shared concerns, trust, and cooperation has grown through the project implementation period. Generally, for GEF we will need to build our program especially in Central Asia, where we have limited assistance at present.

Box 23. Russia: Fire Management in the Amur-Sikhote-Alin Ecosystems**Proposed GEF Grant: US\$5 million**

A project in the early stages of preparation would aim to improve fire management in the fragile, globally significant forest ecosystems of the Pacific Far East. These ecosystems are designated as a global hotspot, including some of the most unusual temperate forests in the world, with a high level of endemism among flora and invertebrates, and an unusual assemblage of large animals; the Amur tiger, Amur leopard, musk deer, and Himalayan bear share the same habitat as the brown bear, reindeer, and salmon. . The Federal forestry organization is responsible for fire management in economically accessible forests; but in protected areas and forests not designated for commercial harvesting, responsibilities are less clearly defined, and there are severe funding shortfalls.

The project would bring together the environmental protection agencies, the forest service, and local communities to design and implement an effective fire management strategy that would protect these vulnerable ecosystems and build on the approaches developed for the economically accessible forests under the Forestry Loan.

Box 24. Partnership for Nutrient Reduction—Black Sea and Danube Program**Proposed GEF Grant: US\$70 million**

The Black Sea is bordered by six countries, and there are 10 major riparian countries in the Danube Basin. All of these countries are heavily industrialized and have important agricultural sectors, and all discharge a major portion of their pollutants into the rivers discharging into the Black Sea. Over 50 percent of the pollution load is from the Danube. Coastal resorts, wetlands of international importance, ecosystems, and the fishing industry have all suffered badly from excessive nutrient discharges. It is estimated that losses from reduced revenues from fisheries average US\$300 million per year compared with 1980 levels, and that losses from reduced tourism average US\$400 million per year. In addition, over 20,000 water-related illnesses are reported annually. An investment program of nearly US\$2 billion has been identified.

The objective of the program would be to provide concessional funding to assist riparian countries to reduce nutrient discharges, through projects in improved water/wastewater management, flood protection, wetlands restoration for increased nutrient absorption, or improved agricultural practices to reduce runoff and nonpoint pollution. The economic rate of return from these types of investments, in terms of gains from improved health, increased tourism, and fisheries is estimated to be over 25 percent.

The GEF would provide the funding for the international benefits of these local investments, combining a regional programmatic approach with action on the ground and benefiting the population of participating countries. The GEF contribution is estimated at US\$70 million. It is intended that the GEF funding would help to catalyze funding from other multilateral and bilateral partners as well as the World Bank. The GEF program would establish a framework for eligibility, and individual clients would apply for subprojects within that framework.

Economic and Sector Work

Through economic and sector work we can work with client countries to agree on priorities for reform and investment, and link reforms in natural resource management with broader macroeconomic reforms. This should involve increasingly working across sectors and contributing to country assistance strategies, Comprehensive Development Frameworks (CDFs), and Poverty Reduction Strategy Programs (PRSPs). The Russia Country Economic Memorandum (CEM), whose overall focus is improved public sector management with regard to taxation, revenue collection, and reducing the problem of nonpayments, will include a section of reform of natural resource taxes. The Albania PRSP will examine the links between reducing rural poverty as a strategic objective and improved economic and natural resource management. The recent Water Resources Management Plan for Armenia illustrated the role of improved land and water management in improving rural livelihoods. Boxes 25 and 26 illustrate two types of sector work. The first, for Tajikistan, illustrates a contribution to the broad poverty-reduction agenda. The second, for Armenia, illustrates how sector work in water resource management is linked to sustainable economic growth, and to sector investments and policy and institutional reform. There is, however, still scope for self-standing sector or subsector analysis. As another example of sector analytical work, a recent Forestry Sector Study for Turkey illustrated how forest reform is linked to broad institutional reform, with a move away from production forestry to a landscape planning approach that would maximize nontimber values and rural development opportunities.

National Environmental Action Plans (NEAPs) are useful for reaching in-country consensus on environmental priorities. They have been carried out in most countries and are under way in Bosnia, Croatia, and Turkmenistan. In general, given increasing budget constraints, our sector work is likely to be very operationally focused and closely linked with poverty-reduction strategies or the broader reform agenda. NEAPs in the past have provided an opportunity to bring in a range of stakeholders and reach consensus on priorities. In several countries we need to follow up these NEAPs, in the context of the PRSP or CDF process.

The Kazakhstan NEAP, which has recently been completed, illustrates that by staying the course and working closely with stakeholders in the country and with other donors, we can build agreement for implementing priority environmental programs that achieve country development objectives. The NEAP was financed with an Institutional Development Fund (IDF) grant that helped to identify key environment issues, improve coordination between ministries, strengthen the role of the Ministry of Natural Resources and Environment, and mobilize multidonor financing. It has also helped to focus Bank assistance in the water sector; two projects are under preparation to address water supply, water resources, and environmental pollution in the Nura Ishim River Basin.

Box 25. Poverty Reduction Strategy: Access to Land and Water in Tajikistan

For Tajikistan, with per capita GDP of only US\$370, poverty is the central development issue. Incidence of poverty is higher (23.4 percent) in rural than in urban areas (18.9 percent). Agriculture contributes 26 percent of GDP, and accounts for over 50 percent of the labor force. Irrigated cotton plays a key role in exports and tax revenues. It must play a key role in one of the four pillars of a poverty alleviation strategy—labor-intensive growth.

Land has in principle been privatized and state and collective farms reorganized as joint stock companies. Yet 250,000 ha or 25 percent of the arable land may now be out of production because of the breakdown in the irrigation and drainage systems following the transition. Household plots averaging only 0.13 ha comprise 45 percent of rural household income; over 50 percent of these households also own cattle and 50 percent grow wheat; the plots are a key part of households' survival strategies. Overall, cotton areas have declined and wheat expanded as farmers have turned to subsistence agriculture.

In one noncotton-growing area privatization has led to dramatic increases in yields. Cotton production is still covered by central planning and quota systems that have contributed to low productivity on the land. Government, supported by the Bank, is now pursuing privatization more rapidly. Small-holder cotton grown by choice for private profitability with transparent resource costs will increase rural incomes but may exclude the poorest and landless.

Irrigation and drainage were subsidized; failure to maintain the systems has led to waterlogging in some areas, and system failure in others. WUAs are being promoted, together with the introduction of higher water tariffs. Again, there is a risk that the benefits of these reforms will exclude the poorest. Furthermore, the legal framework for operationalizing WUAs is unclear.

A pro-poor strategy has been developed that would promote equitable and transparent land distribution to private farmers with flexibility in management systems, provide freedom of choice for crop production, support irrigation rehabilitation and institutional and price reform on viable areas, and tailor credit and farm support services to small farms and labor intensive technologies.

These reforms would promote opportunity through access to resources and empowerment through participatory land distribution. They would also improve incentives for sound land and water resource management.

Partnerships and Alliances

The Bank will need to continue to work closely, as we have in the past, with other institutions, including NGOs and multilateral and bilateral agencies, supporting in particular exchanges of experience between ECA countries, and between relevant OECD and ECA countries. The EU is also an increasingly important partner. Certain bilateral partners have particular areas of focus; the Dutch have a special interest in water management, the Swiss in management of mountain ecosystems, and the Finns more generally in the Baltics and northwest Russia.

Box 26. Armenia: Integrated Water Resources Management Strategy, 2000
Cost: US\$0.2 million

Water resources play a key role in Armenia's development. Hydropower accounts for 35 percent of energy production. The level of the country's largest water body, Lake Sevan, has been reduced by more than 20 meters because of excessive withdrawals. Rainfall averages 620 mm but is only 300 mm in the Ararat Valley where the land is most fertile. Total renewable water resources are 9.9 billion m³, including international transfers. Total withdrawals have declined since 1985 because of the decline in use of irrigation water, from 67 percent to 43 percent of withdrawals, and are currently 2.5 billion m³. Distribution of resources is very uneven, water resource use is inefficient, interbasin transfers have had damaging environmental effects, and water use for ecological and recreational purposes and for fisheries has been neglected. Armenia is vulnerable to flash floods from melting snow and heavy rain, but also from poor maintenance of flood mitigation infrastructure, overdevelopment of flood plains, deforestation, and drainage of wetlands.

The objectives of the strategy are to help the Armenian authorities formulate alternative water management strategies, prepare a water action and investment plan, and enhance local institutional capacity. The plan preparation would also improve cooperation between different stakeholders in the water sector in Armenia and improve cooperation between local and international stakeholders.

The work would build on the Lake Sevan Action Plan financed with a previous IDB grant, which aimed to improve management of the lake ecosystem and its watershed, and to restore its value for recreation, fisheries, and biodiversity conservation. It would also build upon an irrigation rehabilitation loan, which improves irrigation management and increases agricultural production, the water and wastewater component of a municipal project for Yerevan, which improves management of services for the city, and a dam safety project, which are all ongoing. A community-based natural resource management project is also under preparation in the upper watershed of Lake Sevan.

Development of the integrated strategy and plan, therefore, follows substantial investment in the water sector, and establishment of dialogue and understanding in the context of these investments. The strategy, together with the investments, would help increase resource management and incomes in Armenia.

We will also take advantage of new opportunities for collaboration. The World Wildlife Fund/World Bank Forestry Alliance supports targets in sustainable forest management. (Specifically, it pursues the goal of having 200 million ha of production forest certified as being sustainable managed by 2005, and an additional 50 million ha of protected areas gazette also by 2005 (see Box 27). The alliance provides grants for activities that promote these goals. Countries of focus to date are Russia, Romania, and Georgia. Our European partners are leading the program for Stability and Prosperity in southeast Europe, and this should help to catalyze funding for environment and natural resource management programs in these countries.

Box 27. Sharing International Experience with Forestland Restitution and Certification

The Bank, with funding from the WWF Alliance, Finnish, and German trust funds, has supported workshops in Romania to share recent experience with forestland restitution. Participants are likely to include Romania, Bulgaria, Slovenia, the Slovak Republic, Latvia, and Germany. The workshops have examined:

- The legal, institutional, and policy requirements for successful restitution;
- Models for organization of nonpublic forest owners;
- Advisory and service functions for nonpublic forest owners;
- Alternative incentive and regulatory schemes to ensure sustainable forest management by new owners;
- The implications of certification on alternative approaches to certification;
- The workshops, in addition to sharing experience, should help participants, especially in Romania and Bulgaria, formulate alternative policy options to address restitution. Total costs are estimated at US\$150,000. Assistance and extension programs will also be needed for new forest owners.

In Central Asia we will also need to work more with the Asian Development Bank. Box 28 illustrates how we have been able to work with partners to mobilize investments. Out of a project cost of over US\$4 million, the government of Tajikistan has borrowed only US\$500,000 on IDA terms. However, we need to recognize that these partnerships, where each agency has their own priorities and procedures, are also expensive to administer.

We should also focus increasingly on fostering partnerships between our member countries. On participatory natural resource management and WUAs, Turkey has experience to share with other countries, especially the Caucasus and Central Asia. On forestland restitution and certification, Latvia and the Slovak Republic have experience to share, especially with Romania and Bulgaria. On sustainable agricultural land management, exchanges between West European and American or Canadian partners exist but need to be developed further.

We will also need to work with other innovative instruments as appropriate, including supporting debt for nature swaps (as in Georgia), and developing opportunities for our clients to use the Prototype Carbon Fund (as in Russia and Kazakhstan). In many of our countries we will need to use the range of instruments described above together to help our client countries implement effective strategies for sustainable natural resource use. In the Romania forest sector, for example, we have combined GEF assistance, analytical work supported by trust funds, the WWF Alliance, the comprehensive development framework of the new CAS, and now preparation of an investment operation to help our clients address sustainable forest management issues. This combination of approaches is likely to be increasingly widespread in the future.

Box 28. Tajikistan: Lake Sarez Risk-Mitigation Project, 2000**Cost: US\$4.3 million**

Tajikistan is rugged and mountainous, and the terrain is prone to natural hazards. Lake Sarez in the Upper Murghab Valley in the Pamir Mountains, at an altitude of 3200 meters, was formed in 1911 following an earthquake. The naturally formed dam is over 550 m high, the highest of any dam in the world. Another earthquake in the area would make the dam vulnerable to collapse, generating a flood that could put the lives of over 30,000 people at risk, and affect the livelihoods of up to 5 million people living downstream of the dam.

The project objectives are to help the government of Tajikistan to plan, coordinate, promote, and implement mitigation and preparedness activities in case the dam forming Lake Sarez breaks.

The project would support (i) the design and installation of a community-based monitoring system and early warning system (EWS); (ii) strengthening of local communities on emergency preparedness plan and the provision of safety-related supplies; (iii) a study to formulate a risk assessment and develop long-term solutions; and (iv) the strengthening of the Lake Sarez Agency.

- Nonstructural measures can be implemented more rapidly and at a much lower cost than the structural ones and can play an important role in mitigating the consequences of a disaster.
- In order to prevent a disaster from happening, structural measures are required.
- Community involvement in the early warning systems is key.
- In planning an emergency response to a potential flood, it is critical that “safe havens” be identified.
- The implementing agency must be strengthened to enable it to respond to a disaster of such a scale.
- Preparedness must also be developed at the local community level.

Annex I. Key Natural Resource Management Issues in the ECA Region by Sub-Region

The Baltics, Poland, and Belarus

Geography and Climate

These countries, ranging from 40 to 59 degrees north, have an area of 0.68 million km² and a population of 56 million. Climate is temperate and mild, transitional to continental. Precipitation varies from 600 mm to 800 mm and is evenly distributed, average maximum temperatures are +16 to +19C in the summer and -1 to -8C in the winter, and the growing season lasts 100–120 days. The terrain is largely flat or undulating and heavily forested, with extensive wetlands along the Baltic Sea and in the Upper Dnieper Basin in Belarus. High elevations exist only in the south of Poland, rising to almost 2500 m in the High Tatras (part of the Carpathian Mountains). Soils are of average fertility, and are generally acidic; peat soils are very fertile but often water-logged.

Economy

GNP per capita varies from US\$2,180 (Belarus) to US\$3,910 (Poland). In all countries except Belarus, the transition to a free-market economy is well under way, with most land being privately owned. Industrial restructuring is well under way, and there is extensive trade with the countries of Western Europe and Scandinavia. All these economies are exhibiting healthy growth (4.4 percent annually in 1996-97 for Poland, 5.7 percent for Estonia), and are preparing themselves for EU accession. The rural population ranges from 29-35 percent of the total population, while rural poverty levels remain more widespread than urban poverty. (In Estonia 15 percent of the rural and 7 percent of the urban population are characterized as poor). The Baltics and Belarus have low fertility rates and an aging population.

Belarus has had difficulty reaching consensus on economic reform measures. Land has not yet been effectively privatized and markets are poorly developed. The economy has been stagnant and, as in Russia and Ukraine, male mortality has risen substantially. Nevertheless, estimates indicate average poverty rates of 23 percent, similar to Poland (24 percent). Agriculture contributes between 5 percent (Poland) and 13 percent (Belarus) of GDP, but comprises about 28 percent of the labor force in both countries. It also contributes to 12-14 percent of total exports.

GDP, Population and Land Area⁷

Country	Total land area 1000 km ² in 1997	Total Population (million) in 1998	% rural population in 1998	GNP Per Capita (US\$) in 1998	GNP Growth, 1997-98 (%)	Agriculture value-added (%) of GDP in 1998
Belarus	207	10	29	2,180	10.5	13
Estonia	42	1	31	3,360	5.7	6
Latvia	62	2	31	2,420	3.4	5
Lithuania	65	4	32	2,540	4.8	10
Poland	304	39	35	3,910	4.4	6
Total	680.0	56.0	x	x	x	x

Agriculture and Land Use

Arable land covers about 30 percent of total land area, except in Poland, where it is as high as 46.2 percent. All countries in this subregion are heavily forested, and have relatively little pastureland. In Poland small farms have always been predominant; nowadays some are too small to be economically viable. In the Baltics, land restitution programs have been implemented, while for Belarus this process has barely begun. Poland suffers from water shortages (see below), and extensive drainage of farmland may have contributed to falling groundwater levels, accompanied by soil compaction and other aridization symptoms that affect up to 70 percent of Polish farmland. Drainage may also have been excessive in Lithuania, where about 77 percent of wetlands have been drained for agricultural purposes. Soil/moisture conserving farming methods are not widely practiced. Cereal yields average 2115 kg/ha to 2937 kg/ha (Latvia and Poland respectively). Partly due to a decline in rural populations, and partly because of the rather poor soil fertility, agricultural land area is declining (in Lithuania by about 14,400 ha per year). This presents a particularly difficult situation for new private farmers; as new landowners and with farm subsidies having been greatly reduced, some are finding that their land is not worth much.

While there were declines in agricultural production in the early 1990s, the situation has stabilized and is presently at 1989 levels (except for Estonia). Fertilizer applications, though much lower than before the transition and below Western European levels, are adequate. The Baltic countries, and especially Poland, have important livestock industries, and livestock production has fallen less than in other parts of the region (average cattle populations have fallen by 30 percent and average pig populations by 12 percent). There are problems with the improper disposal of animal waste, which has affected river and groundwater quality, especially in Poland.

Land Use⁸

	total land area 000 km2 in 1997	Arable Land % in 1997	Forest land % in 1995	Pasture land% in 1995	Other %
Belarus	207	29.8	35.5	14.0	20.7
Estonia	42	26.7	47.6	7.0	18.7
Latvia	62	29.0	46.4	13.0	11.6
Lithuania	65	45.5	30.5	7.7	16.3
Poland	304	46.2	28.7	13.4	11.7

Cropland⁹

Country	Arable land ha per capita	Irrigated land as % of cropland		Annual fertilizer use (kg/ha of arable land)	Grain consumption as a % of domestic production	Grains fed to livestock as a % of total grain consumption	Average yield of cereals	
		1995-97	1995-97	1994-96	1995-97	1993-95	1995-97	in kg/ha 1994-96
								1996-98
Belarus	0.6	1.8	1.9	110	109	67	2161	2204
Estonia	0.77	0.3	x	24	116	63	1756	1931
Latvia	0.7	1.1	x	30	102	60	1854	2115
Lithuania	0.79	0.3	x	38	105	64	2024	2474
Poland	0.36	0.7	0.7	111	108	61	2854	2937

Livestock¹⁰

Livestock (million head)				
	Cattle	Cattle	Pigs	Pigs
	1993	1998	1993	1998
Baltics, Poland and Belarus	15.5	13.6	27.1	24.1

Water Resources

The water of the Baltic countries and Poland, and 46 percent of the territory of Belarus, drain into the Baltic. All countries except Poland have ample water resources, with renewable water resources ranging from 1278 m³ (Poland) to 8642 m³ (Estonia) per capita; and, overall, the usage of water for irrigation is not significant. Because of the flat terrain (and, in Poland, ample coal reserves), only Latvia uses a substantial amount of water to generate power (65.6 percent of electricity is generated by hydropower). The main problem has been one of assuring acceptable water quality levels and managing wetlands and coastal areas for ecosystem conservation as well as recreational uses. (See also the section below on biodiversity). A particular issue also has been the quality of the water of the

Baltic Sea, as this sea plays an important role for the tourism and the fishing industries. There has been good financial and technical cooperation with the Scandinavian riparian countries in this area. Parts of Poland are also vulnerable to flooding (see below). Marine fisheries are important for the Baltic countries, with total annual fish catch at 39.4 thousand metric tons.

River Flows¹¹

Country	Annual Internal Renewable Water Resources			Annual river flows	
	Total (billion m3)	1998 capita (m3)	Per	from other countries (billion m3)	to other countries
Belarus	372	3595		208	54.9
Estonia	127	8642		10	x
Latvia	167	6685		187	x
Lithuania	156	4174		93	x
Poland	494	1278		68	x

Water Withdrawals¹²

Country	Freshwater resources m3 per capita in 1998	Annual withdrawals		Sectoral withdrawals (%)		
		billion m3	% of total water resources	Agricultural	Industrial	Domestic
Belarus	5665.0	2.7	4.7	35.0	43.0	22.0
Estonia	8829.0	0.2	1.3	5.0	39.0	56.0
Latvia	14455.0	0.3	0.8	13.0	32.0	55.0
Lithuania	6724.0	0.3	1.0	3.0	16.0	81.0
Poland	1629.0	12.1	19.2	11.0	76.0	13.0

Production of Electricity¹³

Production of electricity (in billion kWh) in 1997		
Country	Total	Hydropower (%)
Belarus	26.1	0.1
Estonia	9.2	0
Latvia	4.5	65.6
Lithuania	14.4	2.1
Poland	140.9	1.4
Total	195.1	x

Fisheries¹⁴

	Average annual marine catch	Average annual freshwater catch	Average annual aquaculture production, in 000 metric tons, 1993-95				
	000 metric tons 1993-95	000 metric tons 1993-95	Marine fish	Diadromous fish	Freshwater fish	Molluscs/ Crustaceans	Total
Baltic States							
Belarus	0.0	14.4	0.0	0.0	13.7	0.0	13.7
Estonia	131.2	3.2	0.0	0.3	0.1	0.0	0.3
Latvia	142.4	1.2	0.0	0.0	0.5	0.0	0.5
Lithuania	70.3	3.2	0.0	0.0	2.2	0.0	2.2
Poland	397.1	47.8	0.0	4.5	18.2	0.0	22.7
Total	741.0	69.8	0.0	4.8	34.6	0.0	39.4

Forestry and Biodiversity

Forests play a major role in the economies of this subregion, which are all net exporters of forest products. In all countries, conifers, especially Scotch pine and spruce, predominate. All countries suffered devastation during World War II, and there have been extensive reforestation programs since then. In addition, as the economies have become more industrialized and populations migrated to towns, agricultural land area has decreased, while forestland has increased (in Latvia, forestland has increased from 25 percent of land area in 1920 to 45 percent today). As a result, the forests are "skewed" to the younger age classes.

There is a close link between forest management and the health of the forest industries. In Poland exports average US\$350 million per year and account for 6 percent of employment. The Baltic countries and Poland have all produced new forest legislation since 1990, stressing the multipurpose functions of forests. All countries have a strong tradition in forest management, research and training, and Poland and Latvia have begun to work on forest certification for Western European and Nordic markets. A feature of the Baltic countries is restitution of forestland to private owners (45 percent in Lithuania, 43 percent in Latvia, 52 percent in Estonia). Average holdings are small, with most forest owners being elderly. This poses a challenge for sustainable forest management, and forest extension programs have only recently begun.

There is a tradition of public access to forests in all of these countries, and they are widely used for recreation, including hunting and the gathering of mushrooms and berries. There are established game management regimes. The forests harbor unusual ecosystems; the Belovezhskaya forest on the borders of Poland and Belarus is the largest remaining lowland forest in Europe outside of Russia, much of it being primeval or old growth.

Wetland and coastal ecosystems include the Mazurian Lakes in northeast Poland, and the Gulf of Riga and Irbe Strait in Latvia. These are rich habitats for breeding and migrating waterfowl and an array of aquatic life, especially in Latvia, which still has extensive, almost untouched shorelines and is home to over 2 million birds in the autumn and winter periods. Meadow ecosystems were once extensive in Lithuania, covering 20 percent of the land area in the 1950s; since then, most have been transformed into collective farms, some now abandoned.

All of these countries have well-established protected area systems, comprising 4.1 percent (Belarus) to 12.6 percent (Latvia) of total land area. Belarus has a lack of adequate funding for maintaining the protected area system, while in the Baltics and Poland, the threats to protected areas come from polluted water (damaging aquatic ecosystems) and poorly managed tourist development along the coasts.

Forestry¹⁵

Country	Forested Area 000 km ² in 1995	% of Total Land Area in 1995	Nationally protected areas	
			000 km ² in 1996	as % total land area in 1996
Belarus	74.0	35.5	8.6	4.1
Estonia	20.0	47.6	5.1	12.1
Latvia	29.0	46.4	7.8	12.6
Lithuania	20.0	30.5	6.5	10.0
Poland	87.0	28.7	29.1	9.6
Total	230.0	x	57.1	x

Natural and Manmade Disasters

Parts of Poland are vulnerable to floods. The 1997 rainstorm in the Upper and Middle Odra and Upper Vistula flooded 440,000 ha and 56,000 buildings, causing an estimated US\$3 billion in damage. The severity may have been aggravated by the excessive development in the flood plains. There are difficult balances to be made between flood protection measures and environmental conservation. For Belarus the effects of the Chernobyl nuclear accident remain; although only about 4 percent of total land area has restricted access, the psychological impact from the nuclear fallout still remains strong. Damage to forests in Poland due to air pollution is quite severe. Twenty-four percent of forest districts are classified as ecological hazards, and damage is more prevalent at higher altitudes in the Sudety Mountains, where 16,000 ha of forests have died.

Key Policy and Institutional Issues

For Poland and the Baltics, adapting policies and standards to those of the European Union is a challenge. Expanding the area of independently certified forests will also be challenging, as the subregion's Western European and Nordic markets become increasingly demanding. Providing

adequate support services to new small private farm and forest owners will be necessary for the privatization policy to be successful. The rural population most likely will continue to decline, while agricultural land is consolidated as it was in Western Europe, and agricultural land area may decline further. For Belarus, the challenges of transition remain ahead, and civil society is still poorly developed. With the exception of Belarus, these countries have moved quickly with development of transparent institutions and local governance.

In summary, the main natural resource management issues in the Baltics, Poland, and Belarus are:

- Continuing to adapt forest policies to the changing requirements of the market, within a framework of sustainable forest management and a policy environment that is friendly to investment;
- Providing appropriate support services to assist new private farm and forest owners to manage agricultural and forestland profitably and sustainably, within the context of overall population decline and likely increases in the importance of the nonfarm sector;
- Continuing to improve water quality in the rivers and in the Baltic; and
- Assuring an appropriate balance between tourism/recreation and industry and conservation of coastal ecosystems in coastal and wetland management.

The Danube and the Carpathians

Geography and Climate

This subregion has an area of 1.1 million km² and a population of 102 million. It includes the Carpathian Mountains, with altitudes of up to 3500 m, which stretches across parts of all of the countries of the northern half of the Black Sea Basin, including the larger part of the Danube River Basin. Climate is characterized as moderate temperate, with average winter temperatures varying from 0 to -5C (-10C in the mountains) and summer temperatures ranging from +17 to +23C. Precipitation averages 600-700 mm in the plains and up to 1200 mm in the mountains, and is generally well distributed, though in the south of Ukraine and Moldova and east of Romania rainfall averages only 350 mm and supplementary irrigation is necessary.

Economy

Hungary, the Czech Republic, and the Slovak Republic have adapted well to the transition, and are preparing to join the European Union, with per capita GNP of more than US\$3,700. Despite moving ahead with macroeconomic and land reforms, per capita GNP in Moldova has declined sharply and is now only US\$380. Ukraine has had difficulty gaining consensus for macroeconomic and agricultural

reforms and, like Russia, has faced growing social hardship, increasing male mortality rates, and an overall decline in population growth rates. The reform path in Romania has also been bumpy. All countries have important agricultural sectors, with rural population between 25 and 54 percent of total population, and agriculture's contribution to GDP varying from 6 percent (Hungary) to 14 percent in Ukraine, 16 percent in Romania and 29 percent in Moldova. While poverty levels are low in Central Europe, according to some estimates, nearly 39 percent of the population live below the poverty line in Romania and over 60 percent in Ukraine and Moldova.

GDP, Population and Land Area¹⁶

Country	Total land area 1000 km ² in 1997	Total Population (million) in 1998	% rural population in 1998	GNP Per Capita (US\$) in 1998	GNP Growth, 1997-98 (%)	Agriculture value-added (%) of GDP in 1998
Czech Republic	77	10	25	5,150	-2.2	4
Hungary	92	10	36	4,510	4.2	6
Moldova	33	4	54	380	-9.5	29
Romania	230	23	44	1,360	-8.3	16
Slovak Republic	48	5	43	3,700	4.2	4
Ukraine	579	50	32	980	-2.4	14
Total	1059	102	x	x	x	x

Agriculture and Land Use

All countries of the subregion have extensive arable land, which accounts for 40.4 percent of land use in Romania, over 52.2 percent in Hungary and 57.1 percent in Ukraine. All have fertile soils, and Ukraine in particular benefits from black chernozem soils of exceptional fertility covering 22 million ha, over half the arable land; it was a major supplier of agricultural products to the FSU. Moldova has specialized in fruit and wine, and agriculture accounts for about 70 percent of merchandise exports. Agriculture accounts for 14 percent of exports in Hungary.

Romania has undertaken large-scale land privatization, and this has led to fragmentation of land into farms averaging only 2.6 ha, with agricultural support services not yet adapted to the new ownership structure. Privatization has been frequently accompanied by deterioration in land conservation practices, as farmers have ceased to plough along the contour. Crop production in 1999 was still only 90 percent of 1990 levels (In Central Europe there have also been declines in production.) Land privatization in Moldova has brought about increasing inequities regarding access to inputs, while agricultural reforms in Ukraine have moved slowly. Livestock populations have declined sharply, by 40 percent on average for pigs, cattle, and sheep. Meat production may have

been excessive during the 1980s, but consumption has declined sharply in the 1990s as incomes have fallen, forcing people to subsist on a diet of bread and potatoes.

Agricultural input use is modest, and in Ukraine fertilizer application levels at under 30 kg per ha are insufficient to maintain soil fertility. Cereal yields in Ukraine were 2.3 tons per ha in 1998 (a drought year), but overall production levels have remained roughly constant since the early 1990s. Yields are only half those in the United States (5 tons per ha), while soils are generally poorer, and one-third of those in France (6.8 tons per ha). Soil and moisture conservation measures are rarely used in Ukraine or Romania, and could help enhance long-term fertility. At the same time, it must also be taken into account that general rainfall levels are low, which makes the soil drier. And the more sloping areas are vulnerable to both wind and water erosion. Irrigated land is a small proportion of arable area except in Romania; where large-scale systems were developed on over 3 million ha, many with high pumping lifts. About 1 million ha can economically be irrigated, but rehabilitation and adaptation to the new ownership structures is required.

Land Use¹⁷

	total land area 000 km2 in 1997	Arable Land % in 1997	Forest land % in 1995	Pasture land% in 1995	Other %
Czech Republic	77	40.0	34.0	11.4	14.6
Hungary	92	52.2	18.6	12.0	17.2
Moldova	33	54.1	10.8	12.1	23.0
Romania	230	40.4	27.1	21.3	11.2
Slovak Republic	48	30.7	41.4	16.7	11.2
Ukraine	579	57.1	15.9	13	14.0

Cropland¹⁸

Country	Arable land ha per capita	Irrigated land as % of cropland		Annual fertilizer use (kg/ha of arable land)	Grain consumption as a % of domestic production	Grains fed to livestock as a % of total grain consumption	Average yield of cereals	
		1995-97	1995-97	1994-96	1995-97	1993-95	1995-97	in kg/ha 1994-96
Czech Republic	0.3	0.7	0.7	108	94	58	4167	4141
Hungary	0.47	4.2	4.2	87	84	72	3910	4275
Moldova	0.41	14.1	14.1	66	111	53	2711	2861
Romania	0.41	31.3	31.4	40	105	66	2812	2867
Slovak Republic	0.28	12.5	13.4	78	89	64	4298	4209
Ukraine	0.65	7.4	7.5	27	102	48	2410	2211

Livestock¹⁹

	Livestock (million head)			
	Cattle	Cattle	Pigs	Pigs
	1993	1998	1993	1998
Danube and Carpathians	32	19.8	47.1	29.1

Water Resources and Regional Waters

Only the Czech Republic and the Slovak Republic are water-abundant. Both Hungary and Moldova are dependent on watersheds from other countries, while in Ukraine and Romania annual water withdrawals total 31 percent or more of renewable resources. Both countries are downstream riparians of major rivers, and water quality presents special challenges in the Danube and Dnieper respectively. The Danube, 2700 km long, with 10 riparian countries, has been the subject of a multicountry action program for seven years. Some river water is diverted for irrigation, and the Iron Gates Dam regulates the flow for electric power generation. Balancing regional water quality improvement priorities with financing capabilities at the national level has been difficult. A particular additional issue, especially for Hungary, which has low lying terrain, is flood control.

The Dnieper, 2200 km long, is the third largest river in Europe (after the Volga and the Danube), and 22 of the 33 million people living in its watershed live in Ukraine. Water withdrawals for industry and municipal use are heavy; with 44.8 km³ of water crossing the border into Ukraine, and only 8.5 km³ being discharged into the Black Sea. There are now six major reservoirs on the main stream and 500 smaller dams on the tributaries to generate power for industry. The low changes in elevation have led to the creation of large, shallow lakes behind the barrages, have slowed the flow and natural dilution of pollution, and have seriously damaged water quality. The Dnieper is no longer a "self-regulating" ecosystem.

The Dnieper, Dniester, and Danube all flow through extensive wetlands of global significance. While much of the Danube delta is still in its natural state, Ukraine's wetlands have been extensively altered, though they still harbor many habitats. Ukraine has an important fisheries industry. Fish catch from the Black Sea averaged 400,000 tons in 1993-95, and from aquaculture (also dependent on wetlands), 100,000 tons.

The Danube accounts for 50 percent of the pollution load flowing into the Black Sea. Spawning grounds for fisheries are concentrated in the shallow northwestern continental shelf, and are particularly vulnerable to pollution. Overall fish catch in the Black Sea has declined by 90 percent over the past 30 years, largely due to pollution. Reduction of nutrient flows into the Black Seas has been identified as the highest priority for restoring its ecosystems. Balancing coastal zone management with tourism, shipping, industry, urban development, and ecosystem conservation has been difficult. Dredging and extension of canals at the mouth of the Danube to preserve channel

depths for shipping has diverted sediment away from the Romanian coastline and contributed to coastal erosion.

River Flows²⁰

Country	Freshwater resources m3 per capita in 1998	Annual withdrawals		Sectoral withdrawals (%)		
		billion m3	% of total water resources	Agricultural	Industrial	Domestic
Czech Republic	1554.0	2.5	15.8	2.0	57.0	41.0
Hungary	11865.0	6.3	5.2	36.0	55.0	9.0
Moldova	2722.0	3.0	25.3	26.0	65.0	9.0
Romania	9222.0	26.0	12.5	59.0	33.0	8.0
Slovak Republic	15396.0	1.4	1.7	x	x	x
Ukraine	2776.0	26.0	18.6	30.0	52.0	18.0

Water Withdrawals²¹

Production of electricity (in billion kWh) in 1997		
Country	Total	Hydropower (%)
Czech Republic	64.2	2.6
Hungary	35.4	0.6
Moldova	5.3	7.2
Romania	57.1	30.6
Slovak Republic	24.3	17
Ukraine	177.8	5.5
Total	364.1	x

Production of Electricity²²

Country	Annual Internal Renewable Water Resources			Annual river flows	
	Total (billion m3)	1998 Per capita (m3)		from other countries (billion m3)	to other countries
Czech Republic	582	5694		x	x
Hungary	60	604	1140	x	
Moldova	10	225	117	12	
Romania	370	1639	1710	x	
Slovak Republic	308	5745	x	x	
Ukraine	531	1029	865	x	

Fisheries²³

	Average annual marine catch	Average annual freshwater catch	Average annual aquaculture production, in 000 metric tons, 1993-95				
	000 metric tons 1993-95	000 metric tons 1993-95	Marine fish	Diadromous fish	Freshwater fish	Molluscs/ Crustaceans	Total
The Danube Basin							
Czech Republic	0.9	21.7	0.0	0.6	20.9	0.0	21.5
Hungary	0.4	23.0	0.0	0.1	9.6	0.0	9.7
Moldova	0.0	4.8	0.0	0.0	4.8	0.0	4.8
Romania	19.9	29.0	0.0	0.4	20.1	0.0	20.5
Slovak Republic	0.9	2.4	0.0	0.8	0.8	0.0	1.6
Ukraine	307.6	61.4	0.2	0.4	51.0	0.4	52.0
Total	329.7	142.3	0.2	2.3	107.2	0.4	110.1

Forests and Biodiversity

Romania, the Czech Republic, and the Slovak Republic are all forest-rich, and all have a long tradition of sound forest management, with much of the forest managed for watershed protection and restrictions on harvesting. The timber industry is a significant source of employment for these countries. The wood industry in the Slovak Republic comprises 13 percent of industrial production, and Romania is a major furniture exporter, although the industry has had difficulty restructuring. Nontimber values, including recreation, skiing, hunting, and harvesting of mushrooms, berries, and other products exceed the timber value of these forests. Romania retains a rich large mammal population (an indicator of forest health), including 60 percent of Europe's bears and 40 percent of its wolves. Forest species are diverse, with a predominance of high-value beech and oak.

Over half of all forestland has been restituted to private individuals and communes in the Czech Republic and the Slovak Republic, and a structure of regulations, incentives, and support systems have accompanied this restitution process. Romania is pursuing the same policy but urgently needs to develop similar support systems to help new owners with sustainable management. Ukraine has also pursued reforestation programs in the less fertile north, following a decline in the rural population.

Ukraine and Central Europe all have well-developed protected area systems comprising from 1.6 percent (Ukraine) to 15.8 percent (Czech Republic) of land area, but no such system exists at present in Romania, although there are nature reserves and the Danube Delta is a biosphere reserve. A challenge for Hungary, Ukraine, and Romania is to integrate biodiversity conservation with profitable agriculture in the "production landscape."

Forestry²⁴

Country	Forested Area 000 km ² in 1995	% of Total Land Area in 1995	Nationally protected areas	
			000 km ² in 1996	as % total land area in 1996
Czech Republic	26.0	34.0	12.2	15.8
Hungary	17.0	18.6	6.3	6.8
Moldova	4.0	10.8	0.4	1.2
Romania	62.0	27.1	10.7	4.6
Slovak Republic	20.0	41.4	10.5	21.8
Ukraine	92.0	15.9	9.0	1.6
Total	221.0	x	49.1	x

Natural and Manmade Disasters

Hungary is vulnerable to floods, but natural disasters in general are not a key concern. The Chernobyl nuclear disaster contaminated land in northern Ukraine. About 270,000 ha were considered to be seriously contaminated (with 5-15 Ci/km²) and 5.4 million ha mildly contaminated. Some 700,000 people qualified for resettlement, although not all took the opportunity.

Danube riparians are especially vulnerable to industrial accidents. The cyanide spill into the Tisza River in Romania, a tributary of the Danube, caused massive fish and wildlife kills in Hungary. There is not yet any clear legal mechanism enabling downstream riparians to seek compensation for the negative ecological impacts brought about by such disasters.

Key Policy and Institutional Issues

For Central Europe and Romania, preparation for integration with the EU is a priority; while for Ukraine, the reform agenda is still at an early stage. Adaptation of support services to the market economy and creation of an investment-friendly environment are also important. Romania and Ukraine are overcoming the effects of authoritarian, centralized regimes and have some way to go to achieve transparent institutions; however, even under previous regimes, environmental NGOs were tolerated. Civil society is better developed in Central Europe.

The key natural resource management priorities in the Danube and Carpathians can be summarized as follows:

- Encouraging sustainable agricultural land use practices while improving real access of private farmers to land, inputs, and support services;
- Addressing water quality management, including hazardous waste spills and nutrient levels, in the major regional rivers;
- Assuring sustainable forest management within the context of restitution to private owners; and
- Assuring sustainable ecosystem management with the participation of local populations.

The Balkans

Geography and Climate

The population living in the Balkans totals about 24 million.²⁵ The Balkans' total land area measures 0.29 million km², making the region almost the same size as Poland (0.3 million km²). The geography of the Balkans is quite varied, ranging from high mountain ranges (the Julian Alps and the Balkan, Rhodope, and Carpathian Mountains) and deep valleys, to low-lying coastal areas (Black Sea, Adriatic Sea) and wetlands along the Danube River and parts of the Albanian coastline. The Balkans also contain karst ecosystems, with caves, sinkholes, and treeless valleys. Altitude ranges from 2500 m in Romania to 3000 m in Slovenia and Bulgaria. The recreational value of the mountains and shorelines is very high. Climate varies from subtropical Mediterranean (Croatia and Albania) to moderately continental (northeastern Bulgaria). Winter temperatures range from -10 degrees C in the mountains to +10 degrees C in the lowlands, with average summer temperatures of 10-25 C. The mountains receive abundant precipitation, averaging 1500 mm, while in the fertile Danube plains, rainfall averages only 300-400 mm, requiring supplementary irrigation. High levels of evapo-transpiration also require supplementary summer irrigation in parts of Albania and Macedonia.

Economy

GNP per capita ranges from US\$9,780 in Slovenia, the wealthiest country in the region, to US\$810 in Albania, one of the poorest countries in the region. The percentage of people living in rural areas ranges from 31 percent (in Bulgaria) to 60 percent (in Albania). While Slovenia is preparing to enter the EU, the other Former Yugoslav Republic (FYR) countries have suffered from the negative economic and ecological impacts of the 1991-95 war, during their transition to independence. Albania suffered from unstable government, economic chaos due to pyramid schemes, and a breakdown in law and order. Bulgaria moved rapidly ahead with land privatization, but has also faced political instability and growing poverty.

GDP, Population, and Land Use²⁶

Country	Total land area 1000 km ² in 1997	Total Population (million) in 1998	% rural population in 1998	GNP Per Capita (US\$) in 1998	GNP Growth, 1997-98 (%)	Agriculture value-added (%) of GDP in 1998
Albania	27	3	60	810	7.9	54
Bosnia	51	4	58	x	x	x
Bulgaria	111	8	31	1,220	4.4	19
Croatia	56	5	43	4,620	1.8	9
Macedonia	25	2	39	1,290	3.1	11
Slovenia	20	2	50	9,780	3.9	4
Total	290.0	24.0	x	x	x	x

Fisheries²⁷

	Average annual marine catch	Average annual freshwater catch	Average annual aquaculture production, in 000 metric tons, 1993-95				
	000 metric tons 1993-95	000 metric tons 1993-95	Marine fish	Diadromous fish	Freshwater fish	Molluscs/Crustaceans	Total
The Balkans							
Albania	2.3	0.8	0.0	0.0	0.1	0.3	0.4
Bosnia	0.0	2.5	x	x	x	x	x
Bulgaria	13.3	9.0	0.0	0.7	7.4	0.0	8.1
Croatia	19.6	4.0	0.3	0.3	3.7	0.3	4.6
Macedonia	0.6	0.7	0.0	0.6	0.6	0.0	1.2
Slovenia	2.6	0.4	0.1	0.5	0.2	0.0	0.8
Total	38.4	17.4	0.4	2.1	12.0	0.6	15.2

Land Use Management

The subregion is land scarce except for Bulgaria, with arable land averaging 0.3 ha per capita or less, and comprising about 39 percent of total land area. Agriculture is diverse, with high value horticultural crops as well as the basic staples. Yields have fallen less than in many other parts of the subregion. However, in Albania, impoverished communities rely increasingly on fuelwood, and there is overgrazing and deforestation, while in Bulgaria the collapse of irrigation infrastructure following privatization has led to a reduction in output and incomes.

Land Use²⁸

	total land area 000 km2 in 1997	Arable Land % in 1997	Forest land % in 1995	Pasture land %	Other %
Albania	27	21.1	38.2	14.8	25.9
Bosnia	51	9.8	53.1	23.5	13.6
Bulgaria	111	39.0	29.3	16.3	15.4
Croatia	56	23.6	32.6	19.6	24.2
Macedonia	25	23.9	38.9	25.2	12.0
Slovenia	20	11.5	53.5	25.0	10.0

Cropland²⁹

Country	Arable land ha per capita	Irrigated land as % of cropland		Annual fertilizer use (kg/ha of arable land)	Grain consumption as a % of domestic production	Grains fed to livestock as a % of total grain consumption	Average yield of cereals	
		1995-97	1995-97	1994-96	1995-97	1993-95	1995-97	in kg/ha 1994-96
							x	1996-98
Albania	0.18	48.4	48.4	13	165	0	2537	2597
Bosnia	0.14	0.3	0.3	14	101	x	2957	2348
Bulgaria	0.51	18	18.7	44	96	52	2615	2657
Croatia	0.29	0.2	0.2	166	96	x	4340	4733
Macedonia	0.31	8.7	9.4	72	121	0	2719	2812
Slovenia	0.21	0.7	0.7	312	262	x	5026	5435

Livestock³⁰

	Livestock (million head)			
	Cattle	Cattle	Sheep	Sheep
		1993	1998	1993
The Balkans		3.7	2.8	13.3
				7.3

Coastal Zone Management

The coastlines of Croatia and Albania are of outstanding natural beauty. Coastal land use planning in Croatia has generally found a good balance between development and conservation, but the coastline of Albania is threatened by poorly planned construction activities. Bulgaria's coastline is also a tourist attraction. Parts are heavily industrialized, but there is progress in developing integrated land use planning approaches.

Forest Management and Biodiversity

The subregion has rich and varied forest ecosystems and, especially in the north, a long tradition of sustainable forest management. In Croatia broadleaves predominate, while in Albania, in addition to conifers and oak coppice, there is garrigue and maquis. Forestry is important to the economies of several of these countries. In Slovenia and Bulgaria, forestland restitution programs are being implemented, while in Slovenia these have been accompanied by a package of extension and incentive programs. Bulgaria, though, is not following a similar approach to restitution, which poses a

challenge to sustainable management. These forests have important recreational values, and the ski industry is well developed. In Albania, forests and rangeland are also a direct source of livelihood for poor rural populations. The Balkan forest and montane ecosystems are at a geographical crossroads, and of exceptionally rich biodiversity.

Forestry³¹

Country	Forested Area 000 km ² in 1995	% of Total Land Area in 1995	Nationally protected areas	
			000 km ² in 1996	as % total land area in 1996
Albania	10.0	38.2	0.8	2.9
Bosnia	27.0	53.1	0.2	0.4
Bulgaria	32.0	29.3	4.9	4.4
Croatia	18.0	32.6	3.7	6.6
Macedonia	10.0	38.9	1.8	7.1
Slovenia	11.0	53.5	1.1	5.5
Total	108.0	x	12.5	x

Irrigation and Water Management

While water resources are generally abundant in the north, there are regional water scarcities in the south and east; and interbasin transfers have been considered. While irrigation infrastructure has deteriorated, there are few problems of salinity, in part because most of the terrain has good natural drainage, in part because the irrigation is supplementary. Overall, water management does not pose a problem in this subregion.

River Flows³²

Country	Annual Internal Renewable Water Resources			Annual river flows	
	Total (billion m ³)	1998 Per capita (m ³)	Per capita (m ³)	from other countries (billion m ³)	to other countries
Albania	445	2903.0		113	x
Bosnia	X	x	x	x	x
Bulgaria	180	2146.0		1870	x
Croatia	614	13663.0		x	x
Macedonia	X	x	x	x	x
Slovenia	X	x	x	x	x

Water Withdrawals³³

Country	Freshwater resources m ³ per capita in 1998	Annual withdrawals		Sectoral withdrawals (%)		
		billion m ³	% of total water resources	Agricultural	Industrial	Domestic
Albania	12758	1.4	3.3	71	0	29
Bosnia	9952	x	x	x	x	x
Bulgaria	24663	13.9	6.8	22	76	3
Croatia	15863	0.1	0.1	0	50	50
Macedonia	3483	x	x	x	x	x
Slovenia	9334	0.5	2.7	0	50	50

Production of Electricity³⁴

Production of electricity (in billion kWh) in 1997		
Country	Total	Hydropower (%)
Albania	5.6	96.3
Bosnia	2.2	64.5
Bulgaria	41.6	4.1
Croatia	9.7	54.7
Macedonia	x	x
Slovenia	13.2	23.5
Total	72.3	x

Environmental Impacts of War

The Yugoslavia war from 1991-95 destroyed about 80,000 ha of forestland in Bosnia. Up to 25 percent of Bosnia's forests is inaccessible due to land mines. The high costs and difficulty of demining make it tough for Bosnia to recover its remaining forestland. In Croatia, coastal forests were destroyed and are also littered with landmines. The 1999 war in Serbia and Kosovo has put further stress on natural resources in the area, having resulted in the destruction of municipal services and infrastructure, including damage to solid waste facilities, power supply, water supply, and wastewater treatment plants. The bombing of factories has in some cases led to hazardous substance spills.

Natural Disasters

Macedonia and parts of the Federal Republic of Yugoslavia are vulnerable to earthquakes. The coastal forests of Croatia and Albania are subject to fires in the summer, while floods cause damage, especially in Croatia.

The key natural resource management issues in the Balkans can be summarized as follows:

- Assisting with postwar restoration of infrastructure and municipal services, and de-mining the land;
- Assuring sustainable coastal zone and forest ecosystems management to conserve fragile landscapes and maintain tourism and recreational values;
- Providing adequate support services to new agricultural and forest landowners to ensure sustainability and provide adequate incomes;
- Developing community-based forest, rangeland, and irrigation management in Albania; and
- Addressing governance issues while supporting improved public sector management more broadly.

Russia

Geography and Climate

Russia, with a population of 147 million and a land-area of 17 million km², is the largest country in the world, spanning 11 time zones and 7000 km from east to west. The climate ranges from arctic to temperate and even subtropical, and from moderately humid to extracontinental. Precipitation varies from below 200 mm in the Caspian Sea deserts to over 800 mm in central parts of European Russia, the Far East and in most mountainous areas (Caucasus, Urals, and Siberia). Average summer maximum temperatures range between +15 and +20 C throughout most of the country, except in northern parts, which remain cool (+5 to +12 C), and there also remain vast areas of permafrost. More than two-thirds of the country is above 55 degrees north, with long cold winters and a frost-free period of less than 100 days. Over 85 percent of the population lives in the milder regions of the central and southern parts of European Russia and along the Trans-Siberian railroad corridor.

The terrain is mostly flat or rolling, except for the northern Caucasus and Urals, and mountains in eastern Siberia and the Far East, which reach 4500 m or more (Mount Elbrus in the Caucasus is the highest point in Europe at 5642 m in elevation). Moving from south to north, the vegetation changes from semideserts and grasslands to mixed forests, then to coniferous boreal forests, taiga and tundra, and finally the arctic desert. There are extensive wetlands, especially in the boreal and subarctic watersheds and elsewhere in the floodplains of the larger rivers. Russia's rivers include three of the 10 rivers with the greatest flow in the world (Yenisey, Lena, and Amur). Russia has one-fifth of the world's forests, but most of these are in remote and environmentally fragile areas. Russia's global significance in terms of natural resources imposes global as well as local challenges for their management.

Economy

Russia's per capita GNP was US\$2,260 in 1998, with agriculture contributing 7 percent. Russia is a net importer of food; however, forest products account for US\$4 billion in exports. Poverty, especially in small towns and rural areas, is pervasive. Male life expectancy has dropped to only 58 years, due to the stress of working without getting paid regularly (frequent wage arrears of 6 months or more) and the increase in unemployment, which have triggered a sharp rise in depression (inability to be the breadwinner of the family), which is reflected by the increase in alcoholism. Fertility is down (inability to sustain the costs of raising children), and overall population declined by nearly one million in 1999. Further structural reforms are needed, in particular adjustment of energy prices, removal of implicit subsidies through the nonpayments systems, and increasing the noncash economy. Natural resources financing, and taxation policies need broad revision.

GDP, Population, and Land Area³⁵

Country	Total land area 1000 km ² in 1997	Total Population (million) in 1998	% rural population in 1998	GNP Per Capita (US\$) in 1998	GNP Growth, 1997-98 (%)	Agriculture value-added (%) of GDP in 1998
Russia	16889	147	23	2,260	-6.6	7

Agriculture and Land Use

Arable land is only 7.5 percent of land area, compared with 45.2 percent for forestland and only 5.2 percent for pastures. Only 4 percent of arable land is irrigated; however, because of Russia's vast size, this translates into 5.2 million ha; 6 million ha of lands are under drainage systems. It is estimated that 3 million ha of irrigated land and 2 million ha of drainage systems are in need of rehabilitation. Soils on vast areas are of rather poor quality (mostly due to permafrost conditions); however, the "central chernozem zone" in the south of European Russia has some of the naturally most fertile soils in the world. Soil/moisture conservation measures are frequently not followed, and this, combined with variable rainfall and droughts every three years on average, and soil compaction from use of heavy machinery, have made the soil vulnerable to wind and water erosion. Food production is only 65 percent of 1985 levels according to official data, and an increasing proportion of food is grown on small household plots. Fertilizer use has fallen by over 50 percent to only 14 kg/ha and is insufficient to maintain fertility; cereal yields averaged only 1302 kg per ha in 1996-98. There has also been a dramatic fall in the livestock population (by 31.4 percent for cattle, and 27.2 percent of poultry). Although farms have in principle been privatized, this has meant mostly conversion into "joint stock companies," whose managers frequently maintain close ties with the local administration and who maintain a monopoly on inputs, machinery, marketing, and provision of basic social services. In this

environment, there is no real access to land resources, except for the garden plots (and even these may be dependent on inputs from the joint stock company).

Land Use³⁶

	total land area 000 km2 in 1997	Arable Land % in 1997	Forest land % in 1995	Pasture land% in 1995	Other %
Russia	16889	7.5	45.2	5.2	42.1

Cropland³⁷

Country	Arable land ha per capita	Irrigated land as % of cropland		Annual fertilizer use (kg/ha of arable land)	Grain consumption as a % of domestic production	Grains fed to livestock as a % of total grain consumption	Average yield of cereals	
		1995-97	1995-97	1994-96	1995-97	1993-95	1995-97	in kg/ha 1994-96
Russia	0.85	4	4	14	102	50	1313	1302

Livestock³⁸

Livestock (million head)				
	Cattle	Cattle	Pigs	Pigs
	1993	1998	1993	1998
Russia	52.2	31.7	31.5	17.3

Water Resource Management

Russia is rich in water resources; however, many of the rivers are remote from populated or irrigated areas. As a result, Russia only uses 1.7 percent of its renewable water resources (which total 4312.7 km³, or more than four times the rest of the ECA region put together). Rivers account for over 18.8 percent of electricity generation. The bulk of water use is for industry (62 percent), with agriculture accounting for 20 percent and domestic use for 19 percent. The issue is, rather, one of water quality management, especially in the densely populated river basins such as the Volga, home to over 60 million people.

Regulation of the Volga for flood control and hydroelectricity, combined with the flat terrain, has slowed river flow and natural dilution and contributed to heavy pollution loads, not only originating from municipalities but also from agriculture. Much of the water is now unfit for drinking even with treatment, and pollution and river regulation have contributed to loss of habitat for fish spawning

grounds, which has brought about declines in fisheries and the sturgeon harvest. The Volga Delta wetlands, Europe's largest delta, are under threat from pollution.

River Flows³⁹

Country	Water Resources		Annual river flows	
	Total (billion m ³)	1998 Per capita (m ³)	from other countries (billion m ³)	to other countries
Russia	43127	29115	1855	54

Water Withdrawals⁴⁰

Country	Freshwater resources m ³ per capita in 1998	Annual withdrawals		Sectoral withdrawals (%)		
		billion m ³	% of total water resources	Agricultural	Industrial	Domestic
Russia	30619	77.1	1.7	20	62	19

Production of Electricity⁴¹

Production of electricity (in billion kWh) in 1998		
Country	Total	Hydropower (%)
Russia	833.1	18.8

Fisheries Management

This is a special issue for Russia. Official marine catch is over 4 million metric tons, mostly from the North Pacific, and the freshwater catch is 170,000 metric tons. Fisheries were once centrally managed; they suffered from the economic downturn, but the industry is recovering and management has been decentralized. The fleet is being modernized with hard currency generated by fish marketing, putting increasing pressure on the resource in an environment of weaker monitoring and control. The government has recently been undertaking a number of steps to combat corruption in this sector, but progress is slow. At the other end of the scale, recreational fishing is a favorite pastime of many Russians, but is dependent on adequate freshwater quality.

Fisheries⁴²

	Average annual marine catch 000 metric tons 1993-95	Average annual freshwater catch 000 metric tons 1993-95	Average annual aquaculture production, in 000 metric tons, 1993-95				
			Marine fish	Diadromous fish	Freshwater fish	Molluscs/Crustaceans	Total
Russia	4032.5	170.4	0.1	2.4	72.5	1.3	76.3

Forestry and Biodiversity

Russia has the largest forest resources of any country, possessing 22 percent of the world's total forest area, which accounts for 15 percent of the global carbon terrestrial pool. Eighty percent of forests are slow-growing boreal forests, with species including spruce, Scotch pine, Siberian pine, larch, birch, and aspen, with the richest forests found in the middle taiga. Forest industries used to employ 2 million people directly, but forest harvests have fallen from 300 million m³ in 1990 to less than 80 million m³ in 1998. Although there has been some recovery, a large portion of production is exported as saw logs, with little local processing or value-added.

The challenge is for the forest sector to recover, and to contribute to poverty reduction and economic growth within a sound management framework. The principles of biologically sustainable forest management are well understood in Russia, which has well established forestry institutions. However, there is a need for reforms in forest financial and leasing policy, in forest information management and transparency, for improved forest protection and regeneration, and for training in modern technologies and enterprise management. Especially in European Russia there is scope for using forest certification as a market tool for increasing exports within sustainable management.

Russia has a well-developed protected area network at the federal and regional levels, covering 58 million ha, or 3.1 percent of total land area. Although management has come under pressure with a decrease in financing following the economic crisis, much progress has been made to engage the local population in conservation management; but at the same time much remains to be done. Globally significant ecosystems include the Russian Far East, Lake Baikal, the Caucasus, and the Arctic.

Forestry⁴³

Country	Forested Area 000 km ² in 1995	% of Total Land Area in 1995	Nationally protected areas	
			000 km ² in 1996	as % total land area in 1996
Russia	7635.0	45.2	516.7	3.1

Global Significance of Russia

Sound management of Russia's ecosystems is of global importance, particularly in regard to the Arctic ecosystems (the ice cap and Arctic marine life), the carbon balance (forests and wetlands), and freshwater resources flowing into the sea (Russia's rivers). The challenge is to combine these "global goods" with benefits for the Russian economy and society.

Natural Disasters

Russia is relatively less vulnerable to natural disasters as far as the risk of loss of life is concerned. The extreme winter cold, however, makes the population especially vulnerable to breakdown in supply or distribution of energy for heating systems. Furthermore, nonpayments by local authorities to gas cofinanciers, themselves short of cash, have led to heating systems being cut off for entire communities. Transfer of responsibility for heating from local industries to municipalities, while commercially rational, has also led to difficulties in maintenance, payments, and supply. Parts of the region are prone to drought, and the forests, especially in the Far East, are increasingly vulnerable to catastrophic fires. Seasonal floods are damaging in many areas of southern Siberia. Forest pests and locust outbreaks also cause economic damage.

Institutional and Policy Issues

Russia faces many challenges. The changing balance of power between the federal and regional administrations, governance and corruption, difficulties with tax collection, and the pervasive problem of nonpayments and substitution of a barter for cash economy all affect natural resource management. Sound natural resource taxation policies, energy, water and forest charges that reflect scarcity, access of farmers to inputs and land through market channels, and transparent regulations are all areas where there is still progress to be made. Russia's growing NGO community and press, and increasingly widespread networks of the academic community, are, however, gradually bringing about increased transparency, which in time may translate into increased accountability.

The key natural resource management priorities in Russia can be summarized as follows:

- Improving management of forests to facilitate poverty reduction, economic recovery, and sustainable resource management;
- Supporting recovery of soil fertility through sound land management practices;
- Facilitating effective access to agricultural land and inputs within a market framework;
- Improving water quality through better municipal and industrial water management and agricultural practices;
- Sustaining fisheries resources through adequate monitoring, controls, and financial instruments;
- Meeting global commitments regarding climate change, international waters, and biodiversity conservation; and
- Improving the governance and public participation framework to achieve these aims.

Turkey and the Caucasus

Geography and Climate

The subregion, with an area of about 0.95 million km² and a population of 80 million, is characterized by its geographical and biological diversity. The subregion is mountainous, with elevation averaging over 1000 m and mountains of the main Caucasus range rising to over 5000 m. The region is highly vulnerable to seismic events, and earthquakes cause heavy loss of life. Rainfall varies from over 2000 mm along the Black Sea coast to 350 mm in the central Anatolian Plateau and less than 300 mm in the most fertile areas of Armenia and Azerbaijan. The climate, primarily subtropical, varies from Mediterranean to continental. Internal renewable water resources are abundant, except in Azerbaijan, where they average only 1,069 m³ per capita per year, and high elevations permit water storage for hydropower and irrigation.

Economy

GNP per capita income is nearly US\$3,160 in Turkey, but there are wide regional differences, with incomes in the east and southeast only one-third of the average. GNP has collapsed in the Caucasus countries, with per capita GNP ranging from US\$460 to US\$970. Widespread hardship has resulted from the recent severe earthquakes and aftershocks in Turkey, and from the prolonged fighting in Nagorno-Karabakh and Abkhazia (Georgia). Rural population is 27 percent to 43 percent of the total, while urbanization is rapid in Turkey, and overall population growth is about 1.6 percent per year. In the Caucasus, overall population growth is stable, and there is some reverse migration occurring as people return to farming for subsistence. Agriculture is 18 percent of GDP in Turkey and is declining as the economy grows and diversifies, but has risen to 33 percent of GDP in Armenia, where livestock averages about 35 percent of agricultural GDP.

GDP, Population, and Land Area⁴⁴

Country	Total land area 1000 km ² in 1997	Total Population (million) in 1998	% rural population in 1998	GNP Per Capita (US\$) in 1998	GNP Growth, 1997-98 (%)	Agriculture value-added (%) of GDP in 1998
Armenia	28	4	31	460	3.4	33
Azerbaijan	87	8	43	480	9.9	20
Georgia	70	5	40	970	2.7	26
Turkey	770	63	27	3,160	3.9	18
Total	955.0	80.0	x	x	x	x

Agriculture and Land Use

Because of the highly mountainous terrain, arable land comprises only 11.2 to 34.5 percent of total land area in all of these countries. Pasture land accounts for 16 to 25.3 percent of total land area, and forests for 11.4 to 42.9 percent. Turkey has highly diverse agricultural production, varying from sophisticated plastic house production of high-value crops along the Mediterranean, to extensive wheat/livestock production systems in the center and east, and regional specialty crops (apricots in Malatya and pistachio in Gaziantep). These are grown for export but, above all, for the large domestic market. A range of subsidies that are presently being phased out has impeded sector growth. Almost all agricultural land is privately owned and family farms predominate. Georgia's agriculture is also highly diverse, including production of wine and citrus as well as cereals. Export competitiveness of these crops from the Caucasus countries has declined, with the erosion of reciprocal trade agreements between Russia and the FSU states, and their integration into the global markets. Fertilizer levels have dropped by over 50 percent since the transition and are insufficient to maintain fertility. As a result, food production has declined and is now only 50 percent of 1985 levels (Azerbaijan).

Soil erosion is a serious problem, with over 60 percent of the land being classified as severely eroded in Turkey. This is due partly to conversion of fragile rangeland to arable land and to poor grazing practices on remaining rangeland, which leads to a reduction in vegetative cover. In the Caucasus countries erosion is also a problem, especially in mountainous watersheds, as is overgrazing. Livestock populations have remained stable relative to elsewhere in the region, though sheep populations have declined by about 25.8 percent.

In Turkey, **irrigated land** is only 14.7 percent of cropped area yet 70 percent of the value of production; but in the countries of the Caucasus, irrigated land is on average 56 percent of cropped area. Despite the irrigation infrastructure, cereal yields in the Caucasus are low (under 1,772 kg/ha), and fertilizer use is low. All the Caucasus countries have suffered from deterioration of their irrigation infrastructure; land has been privatized without the institutional mechanisms being in place to provide small farmers with the support services they need. Drainage and salinity are also serious problems, especially in Azerbaijan. Water charges are low and water losses total 50 percent or more, but adequate water delivery is a key first step to assuring farmers the income they need to pay for inputs. Water losses from irrigation distribution systems have increased sharply as funds for maintenance have declined; they have more than doubled in the case of Armenia. In Turkey, while water user groups have existed for decades on small irrigation schemes, only in the last five years have they developed on larger schemes, while responsibility for maintenance has been transferred to large associations (often covering 10,000 ha or more).

Land Use⁴⁵

	total land area 000 km2 in 1997	Arable Land % in 1997	Forest land % in 1995	Pasture land% in 1995	Other %
Armenia	28	17.5	11.8	24.6	46.1
Azerbaijan	87	19.3	11.4	25.3	44.0
Georgia	70	11.2	42.9	24.1	21.8
Turkey	770	34.5	11.5	16.0	38.0

Cropland⁴⁶

Country	Arable land ha per capita	Irrigated land as % of cropland		Annual fertilizer use (kg/ha of arable land)	Grain consumption as a % of domestic production	Grains fed to livestock as a % of total grain consumption	Average yield of cereals	
							1994-96	1996-98
		1995-97	1995-97	1994-96	1995-97	1995-97	in kg/ha	in kg/ha
Armenia	0.13	51.5	43.7	16	377	21	1431	1772
Azerbaijan	0.21	74.9	50	18	185	30	1599	1647
Georgia	0.14	43.3	42.2	46	362	26	1881	1692
Turkey	0.43	14.7	15.4	68	99	33	2019	2196

Livestock⁴⁷

	Livestock (million head)			
	Cattle		Sheep	
	1993	1998	1993	1998
The Caucasus and Turkey	15.2	14.6	50.2	37.2

Water Resources

In all countries, water resource management is a key issue. Agriculture accounts for 70 percent of water withdrawals in Turkey and Azerbaijan, and in both countries there have been difficulties reconciling conflicting demands for municipal and industrial use, along with conservation of natural lakes and wetlands. Turkey has undertaken an ambitious investment program in multipurpose dams, and hydroelectric power now accounts for over 38 percent of power generation there. It has been as high as 84 percent in mountainous Georgia; however, significant parts of the hydroelectric power infrastructure now require major repairs following the fighting in Abkhazia and Nagorno-Karabakh, and lack of maintenance. Riparians downstream of Turkey have been concerned by large-scale water

resource development in the Euphrates Basin. Azerbaijan is water scarce, dependent on the Kur watershed, originating in Georgia, and extension of the irrigated area would increase rural incomes.

Armenia has also undertaken large-scale water resource development. However, with the collapse of infrastructure and the confusion surrounding privatization and rising energy prices, water withdrawals for agriculture are less than one-third of 1990 levels, and irrigated areas have fallen from 311 ha in 1985 to 173,000 ha in 1995. Despite the overall abundance of water, there are regional imbalances. There are, furthermore, conflicts between maximizing water releases in the winter (for electricity generation, to compensate for the rise in fossil fuel prices) and storing water in winter for irrigation in the summer. Water withdrawals have led to a drop by 18 meters in Armenia's largest lake, Lake Sevan, with negative consequences for fisheries and ecosystems.

River Flows⁴⁸

Country	Annual Internal Renewable Water Resources			Annual river flows	
	Total (billion m ³)	1998 capita (m ³)	Per	from other countries (billion m ³)	to other countries
Armenia	91	2493.0		15	5.2
Azerbaijan	81	1069.0		222	x
Georgia	581	10682.0		52	20.2
Turkey	1960	3074.0		76	60.4

Water Withdrawals⁴⁹

Country	Freshwater resources m ³ per capita in 1998	Annual withdrawals		Sectoral withdrawals (%)		
		billion m ³	% of total water resources	Agricultural	Industrial	Domestic
Armenia	2767.0	2.9	27.9	66.0	4.0	30.0
Azerbaijan	3831.0	16.5	54.6	70.0	25.0	70.0
Georgia	11632.0	3.5	5.5	59.0	20.0	21.0
Turkey	3209.0	35.5	17.4	73.0	11.0	16.0

Production of Electricity⁵⁰

Production of electricity (in billion kWh) in 1997		
Country	Total	Hydropower (%)
Armenia	6	23.1
Azerbaijan	16.8	9
Georgia	7.2	84.3
Turkey	103.3	38.5
Total	133.3	x

Fisheries⁵¹

	Average annual marine catch	Average annual freshwater catch	Average annual aquaculture production, in 000 metric tons, 1993-95				
	000 metric tons 1993-95	000 metric tons 1993-95	Marine fish	Diadromous fish	Freshwater fish	Molluscs/Crustaceans	Total
The Caucasus and Turkey							
Armenia	2.0	2.5	0.0	1.8	1.9	0.0	3.7
Azerbaijan	33.3	2.7	10.0	0.0	2.0	0.0	12.0
Georgia	28.1	2.7	0.0	0.0	2.7	0.0	2.7
Turkey	573.3	30.1	6.7	9.5	0.4	0.1	16.7
Total	636.7	38.0	16.7	11.3	7.0	0.1	35.1

Regional Seas

In Azerbaijan, the increasing pollution of the Caspian Sea, caused largely by the local oil industry, and also due to discharges from the Volga, is a major issue. This has led to the collapse of the fishing industry in general (from 60,000 tons in 1985 to 10,000 tons in 1995), and the sturgeon industry in particular. The Azeri quota for sturgeon is now only 170 tons. Weakened governance and oversight of the industry since the transition has also contributed to its collapse. The rising level of the Caspian Sea has been an additional problem, flooding infrastructure and leading to pollution of the sea from industrial wastelands near the seashore. Sea levels are predicted to rise another 2.5 meters by 2010. The exact causes for the rise in the sea level are unclear; the sea level is known to vary periodically.

The Black Sea has also suffered from pollution and overfishing. The fishing fleet has been overdeveloped, and regional agreements on fisheries management have made little progress. Important for Turkey is management of urbanization and tourist development as the economy continues to develop rapidly, while in Georgia oil spills and ship waste have contributed to pollution.

Forestry and Biodiversity

Turkey and the Caucasus are wood-deficit countries. Gazetted forested land in Turkey is 11.5 percent of land area, but half of this is effectively degraded rangeland. Georgia's forests cover 42.9 percent of land area and are dominated by deciduous species. Both countries' forests are unusually rich in species diversity. Georgia's forests were managed for protection and recreation, and were rich in wildlife, with timber imported from the FSU prior to 1990. Forests in Armenia and Azerbaijan cover only about 12 percent of total land area but are also rich in species diversity. The challenge in the Caucasus is to manage these forests sustainably while meeting the increasing timber requirements for contribution to economic growth, in a context of acute poverty and poor law enforcement. In Armenia, with rising fossil fuel prices, fuelwood now accounts for 50 percent of household energy use. Participatory approaches to improve watershed management have been used successfully to increase incomes in poor areas of rural Turkey, and hold promise for the Caucasus.

Both Turkey and the Caucasus are exceptionally rich in species diversity. In Turkey the wild relatives of many globally important foods have their origin, including wheat, barley, chickpeas, lentils, fruit trees, and flowers, while Armenia and Azerbaijan are rich in medicinal plants. Georgia and Turkey are home to globally significant wetlands.

The Caucasus have a well-developed protected area system, comprising 5.5 to 7.4 percent of land area (Azerbaijan and Armenia, respectively). Only 2.7 percent of Georgian territory is managed as nature reserves; however, the area legally protected was once much larger, since most forests were managed for protection. In Turkey in contrast, only 1.4 percent of total land area is under protection, although there are plans to increase the size of protected areas.

Forestry⁵²

Country	Forested Area 000 km ² in 1995	% of Total Land Area in 1995	Nationally protected areas		as % total land area in 1996
			000 km ² in 1996	as % total land area in 1996	
Armenia	3.0	11.8	2.1	7.4	
Azerbaijan	10.0	11.4	4.8	5.5	
Georgia	30.0	42.9	1.9	2.7	
Turkey	89.0	11.5	10.7	1.4	
Total	132.0	x	19.5	x	

Natural Disasters

Turkey and Armenia are especially vulnerable to severe earthquakes that cause great loss of life. Georgia is subject to avalanches and floods that often lead to catastrophic mudflows and landslides in mountainous areas.

Policy and Institutional Issues

Overcentralization of authority and decision-making and agricultural price distortions (Turkey); unstable political institutions, corruption, and weak governance (the Caucasus); pricing policies for water, land, and forest resources that do not always reflect scarcities (all countries); and an institutional framework for access to and management of land that has lagged behind privatization policies (Armenia and Azerbaijan) are some of the major policy and institutional issues that these countries face. Overriding these issues in the Caucasus is the widespread poverty associated with the transition. All countries, to a varying degree, are also struggling to balance authoritarian tradition with an increasing trend toward openness to criticism and development of democratic institutions.

The key natural resource management issues in Turkey and the Caucasus can be summarized as follows:

- Managing water resources to balance the needs of irrigated agriculture, and increasing farm incomes with municipal and with nonconsumptive needs;
- Watershed management to maintain the fertility of agricultural, range, and forestland and increase the incomes of rural populations;
- Emphasizing the nontimber values of forests while meeting the needs of the rural population for fuel and livelihoods;
- Managing coastlines to conserve ecological values and provide a sustainable basis for the tourism industry; and
- Maintaining the economic, ecological, and tourism potential of the Black and Caspian seas.

Central Asia

Geography and Climate

The Central Asian republics cover 3.9 million km², with a population of 56 million. Climate varies from temperate and subtropical to arid continental, with hot summers and cold winters. The southeastern part of the subregion is mountainous, with altitudes in the Tien Shan and Pamir rising to over 5000 m. The Altai Mountains in northeast Kazakhstan border Mongolia and Russia. Much of Kazakhstan comprises arid steppes, while Turkmenistan and Uzbekistan are largely desert landscapes. The region is arid and water scarce, with rainfall averaging only 100 mm in the Aral Sea Basin, rising to 400 mm in the Kyrgyz Republic and Tajikistan, and over 1000 mm in the mountains. Despite the arid climate, there are rich and varied ecosystems, especially in the Altai-Sayan ecosystem in eastern Kazakhstan, a mountainous area located at the transition zone between the northern taiga, Altai Mountains, and central Asian deserts, and in the western Tien Shan range bordering Kazakhstan, the Kyrgyz Republic, and Uzbekistan. Although Kazakhstan and Turkmenistan border the Caspian Sea, the southern part of the region drains into the Aral Sea, and water resource management, together with desertification of the northern steppes, is by far the predominant natural resource management issue for this subregion.

Economy

This subregion includes three of the poorest countries in ECA, with per capita GNP of only US\$370 in Tajikistan, US\$380 in the Kyrgyz Republic, and US\$640 in Turkmenistan. The remoteness of the areas, civil unrest, and the discontinuation of subsidies from Moscow following independence, together with the confusion surrounding the transition, have contributed to a decline in living standards. (However, even during Soviet times, in contrast to other republics of the former USSR,

there was considerable poverty in these republics). Uzbekistan and Kazakhstan are benefiting from their natural gas and oil reserves, but Turkmenistan has yet to find a cost-effective way to extract and transport its oil and gas for export. An average of 56 percent of the population lives in rural areas. Tajikistan is the most rural (73 percent), while Kazakhstan is the least rural (44 percent). GNP per capita has fallen over the 1990s. There have been difficulties with the transition from centrally planned to free-market economies, involving mass privatization of state-owned enterprises, liberalization, and stabilization measures. There has been an economic and social decline of the rural economy, along with further misuse of natural resources (for example, woodcutting and overgrazing), linked with rising poverty. Agriculture is key to the economy in all of these countries.

GDP, Population, and Land Area⁵³

Country	Total land area 1000 km ² in 1997	Total Population (million) in 1998	% rural population in 1998	GNP Per Capita (US\$) in 1998	GNP Growth, 1997-98 (%)	Agriculture value-added (%) of GDP in 1998
Kazakhstan	2,671	16	44	1,340	-2.2	9
Kyrgyz Republic	192	5	66	380	4.2	46
Tajikistan	141	6	73	370	15.2	26.3
Turkmenistan	470	5	55	640	x	25
Uzbekistan	414	24	62	950	5.2	31
Total	3888	56.0	x	x	x	x

Agriculture, Land Use, and Soil Fertility

Much of Kazakhstan comprises arid and semiarid steppe land, earlier used for extensive livestock production, some of which was converted to cropland in the 1950s and 1960s using extensive farming methods. These soils are now vulnerable to erosion and, without permanent vegetative cover, have lost much of their topsoil. Related soil loss due to wind and water erosion may be as high as 5 tons per ha. Sixty percent of the territory is under threat of desertification. Soil/moisture conservation farming methods are not practiced. Wheat yields are less than 1 ton per ha. Except in Kazakhstan, the subregion is land-scarce, with arable land per capita being as little as 0.14 ha in Tajikistan. Intensive farming methods are appropriate on irrigated land, whereas the range and mountain land only allow for extensive livestock production. Irrigated agriculture is widely developed in the Aral Sea Basin, with cotton being the predominant crop, as well as horticulture and cereals. Central Asia was the third biggest producer of cotton after China and the United States. Cotton crops require higher amounts of fertilizer applications, but often the mix of fertilizer used is inappropriate, leading to its overuse. The overuse of pesticides, a common problem in the 1970s, declined due to lack of funds to purchase them as well as lack of equipment. On a more positive note, steps have been taken towards decreasing the consumption of pesticides through the slow adoption of integrated pest management in some

areas. However, most surface water in cotton-growing areas is still contaminated with persistent pesticides and is unsuitable for human consumption. The main issues regarding land use are soil salinization, waterlogging, desertification, and overgrazing.

Regarding the growing problem of overgrazing, during the Soviet period, the use of rangeland in Kazakhstan was subject to restrictions on carrying capacity, which were not always respected. While overall livestock numbers have declined drastically since the transition, there is localized overgrazing, for small livestock owners like to keep their new animals close to home, as new sustainable patterns of summer and winter feeding and management have not yet emerged. Moreover, the rising and increasingly saline water table is limiting the number of usable wells and, consequently, livestock access to remote pastures. Sheep farming is important also in the mountainous Kyrgyz Republic. Here too, while overall numbers have declined, there is overgrazing in some areas and undergrazing in others. This is associated with the privatization of individual flocks. Their sizes have shrunk, but owners are not yet organized to manage seasonal migration or able to grow sufficient fodder to feed their animals in the winter season. Consequently, summer pastures are underutilized and might become overgrown with noxious shrubs, while winter pastures are overused.

The shrinking of the inland Aral Sea and exposure of its salinized bed contribute significantly to airborne salt particle pollution, which leads to human health problems. The Aral Sea disaster and increased inland water salinity has also lead to significant declines in fish production and aquatic biodiversity. It further jeopardizes the economic sustainability of local communities already affected by the overall economic downturn and declining river transport.

Land Use⁵⁴

	total land area 000 km2 in 1997	Arable Land % in 1997	Forest land % in 1995	Pasture land% in 1995	Other %
Kazakhstan	2671	11.2	3.9	70	14.9
Kyrgyz Republic	192	7.0	3.8	44.9	44.3
Tajikistan	141	5.4	2.9	24.3	67.4
Turkmenistan	470	3.5	8.0	63.8	24.7
Uzbekistan	414	10.8	3.0	46.5	39.7

Cropland⁵⁵

Country	Arable land ha per capita 1995-97	Irrigated land as % of cropland		Annual fertilizer use (kg/ha of arable land) 1995-97	Grain consumption as a % of domestic production 1993-95	Grains fed to livestock as a % of total grain consumption 1995-97	Average yield of cereals in kg/ha	
		1995-97	1994-96				1994-96	1996-98
Kazakhstan	1.93	7.2	6.9	4	74	39	650	668
Kyrgyz Republic	0.29	77.3	76.8	23	147	33	1923	2544
Tajikistan	0.13	79.7	80.6	81	369	19	1109	1682
Turkmenistan	0.35	105.4	87.8	85	155	37	2570	1292
Uzbekistan	0.19	88.3	81.6	116	169	19	1762	2292

Livestock⁵⁶

Livestock (million head)				
	Cattle	Cattle	Sheep	Sheep
	1993	1998	1993	1998
Central Asia	17.2	12.1	53.7	27.3

Water Resources Management

Two-thirds of the population of the subregion (about 35 million people) live in the Aral Sea Basin. It comprises the drainage area of two large rivers, the Amu Darya, rising in the Pamir Mountains, with a flow of 70-80 km³, and the Syr Darya, rising in the Tien Shan range to the north. The rivers end in deltas in the Aral Sea. These waters have sustained the various civilizations who inhabited Central Asia for centuries. Over 90 percent of the waters of these rivers are used for irrigation, which has been very extensively developed throughout the 20th century, with irrigated areas increasing from 2.5 million ha in 1900 to 4.7 million ha in 1950 and 7.9 million ha in 1990 (double the area of irrigated land in Egypt). As a result, water flows into the Aral Sea, which received about 60 km³ annually until 1960, when the flows dropped off to only 5-20 km³ annually.

The surface area of the Aral Sea has declined from 67,000 km² to 30,000 km². There have been severe environmental and social consequences as a result. Drinking water quality has declined, affecting health, and wind and waterborne salt from the soil and desiccated seabed have degraded tracts of agricultural land. The fisheries industry has collapsed and the river delta wetlands, once globally significant ecosystems, have dried up. The livelihoods of 3.5 million people living around the Aral Sea have been negatively affected.

In the irrigated areas, as a result of excessive water withdrawals and poor irrigation practices, combined with the lack of natural drainage and the soil and groundwater structure, there is now widespread waterlogging and soil salinization, which lowers soil productivity and crop yields. It is estimated that approximately US\$2 billion, or 5 percent of Central Asia's GDP, is lost annually to salinization. In the past, policies were lacking to provide incentives for rational use and conservation of irrigation water. Rising saline water tables also threaten the livestock economy, as the number of usable wells is declining.

A further difficulty has been that while in the past water was stored in the winter and released for irrigation in the summer, with rising fossil fuel prices, water is released for electricity generation by upstream riparians in the winter. While agreements on water sharing exist between the riparians, these are strained by the economic and environmental crises.

River Flows⁵⁷

Country	Annual Internal Renewable Water Resources			Annual river flows	
	Total (billion m3)	1998	Per capita (m3)	from other countries (billion m3)	to other countries
Kazakhstan	754	4484.0		342	32.0
Kyrgyz Republic	465	10394.0		259	35.6
Tajikistan	663	11171.0		503	86.9
Turkmenistan	10	232.0		700	52.6
Uzbekistan	163	704.0		341	x

Water Withdrawals⁵⁸

Country	Freshwater resources m3 per capita in 1998	Annual withdrawals		Sectoral withdrawals (%)		
		billion m3	% of total water resources	Agricultural	Industrial	Domestic
Kazakhstan	7029.0	33.7	30.7	81.0	17.0	2.0
Kyrgyz Republic	2509.0	10.1	94.9	94.0	3.0	3.0
Tajikistan	13071.0	11.9	14.9	92.0	4.0	4.0
Turkmenistan	9644.0	23.8	52.3	98.0	1.0	1.0
Uzbekistan	5476.0	58.1	63.4	94.0	2.0	4.0

Production of Electricity⁵⁹

Production of electricity (in billion kWh) in 1997		
Country	Total	Hydropower (%)
Kazakhstan	52	12.5
Kyrgyz Republic	12.6	89.1
Tajikistan	14	98.8
Turkmenistan	9.4	0.1
Uzbekistan	46.1	12.5
Total	134.1	x

Fisheries⁶⁰

	Average annual marine catch 000 metric tons 1993-95	Average annual freshwater catch 000 metric tons 1993-95	Average annual aquaculture production, in 000 metric tons, 1993-95				
			Marine fish	Diadromous fish	Freshwater fish	Molluscs/Crustaceans	Total
Central Asia							
Kazakhstan	13.3	39.0	0.0	0.0	1.8	x	1.8
Kyrgyz Republic	0.1	0.3	0.0	0.0	0.2	0.0	0.2
Tajikistan	0.0	3.8	0.0	0.0	3.6	0.0	3.6
Turkmenistan	16.5	2.5	0.0	0.0	1.1	0.0	1.1
Uzbekistan	0.0	21.7	0.0	0.0	14.6	0.0	14.6
Total	29.9	67.3	0.0	0.0	21.3	0.0	21.3

Forestry and Biodiversity

Forestland covers no more than 8 percent of total land area, and the subregion is forest-poor. However, because of its vast size, forested area in Kazakhstan totals 105,000 km², the largest in the region after Russia and Turkey. Forests in Eastern Kazakhstan include a rich variety of pines and coniferous species, comprising 50 percent of forested area in the country, which serves as the home to threatened species, including the snow leopard and Argali sheep. Turkmenistan is the only country that has no true forestland (canopy cover) but whose landscape is dotted with stubby saksaul trees/bushes. Forest and montane ecosystems in the southeast of the region include an array of species, including wild relatives of commercially important species such as tulips, apples, walnuts, apricots, and medicinal plants. The western Tien Shan is also important for many migratory bird species, endangered raptors, and mammals. The mountains are also widely used for animal grazing. The forests of the subregion are thus important for protection of watersheds, vegetative cover, ecosystem conservation, and local livelihoods rather than for timber production. Freshwater wetlands, previously a refuge for a wide variety of mammalian and bird species, are either becoming saline or used as irrigated land, decreasing the buffer capacity of the upper watersheds and increasing the risk of floods.

In an effort to show formal commitment to protecting their ecosystems, all Central Asian countries ratified the Convention on Biological Diversity: Kazakhstan (1994), the Kyrgyz Republic (1996), Tajikistan (1997), Turkmenistan (1996), and Uzbekistan (1995).

Forestry⁶¹

Country	Forested Area 000 km ² in 1995	% of Total Land Area in 1995	Nationally protected areas	
			000 km ² in 1996	as % total land area in 1996
Kazakhstan	105.0	3.9	73.4	2.7
Kyrgyz Republic	7.0	3.8	6.9	3.6
Tajikistan	4.0	2.9	5.9	4.2
Turkmenistan	38.0	8.0	19.8	4.2
Uzbekistan	13.2	3.0	8.2	2.0
Total	154.0	x	114.2	x

Natural Disasters

In Tajikistan, a natural dam created by a 1911 earthquake could break with a new flood, thereby increasing the potential for Lake Sarez to overflow and flood half of the country. There currently is a dam control project in Tajikistan, a country rather vulnerable to floods. In June 1997 a flood in the Kyrgyz Republic brought about major mudslides and landslides, uprooting the trees covering the hillsides. This was largely a result of past overgrazing and poor upland land management. Kazakhstan, Uzbekistan, and Turkmenistan periodically suffer from locusts during the spring and summer, which mainly destroy rangeland but can occasionally affect crop production.

Manmade Disasters

The rapid shrinking of the Aral Sea is by far the worst ecological disaster in Central Asia and, together with the Virgin land program, the best known. In this context other ecological disasters have had relatively less impact but include the dumping of oil waste, which has polluted land in Kazakhstan, and the spent fuels and scrap metal of failed rockets launched from the Baikanour space station, which have contaminated large tracts of Kazak rangeland. Mining mishaps and poor handling of tailings continue to threaten land and water resources, including pristine waters such as Lake Issyk Kul (in the Kyrgyz Republic). Finally, the widespread, careless storage of obsolete chemicals and pesticides continue to pose a potential threat to surface water.

The key natural resources management issues in Central Asia can be summarized as follows:

- Improving irrigation and drainage management to conserve water;
- Managing agricultural and rangeland to maintain soil and moisture levels, restore fertility, and reduce erosion and pesticide contamination;

- Limit further shrinking of the Aral Sea in order to contain further ecological disasters, limit earth damages, and preserve remaining ecosystems;
- Manage the upper watersheds in the Tien Shan and Altai to maintain ecosystems and productive vegetation for sustainable livelihoods, and to reduce runoff and flood damage; and
- Develop range and mountain land tenure systems that are conducive to sustainable use.

Annex 2. Statistical Tables

Table I. River Flows, Water Withdrawals⁶²

	Annual Internal Renewable Water Resources		Annual River Flows		Freshwater Resources	Annual Withdrawals		Sectoral Withdrawals (%)		
	Total (km ³)	1998 per capita (m ³)	from other countries (km ³)	to other countries	m ³ per capita in 1998	billion m ³	% of total water resources	Agricultural	Industrial	Domestic
Baltic States										
Belarus	37.2	3595	20.8	54.9	5665	2.7	4.7	35	43	22
Estonia	12.72	8642	0.1	x	8829	0.2	1.3	5	39	56
Latvia	16.74	6685	18.7	x	14455	0.3	0.8	13	32	55
Lithuania	15.56	4174	9.3	x	6724	0.3	1.0	3	16	81
Poland	49.40	1278	6.8	x	1629	12.1	19.2	11	76	13
The Danube Basin										
Czech Republic	58.21	5694	x	x	1554	2.5	15.8	2	57	41
Hungary	6	604	114	x	11865	6.3	5.2	36	55	9
Moldova	1	225	11.7	12	2722	3	25.3	26	65	9
Romania	37	1639	171	x	9222	26	12.5	59	33	8
Slovak Republic	30.79	5745	x	x	15396	1.4	1.7	x	x	x
Ukraine	53.10	1029	86.5	x	2776	26	18.6	30	52	18
The Balkans										
Albania	44.50	2903	11.3	x	12758	1.4	3.3	71	0	29
Bosnia	x	x	x	x	9952	x	x	x	x	x
Bulgaria	18	2146	187	x	24663	13.9	6.8	22	76	3
Croatia	61.40	13663	x	x	15863	0.1	0.1	0	50	50
Macedonia	x	x	x	x	3483	x	x	x	x	x
Slovenia	x	x	x	x	9334	0.5	2.7	0	50	50

	Annual Internal Renewable Water Resources		Annual River Flows from other countries (km ³)	to other countries	Freshwater Resources m ³ per capita in 1998	Annual Withdrawals		Sectoral Withdrawals (%)		
	Total (km ³)	1998 per capita (m ³)				billion m ³	% of total water resources	Agricultural	Industrial	Domestic
The Caucasus and Turkey										
Armenia	9.07	2493	1.5	5.2	2767	2.9	27.9	66	4	30
Azerbaijan	8.12	1069	22.2	x	3831	16.5	54.6	70	25	70
Georgia	58.13	10682	5.2	20.2	11632	3.5	5.5	59	20	21
Turkey	196	3074	7.6	60.4	3209	35.5	17.4	73	11	16
Central Asia										
Kazakhstan	75.42	4484	34.2	32	7029	33.7	30.7	81	17	2
Kyrgyz Republic	46.45	10394	25.9	35.6	2509	10.1	94.9	94	3	3
Tajikistan	66.30	11171	50.3	86.9	13071	11.9	14.9	92	4	4
Turkmenistan	1	232	70	52.6	9644	23.8	52.3	98	1	1
Uzbekistan	16.34	704	34.1	x	5476	58.1	63.4	94	2	4
Russia	4312.7	29115	185.5	54						

Source: WDI 2000.

	Arable land ha per capita	Irrigated land as % of cropland		Annual fertilizer use (kg/ha of arable land)	Grain consumption as a % of domestic production	Grains fed to livestock as a % of total grain consumption	Average yield of cereals	
	1995-97	1995-97	1994-96	1995-97	1993-95	1993-95	in kg/ha 1996-98	in kg/ha 1994-96
Central Asia								
Kazakhstan	1.93	7.2	6.9	4	74	39	668	650
Kyrgyz Republic	0.29	77.3	76.8	23	147	33	2544	1923
Tajikistan	0.13	79.7	80.6	81	369	19	1682	1109
Turkmenistan	0.35	105.4	87.8	85	155	37	1292	2570
Uzbekistan	0.19	88.3	81.6	116	169	19	2292	1762
Russia	0.85	4.0	4	14	102	50		1313

Source: WDI 2000; FAO Production Yearbook.

Table 2. Cropland⁶³

	Arable land ha per capita	Irrigated land as % of cropland		Annual fertilizer use (kg/ha of arable land)	Grain consumption as a % of domestic production	Grains fed to livestock as a % of total grain consumption	Average yield of cereals	
	1995-97	1995-97	1994-96	1995-97	1993-95	1993-95	in kg/ha 1996-98	in kg/ha 1994-96
Baltic States								
Belarus	0.60	1.8	1.9	110	109	67	2204	2161
Estonia	0.77	0.3	x	24	116	63	1931	1756
Latvia	0.70	1.1	x	30	102	60	2115	1854
Lithuania	0.79	0.3	x	38	105	64	2474	2024
Poland	0.36	0.7	0.7	111	108	61	2937	2854
The Danube Basin								
Czech Republic	0.30	0.7	0.7	108	94	58	4141	4167
Hungary	0.47	4.2	4.2	87	84	72	4275	3910
Moldova	0.41	14.1	14.1	66	111	53	2861	2711
Romania	0.41	31.3	31.4	40	105	66	2867	2812
Slovak Republic	0.28	12.5	13.4	79	89	64	4209	4298
Ukraine	0.65	7.4	7.5	27	102	48	2211	2410
The Balkans								
Albania	0.18	48.4	48.4	13	165	0	2597	2537
Bosnia	0.14	0.3	0.3	14	101	x	2348	2957
Bulgaria	0.51	18.0	18.7	44	96	52	2657	2615
Croatia	0.29	0.2	0.2	166	96	x	4733	4340
Macedonia	0.31	8.7	9.4	72	121	0	2812	2719
Slovenia	0.12	0.7	0.7	312	262	x	5435	5026
The Caucasus and Turkey								
Armenia	0.13	51.5	43.7	16	377	21	1772	1431
Azerbaijan	0.21	74.9	50	18	185	30	1647	1599
Georgia	0.14	43.3	42.2	46	362	26	1692	1881
Turkey	0.43	14.7	15.4	68	99	33	2196	2019

Table 3. Fisheries

	Fisheries							
	Average annual marine catch 000 metric tons 1993-95	Average annual freshwater catch 000 metric tons 1993-95	Average annual aquaculture production, in 000 metric tons, 1993-95					
			Marine fish	Diadromous fish	Freshwater fish	Molluscs/Crustaceans	Total	
Baltic States								
Belarus	0.0	14.4	0.0	0.0	13.7	0.0	13.7	
Estonia	131.2	3.2	0.0	0.3	0.1	0.0	0.3	
Latvia	142.4	1.2	0.0	0.0	0.5	0.0	0.5	
Lithuania	70.3	3.2	0.0	0.0	2.2	0.0	2.2	
Poland	397.1	47.8	0.0	4.5	18.2	0.0	22.7	
The Danube Basin								
Czech Republic	0.9	21.7	0.0	0.6	20.9	0.0	21.5	
Hungary	0.4	23.0	0.0	0.1	9.6	0.0	9.7	
Moldova	0.0	4.8	0.0	0.0	4.8	0.0	4.8	
Romania	19.9	29.0	0.0	0.4	20.1	0.0	20.5	
Slovak Republic	0.9	2.4	0.0	0.8	0.8	0.0	1.6	
Ukraine	307.6	61.4	0.2	0.4	51.0	0.4	52.0	
The Balkans								
Albania	2.3	0.8	0.0	0.0	0.1	0.3	0.4	
Bosnia	0.0	2.5	x	x	x	x	x	
Bulgaria	13.3	9.0	0.0	0.7	7.4	0.0	8.1	
Croatia	19.6	4.0	0.3	0.3	3.7	0.3	4.6	
Macedonia	0.6	0.7	0.0	0.6	0.6	0.0	1.2	
Slovenia	2.6	0.4	0.1	0.5	0.2	0.0	0.8	
Russia	4032.5	170.4	0.1	2.4	72.5	1.3	76.3	
Turkey and the Caucasus								
Armenia	2.0	2.5	0.0	1.8	1.9	0.0	3.7	
Azerbaijan	33.3	2.7	10.0	0.0	2.0	0.0	12.0	
Georgia	28.1	2.7	0.0	0.0	2.7	0.0	2.7	
Turkey	573.3	30.1	6.7	9.5	0.4	0.1	16.7	
Central Asia								
Kazakhstan	13.3	39.0	0.0	0.0	1.8	x	1.8	
Kyrgyz Republic	0.1	0.3	0.0	0.0	0.2	0.0	0.2	
Tajikistan	0.0	3.8	0.0	0.0	3.6	0.0	3.6	
Turkmenistan	16.5	2.5	0.0	0.0	1.1	0.0	1.1	
Uzbekistan	0.0	21.7	0.0	0.0	14.6	0.0	14.6	

Source: WDI 2000; FAO Production Yearbook.

Table 4. Selected Socioeconomic Indicators

Regional Clusters	Socio-Economic Indicators					
	Land area million ha	Pop.	ha of arable land per person	GNP Bill: US\$ 1997	GNP per capita US\$	AGRIC: as % GDP % in 1998
	total in 1998		in 1998			
Baltic States						
Belarus	2.07	10	0.61	22.1	2,180	13.0
Estonia	4.2	1	0.82	4.8	3,360	6.0
Latvia	6.2	2	0.70	6.0	2,420	5.0
Lithuania	6.5	4	0.62	8.3	2,540	10.0
Poland	30.5	39	0.39	138.8	3,910	5.0
The Danube Basin						
Czech Republic	7.9	10	0.22	53.6	5,150	4.0
Hungary	9.2	10	0.49	42.1	4,510	6.0
Moldova	3.3	4	0.51	4.0	380	29.0
Romania	23.0	23	0.46	32.0	1,360	16.0
Slovakia	4.8	5	0.30	19.8	3,700	4.0
Ukraine	57.9	50	0.67	84.1	980	14.0
The Balkans						
Albania	2.7	3	0.22	2.5	810	54.0
Bosnia	5.1	4	0.23	NA	NA	NA
Bulgaria	11.1	8	0.50	9.5	1,220	19.0
Croatia	5.6	5	0.27	20.7	4,620	9.0
Macedonia	2.5	2	0.52	1.8	1,290	11.0
Slovenia	2.0	2	0.15	16.3	9,780	4.0
The Caucasus and Turkey						
Armenia	2.8	4	0.26	2.0	460	33.0
Azerbaijan	8.7	8	0.27	3.6	480	20.0
Georgia	7.0	5	0.21	4.5	970	26.0
Turkey	77.0	63	0.43	199.5	3,160	18.0
Central Asia						
Kazakhstan	2.67	16	2.12	21.9	1,340	9.0
Kyrgyz Republic	19.8	5	0.31	1.8	380	46.0
Tajikistan	14.1	6	0.14	2.0	370	6.0
Turkmenistan	47.0	5	0.32	2.9	640	25.0
Uzbekistan	41.4	24	0.20	22.0	950	31.0
Russia	1168.8	147	0.90	403.5	2,260	7.0

Sources: WDI 2000; FAO Production Yearbook; World Resources Institute

Table 5. Natural Resource Endowments

Regional Clusters	Natural Resource Endowments						
	Area of Land (1000 ha)			Land use % of land area			Irrigated land as % arable
	Arable and perm: crops	Forest	Pasture	Arable land	Forest	Pasture	
Baltic States							
Belarus	6,329	7,000	2,900	29.8	34.0	14.0	1.6
Estonia	1,114	2,144	300	26.7	46.0	7.0	--
Latvia	1,740	2,994	800	29.0	45.0	13.0	--
Lithuania	2,296	2,046	500	45.5	30.0	7.7	--
Poland	14,988	8,672	4,100	46.2	29.0	13.4	0.7
The Danube Basin							
Czech Republic	3,386	2,637	900	40.0	33.4	11.4	0.7
Hungary	4,974	1,767	1,100	52.2	19.2	12.0	4.2
Moldova	2,180	421	400	54.1	12.7	12.1	14.2
Romania	10,481	6,680	4,900	40.4	29.0	21.3	29.6
Slovakia	1,616	2,020	800	30.7	41.0	16.7	4.9
Ukraine	34,357	10,352	7,500	57.1	18.0	13.0	7.5
The Balkans							
Albania	702	1,449	400	21.1	50.4	14.8	49.8
Bosnia	800	2,710	1,200	9.8	53.1	23.5	0.2
Bulgaria	4,219	3,683	1,800	39.0	33.2	16.3	19.0
Croatia	1,221	2,458	1,100	23.6	43.5	19.6	0.3
Macedonia	661	1,000	630	23.9	40.0	25.2	10.6
Slovenia	286	1,094	500	11.5	54.7	25.0	28.0
The Caucasus and Turkey							
Armenia	573	329	690	17.5	11.0	24.6	50.0
Azerbaijan	2,000	950	2,200	19.3	10.9	25.3	50.0
Georgia	1,127	2,758	1,690	11.2	39.6	24.1	41.6
Turkey	27,771	20,199	12,380	34.5	26.0	16.0	15.1
Central Asia							
Kazakhstan	34,987	10,500	187,000	11.2	3.9	70.0	6.1
Kyrgyz Republic	1,420	940	8,900	7.0	4.2	44.9	70.4
Tajikistan	860	537	3,500	5.4	3.8	24.3	83.4
Turkmenistan	1,480	4,127	30,000	3.5	8.5	63.8	87.8
Uzbekistan	4,500	1,300	20,800	10.8	3.2	46.5	89.0
Russia	132,302	1.6	877,300	7.5	45.3	5.2	4.0

Sources: WDI 2000; FAO Production Yearbook; World Resources

Table 6. Livestock

Livestock Population: ECA Region: 1993 and 1998 and % Change								
Animal class 000 head	Year	Baltics	Danube	Balkans	Caucasus	Central Asia	Russia	Total
cattle	1993	15.5	32	3.7	15.1	17.2	52.2	135.7
	1998	13.6	19.8	2.8	14.6	12.1	31.7	94.6
	% change	-30.5	-39	-17.2	-4.7	-33.8	-37.4	-32.7
sheep	1993	4.6	30.2	13.3	50.1	58.7	25.8	182.7
	1998	6.7	13	7.3	37.2	27.3	17.1	108.6
	% change	-55.5	-56.9	-45.2	-25.8	-53.1	-33.6	-43.9
horses	1993	0.7	4.3	1.9	7.3	8.3	3.6	26.1
	1998	0.1	1.9	1	5.3	3.9	2	14.2
	% change	-85.5	-57	-45.3	-27.1	-53.6	-33.6	-44.4
pigs	1993	27.1	47.1	6.9	1.1	4.1	31.5	117.8
	1998	24.1	29.1	3.6	0.4	1.2	17.3	75.7
	% change	-12.5	-40.4	-47.7	-63.1	-71.3	-45.1	-36.7
chickens	1993	0.1	0.4	0.07	0.1	0.1	0.6	1.37
	1998	0.1	0.3	0.05	0.2	0.04	0.4	1.09
	% change	-13.3	-39	-34.3	-63.3	-67.9	-27.2	-25

Source: FAO Production Yearbook, Vol. 49, 1995; Vol. 52, 1998

Table 7. Forestry and Land Use in ECA

Subregion	Country	Forestry and Land-Use in ECA				
		Total land area 1000km ²	Forestland as % of total area	Growing stock	Net annual increment	"Ratio of self-sufficiency" (how much more or less a country produces than it needs)
		1000km ²	%	m ³ per ha	Mln m ³ , over bark	%
Baltics, Poland, and Belarus	Belarus	207	36	147	24.9	237.7
	Estonia	42	46	127	7.3	236.8
	Latvia	62	45	159.2	13.7	350.0
	Lithuania	65	30	164	11.8	157.2
	Poland	304	29	165.1	44.8	113.3
Danube and Carpathians	Czech Rep.	77	34	234	20.4	153.3
	Hungary	92	19	N/A.	N/A.	77.0
	Moldova	33	11	N/A.	0.9	N/A.
	Romania	230	26	212.6	34.6	175.0
	Slovak Republic	48	41	181	11.7	243.9
	Ukraine	579	16	N/A.	20.0	N/A.
The Balkans	Albania	27	38	57.3	77.5	77.5
	Bosnia	51	53	N/A.	N/A.	N/A.
	Bulgaria	111	30	110	119.7	119.7
	Croatia	56	44	121	127.0	127.0
	Macedonia	25	37	N/A.	52.1	52.1
	Slovenia	20	53	N/A.	87.8	87.8
The Caucasus, Russia and Turkey	Armenia	28	14	119	0.1	N/A.
	Azerbaijan	87	13	N/A.	N/A.	N/A.
	Georgia	70	44	153	4.0	N/A.
	Russia	16889	45	106	830,010.0	134.5
	Turkey	770	26	N/A.	18.1	79.1
Central Asia	Kazakhstan	2671	7	N/A.	3.3	N/A.
	Kyrgyz Rep.	192	4	N/A.	N/A.	N/A.
	Tajikistan	141	3.5	15	N/A.	N/A.
	Turkmenistan	470	8	3	0.1	N/A.
	Uzbekistan	414	3.2	N/A.	N/A.	N/A.

Sources: Forest and Forest Industries, Country Fact Sheets, FAO 1997; except total land area 000 km², from WDI, 1999.

Table 8. Forest Industry and Economic Characteristics

		Forest Industry and Economic Characteristics (1997, FAO)							
		Roundwood		Sawnwood (+sleepers)		Paper and paperboard production		Fuelwood and charcoal production	
		product-n 1000 m ³	exports	product-n 1000 m ³	exports	product-n 1000 Mt	exports	product-n 1000 m ³	exports
Baltics, Poland, and Belarus	Belarus	17,585	894	1,545	295	131	3	809	0.1
	Estonia	5,796	2,902	650	661	54	57	1,100	78
	Latvia	8,962	3,307	2,700	2,170	16	8	2,902	1
	Lithuania	5,150	778	1,250	964	29	25	1,145	2
	Poland	21,561	523	5,910	997	1,640	417	1,706	221
Danube and Carpathians	Czech Rep.	13,496	3,306	3,393	1,419	772	382	616	170
	Hungary	3,601	977	262	184	410	161	1,914	214
	Moldova	406	.2	30	.3	N/A.	5	356	N/A.
	Romania	13,750	58	1,861	1,242	324	102	3,913	57
	Slovak Rep.	5,945	1,185	767	401	525	209	339	258
	Ukraine	10,088	479	N/A.	243	261	55	1,846	14
The Balkans	Albania	409	29	4	13,499	44	0	346	26
	Bosnia	40	41	20	255	N/A.	3	N/A.	17
	Bulgaria	3,059	264	253	205	149	14	1,197	56
	Croatia	3,091	456	642	402	393	128	1,047	N/A.
	Macedonia	774	2	40	63	21	0.3	616	N/A.
	Slovenia	2,209	329	510	395	430	722	547	111
Russia, Turkey, and the Caucasus	Armenia	N/A.	0.1	N/A.	0.1	N/A.	0	N/A.	N/A.
	Azerbaijan	N/A.	0.2	N/A.	3	N/A.	N/A.	N/A.	N/A.
	Georgia	N/A.	45	N/A.	7	N/A.	0	N/A.	N/A.
	Russia	83,968	18,723	19,500	4,800	3,332	1,434	20,778	92
	Turkey	18,050	10	4,268	114	951	29	8,277	N/A.
Central Asia	Kazakhstan	315	5	N/A.	N/A.	N/A.	0.2	315	N/A.
	Kyrgyz Rep.	N/A.	0.5	N/A.	0.9	N/A.	0.2	N/A.	N/A.
	Tajikistan	N/A.	N/A.	N/A.	0	N/A.	0	N/A.	N/A.
	Turkmenistan	N/A.	N/A.	N/A.	0.1	N/A.	0	N/A.	N/A.
	Uzbekistan	N/A.	0.3	N/A.	N/A.	N/A.	N/A.	N/A.	N/A.

Source: FAO Forestry statistics: <http://apps.fao.org/cgi-bin/nph-db.pl?subset=forestry>.

Table 9. Social and Demographic Characteristics

Subregion	Country	Social and Demographic Characteristics			
		Total Population in 1998	Area of forest per capita	% of rural population in 1998	GNP per capita in 1998
		Million	Ha	%	US\$
Baltics, Poland, and Belarus	Belarus	10	0.86	29	2,180
	Estonia	1	1.40	31	3,360
	Latvia	2	1.19	31	2,420
	Lithuania	4	0.55	32	2,540
	Poland	39	0.23	35	3,910
Danube and Carpathians	Czech Rep.	10	0.25	25	5,150
	Hungary	10	0.17	36	4,510
	Moldova	4	0.08	54	380
	Romania	23	0.29	44	1,360
	Slovak Rep.	5	0.38	43	3,700
	Ukraine	50	0.18	32	980
The Balkans	Albania	3	0.42	60	810
	Bosnia	4	1.15	58	x
	Bulgaria	8	0.40	31	1,220
	Croatia	5	0.55	43	4,620
	Macedonia	2	0.50	39	1,290
	Slovenia	2	0.54	50	9,780
The Caucasus, Russia, and Turkey	Armenia	4	0.10	31	460
	Azerbaijan	8	0.16	43	480
	Georgia	5	0.56	40	970
	Russia	147	5.98	23	2,260
	Turkey	63	0.33	27	3,160
Central Asia	Kazakhstan	16	N/A.	44	1,340
	Kyrgyz Rep.	5	N/A.	66	380
	Tajikistan	6	0.08	73	370
	Turkmenistan	5	1.12	55	640
	Uzbekistan	24	N/A.	62	950

Sources: WDI, 2000; except area of forest per capita, from Forest and Forest Industries, Country Fact Sheets, FAO 1997.

Table 10. Protected Areas: Quantitative Characteristics

Protected Areas: Quantitative Characteristics Subregion	Country	Protected Areas		
		'000 km ²	'000 ha	As % of land area
Baltics, Poland, and Belarus	Belarus	8.6	864	4.2
	Estonia	5.1	507	12.0
	Latvia	7.8	775	12.5
	Lithuania	6.5	646	10.0
	Poland	29.1	2911	9.6
Danube and Carpathians	Czech Rep.	12.2	1233	15.8
	Hungary	6.3	629	6.8
	Moldova	0.4	39	1.2
	Romania	10.7	1074	4.7
	Slovak Republic	10.5	1046	21.8
	Ukraine	9.0	898	1.6
The Balkans	Albania	0.8	76	2.8
	Bosnia	0.2	25	0.5
	Bulgaria	4.9	491	4.4
	Croatia	3.7	375	6.7
	Macedonia	1.8	180	7.1
	Slovenia	1.1	115	5.7
The Caucasus, Russia, and Turkey	Armenia	2.1	214	7.6
	Azerbaijan	4.8	476	5.5
	Georgia	1.9	195	2.8
	Russia	516.7	51670	3.1
	Turkey	10.7	1071	1.4
Central Asia	Kazakhstan	73.4	7337	2.7
	Kyrgyz Rep.	6.9	688	3.6
	Tajikistan	5.9	587	4.2
	Turkmenistan	19.8	1977	4.2
	Uzbekistan	8.2	850	2.1

Sources: World Resources, 1998; except 000km², from WDI, 1999.

Table 11. Absolute Poverty Rates of Eastern European and Central Asian Economies

Country	Survey Date	Headcount Index 2.15\$/day	Headcount Index 4.30\$/day	Ratio of survey to private cons.	1988 GNP mean cons. \$ per capita	1998 GNP in \$ 1996 PPP atlas method
Tajikistan	1998	68.3	95.8	1.02	370	1040
Kyrgyz Rep.	1998	49.1	84.1	0.83	380	2247
Armenia	1996	40.0	74.7	0.99	460	2074
Moldova	1997	30.1	68.6	1.19	380	1995
Azerbaijan	1999	23.5	64.2	1.32	480	2168
Russia	1998	18.8	50.3	0.85	2260	6186
Georgia	1996-7	14.6	47.1	0.70	970	3429
Albania	1996	11.5	58.6	0.68	810	2864
Turkmenistan	1998	7.0	34.4	0.89	502	2875
Romania	1998	6.8	44.5	0.43	1360	5571
Latvia	1998	6.6	34.8	0.68	2420	5777
Kazakhstan	1996	5.7	30.9	0.45	1340	4317
Bulgaria	1995	3.1	18.2	0.67	1220	4683
Lithuania	1999	3.1	22.5	0.70	2540	6283
Ukraine	1999	2.7	24.6	1.11	980	3130
Estonia	1998	2.1	19.3	0.80	3360	7563
Hungary	1997	1.3	15.4	0.47	4510	9832
Poland	1998	1.2	18.4	0.67	3910	7543
Belarus	1996	1.1	20.5	1.13	2180	6318
Croatia	1998	0.2	4.0	1.18	4620	6698
Slovenia	1997-98	0.0	0.7	0.94	9780	14399

Note: Private consumption data are not available for Tajikistan, Turkmenistan, or Kazakhstan. GDP per capita in current prices is used instead. Private consumption data for Lithuania and Azerbaijan are for 1998; GDP per capita (first half 1999) are used for Ukraine. The poverty headcount numbers are based on the international poverty lines of \$2.15 and \$4.30 per person per day. The survey for Albania did not cover the capital city Tirana. Since 1997 was a year of hyperinflation for Bulgaria, the absolute poverty estimates for 1995 were used instead.

Table 12. Protected Areas

		Protected Areas by type, etc.			
		Protected areas by type	Threats to nature and biodiversity	Bank/GEF supportive programs	Type of intervention
Baltics, Poland, and Belarus	Belarus Protected areas 1000 km ² : 8.6 % of land area: 4.1	- National parks - Nature reserves	- Lack of resources and need for alternative financing mechanisms for administration of the protected areas. - Significant adverse impacts from water and air pollution on forests and wildlife habitats.	Yes	<p>Biodiversity Protection Project (closed): The objectives are:</p> <ul style="list-style-type: none"> a) institutional support to Belovezhskaya National Park, Council of Ministers and Committee of Ecology to enable them to carry out its biodiversity conservation management activities; b) investment in programs to preserve endangered forest ecosystems through pilot investments in air and soil monitoring equipment, land planning, etc. <p>Forestry Development Program: The program objectives include:</p> <ul style="list-style-type: none"> a) sector policy reform: adjustment of forest enterprises in accordance and prepare them for future privatization; b) production support: implementation of intensified silviculture, creation of seed facilities, introduction of efficient harvesting practices; c) forest fire protection: provision of adequate protection against forest fires and prevention of the spread of radionuclide contamination through forest fires; d) forest ecology: policy for the preservation of biodiversity and species mix; e) institution building: professional training in forestry and business; preparation for operations with an open market economy; forestry research planning of forestry higher education reforms; and f) technical assistance to forest resource management and planning.

	Estonia Protected areas 1000 km ² : 5.1 % of land area: 12.1	- National parks - Nature reserves - Landscape reserves - Nature park	- Illegal cutting of forests. - Spawning and living conditions of many fish species have declined due to seawater pollution. - Degradation of seminatural coastal ecosystems due to declining traditional agricultural activities.	No	
	Latvia Protected areas 1000 km ² : 7.8 % of land area: 12.6	- State reserves - Biosphere reserve - National park - Culture/historic preserve	- Illegal cutting of forests. - Need for greater protection of sensitive coastal ecosystems.	No	
	Lithuania Protected areas 1000 km ² : 6.5 % of land area: 10.0	- National parks - Regional parks - Reserves	- Environmental damage from oil extraction and exploitation of deep mineral resources. - Threats to natural habitats and biodiversity, especially fish. - Excessive timber felling. - Need for greater protection of sensitive coastal ecosystems.	Yes	WWF Alliance workshop: Training seminar with WWF Finland under WWF Alliance
	Poland Protected areas 1000 km ² : 29.1 % of land area: 9.6	- National parks - Nature reserves - Landscape parks	- Degraded forests and habitats as a result of pollution. - Baltic Sea coastal ecosystem degradation and obligations for improvement of international waters. - Obligations for ODS phaseout and greenhouse gas reduction.	Yes	Forestry Development: Project objectives are: a) institutional support to the MENRF to enable it to carry out its biodiversity conservation-management activities, including the establishment of facilities for ex situ conservation of genetic material in the Sudety forests of southwest Poland and for a biodiversity protection program for Bialowieza Primeval Forest (BPF) ecosystem of eastern Poland; and b) investment in programs to preserve endangered forest ecosystems for biodiversity conservation through provision of funding for pilot investments in air and soil monitoring equipment, a forest gene bank and related archival nursery equipment.

Danube and Carpathians	Czech Rep. Protected areas 1000 km ² : 12.2 % of land area: 15.8	- National parks - National nature reserves - Protected landscape areas - Natural areas - Biosphere reserves	- Increasingly detrimental effect of air pollution on spruce and pine forests in northern Bohemia. - Loss of biodiversity due to damage to habitat and planting of monoculture forests.	Yes	Czech Republic Biodiversity Protection (closed): The objective is to protect and strengthen forest and related ecosystem biodiversity by: a) protecting three representative ecosystem-zones containing alpine meadows, lowland forests, and wetland and mountain forests; b) supporting the activity of three transnational biodiversity protection networks; and c) developing a system of financially sustainable biodiversity protection.
	Hungary Protected areas 1000 km ² : 6.3 % of land area: 6.8	- National parks - Landscape protection regions - Nature conservation areas	- Lake Balaton is polluted with agricultural and livestock wastes and endangered by overexploitation for recreation and tourism. - The Sajo River ecosystem is exhibiting some signs of eutrophication due to significant pollution with industrial effluents. - Forest damage due to acid rain.	No	
	Moldova Protected areas 1000 km ² : 0.4 % of land area: 1.2	- Scientific reserves - National parks - Landscape reserves	- Sustainable forest management practices have been abandoned due to severe economic circumstances. - Significant wetland areas have been drained. - Limestone quarries and dredging riverbeds for sand have degraded river banks and changed dramatically the fish population.	No	

	Romania Protected areas 1000 km ² : 10.7 % of land area: 4.6	- Nature reserves - Nature parks - National parks	- Deforestation and unsustainable wood harvesting from restitution of forestlands and breakdown in field enforcement systems. - Threats to priority biodiversity conservation sites due to the absence of an effective protected area system.. - Defoliation of tree species susceptible to industrial pollution, including acid rain.	Yes	<p>Romania Danube Delta Biodiversity: The objective is to contribute to conservation of biodiversity within the Delta, strengthening the capacity of Danube Delta Biosphere Reserve Authority and Danube Delta Institute to monitor and manage protected areas effectively, working with local community groups to ensure sustainable resource use and restore some wetlands to their natural conditions.</p> <p>Integrated Biodiversity Conservation and Protected Area Management: The primary objective of the proposed project is the sustainable conservation of the biological diversity and ecological integrity of Romanian mountain, forest, and meadow ecosystems that are of international importance.</p> <p>Forestry Sector Review and Forestry Note: The objective is to assess needs for reforms of the sector with particular focus on restoring financial and environmental sustainability and poverty alleviation.</p>
	Slovak Rep. Protected areas 1000 km ² : 10.5 % of land area: 21.8	- National parks - Protected landscape areas	- Significant damage to forests due to industrial air pollution, especially in the vicinity of smelters and iron mines. - Loss of flora and fauna due to damaged habitat and loss of fish in polluted rivers.	Yes	<p>Biodiversity Protection Project (closed): The objectives are to:</p> <ul style="list-style-type: none"> a) initiate a range of activities including development of management techniques for key biotypes (forest, wetlands, and alpine meadows); b) develop revenue-generation mechanisms for the protected area system; and c) provide support for project management coordination at the national and zonal levels.

	Ukraine Protected areas 1000 km ² : 9.0 % of land area: 1.6	- Natural reserves, including biosphere and natural reserves, national natural parks, limited access areas, natural monuments, arboretum parks, parks - monuments of the garden and park art, botanical gardens, zoos, regional landscape parks, protected grounds	- Immediate environmental threats (soil and water contamination) due to the possible leakage from the "sarcophagus" of the damaged unit. - Long-term impacts on human health and the environment still need to be addressed.	Yes	Ukraine Danube Delta Biodiversity: The objective is to protect and enhance the Ukrainian portion of the delta ecosystems, contributing to conservation of biodiversity within the delta. Ukrainian Trans-Carpathian Biodiversity Protection: The objectives of the project are to: a) incorporate this part of the project as an add on to the proposed Slovak Biodiversity Protection Project; b) support the Ukrainian portion of overall trilateral effort (Ukraine, Poland, and Slovak) to protect habitat fragments, stop species lost, and upgrade habitat management; and c) develop and implement the legal, institutional, and administrative interventions to achieve long-term protection of the area in the country as well as in two other countries. Wetlands:
The Balkans	Albania Protected areas 1000 km ² : 0.8 % of land area: 2.9	- Strict nature Reserves/scientific reserves - National parks - Nature monuments - Managed nature reserves/species and habitat management area Landscape/seascape protected area - Protected area of multiple use	- Habitat loss and deterioration - Intensive land use - Pollution - Forest overharvesting - Gravel extraction from riverbeds and sand extraction	Yes	Forestry: The three principal objectives are to: a) restore degraded state-owned forest and pasture areas and promote their sustainable use; b) promote conservation of natural forest ecosystems; and c) take the initial steps in the transition of the forestry/pasture sector to a market economy, separating commercial from regulatory functions and establishing mechanisms for self-financing of the commercial activities.
	Bosnia Protected areas 1000 km ² : 0.2 % of land area: 0.4	- Strict reserves - National parks - Nature parks - Primeval reserves	- Inadequate forest management as well as acid rain (due to air pollution) have caused damage to the forests. - An assessment of the war-related environmental damage and strategies for remedy will be needed.	Yes	Forestry: The objective of the Forestry Project for Bosnia-Herzegovina is to resume sustainable management and protection of Bosnian forest resources in order to 1) ensure the sustainability of the rapid recovery of the wood harvesting and wood processing sectors, and 2) control the potential environmental impact of this recovery.

	Bulgaria Protected areas 1000 km ² : 4.9 % of land area: 4.4	- National parks - Botanical reserves - Reserves - Forest reserves - Biosphere reserves - World heritage sites	Environmental degradation due to unsafe environmental management policies.	No	
	Croatia Protected areas 1000 km ² : 3.7 % of land area: 6.6	- National parks - Nature Parks - Strictly protected nature reserves - Special reserves (botanical, geomorphologic, hydrologic, and, etc.)	Highly sensitive coastal forests were burnt and mined during war conflicts.	Yes	<p>Coastal Forest Reconstruction: The main objective of the project is to restore and protect forestland in the coastal zone of Croatia in order to enhance the landscape and recreation values of the region and thereby contribute to restore tourism to its prewar level. Other objectives are to:</p> <ul style="list-style-type: none"> a) restore the environmental role of coastal forests destroyed by the war by protecting soil and water, and initiate the restoration of the natural vegetation; b) address the forest fire problem; and c) develop the knowledge base for improved management and protection of coastal forests.
	Macedonia Protected areas 1000 km ² : 1.8 % of land area: 7.1	- Strict natural reserves - National parks - Monuments of nature/landscapes with natural features - Natural reserves/managed reserves - Protected landscape	<ul style="list-style-type: none"> - Lake Ohrid is polluted with wastewater discharges and agricultural runoff. - About 38 percent of the arable land is severely eroded due primarily to poor grazing practices. - Harvesting timber in protected areas. 	No	
	Slovenia Protected areas 1000 km ² : 1.1 % of land area: 5.5	- National park - Nature parks - Regional parks	<ul style="list-style-type: none"> - Moderately damaged forests due to acid rain, agricultural development, and tourism. - Endangered freshwater and wetland ecosystems due to industrial construction and waste, transportation, and tourism 	No	

Russia, Turkey, and the Caucasus	Armenia Protected areas 1000 km ² : 2.1 % of land area: 7.4	- State reservations - Nature preserves	- Degradation of internationally significant biodiversity. - Pressure on a range of habitats, including forests, rangelands, and wetlands. - Key habitats, especially wetlands, underrepresented in existing protected areas.	No	
	Azerbaijan Protected areas 1000 km ² : 4.8 % of land area: 5.5	- State reserves - State-protected areas	- Uncontrolled incursion into protected areas for subsistence use. - Forest resources are exploited at unsustainable levels.	No	
	Georgia Protected areas 1000 km ² : 1.9 % of land area: 2.7	- National park - Protected areas - Nature reserves	- There are some problems with lead smelters and a thermal power plant. The big air pollution problems are likely to be due to increased transport. - Given the importance of tourism and recent problems with illegal logging, conservation and forestry management activities seem more important than abatement activities.	Yes	<p>Forestry Biodiversity Conservation: The objectives are to:</p> <ul style="list-style-type: none"> a) develop a strategic action plan with Georgian authorship that will serve as a vehicle for future project implementation, funding acquisition, and facilitation of sustainable protection and management of biodiversity through the development of cross-sectoral programs; b) integrate the country's unique biological and cultural landscapes and resources, an approach exemplified in the current WWF National Park Planning program; c) raise public awareness of the value of protecting biodiversity, through the national workshop and an advertising campaign; and d) prepare the first National Report for submission to the CoP. <p>Forestry Development Program: The objectives of the first phase are to:</p> <ul style="list-style-type: none"> a) fill the gaps in the assessment of the current economic, policy, legal, financial, and institutional framework within which the forest sector currently operates; and b) formulate and agree upon a program of actions that will create an enabling environment for the sustainable management, protection, and use of Georgia's forest resources.

	Russia Protected areas 1000 km ² : 516.7 % of land area: 3.1	- National parks - Nature sanctuaries or partial reserves - National hunting reserves - Nature monuments	Environmental degradation due to unsafe environmental management policies.	Yes	<p>Biodiversity Conservation: The objectives are to:</p> <ul style="list-style-type: none"> a) assess the current status of biodiversity in Russia and its conservation; b) outline some of the measures needed to sustain its biodiversity over the long term, such as strengthening protected areas; and c) assist the government of Russia to strengthen biodiversity conservation strategy in the country. <p>Sustainable Forestry Pilot: The project objectives are to:</p> <ul style="list-style-type: none"> a) establish sustainable forest management practices in three pilot regions of Leningrad Oblast, Krasnoyarsk Kray and Khabarovsk Kray. Achievement of these objectives would be measured by adoption of improved forest management plans, completion of forest inventories, and implementation of improved forest fire and pest control systems; and b) provide support to rationalization of forest enterprises by regional governments. Achievement of these objectives would be measured through completion of industry viability analyses, enterprise social asset rehabilitation and transfer to local communities, and technical assistance and training for restructuring of forest enterprises.
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	Turkey Protected areas 1000 km ² : 10.7 % of land area: 1.4	- National parks - Nature parks - Natural monuments - Natural reserve areas - Special protected areas	- Degradation of coastal and marine ecosystems due to discharges of industrial waste. - Harmful effects of growing tourism without adequate infrastructure. - Harmful fishing practices. - Forests degraded due to harmful farming and fuelwood practices, unclear property rights, and institutional constraints. - Ecologically insensitive development projects, detrimental resource policies, and lack of effective government policies contribute to the problem.	Yes	<p>In situ Gene Conservation (closed): Revitalizing commercially important species: crops and timber species.</p> <p>Protected Area and Sustainable Natural Resource Management: The project objectives are to:</p> <ul style="list-style-type: none"> a) establish effective participatory systems for sustainable conservation and natural resource management at four pilot sites selected from each of Turkey's four main biogeographic zones; b) build the national capacity and public support to catalyze replication of this experience to develop a nationwide network of protected areas; and c) improve the legal and regulatory framework for biodiversity conservation and explore opportunities for mainstreaming biodiversity conservation in forest planning and management. <p>Forestry Sector Review: The objective is to assess needs for reforms of the sector with particular focus on restoring financial and environmental sustainability and poverty alleviation.</p>
Central Asia	Kazakhstan Protected areas 1000 km ² : 73.4 % of land area: 2.7	- National parks - Strict nature reserves - Ramsar wetlands sites	- Loss of soil fertility due to erosion and salinity. - Lack of resources and administrative capacity for management of protected areas has resulted in the limited scope of protected areas and unauthorized hunting and trading of endangered species.	Yes	<p>Regional Transboundary Biodiversity: The project objectives are to:</p> <ul style="list-style-type: none"> a) strengthen and expand the strict nature reserves network in the west Tien Shan to conserve unique plant and animal communities; b) identify alternative and sustainable income-generating activities for local communities and other stakeholders to reduce pressure on the reserves; c) strengthen local and national capacity through education and training; d) raise public awareness of biodiversity values and increase participation in biodiversity conservation; and e) establish regional (transnational) coordination and cooperation mechanisms for biodiversity conservation activities to strengthen management capacity.

	Kyrgyz Rep. Protected areas 1000 km ² : 6.9 % of land area: 3.6	- National parks - Strict nature reserves - Ramsar wetlands sites - Biosphere reserves	- Fragile forests due to improper forest and rangeland management in the past, as well as illegal exploitation of forests for firewood and construction. - Extensive overgrazing reduces natural forest regeneration. - Rapid loss of wildlife due to excessive hunting and habitat fragmentation/destruction.	Yes	Regional Transboundary Biodiversity: Same as above. Forestry Sector Review: TIJEN
	Tajikistan Protected areas 1000 km ² : 5.9 % of land area: 4.2	- Nature reservations - Nature refuge - National park	- Land degradation due to overacting and grazing.	No	
	Turkmenistan Protected areas 1000 km ² : 19.8 % of land area: 4.2	- Strict nature reserves - Ramsar wetlands sites - Biosphere reserves	- Limited water availability and poor sanitation facilities and practices result in a high incidence of waterborne diseases. - Oil pollution problems (present and potential). - Environmental problems in the Caspian Sea.	No	
	Uzbekistan Protected areas 1000 km ² : 8.2 % of land area: 2.0	- National parks - Strict nature reserves	- Desertification of the Amu Darya Delta has led to the disappearance of water and near water biological populations. - Nature conservation objectives are often compromised due to management deficiencies and scarce funding.	Yes	Regional Transboundary Biodiversity: Same as above.

Sources: WDI, 2000; Countries' National Environmental Action Plans; Protected Areas in Eastern and Central Europe and the USSR, IUCN 1990; Biodiversity Conservation in Transboundary Protected Areas, National Research Council 1996; World Bank Web Environmental Data Sheets: <http://eca/ecsre/envcopp/default.h>

Annex 3. Classification of Assistance Program

Irrigation and Drainage			
Projects Under Preparation			
Country	Project	FY	Total Project Costs in Million US\$
Armenia	Irrigation Development Project	2002	60
Azerbaijan	Irrigation and Drainage Infrastructure Rehabilitation Project	2000	46.8
Georgia	Irrigation and Drainage Rehabilitation	2001	25
Kyrgyz Republic	On-Farm Irrigation	2000	29
Romania	Irrigation Rehabilitation	2002	50
Turkmenistan	Karakum Main Canal	2001	65
Uzbekistan	Karshi Pumping Cascade	2001	114
Uzbekistan	Drainage	2001	70
Projects Under Supervision			
Country	Project	FY	Total Project Costs in Million US\$
Albania	Irrigation and Drainage II	1999	40.5
Armenia	Irrigation Rehabilitation	1995	57.1
Kazakhstan	Irrigation and Drainage	1996	117.8
Kyrgyz Republic	Irrigation	1998	46.8
Macedonia	Irrigation Rehabilitation	1998	32.5
Turkey	Privatization of Irrigation	1998	58.8

Dam Safety/Earthquake/Flood/Water Management			
Projects Under Preparation			
Country	Project	FY	Total Project Costs in Million US\$
Kazakhstan	Nura River Cleanup	2002	100
Tajikistan	Lake Sarez Risk Mitigation Project	2000	4.29
Projects Under Supervision			
Country	Project	FY	Total Project Costs in Million US\$
Armenia	Dam Safety Project	1999	30.3
Kyrgyz Republic	Flood Emergency	1999	14.1
Poland	Flood	1998	498
Turkey	Marmara Earthquake Emergency Recovery	2000	737

Rural Finance			
Projects Under Preparation			
Country	Project	FY	Total Project Costs in Million US\$
Moldova	Rural Finance II	2001	22.5
Romania	Rural Finance	2001	291
Ukraine	Rural Finance Pilot	2001	50
Projects Under Supervision			
Country	Project	FY	Total Project Costs in Million US\$
Albania	Microcredit	1999	22.8
Kyrgyz Republic	Rural Finance II	1999	22.9
Kyrgyz Republic	Rural Finance	1997	21.0
Moldova	Rural Finance	1998	6.1
ESW			
Country	Project	FY	Total Project Costs in Million US\$
Romania	Rural Finance Review	1999	0.015

International Waters			
Projects Under Preparation			
Country	Project	FY	Total Project Costs in Million US\$
Regional	Black Sea/Danube GEF Partnership	2001	70
Regional	Caspian Sea	2001	3.2
Romania	Agricultural Pollution Reduction	2001	7.3
Projects Under Supervision			
Country	Project	FY	Total Project Costs in Million US\$
Albania/Macedonia	Lake Ohrid Conservation Project	1998	4.4
Aral Sea	Water and Environmental Management	1998	21.2
Georgia	Integrated Coastal Management Project	1999	7.6
Romania	GEF Danube Delta	1995	4.5
Ongoing ESW			
Country	Project	FY	Total Project Costs in Million US\$
Armenia	Water Resources	2000	0.02
Bulgaria	Black Sea/Danube	2000	0.01
Georgia	Water Sector Note	2001	0.10
Regional	Baltic Sea Development Project	2001	0.1
Regional	METAP	2000	0.27
Russia	Volga Basin Management	2001	0.15

Forestry/Natural Resource Management			
Projects Under Preparation			
Country	Project	FY	Total Project Costs in Million US\$
Albania	Fishery Development Project	2002	10
Albania	Support to Butrint NP	2000	0.215
Armenia	Natural Resource Management	2001	10
Georgia	Forestry	2002	20.5
Romania	Forest Development Program	2002	24.35
Slovenia	Enabling Activities	2001	0.03
Projects Under Supervision			
Country	Project	FY	Total Project Costs in Million US\$
Albania	Forestry	1996	17
Belarus	Forestry Development	1994	54.7
Bosnia	Forestry	1998	20.2
Croatia	Coastal Forest Reconstruction	1997	67.3
Russia	Environment Management	1995	185
Russia	Sustainable Forest Pilot Project	2000	75
Slovenia	Environment	1996	38.3
Turkey	Eastern Anatolia Water Rehabilitation	2001	30
Turkey	Eastern Anatolia Watershed	1993	121
ESW			
Country	Project	FY	Total Project Costs in Million US\$
Kazakhstan	Forestry Review	2001	0.19
Kyrgyz Republic	Forestry Sector Review	2001	0.03
Moldova	Enabling Activities	2000	N/A
Regional	ECA Environment Strategy	2000	0.1
Regional	Natural Resource Management	2000	0.06
Regional	WWF Alliance-Forestry Certification and Restitution Study	2000	N/A
Turkey	Animal Resources Study	2000	0.03
Turkey	Forest Sector Review	1999	0.04

Land Reform/Title Registration/Farm Restructuring			
Projects Under Preparation			
Country	Project	FY	Total Project Costs in Million US\$
Bulgaria	Land Registration and Restitution	2002	20
Croatia	Registry/Cadastre	2001	5
Hungary	Rural Policy Dialogue	2000	1
Kazakhstan	Real Estate Reg. II.	2001	9.4
Kyrgyz Republic	Agricultural Marketing	2002	11.84
Latvia	Mortgage/Land Bank Privatization	1999	N/A
Poland	Rural Development Project	2000	301
Ukraine	Title Registration	2002	73
Uzbekistan	Rural Enterprise Support Project	2001	42
Projects Under Supervision			
Country	Project	FY	Total Project Costs in Million US\$
Armenia	Title Registration	1999	10.6
Azerbaijan	Farm Privatization	1997	28.8
Kazakhstan	Real Estate Reg. Project	1997	13.3
Macedonia	Privatization Farmer Support	1996	10.2
Poland	Rural Environmental Protection	2000	15
Russia	Land Reform Impl. Supp.	1994	80
Slovenia	Real Estate Regional Modernization Project	1999	28.9
Tajikistan	Farm Privatization Support	1999	23.5
Tajikistan	Rural Infrastructure	2000	23.6
Ongoing ESW			
Country	Project	FY	Total Project Costs in Million US\$
Belarus	Farm Restructuring Note II	2000	0.05
Regional	EU Access - Rural	2000	0.09
Regional	Farm Debt	2000	0.1

Agricultural Extension/Research/Agriculture			
Projects Under Preparation			
Country	Project	FY	Total Project Costs in Million US\$
Albania	Agricultural Services	2001	10
Bosnia	Agriculture II	2003	12
Kazakhstan	Agricultural Support Services	2002	40
Kazakhstan	Agricultural Post Privatization II	2001	50
Kazakhstan	Wheat Industry IDF	1999	0.40
Moldova	Market Access	2001	20
Romania	Rural Development	2002	100
Turkmenistan	Agricultural Development	2002	30
Turkmenistan	Plant Protection Services	2001	11.9
Ukraine	Agribusiness Development	2002	30
YF-Kosovo	Emergency Farm Construction	2000	25
Projects Under Supervision			
Country	Project	FY	Total Project Costs in Million US\$
Armenia	Agricultural Reform Support Project	1998	19.8
Azerbaijan	Agricultural Development and Credit	1999	33.7
Croatia	Farmer Support Services	1996	30
Georgia	Agricultural Development Project	1997	26.3
Georgia	Agriculture Research Extension Training Project	2000	12.41
Kazakhstan	Agricultural Post Privatization Assistance Project	1998	23.8
Kyrgyz Republic	Agricultural Support Services Project	1998	30.2
Kyrgyz Republic	Sheep and Wool Improvement	1996	16.8
Kyrgyz Republic	Sheep and Wool Development - International Fund for Agricultural Development (IFAD)	2001	N/A
Latvia	Rural Development	1999	19
Lithuania	Privatization and Agricultural Development	1996	54.8
Moldova	Agriculture I	1996	18.5
Romania	Agricultural Support Services	2000	17.82
Russia	Agricultural Reform Implementation	1994	285
Turkey	Agricultural Research	1992	55
Turkey	Commodity Market Development	1999	5.7
Turkmenistan	Agricultural Reform/Indicators	2000	0.01
Ukraine	Agriculture Seed Development	1995	63.3
Uzbekistan	Cotton Subsector Improvement	1995	73.8
Ongoing ESW			
Country	Project	FY	Total Project Costs in Million US\$
Azerbaijan	Rural Sector and Infrastructure Analysis	2001	0.04
Georgia	Agricultural Sector Updates	2000	0.01
Kyrgyz Republic	Agricultural Input Marketing	1999	0.005
Macedonia	Agricultural Sector Review	2001	0.01
Poland	Rural Markets Study	2001	0.06

Regional	Agricultural Research Program	1999	N/A
Regional	Grain Trading Activities	2000	0.02
YF-Kosovo	Agriculture Reconstruction Program	2000	0.13

GEF Projects (Biodiversity)			
Projects Under Preparation			
Country	Project	FY	Total Project Costs in Million US\$
Bulgaria	Wetland Restoration	2001	13.7
Croatia	Karst Ecosystems Conservation	2001	5.5
Georgia	Biodiversity	2001	11.1
Russia	Amur Sakhalin Eco. Fire Management	2002	5
Slovak Rep.	Grassland Conservation - GEF	2000	0.75
Ukraine	Biodiversity Conservation	2001	8
Projects Under Supervision			
Country	Project	FY	Total Project Costs in Million US\$
Latvia	Solid Waste	1998	16.97
Poland	Rural Environment Project	2000	15.8
Regional	Central Asia Biodiversity	1999	13.6
Romania	Biodiversity	1999	8.8
Russia	Biodiversity Conservation	1996	26
Turkey	Biodiversity Project	2000	11.5

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Notes

1. Data were unavailable for the following countries: Albania, Bosnia, Estonia, Slovak Republic, Slovenia, Turkey, and Uzbekistan.
2. *Source:* WDI, 2000.
3. FORTECH, UK, "Economic Valuation and Reform of the Forestry Sector in Romania", January 1999.
4. See Annex 1 for explanation of ratings. Note also that a rating of 1-2, consistent with centrally planned, state-managed natural resources, may have biologically sustainable management in some areas. The 9-10 indicators have, in addition, transparency, local participation in resource management, and market mechanisms for efficient use.
5. A score of 1-2 indicates that few of the elements for sustainable, transparent natural resource management are in place; a score of 9-10 indicates a very good framework for sustainable natural resource management.
6. See also: The World Bank. "The Road to Stability and Prosperity in South Eastern Europe: A Regional Strategy Paper." Washington, D.C.: World Bank, January 2000.
7. *Source:* WDI, 2000.
8. *Sources:* WDI, 2000; except percent pastureland, from FAO Production Yearbook.
9. *Sources:* WDI, 2000; except irrigated land as percent of cropland 1994-96 from WDI, 1999; grain consumption, grains fed to livestock, and average yield of cereals 1994-96 from World Resources, 1998.
10. *Source:* FAO Production Yearbook, vol. 49, 1995; vol. 52, 1998.
11. *Source:* World Resources, 1998.
12. *Source:* WDI, 2000.
13. *Source:* WDI, 2000.
14. *Source:* World Resources, 1998.
15. *Source:* WDI, 2000.
16. *Source:* WDI, 2000.
17. *Sources:* WDI, 2000; except percent pastureland, from FAO Production Yearbook.
18. *Sources:* WDI, 2000; except irrigated land as percent of cropland 1994-96, from WDI, 1999; grain consumption, grains fed to livestock, and average yield of cereals 1994-96 from World Resources, 1998.
19. *Source:* FAO Production Yearbook, vol. 49, 1995, vol. 52, 1998.
20. *Source:* World Resources, 1998.
21. *Source:* WDI, 2000.
22. *Source:* WDI, 2000.
23. *Source:* World Resources, 1998.
24. WDI, 2000.
25. The data on this section covers only Croatia, Slovenia, Albania, Bosnia, Macedonia, and Bulgaria. It does not include the Federal Republic of Yugoslavia (Serbia and Montenegro) or Kosovo. The Bank does have an assistance program for Kosovo, and its overall assistance strategy for the area is summarized in a recent publication, "The Road to Stability and Prosperity in South Eastern Europe," World Bank, ECA Region, March 2000.
26. *Source:* WDI, 2000.
27. *Source:* World Resources, 1998.

28. *Sources:* WDI, 2000; except percent pastureland, from FAO Production Yearbook.
29. *Sources:* WDI, 2000; except irrigated land as percent of cropland 1994-96, from WDI, 1999; grain consumption, grains fed to livestock, and average yield of cereals 1994-96, from World Resources, 1998.
30. *Source:* FAO Production Yearbook, vol. 49, 1995, vol. 52, 1998.
31. *Source:* WDI, 2000.
32. *Source:* World Resources, 1998.
33. *Source:* WDI, 2000.
34. WDI, 2000.
35. *Source:* WDI, 2000.
36. *Sources:* WDI, 2000; except percent pastureland, from FAO Production Yearbook.
37. *Sources:* WDI, 2000; except irrigated land as percent of cropland 1994-96, from WDI, 1999; grain consumption, grains fed to livestock, and average yield of cereals 1994-96, from World Resources, 1998.
38. FAO Production Yearbook, vol. 49, 1995, vol. 52, 1998.
39. *Source:* World Resources, 1998.
40. *Source:* WDI, 2000.
41. *Source:* WDI, 2000.
42. *Source:* World Resources, 1998.
43. *Source:* WDI, 2000.
44. WDI, 2000.
45. *Sources:* WDI, 2000; except percent pastureland, from FAO Production Yearbook.
46. *Sources:* WDI, 2000; except irrigated land as percent of cropland 1994-96, from WDI, 1999; grain consumption, grains fed to livestock, and average yield of cereals 1994-96, from World Resources, 1998.
47. FAO Production Yearbook, vol. 49, 1995, vol. 52, 1998.
48. *Source:* World Resources, 1998.
49. *Source:* WDI, 2000.
50. *Source:* WDI, 2000.
51. *Source:* World Resources, 1998.
52. *Source:* WDI, 2000.
53. *Source:* WDI, 2000. Note that figures on the structure of GDP vary widely between data sources.
54. *Sources:* WDI, 2000; except percent pastureland, from FAO Production Yearbook.
55. *Sources:* WDI, 2000; except irrigated land as percent of cropland 1994-96, from WDI, 1999; grain consumption, grains fed to livestock, and average yield of cereals 1994-96, from World Resources, 1998.
56. *Source:* FAO Production Yearbook, vol. 49, 1995, vol. 52, 1998.
57. *Source:* World Resources, 1998.
58. *Source:* WDI, 2000.
59. *Source:* WDI, 2000.
60. *Source:* World Resources, 1998.
61. *Source:* WDI, 2000.
62. *Source:* WDI, 2000.
63. *Sources:* World Resources, 1998; except arable land ha per capita, irrigated land as percent of cropland in 1995-97, annual fertilizer use, average yield of cereals 1996-98, from WDI, 2000.

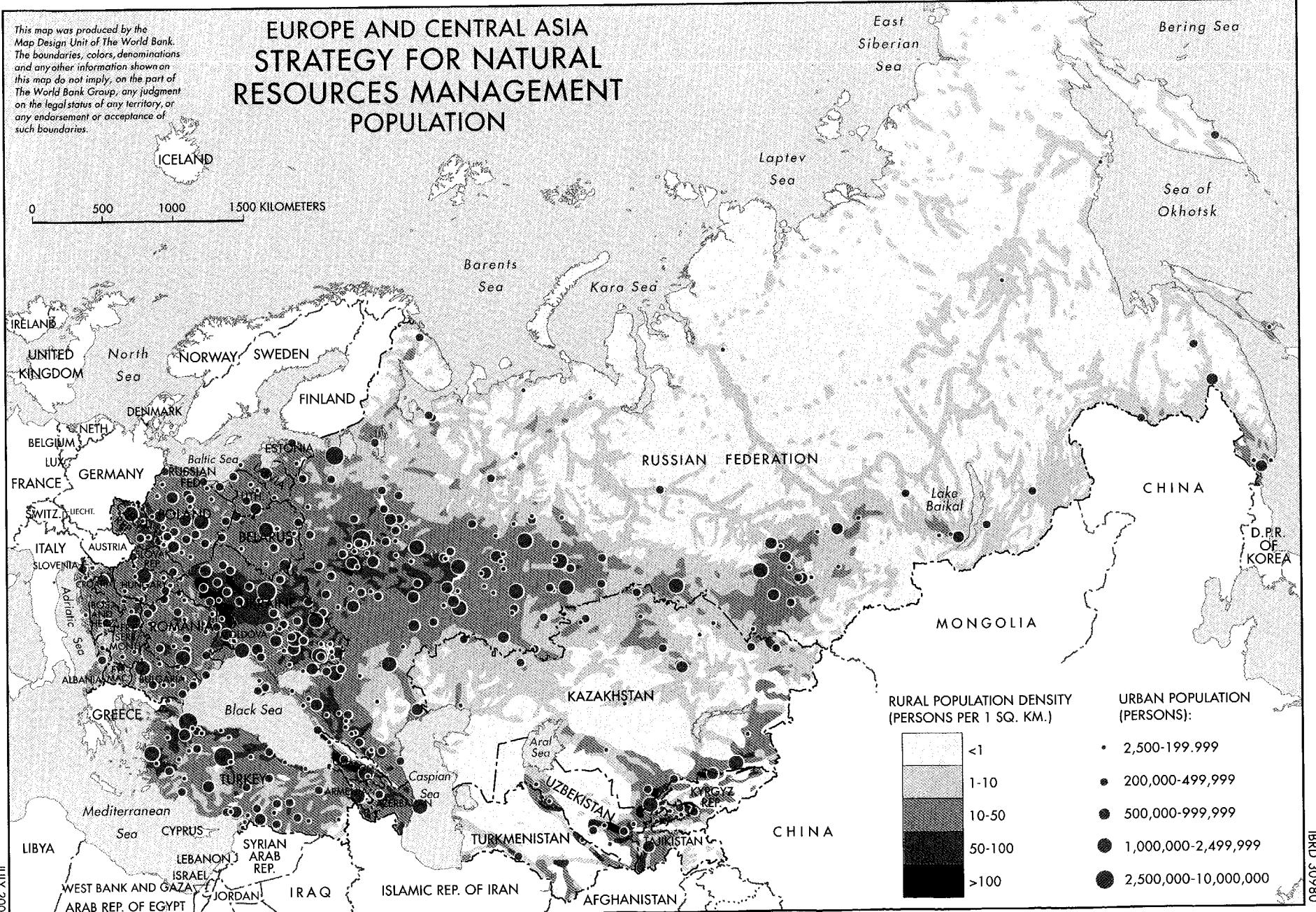
Annex 5

Maps

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EUROPE AND CENTRAL ASIA STRATEGY FOR NATURAL RESOURCES MANAGEMENT POPULATION

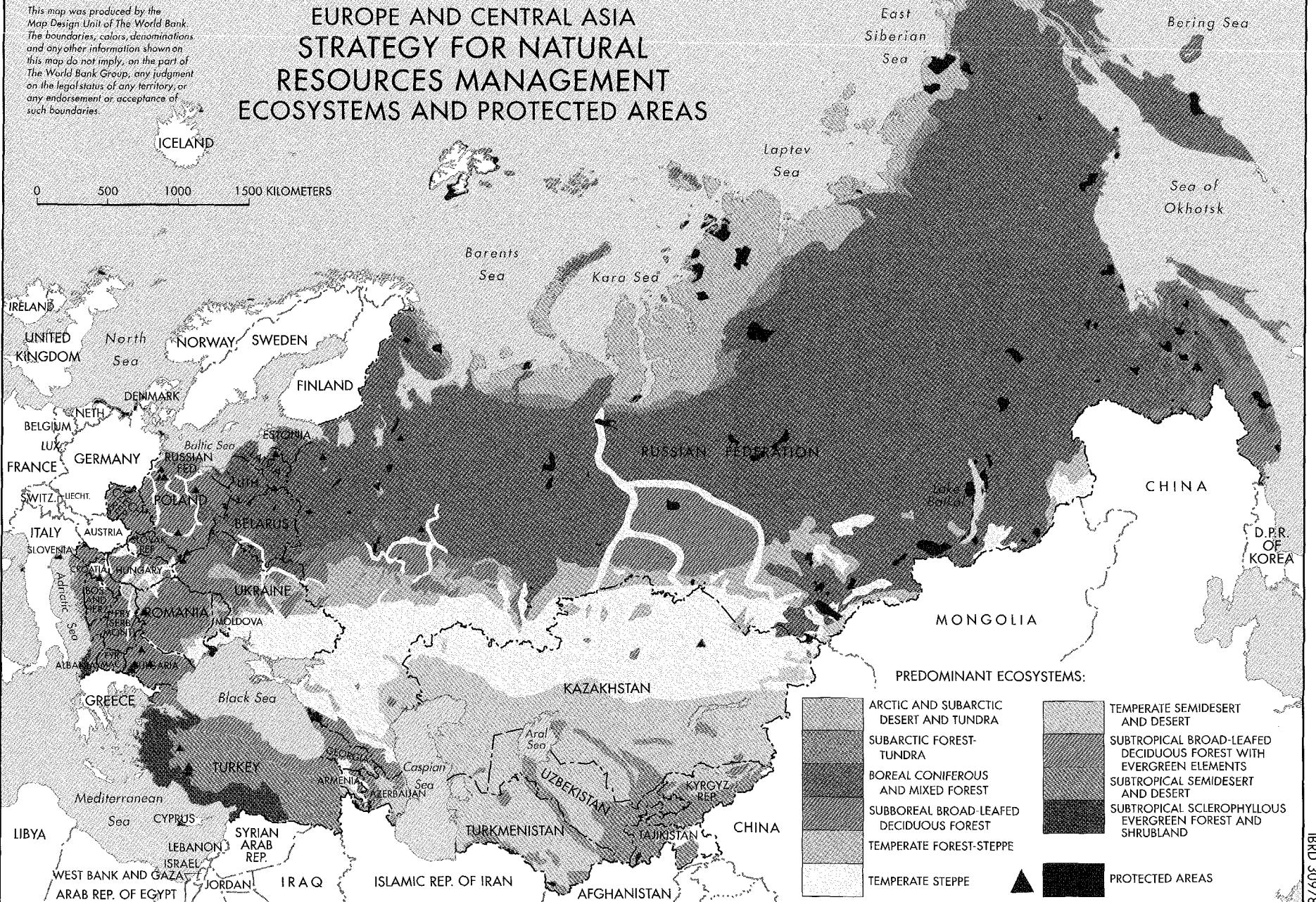
0 500 1000 1500 KILOMETERS



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EUROPE AND CENTRAL ASIA STRATEGY FOR NATURAL RESOURCES MANAGEMENT ECOSYSTEMS AND PROTECTED AREAS

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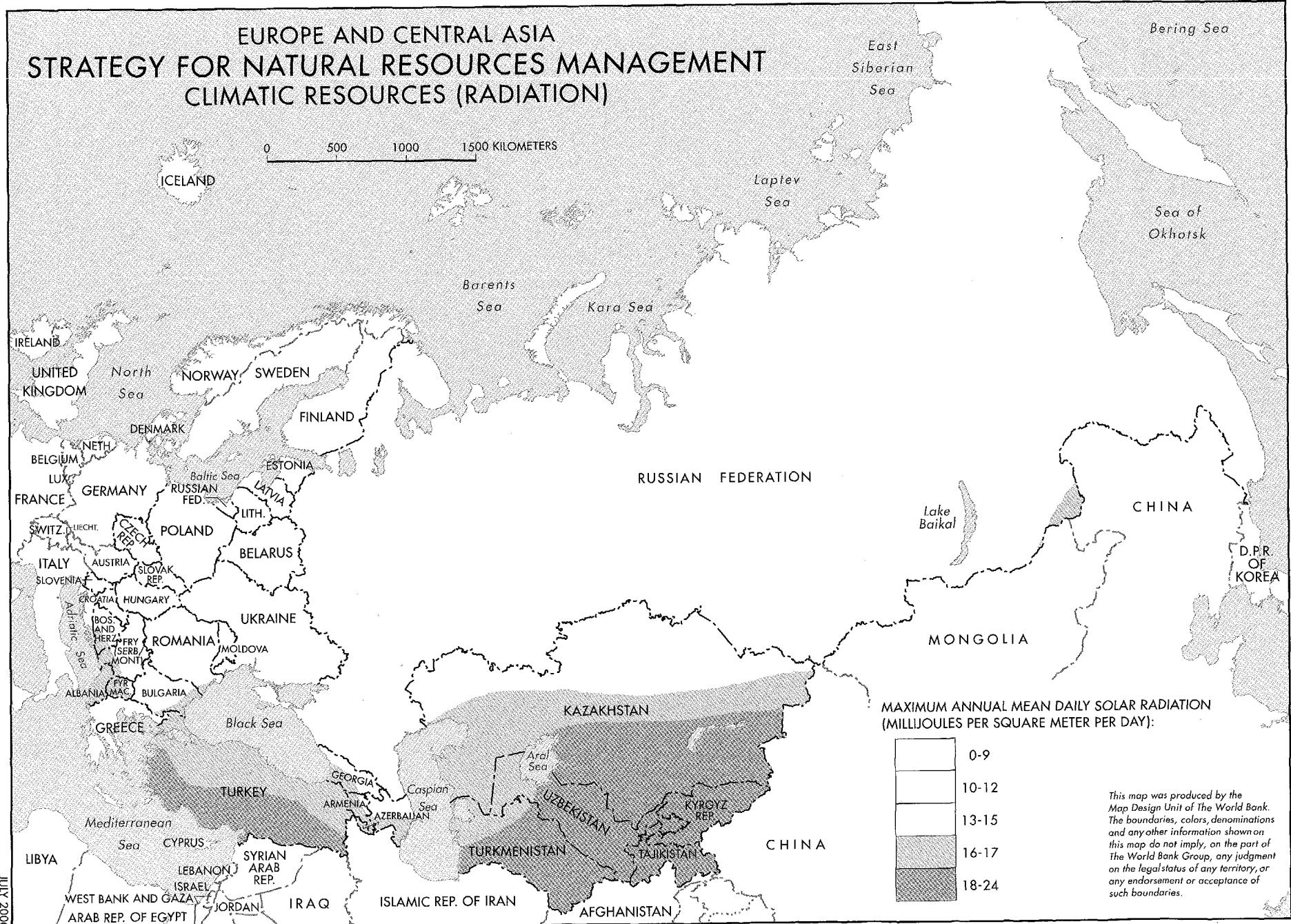


July 2000

IBRD 309/8

EUROPE AND CENTRAL ASIA
STRATEGY FOR NATURAL RESOURCES MANAGEMENT
CLIMATIC RESOURCES (RADIATION)

0 500 1000 1500 KILOMETERS

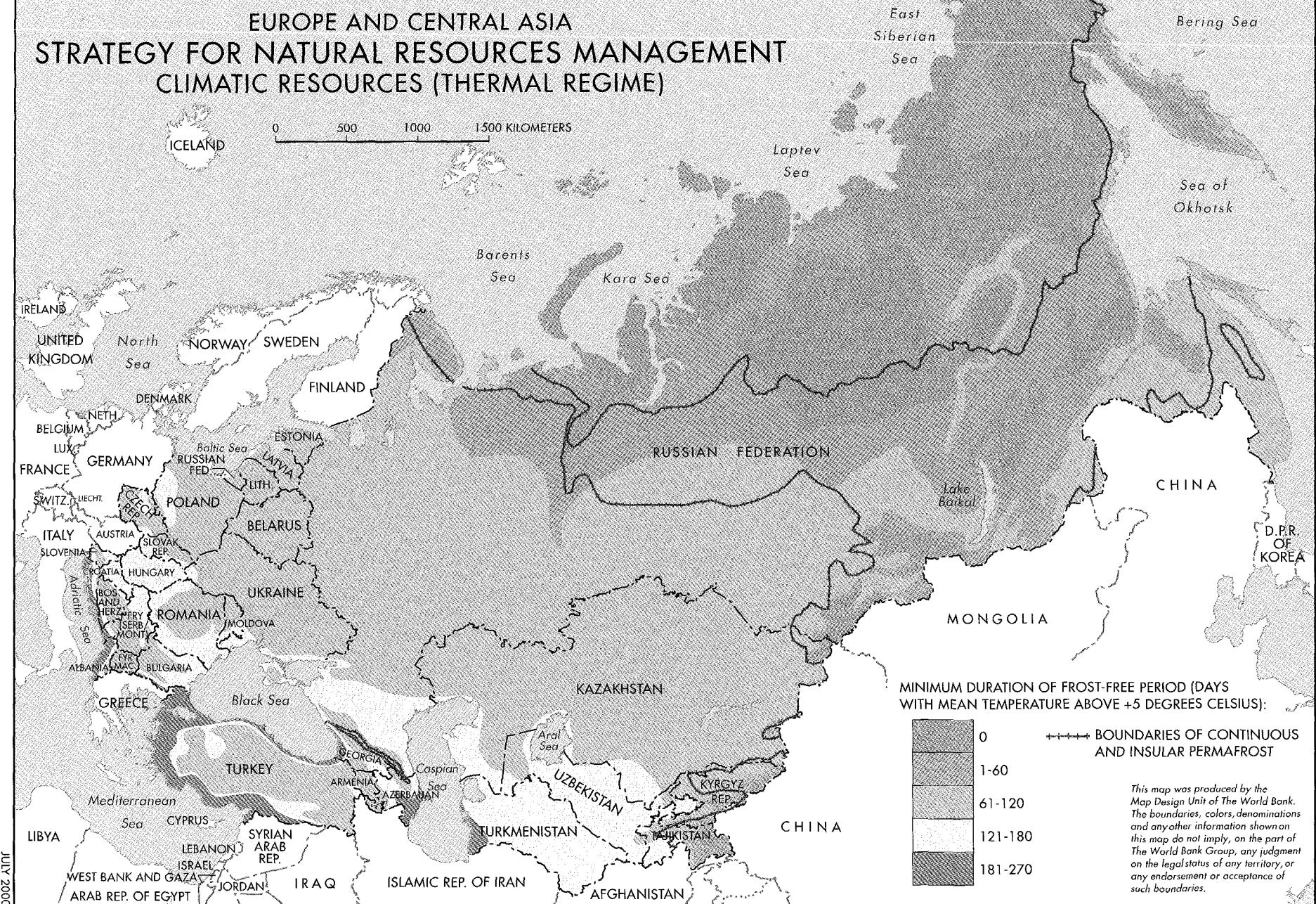


MAXIMUM ANNUAL MEAN DAILY SOLAR RADIATION
(MILLIJOULES PER SQUARE METER PER DAY):

0-9
10-12
13-15
16-17
18-24

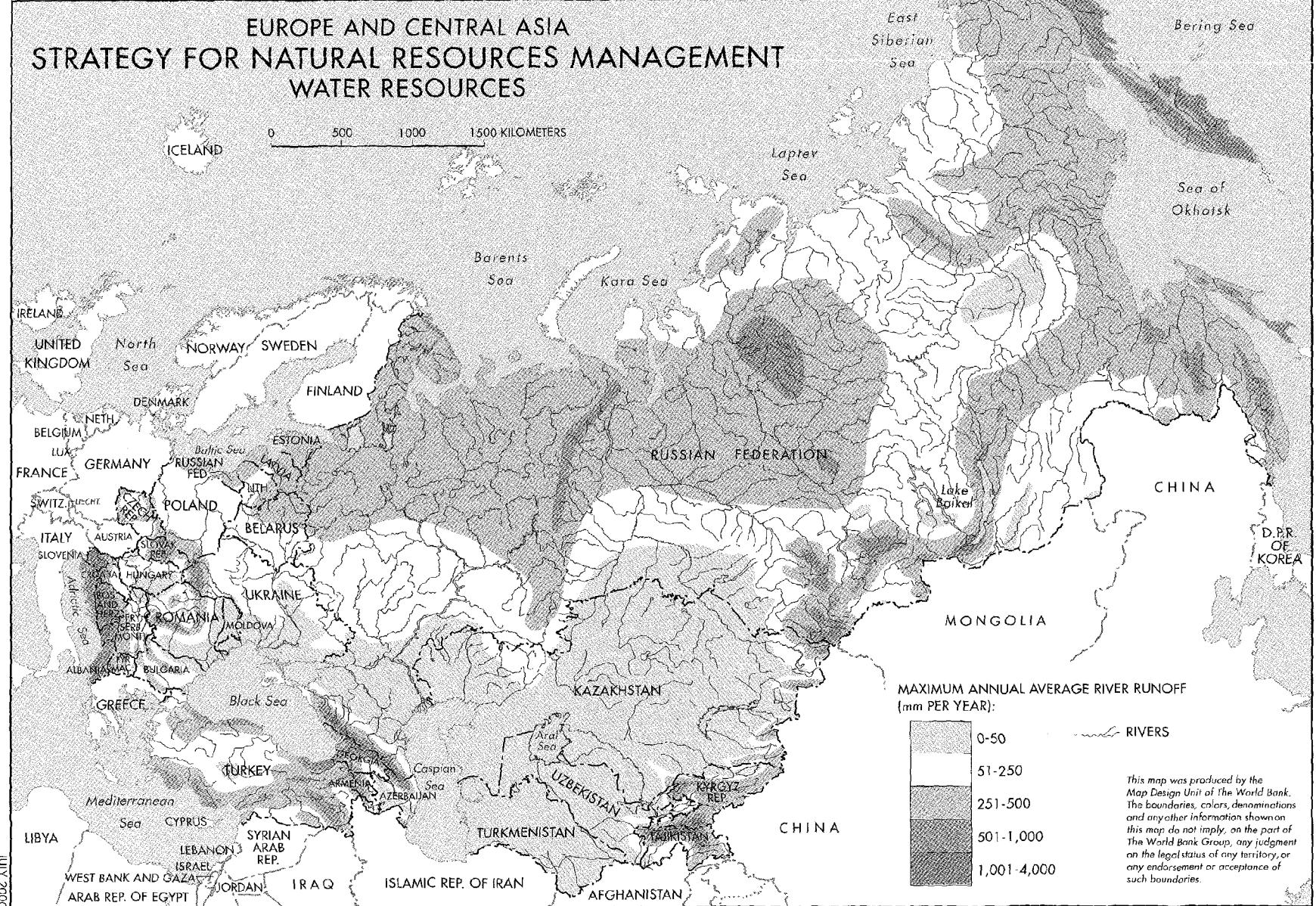
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**EUROPE AND CENTRAL ASIA
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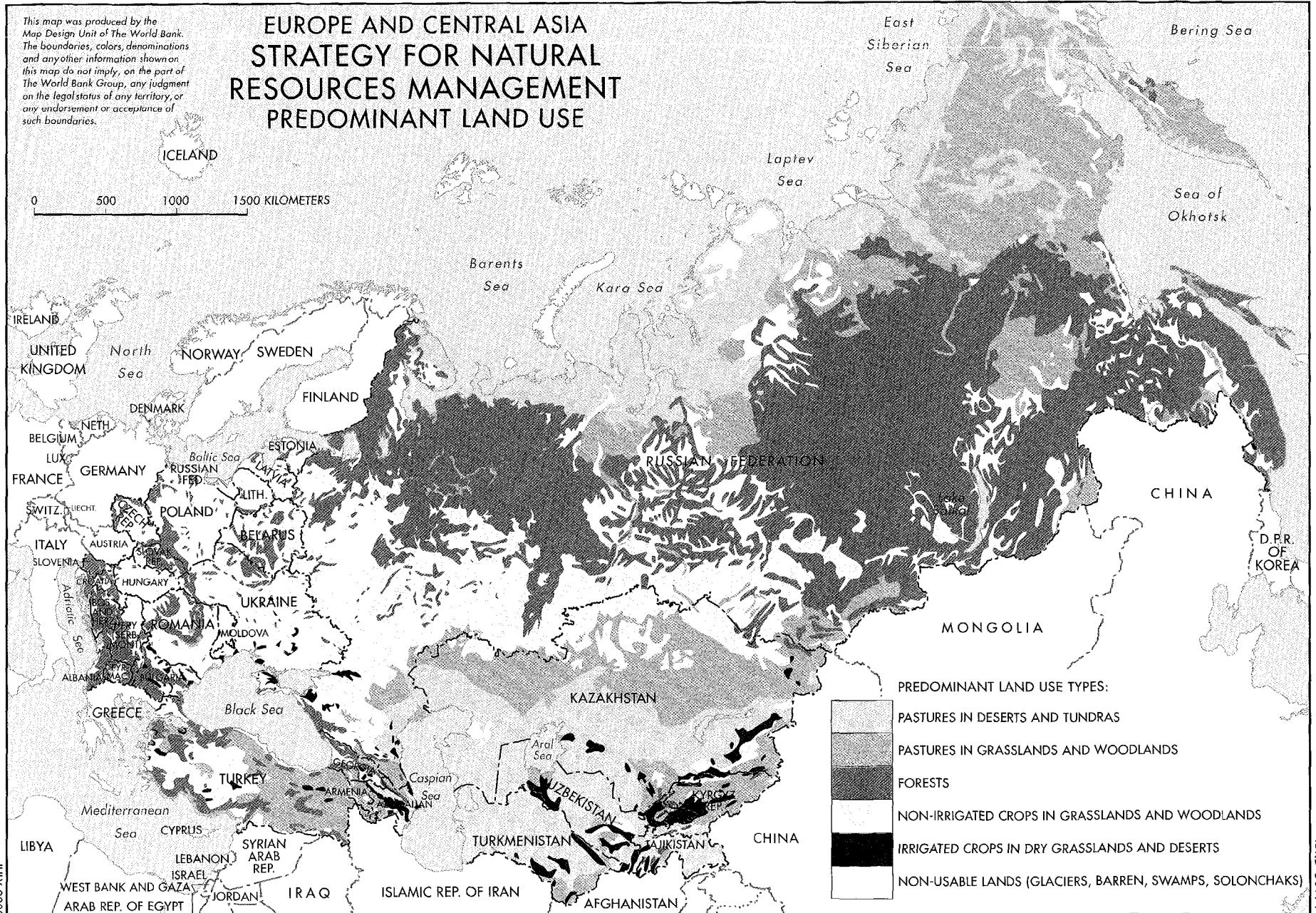
0 500 1000 1500 KILOMETERS



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