GLOBAL ENVIRONMENT FACILITY

13100

Ukraine

Transcarpathian Biodiversity Protection Project

Project Document
July 1993

THE WORLD BANK

GEF Documentation

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Reports by the Chairman - identified by a blue band - are prepared by the Office of the GEF Administrator in collaboration with the three GEF implementing agencies for the biannual Participants' Meetings.

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CURRENCY EQUIVALENT

(April 1993)
2,690 Karbovanets (Kb) = US$ 1

WEIGHTS AND MEASURES

The metric system is used throughout this report.

GLOSSARY OF ABBREVIATIONS

CBR	-	Carpathians Biosphere Reserve
CIS	-	Commonwealth of Independent States
DPRA	-	Department of Protected and Recreation Areas
ECU	-	European Currency Unit
EC	-	European Community
GEF	-	Global Environmental Facility
GET	-	Global Environmental Trust Fund
GIS	-	Geographic Information System
GDP	-	Gross Domestic Product
IBR	-	International Biosphere Reserve (Slovak, Poland and Ukraine)
IBRD	-	International Bank for Reconstruction and Development
ICB	-	International Competitive Bidding
IMF	-	International Monetary Fund
IUCN	-	International Union for the Conservation of Nature and Natural Resources
LCB	-	Local Competitive Bidding
MEP	-	Ministry for Environmental Protection
PMU	-	Project Management Unit
SOE	-	Statement of Expenditure
TA	-	Technical Assistance

FISCAL YEAR

January 1 to December 31

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

GRANT AND PROJECT SUMMARY

RECIPIENT: Ukraine, Ministry of Environmental Protection

AMOUNT: 400,000 SDR

TERMS: Grant

ONLENDING: Not applicable

FINANCING PLAN:

Source	Local	Foreign	Total
	(US$ Million)		
GET Grant	0.250	0.250	0.500
MacArthur Foundation Grant	0.000	0.010	0.010
Government	0.070	0.000	0.070
TOTAL	**0.320**	**0.260**	**0.580**

ECONOMIC RATE OF RETURN: Not calculated, though substantial economic and environmental benefits.

STAFF TECHNICAL REPORT: Report No. 12718-UA dated January 1994

MAPS:

1. Transcarpathian Biodiversity Protection Project — IBRD Map No. 25416
2. GEF Biodiversity Projects: East Carpathians — IBRD Map No. 25417
3. Suggested Priorities for Environmental Protection and Natural Resource Management — IBRD Map No. 25415

MEMORANDUM AND RECOMMENDATION OF THE DIRECTOR
OF THE COUNTRY DEPARTMENT
TO THE REGIONAL VICE PRESIDENT

Background

1. Seven ecological communities transect Ukraine: European broadleafed forests, the northern taiga, the interior steppe, semi-arid sands and marshes near the Black and Azov Seas, the seaside littoral estuaries of large rivers such as the Dnieper, and the sub-tropical pine and chaparral of Crimea. The forest sector of Ukraine (10 million ha, 14 percent of the land area) is under great environmental stress, impacted by poor forestry and agricultural practices and, in some areas, by air pollution. The East Carpathian mountains are a significant part of this forest resource and are recognized as a key center of endemism. Steps to protect the area are urgently required.

2. The Government and the World Bank are presently finalizing a Joint Environmental Study. This study included a review of nature reserve and park management needs in the country. The establishment of reserves for the protection of unique natural ecosystems and genetic resources of plant and animals is an important challenge recognized by the Government of Ukraine[1]. The network of protected areas includes 15 strict nature reserves (Zapovedniki), 3 National Parks, 2 Biosphere Reserves and many other protected landscapes, zoological and botanic gardens and other locally significant reserves. Some 2 percent of the country is under some form of nature protection.

3. The Government is also restructuring its national forest management plans. Timber cutting is prohibited on 30 percent of the forested areas. The government is taking measures to strengthen the management of the forests and also to extend forest cover in the country.

4. The Eastern Carpathian Mountains along the borders of the Slovak Republic, Poland and Ukraine contain some of the least disturbed ecosystems in Eastern Europe. The Carpathians contain one quarter of the flora of Europe and many endemic and medicinal plants useful to mankind. The largest remaining European stand (10,900 ha) of virgin beech forest is standing in the Carpathians. This is a remarkable natural resource for the rest of Europe, which has lost such undisturbed areas. A part of the East Carpathians has been formally designated by Ukraine as the Carpathians Biosphere Reserve under the UNESCO Man and the Biosphere Program.

5. **Carpathians Biosphere Reserve** The Ukrainian Carpathians contain unique preserved areas of beech and spruce forests of significance for analyzing the development history of the East Carpathians vegetation. The first reserve of beech and fir-beech forests was created in 1932 on the Stuzica mountain slopes. Since that time the Reserve has been enlarged to 2,952 ha and included in the Ukrainian Carpathians Biosphere Reserve (CBR). The CBR was created in 1991 with a total area of 38,930 ha, which is subdivided into a reserve zone (21,879 ha), a buffer zone (8,949 ha), and a conservative nature management zone (8,071 ha). The reserve zone includes the Stuzica scenic reserve, and four separately located forest or alpine areas. These areas are the Khust massif, the Ugolsko-Shyrokoluy Lansky Massif, the Chornogirs'ky massif and the Maramoros'ky massif.

1/ Ukraine National Report, UN Conference on Environment and Development, Brazil 1992.

Rationale for GEF Involvement

6. The GEF project has been accorded high priority by the Government. However, funds are not available in Ukraine to carry out the work proposed here The Government does not want to borrow external resources for it at market rates of interest. The GEF project would provide the Government with urgently needed support to assess and redress the environmental damage to Ukraine's forests.

7. The Eastern Carpathians share transboundary ecosystems. The programs developed for their integrated management will be of international utility. The global significance of the areas initially selected is confirmed and supported by their designations by UNESCO and the World Wildlife Fund (International), being identified among the "existing ecological bricks" of Europe.

8. This project will constitute a contribution to the GEF Portfolio. In its efforts to preserve global biodiversity, the GEF will encounter more of the transboundary issues being addressed in this project. It will also frequently encounter the need to balance *in-situ* and *ex-situ* preservation with innovative techniques. It will, in particular, face the conflicting demands of a resident population which can be either a force for further eroding biodiversity or a potent ally in its preservation. In these ways, the progress of this project will be germane to ongoing activities of the GEF and have utility as a case study in trying to incorporate community participaiton.

Project Objective

9. The objectives of this project are to:

(a) Incorporate this small Ukrainian GEF project ($500,000) as an *add-on* to the proposed Slovak Biodiversity Protection Project (GEF $2.3 million). The innovation being supported under the Ukrainian project is threefold: this would be the first GEF project in the Ukraine, the first trilateral transboundary project supported under the GEF, and the first three-country Trust Fund to be organized for biodiversity protection. The MacArthur Foundation of Chicago, Illinois is willing to contribute $300,000 to initiate this Carpathian Biodiversity Protection Trust Fund.

(b) Support the Ukrainian portion of the overall trilateral effort (Ukraine, Poland and Slovak) to protect habitat fragments, stop species loss and upgrade habitat management.

(c) Develop and implement the legal, institutional and administrative interventions to achieve the long term protection of the area in Ukraine as well as the abutting zones in Poland and the Slovak Republic.

10. The project would start with an ecological perspective and includes both *in-situ* and *ex-situ*[2] components to conserve biodiversity. This would entail a program approach involving scientific study of the flora and fauna of the selected key endangered forests, including threats to their viability from human pressures, and developing options to ensure the conservation of species considered at risk. Modern approaches of conservation biology and restoration ecology will be used to identify key management measures. These measures will include the identification of minimum viable populations and critical habitats and establishment of wildlife corridors or linked areas of modified land use which will further enhance biodiversity protection objectives called for by the GEF.

Project Description

11. The GEF operation would support Ukraine's effort to protect its forest ecosystems. Selection of the parks, reserves and zones under the proposed project are based on agreed conservation priorities. Project investments include:

(a) a **Biodiversity Protection Program** that will initiate a range of activities including: inventory (biological and geographical), a systems extinction model, genetic studies, GIS critical habitat analysis and a Trans Carpathian Planning Group. The program will include the development of a national policy on incentives and easements for select land uses which buffer the protected areas. To ensure the longer term maintenance of some of these innovative approaches, a plan and curriculum will be developed for the inclusion of the study of conservation biology in the tertiary forestry curricula, as forestry is the base qualification for most of the mountain natural resource managers;

(b) a **Management Resources Program** to enable coordinated management of the discontinuous reserved areas of the Carpathians Biosphere Reserve and the implementation of the above protection program. These investments will include: (i) computer equipment and GIS facilities, (ii) provision of transport and communications for enforcement, protection and management, and (iii) limited assistance with demonstration activities;

(c) a **Training Program** that will include development of communications skills (extension, public education, interpretation and media relations), language training, data base and computer training, park planning and management training; and,

(d) a **Management Program** that will include assistance to support a joint Ukraine GEF unit (both for the Danube Delta GEF and this project) within the Department of Protected and Recreation Areas and the establishment of a small Project Unit at the administrative center in Uzghorod.

2/ *In-situ* conservation keeps components of biodiversity within their original habitat or natural environment as a part of their evolutionary dynamic ecosystem, whereas *ex-situ* conservation keeps them alive outside of their original habitat or environment.

Actions Agreed

12. During negotiations on the Grant Agreement, assurances were obtained as follows:

(a) **Grant Effectiveness.** The grant would be declared effective upon submission of documentation satisfactory to the Bank that the Project Coordinator in Kiev and the Project Manager in Uzghorod has been appointed.

(b) **Accounts.** A special account would be established in a commercial bank for the project prior to disbursement of the grant. This account would be audited annually by an auditing firm acceptable to the Bank.

(c) **Project Management.** A Project Coordination Unit (Ministry of Environment, Kiev) and a Project Management Unit (PMU) within the Carpathians Biosphere Reserve at Uzghorod would be established prior to disbursement of the grant.

Benefits

13. The principal benefit is to protect a substantial zone of international ecological importance. The Eastern Carpathian forests of Poland, Ukraine and Slovak are unique in Europe and a source of endemic biodiversity.

14. Innovation is fostered by the integration of the various levels of biological diversity (species, population, landscape, habitat) to address issues in conservation planning (as described above). Technically, the project will break new ground in the development of the preservation of genetic material and in the applications of GIS and simplified methods of digital processing. It is also fostered by the unique (for Ukraine) collaboration of groups from a variety of interests in addition to foresters in issues of forest planning and management, for the balancing of *ex-situ* with *in-situ* approaches to biodiversity conservation, and by the use of consultation at the local level in the identification of viable land uses compatible with the preservation of endangered natural systems.

15. The project is designed for sustainability. The long-term viability is achieved through the building of institutions within Ukraine, including some which are relatively disenfranchised but important to biodiversity such as the forestry and Protected Reserve Managements. Other facets that are designed to ensure a project legacy are the training and professional development components. The goal of sustainable revenue generation activities based on consultation with residents who would engage in these activities is another way of ensuring longevity of interventions. These activities are premised on their compatibility with the preservation of biodiversity. They include nature and culture-based tourism, the selling of minor forest products, harvesting game, balancing uneven-aged, small-scale forest production with natural regeneration, and other economically sound and environmentally compatible activities.

16. There is a demonstration value and replicability through the use of integrated planning, new technologies, and bilateral organizational structures that foster international resource management approaches. This GEF project is going to foster solutions for conserving biodiversity. As a test of this approach to regional issues in biodiversity, the project can have significant demonstration value.

Risks

17. The major risks are primarily technical and managerial. The technical risk is that the basic approach to biodiversity protection in the Eastern Carpathians protected areas be further delayed, resulting in continuing degradation of the biodiversity ecosystem. The managerial risk is that Government salaries are extremely low resulting in the departure of top scientists and technicians expected to manage and implement the project from the service of the government and research institute. The project would mitigate these risks by implementing this project in late 1993, 1994 and 1995 to initiate this protection program and by providing funding to support the work of the key scientists and technicians working on the project. Mitigation of the risks would also be achieved by the monitoring and evaluation procedures built into the terms of reference for the Project Management who will be reporting on a quarterly basis. Additionally, quality and control will be achieved by the proposed small secretariat located at Uzghorod which would work closely with the Polish and Slovak units in the Eastern Carpathians to jointly foster its UNESCO designation as a "Man and the Biosphere" Reserve (MaB). There are built-in quality control and monitoring elements because of the research that will be published in peer-reviewed journals of international quality.

Environmental Assessment

18. The project has been reviewed by the Regional Environment Division and it has been placed in the environment screening category "C".

Attachments

SCHEDULE A

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

COST ESTIMATES[3]
(Current US$ Thousands)

		US$ in Thousands				
		Local	Foreign	Total	% Foreign Exchange	% Total Base Costs
A.	**Biodiversity Protection Program**					
	1. Reserve Inventory	4.0	10.0	14.0	71.4	2.6
	2. Acquisition Plan and Investigations	10.0	0.0	10.0	0.0	1.9
	3. Flora and Fauna Inventory	20.0	2.1	22.1	9.5	4.1
	4. Systems and Extinction Model	10.0	5.0	15.0	33.3	2.8
	5. Genetic and Species Studies	35.0	10.0	45.0	22.2	8.4
	6. GIS and Critical Habitat Analysis	3.0	7.0	10.0	70.0	1.9
	7. Trans-Carpathians Planning	5.0	5.0	10.0	50.0	1.9
	8. Development of National Policy	8.0	2.0	10.0	20.0	1.9
	9. Curriculum Development	10.8	1.2	12.0	10.0	2.3
	Sub-Total	105.8	42.3	148.1	28.6	27.8
B.	**Management Resources Program**					
	1. Computer Equipment and GIS	0.0	120.0	120.0	100.0	22.5
	2. Transport and Communications	32.5	32.5	65.0	50.0	12.2
	3. Assistance With Demonstration	25.0	0.0	25.0	0.0	4.7
	Sub Total	57.5	152.5	210.0	72.6	39.4
C.	**Training Program**					
	1. Data Base and Computing	8.0	2.0	10.0	20.0	1.9
	2. Prof. Dev. and Lang. Training	85.0	0.0	85.0	0.0	15.9
	Sub-Total	93.0	2.0	95.0	2.1	17.8
D.	**Public Education & Awareness**					
	1. Completion of Visitor Center	20.0	0.0	20.0	0.0	3.8
	2. Equipment	8.0	2.0	10.0	20.0	1.9
	3. Publications and Strategy	2.0	8.0	10.0	80.0	1.9
	Sub-Total	30.0	10.0	40.0	25.0	7.5
E.	**PROJECT MANAGEMENT**					
	1. Assist Central GEF Unit - Kiev	7.5	7.5	15.0	50.0	2.8
	2. Uzghorod Project Management Unit	25.0	0.0	25.0	0.0	4.7
	Sub-Total	32.5	7.5	40.0	18.8	7.5
Total BASELINE COSTS		318.8	214.3	533.1	40.2	100.0
	Physical Contingency	16.6	10.0	26.6	37.6	5.0
	Price Contingencies	14.8	5.5	20.3	27.2	3.8
Total PROJECT COSTS		350.2	229.8	580.0	39.6	108.8

3/ Excludes MacArthur grants to assist with training and establishment of Tri-National Trust.

SCHEDULE B

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

ESTIMATED SCHEDULE OF DISBURSEMENTS OF GET GRANT

PROCUREMENT ARRANGEMENTS
(US$ Thousands)

	Items	Procurement Method		Total Costs
		ICB	Other	
(1)	**GIS, Air Monitoring and Supporting Equipment**	-	**100.0** [a] **(100.0)**	**100.0** **(100.0)**
(2)	**Communications and Transport Assistance**	-	**150.0** [a] **(150.0)**	**150.0** **(150.0)**
(3)	**Technical Assistance**	-	**110.0** [b] **(100.0)**	**110.0** **(100.0)**
(4)	**Incremental Salaries, Operations and Maintenance**	—	**220.0** [c] (150.0)	220.0 (150.0)
	TOTAL	-	**580.0** **(500.0)**	**580.0** **(500.0)**

NOTE: Figures in parenthesis are GET Grant.
[a] International Shopping ($200,000) and Direct Purchase ($50,000)
[b] According to World Bank consultant guidelines.
[c] Project Management Program and contracted field staff to implement technical activities.

DISBURSEMENT

	Items	Disbursement	
		Amount (US$ million)	% Financing
(1)	Goods and Equipment	0.15	100 %
(2)	Technical Assistance	0.10	100 %
(3)	Salaries, Operations & Maintenance	0.15	100 %
(4)	Un-allocated	0.10	----
	TOTAL	0.50	

SCHEDULE B
(continued)

ESTIMATED IBRD DISBURSEMENTS
(US$ million)

	IBRD FISCAL YEAR		
	1994	**1995**	**1996**
Annual	0.05	0.20	0.25
Cumulative	0.05	0.25	0.50

Closing Date: December 31, 1995

SCHEDULE C

TIMETABLE OF KEY PROJECT PROCESSING EVENTS

(a)	Time Taken to Prepare	3 months
(b)	Prepared by Ministry of the Environment with Bank Assistance	
(c)	First Bank Mission	October 1992
(d)	Appraisal Mission Departure	May 1993
(e)	Negotiations and Grant Signing	June 1993
(f)	Planned Date of Effectiveness	September 1993
(g)	List of Relevant PCRs and PPARS	None

GLOBAL ENVIRONMENT FACILITY

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

TECHNICAL REPORT

TO THE

MEMORANDUM AND RECOMMENDATION OF THE DIRECTOR

January 24, 1994

Natural Resources Management Division
Country Department IV
Europe and Central Asia Region

CURRENCY EQUIVALENT

(April 1993)
2690 Karbovanets (Kb) = US$1

WEIGHTS AND MEASURES

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FISCAL YEAR

January 1 to December 31

UKRAINE
TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

Contents

UKRAINE

GLOBAL ENVIRONMENT FACILITY
TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

TECHNICAL REPORT

I. THE FOREST AND WILDLIFE SECTOR AND THE ENVIRONMENT

A. COUNTRY OVERVIEW

1.1 The newly independent republics of the former Soviet Union have a remarkably diverse natural patrimony which is at risk. The current economic situation threatens one of the most extensive and well-tended systems of nature reserves in the world -- their *Zapovedniki*[1] -- that house a vast range of biological diversity. Yet, their status as strict reserves is fostering resentment by local communities. In Ukraine the government is making a strong effort to protect their "*Zapovedniki*" but the lack of financial resources is hampering their efforts.

1.2 The direct and indirect effects of pollution, forestry and agricultural activities within a radically changing macroeconomic framework cannot be quantified at this time. Nonetheless, these activities, if undertaken without regard to the effects on biodiversity, can reduce the number of species, alter the balance of ecosystems and introduce instability. Short term economic advantage must be balanced against the longer term detrimental impacts of these activities if any of the advantages are to be sustainable.

1.3 In Ukraine, several transitions between adjacent ecological communities are present: between the European broadleafed forests, the northern taiga, the interior steppe, semi-arid sands and marshes near the Black and Azov Seas, the seaside littoral, estuaries of large rivers such as the Danube and Dnieper, and the sub-tropical pine and chaparral of Crimea. Commercially important forest species such as Norway spruce and European beech are at the limits of their ranges. Questions of adaptability important to the management of such species need to be clarified. There is a broad appreciation of the values of such rare resources held in the system of reserves as:

- They house endemic (i.e. found nowhere else) threatened and endangered species;
- They are the only sites of some genetic material of importance (e.g. the best adapted trees, the healthiest soil, fauna and flora) to renewable resource management, and to the restoration of polluted natural systems. These are baseline ecosystems against which change due to development or catastrophe (e.g. Chernobyl) can be measured;
- They are still of a viable size for the maintenance and development of ecosystems and therefore offer the best opportunities to explore the preservation and management of natural forests and grasslands in Europe; and
- They still provide ideal opportunities to evaluate current concepts and methods of maintaining viable populations in relict fragmented forests.

1/ *Zapovedniki* (strictly protected state nature reserves) contain typical or unique natural lands maintained as far as possible in their natural condition unchanged by man. Main management objectives include protection of wildlife and habitat, including the maintenance of entire ecosystems and scientific research.

B. NATURAL RESOURCE MANAGEMENT AND PROTECTION

Biological Diversity

1.4 About 32% of Ukraine's vegetation can be identified as a remnant of the original natural vegetation. The flora contains nearly 4,500 higher plant species. A second revised Ukraine Red Book[2] has been published (1992) and, in all, 631 species of threatened and endangered flora and fungi, including 429 species of vascular plants are listed, (about 12 % of the entire flora). These are mainly endemic relics and they include valuable drug and ornamental species.

1.5 The wildlife patrimony of Ukraine is rich and varied, reflecting the diversity of the major ecological communities found in the country. Two major flyways traverse Ukraine: a north-south and an east-west (coastal). Some of the breeding concentrations are significant. For example, 90% of the world's black-headed Mediterranean gulls breed on the spits and islands of Chornogirs'ky Reserve on the Black Sea near Kherson. There are some 44,800 known species of animals which inhabit Ukraine: 344 birds, 200 fish, 101 mammals, 20 reptiles, 17 amphibians, and the remainder invertebrates. Nonetheless, as in much of the world, most wildlife management is focused on game species and little attention is given to the ecology and requirements of non-game species, particularly if they are not threatened.

1.6 A major threat to the wildlife of Ukraine is not human encroachment as such, but contamination of the natural ecosystems on which they depend.[3] This threat is represented by air and water pollution from industries and, to a lesser extent, by agriculture. Water-dependent species in the river systems or the Black Sea and the Sea of Asov are under severe threat from agricultural discharges containing fertilizers and residues of pesticides and other agro-chemicals that move into streams and rivers. Land animals, while also threatened by contaminated drinking water, are often just as endangered by habitat degradation caused by air pollution. Some 381 species of fauna, including 101 mammals, are listed in the revised Red Data Book, which lists four times the number of species of both flora and fauna than was listed in the original 1974 edition.

1.7 Recognizing the need to address the status of the flora and fauna at the community level, the Academy of Science has published a Green Book. This listing is innovative because it provides a more systematic appreciation of the significant communities, habitats and systems at risk. This can be a far more practical approach in addressing biodiversity protection because enumeration at the species level does not necessarily give an adequate appreciation of the systems which are at risk. Furthermore, the community approach makes recovery planning a more tractable and plausible endeavor.

1.8 Some of the principal regions are:

- The Carpathians and the Crimea which are identified as centers of the highest endemism and are internationally significant. The Carpathians contain one quarter of the flora of Europe and many useful endemic and medicinal plants. The largest remaining European stand (10,900 ha) of virgin beech forest is present in the Carpathians and is a remarkable natural resource for the rest of

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2/ Complete listings of the Red Book are available in the World Bank.

3/ National Report to UNCED, 1992

Europe, which has lost such undisturbed areas. The Crimea is a center of contrast to the rest of the region. The highest species endemism of the country is maintained by the unusual climate of the area.

- Over three hundred thousand hectares of wetlands are of international importance as nesting sites of waterfowl. In the Danube Delta, 25% or 150,000 ha of which is in Ukraine, the number of wetland birds is large, and in the case of several species they form a substantial proportion of the European, Paleoarctic or World populations. It is also important for several globally threatened species including the pygmy cormorant and the red-breasted goose. Sivash bay (45,700 ha), Karkinitski Bay (37,300 ha) and the intertidal areas of Yagorlitski and Tendrovski (113,000 ha) are also wetlands of international importance[4].

- Most of the last virgin steppes of Europe are located in Ukraine in the Ukraine Steppe Reserve (in four separate areas) and in the Askanya Nova Nature Reserve.

1.9 The forest area of Ukraine is about 10 million hectares, most of which has been modified by centuries of genetic modification and exploitation. The total grassland area is of the order of 6.6 million ha of which 380,000 ha is protected, although little of this can be described as natural. The remnants that do survive contain a significant proportion of important threatened species.

1.10 Due to its geographical location, Ukraine has considerable recreational resources concentrated mainly in the western forest region, the southern sea regions and along rivers, particularly the Dnieper, southern Bug and Diester. Resort resources (mineral waters and therapeutic muds) exist throughout the country: 105 mineral wells and 39 deposits of therapeutic mud are used or offer the potential, and 76 resorts of significance are already operating. The south of Ukraine, specifically the Crimea, Mikolaiv, Odessa and Kherson oblasts, are major recreation centers. These resorts cater mainly to national tourism, although they once hosted guests from Eastern Europe and the Soviet Union.

1.11 Future recreational development is at an early planning stage in five regions: the Crimea and the Black Sea area (Odessa, Mikolaiv, Kherson oblasts), the Azov sea coast (Zaporizhskaya and Donetsk oblasts), the Carpathians (Trans-carpathians, Lviv, Ivano Frankovsk and Chernivtsky oblasts), and the middle Dnieper area (Kiev, Chernigiv, Cherkassy oblasts).

1.12 The network of protected areas is limited in extent and cannot by itself maintain the range and extent of habitats required for the continuation of free-living populations of flora and fauna. Activities, particularly in the forestry and agricultural sectors, can be an important adjunct to the protected area network in the protection of biodiversity. Minor alterations to current practice and management, incorporating multiple use and sustainable management approaches offer opportunities for significant biodiversity protection.

1.13 The tourism sector, both local and international, can also have significant benefits for biodiversity. It needs to be developed within acceptable limits and needs to be carefully designed and managed to remain within the ecological and social carrying capacity of a particular area if the potential

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4/ These wetlands were nominated by the government of the former USSR and accepted as part of the RAMSAR convention. Although the wetlands are internationally important, the government of Ukraine has not become a member of the convention and the sites are no longer registered as formal Ramsar sites.

benefits are to be optimized without undue affects on the resource itself. In natural areas, appropriate tourism can not only inform the public of the need for the protection of biodiversity, but it can also encourage active support for wider conservation objectives. At the same time, it can also support the financial viability of protected areas through fees for use and by payment for the provision of services, particularly for recreation.

1.14 A suite of renewable resource based activities can provide economic stimuli and contribute to financial support of the Biosphere Reserve System. The relationship is reciprocal because these activities depend upon the protected areas much like nature-based tourism. For example, an uneven age silvicultural system featuring widely spaced stems resulting from planting at spacings of 2-3m x 2-3m and thinning can result in a fast growing forest which can simulate an ancient forest structure (if snags are left) while allowing harvesting on the typically long rotations used. These forest can also be very profitable where minor forest products are harvested (e.g. mushrooms, berries, etc.).

Protected Areas

1.15 The establishment of reserves for the protection of unique natural ecosystems and genetic resources of plant and animals is an important challenge recognized by the Government of Ukraine[5]. The network of protected areas includes 15 strict nature reserves (*Zapovedniki*), 4 National Parks, 3 Biosphere Reserves and many other protected landscapes, zoological and botanic gardens and other locally significant reserves (See Table 1). Some 2.1 % of the country is under some form of protection. In some regions, however, less than 0.5% is reserved which reflects the influence of agriculture and forestry over a long period of time and the previous overriding aim of increasing production regardless of the impacts on the environment. The government has indicated the aim of increasing the area of reserves to 3 % in the near future and has an ambitious target to include every plant species, which now grows beyond the protected reserves, in two to three reserved areas.

1.16 The highest forms of reservation, or the most protected areas, are the nature reserves, biosphere reserves and, with a greater emphasis on recreation, the national parks. Annex 1 details these areas.

5/ Ukraine National Report, UN Conference on Environment and Development, Brazil 1992.

Table 1 : Network of Territories and the "Natural Heritage Fund[6] of Ukraine"[7]

Category	No.	Area ('000 ha)	% Republic
Nature Reserves	15	207.5	0.34
Biosphere Reserves	2	116.7	0.2
National Parks	3	123.2	0.2
Regional Landscape Parks	1	42.1	0.02
Game Reserves National Local	1	34.1	0.05
Areas of Outstanding Natural Beauty National Local	 123 2538	 4.9 11.4	 0.008 0.02
Isolated Terrain Features	672	68.5	0.11
Botanical Gardens National Local	16	1.9	0.002
Dendrological Gardens National Local	19	1.2	0.002
Zoological Gardens National Local	6	0.1	0.002
Parks and Gardens of Artistic Value	497	13.1	0.02
TOTAL	3893	624.7	0.974

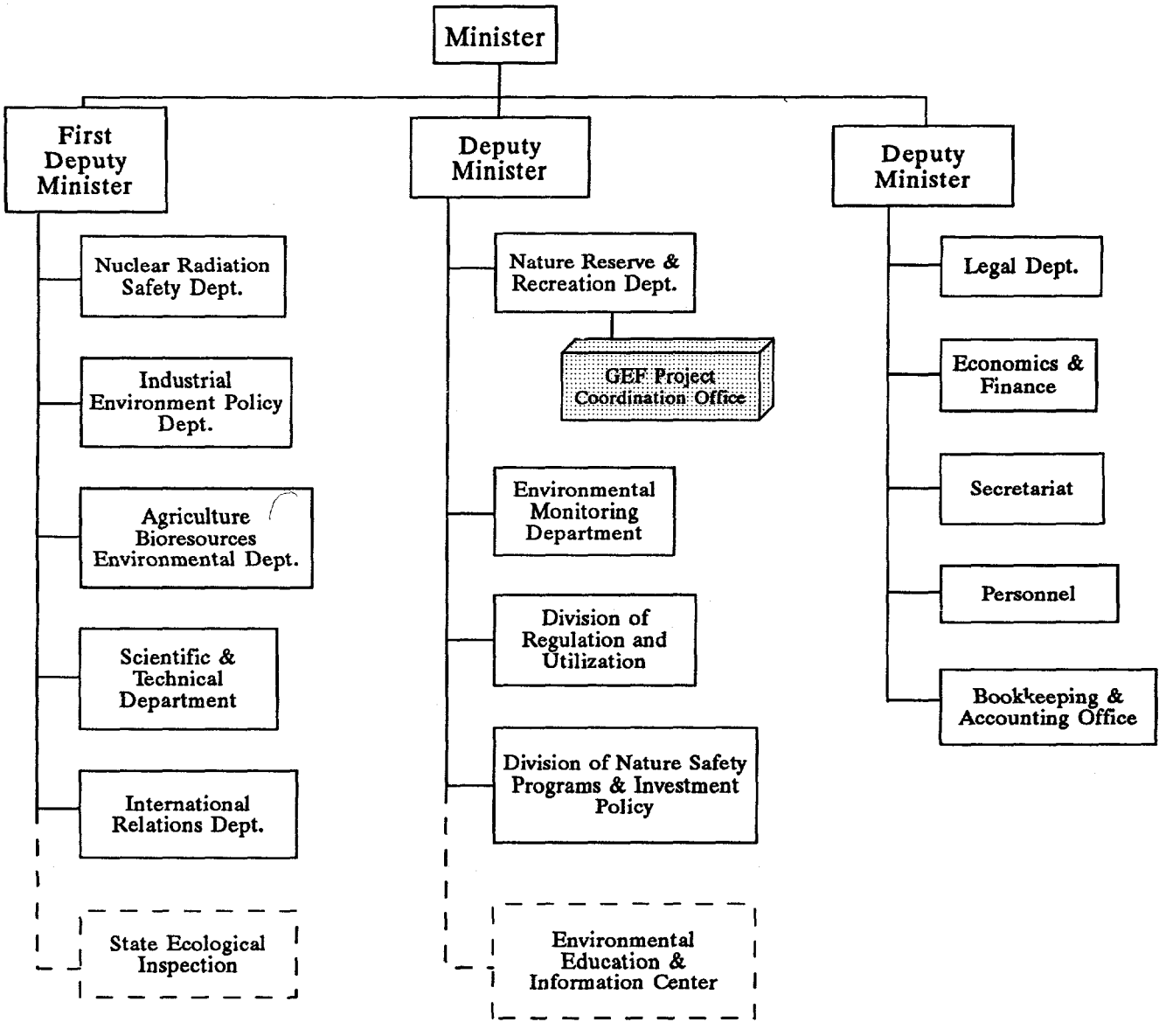
Institutional Setting

1.17 The Ministry for Environmental Protection (See Figure 1) has established a Department for Protected and Recreational Areas with 18 staff. It is responsible for the protected area network, such as development of policy, legislation and supervision of various reporting functions.

6/ The "Natural Heritage Reserve Fund" can best be defined as the area which is recognized as identifiable natural heritage, managed as such by local or national authorities.

7/ Based on Ministry of Environment publication, 1 June 1992

Figure 1. Ministry for Environmental Protection of Ukraine



– – – – – Indicates a subsidiary agency or center under MEP

1.18 Day to day management of the reserves is vested in a multitude of different agencies and institutions, other than the MEP (See Annex 1). Line management functions are complex and unclear. Activities and major work groups reflect the orientation of the managing agency. Management of protected forested areas has rarely been without considerable intervention, including timber production from the less strictly protected buffer zones. There does not seem to be active management of these areas in terms of modern approaches to conservation biology or restoration ecology. Conservation biology is a collective term which would involve the use of existing biological and ecological knowledge to preserve biological diversity in fragments of original ranges. It would include the determination for key species of the minimum critical area for them to be retained in the longer term. Restoration ecology in this context would involve the development of management methods which in the longer term would minimize man's need for intervention to particular ecosystems. It would require a sound appreciation of conservation biology.

1.19 There is a reference manual on protected area management, published in 1988. It has references to relevant legislation, requirements for planning (operational), procedures for the establishment of protected areas, annual reporting requirements, and guidelines on enforcement, protection of fauna and research for different categories of reservation. Although overtaken by recent legislation and never fully adopted by each reserve, the approach is significant and provides a mechanism for the communication of consistent policy and management throughout the system.

Legislative Framework

1.20 The Law on The Natural Heritage "Fund" (or estate) of Ukraine was passed on June 16, 1992. This legislation indicates that the natural heritage fund is national property, although areas outside nature reserves, the protected zones of biosphere reserves and lands granted to national parks can be of either national or any other form of property allowed by the Ukrainian legislation. The legislation indicates that the Ministry for Environmental Protection is the responsible body for organization, protection and utilization of the natural heritage. Notwithstanding this, as **Annex 1** indicates, a number of individual organizations from different ministries have on-the-ground responsibilities for management of specific reserves.

1.21 The legislation permits public organizations to participate in management of the sites and territories of the natural heritage fund to protect them or to participate in research.

1.22 Adjacent to areas formally reserved, the legislation provides for regulations to determine the regime of activities (commercial and industrial) which can occur without compromising the protection of the reserves. These regulations are adopted by state authorities responsible for the designation of such areas (i.e. the actual management authority of each protected area). Assessment of ecological impacts are required in such demarcated area of restricted uses; those activities which have a negative impact are prohibited. The actual size of a restricted area is determined by a special landscape analysis.

1.23 The legislation provides for financing the Natural Heritage sites. All income earned by a reserve is earmarked for retention by the reserve administration. "Ecology funds" are also mentioned as a source of revenue. These funds come from penalties and fines, sales of confiscated equipment, pollution penalties imposed on industry and other enterprises, and voluntary donations. MEP is responsible for regulations for these funds.

1.24 The legislation also establishes mechanisms for the expansion of the network of protected areas, including an examination of the natural and cultural features of each area and consultation with local authorities on proposed expansion. Any expansion proposal describes the area's ecology and analyses the economic impact of the expansion.[8] Importantly, the legislation provides a mechanism in which the Minister can resolve land use conflicts related to a proposal and a number of these areas are currently being considered at ministerial level. It also establishes a "security service" or enforcement organization under the control of each protected area administration.

1.25 A general provision indicates that Ukraine will enter into international agreements for nature protection and the conditions (rules) of these agreements will have priority. Ukraine is not presently a signatory of the RAMSAR Agreement[9] although the sites previously nominated by the USSR are managed in accordance with the Agreement. It is believed that the Environment Strategy Study will identify the need for Ukraine to formally enter into this agreement in the near future. Ukraine also participates in the UNESCO Man and the Biosphere Reserve Program.

1.26 A new law on wildlife was passed in 1993 and a further law on the protection of non-forest vegetation is under consideration. The law on wildlife deals with changes in ownership of wildlife, administration of hunting, and changes in limits and licenses. It also proposes that the primary principle of the reserve system should be protection of habitat rather than wildlife *per se*. Both legislative initiatives call for specific measures to link strictly protected areas with corridors or areas of modified land use. This is an exciting concept with a very significant benefit for the protection of biodiversity. It is a mechanism which could avoid remnant islands of protection which alone are unlikely to sustain a representative sample of flora or fauna (e.g Annex 2). Associated with this approach is the possibility of providing an incentive to individual landholders via tax relief for setting aside small areas of their land for conservation purposes. These are significant, innovative and advanced measures compared to other CIS countries, or indeed for biodiversity preservation efforts globally. To be effective, however, managers and the general public will need to have a sound appreciation of these provisions and the provisions of the new legislation.

Sectoral Issues

1.27 An Environmental Strategy Study is presently being finalized by the government of Ukraine and the World Bank. This study will establish priorities to address the need to consolidate and clarify institutional arrangements, review and reform environmental legislation and provide mechanisms to implement a more effective regulatory environment. This project is consistent with the conclusions, recommendations and priorities of this study for the reserve system.

8/ For example, documentation developed for the proposed Biezkids National Park in northwest Ukraine has a section dealing with the present economic activity (mainly associated with forestry and agriculture) compared to the economic activity and benefit that would accrue as a result of the establishment of the park.

9/ RAMSAR is an international agreement which requires countries to nominate wetlands of international importance.

C. LESSONS LEARNED FROM SIMILAR PROJECTS

1.28 Experience of similar Global Environment Facility Projects is limited, given that similar GEF projects (Poland and Belarus Forest Biodiversity) have been operating for only a short period of time. The Poland GEF biodiversity project, as well as those being developed in Belarus (signed September 1992) and two projects which will be finalized for the Czech and Slovak Republics, have provided a good understanding of biodiversity protection issues and interventions within the region. These recurring issues are:

- the need to develop a relationship with surrounding communities through participation in planning and management and the development of sustainable and appropriate land uses around protected areas;
- the need for coordination with other countries given that wildlife and pollutants do not respect political boundaries and management systems need to be applied over complete ecosystems; and,
- the need for professional development to enable managers, administrators and local communities to effectively develop the skills to manage, plan and administer land and usage in a sustainable way as well as achieving biodiversity protection objectives.

II. THE PROJECT

A. ORIGIN AND RATIONALE

2.1 The proposal arises from the previously approved Czechoslovakian[10] GEF project in the Carpathians as well as from a recent Carpathians agreement between the governments of Poland, Czechoslovakia and Ukraine. On September 27, 1991, the Environment Ministers of the Slovak Republic, Poland and Ukraine signed a declaration to conserve the valuable ecosystems and biodiversity of the Carpathian Mountains in their three countries. The agreement provides for cooperative and coordinated activities by the three nations to initially manage and protect more than 90,000 ha of the Eastern Carpathians as an International Biosphere Reserve (IBR). The declaration includes:

- Establishing the boundaries of the protected areas with scientifically determined zoning, according to the respective legislation in each country, and guided by the UNESCO biosphere reserve principles;
- Promoting and ensuring cooperative scientific research and management for the protection and restoration of Eastern Carpathian ecosystems; and
- Organizing uniform bio-monitoring and protection of migratory animal species.

10/ This project was revised to reflect the formation of the Slovak and the Czech Republics. The Eastern Carpathians component of the Slovak Republic project will be of the order of $0.5 million, also funded by the GEF.

2.2 This project will provide the necessary resources to make the declaration a reality. As such, the project fosters innovation in the complimentary design and management of a biologically significant transboundary area which will be invaluable as a model in many parts of the region.

2.3 The project also fosters innovation in that mechanisms such as determinations of minimum viable population units and habitat areas and the use of wildlife corridors will be developed to further biodiversity protection objectives beyond the formal reserve boundaries, at the same time enabling neighboring local communities to produce sustainable economic returns form their present and future holdings.

B. PROJECT AREA

2.4 The project will concentrate on a series of initiatives in concert with the recent agreement for the trilateral IBR with Poland and Slovak (See Map 1). Activity will be directed to the Carpathians Biosphere Reserve (CBR) of which one particular component, the Stuzica reserve, is common to both biosphere reserve areas (IBR and EBR).

2.5 The Ukrainian Carpathians preserve some unique central European areas of beech and spruce forests which are of great significance for studying the development history of the East Carpathians vegetation. The first reserve of beech and fir-beech forests was created in 1932 on the Stuzica mountain slopes. Since that time the reserve has been enlarged to 2,952 ha and included in the Ukrainian Carpathians Biosphere Reserve (CBR). The CBR was created in 1991 with a total area of 38,930 ha which is sub divided into a reserve zone (21,879 ha), a buffer zone (8,949 ha), and a conservative nature management zone (8,071 ha). The reserve zone includes the Stuzica scenic reserve, and four separately located forest and alpine areas. These areas are the Khust massif (valley of Narcissus), Ugolsko-Shyrokoluy Lansky massif, the Chornogirs'ky massif and the Maramoros'ky massif.

2.6 **The Stuzica Reserve** is located on the border with Slovak and Poland at a range of between 770 to 1269 m (ASL). Flora of the reserve forest includes over 500 species of vascular plants many of which are rare, such as: *Atropa belladonna, Arnica montana, Astrantia major, Helleborus purpurascens, Streptopus amplexifolius*, and *Telekia speciosa*. In this region the beech is characterized by high vitality and has a wide latitudinal range (500-1260m). The sub-alpine meadows occupy small areas with the most typical species being *Nardetum strictae* and *Vaccinetum myrtillae*. The most typical representatives of the fauna are *Felis catus* (wildcat), *Coronella austrialis, Elaphe longissima, Apatura iris and Rosalia alpina.*

2.7 **The Khust Reserve Massif (Valley of Narcissus)** is a small area of forest (256 ha) is the largest european locality for the narrow leaved narcissus. The forest is at 180-200m ASL. In addition to the narcissus there are many other rare plants in particular: *Dactylorhiza majalis, Erythronium dens-canis, Gladiolus imbricatus, Iris sibirica, Orchis laxiflora, Potentilla alba and Leucojum vernum.* The typical fauna representatives include: *Iphiclites podalirius, Eudia pavonia, Papilio machaon, and Proserpinus proserpina.*

2.8 **The Ugolsko-Shyrokoluy Lansky Massif** of 10,350 ha, is located at elevations ranging from 400 to 1280m on the Polonya ridge. The beech forest extends to 1280 m. Although the majority of the ridge is flysch, a limestone ridge is contiguous with the flysch on the south side. This limestone ridge

results in specific flora and fauna associated with caves in the karst system. The forest contains about 550 species of vascular plants. The notable species associated with the limestone include *Taxus baccata, Juniperus sabina* (unique in Ukraine) and *Quercus petrea*. Herbaceous plants also represented here include *Erythronium dens-canis, Cortusa mattioli, Iris graminea, Sedum hispanicum, Coronilla varia, Jovibarba pressiana, Corallorhiza trifida and Orchis morio.*

2.9 Significant fauna species include *Thymallus thymallus, Salamandra salamandra, Ciconia nigra, Falco preregrinus* (peregrine falcon), *Bubo bubo* (eagle owl), *Strix uralensis* (ural owl), *Dendrocopos leucotos* (woodpecker), *Rhinolophus hipposideros* (lesser horseshoe bat), *Myotis emarginatus, Barbastella barbastella* (Barbastelle), *Meles meles* (badger), *Aglia tau* and *Endronius versicolor.*

2.10 **The Chornogirs'ky Reserve Massif** This forest on the Chornogirs'ky ridge at elevations from 800m to 2061m (ASL) has seven identifiable plant profiles associated with elevation. These are (from the bottom) *Fagetum sylvaticum, Acer pseudoplatani-Fagetum* (fragmentary association), Picetum-Abieto-Fagetum, Fageto-Abieto-Picetum, Piceeto-Abietis and elfin woodland with *spinus mugo, Duscheka viridis* and *Juniperus sibirica*. The forest flora numbers more than 700 species of particular note are *Saussurea alpina, Polygonum viviparum, Senecio carpaticus, Gentiana punctata, G. acaulis, Aconitum nanum, Pulmonaria filarszhyana, Leontodon croceus and Rhodendron kotschyi*. Spruce is the dominant forest type (*Piceetum oxalidosum, P. myrtillosium, P. polytrichosium*). The sub alpine level of plants widely represents climatic communities such as *Mugeta, Duschekieta viridae, Junipereta sibirica*. As far as rare communities are concerned it is worth mentioning *Rhodoretum kotschyi, Salicetum herbacea, Doronicetum capatici, Juncetum trifidi and Caricetum sempervirentis*.

2.11 The fauna consists of many rare and commercially valuable species such as *Triturus montandoni, T. alpestris, Circus cianeus, Aquila chrysaetos* (golden eagle), *Tetrao urogallus* (capercaillie), *Glaucidium passerinum* (pygmy owl), *Prunella collaris* (alpine accentor), *Sorex alpinus* (alpine shrew), *Chionomys nivalis and Callimorpha dominulla.*

2.12 **The Maramoros'ky Reserve Massif** has a total area of 3,970 ha with well defined glacier cirques at the higher elevations. The slopes of the cirques are covered with thickets of *Pinus mugo* and *Duschekia viridus*. The geology includes schists, gneiss and marble-like limestone of the Jurassic period which determines the vegetation and to some extent the fauna. The flora is noted for such species as *Campanula carniolica, Cardaminopsis neglecta* and *Anemone narcissiflora*. The herbaceous sub alpine level can display a number of rare species such as *Gentiana lutea, G. punctata, Sempervivum montanum, Anthemis carpatica* and *Poa deyli*.

2.13 The forest fauna shows a number of peculiar features as well. Present are *Tetrao urogallus, Bubo bubo* (Eagle owl), *Neomys anomalus* (Millers water shrew), *Lutreola lutreola* (European mink), *Lutra lutra* (otter), *Felis catus* (wildcat), *Lynx lynx* (Lynx) and *Lucanus cervus*.

2.14 Surrounding each of the reserves are buffer zones which decrease the impact of human induced activity on the protected areas by restricting the extent and nature of some uses.

TABLE: 2 PROPOSED EASTERN CARPATHIANS INTERNATIONAL BIOSPHERE RESERVE (IBR)[11]

Country	Reserve	Area (ha)
Ukraine	Stuzica Reserve (presently 2,952 ha)	14,700
The Slovak Republic	Vychodne Karpaty - protected landscape park (future national park)	40,601
Poland	Sau River Valley Landscape Park Cisna-wetlina Landscape Park Bieszcardy National Park	35,635 46,025 27,065
	TOTAL:	**164,026**

2.15 The table above indicates the area of the proposed IBR with some possible further expansion particularly in Slovak and Ukraine. The international MaB[12] Secretariat is yet to formally endorse the whole area. For project purposes, however, the IBR can be taken as a contiguous unit given the Agreement by all three countries. The CBR has an administrative center at Rakhiv with an administration, research and visitor complex. The visitor center is new and presently being fitted out, although lack of funding has delayed completion of this work.

2.16 The very nature of the CBR, with areas managed as the one entity but actually located some distance from each other, makes management more difficult. The "tyranny of distance" cannot be overcome without effective communication, staffing and resourcing systems. On the other hand the area viewed as a whole, and not just as the reserved areas alone, is primarily a contiguous area of forest and great opportunity exists to establish "corridors" for wildlife management with the assistance of the Ministry of Forestry, particularly at the Oblast level. Secondly, opportunity exists in the agricultural areas for marginal lands to be managed more for wildlife than for pure agricultural production. On the boundary of the reserves both forestry and agricultural activity has had great impact on the integrity of the reserves and there is an identifiable need to develop sustainable management practices in these areas to reduce the detrimental impacts of such activities. Opportunities exist to develop appropriate tourism including identifiable ecotourism activities which could have many benefits; selective forest practices such as systems to encourage the rapid development of an old growth structure with a commercial rotation; educating the public of the need and value of the protected areas and environmental education in general, and to provide revenue to assist with the management of the reserved areas themselves. As importantly there would be opportunities to gain economic benefits by the provision of goods and services to the touring public to offset any reduced production activity required to protect the resource itself. One mechanism which will be developed in the project to introduce new ways of managing land outside the protected reserves will be by the promotion of selected demonstration projects.

2.17 The management of reserves is now in transition and many of the administrative structures require adjustment to fully reflect the new legislation, privatization and a number of major economic and social changes in the country. Unfortunately knowledge of the necessary technical management skills to make these adaptations is not available and the project will need to clearly concentrate on development opportunities of all personnel as well as surrounding communities and farmers. The adaptation will also

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11/ Subject to further investigation and agreement, all three countries and the UNESCO MaB Bureau.

12/ MaB - Man and the Biosphere program of UNESCO.

require support for management facilities to the four areas and significant coordination between all the reserve areas, with the IBR and with local communities and other land management institutions. It should be noted that a Trust is in the process of being established for all three countries covering activities associated with the IBR and the Cooperative Agreement. It should be established by mid 1993 and will act to attract large donations and investments so that the annual income can be used for on-going protection of the reserve.

C. PROJECT OBJECTIVE AND DESIGN

2.18 The project objective is to demonstrate the principles of modern conservation biology and restoration ecology in Ukraine in addition to adopting and implementing successful park planning, management and protection of the Carpathians Biosphere Reserve (CBR). This GEF Biodiversity project will link with a similar GEF project in the Slovak Republic along the common border in the Carpathian mountain system. The design of the project reflects the need to add to this Slovak project as the maintenance of the ecosystem shared by all three countries will require input from Ukraine. As such, the project can be described as an add-on to the existing Slovak initiative which will ensure biodiversity protection objectives are achieved for the ecosystem as a whole. The project will focus on the linkages of habitat fragments, species loss, and habitat management (Annex 2).

2.19 The opportunity to manage for biological diversity using recently developed science is uniquely afforded and will be an innovative component of this project. The goal is to control, understand and manage the forest fragmentation process to ensure the long-term presence of viable populations of flora and fauna that are sensitive to habitat loss. This is an unusually germane and compelling consideration in this case, because there are an array of natural fragments to be managed as a single system.

2.20 The project will develop and implement legal, institutional and administrative interventions to link the isolated reserved components of the CBR in order to maximize the opportunities for biodiversity conservation. This would be achieved by a range of interventions including planning, implementation of wildlife corridors and the development of extension services.

2.21 A second objective is to link with the International Biosphere Reserve (IBR) initiative being developed by Ukraine, Poland and the Slovak Republic. Wildlife, pollution and management issues are not stopped by borders and a coordinated and cooperative management arrangement is required if the ecosystem is to be managed successfully.

D. DETAILS OF PROJECT COMPONENTS

Biodiversity Protection Program **$148,100**

2.22 The Biodiversity Program will develop the information, mechanisms, and skills to manage the forest fragments of the CBR so that biodiversity protection objectives are assured. Details of the program are provided in Annex 2 and Annex 6. It would include a number of components, which are detailed below:

Reserve Inventory - Inventory reserves, forest fragments (by stage of succession, and history of use), and ownership. Data entry into a Geographic Information System (GIS)

Acquisition Planning - Create an acquisition plan based on size, naturalness, geometry and pattern of dispersion (not faunal and floral character). Investigate planned uses, potential for modifying uses important to the plan (e. g. leaving corridors, selective thinning and extended rotations)

Flora and Fauna Inventory - Inventory plant and animal populations in target areas including invaders and exotics

Initiate Systems Extinction model

Genetic and Species Studies - Begin genetic studies of selected (from model) animal species, initiate studies of keystone/dispersor/pollinator systems. Study species from model requirements, and study species movements

GIS and Critical Habitat/Corridor Analysis - Use GIS analysis of movements, home ranges, and employ carrying capacity calculations (developed from the above) to derive minimum critical habitat requirements

Trans Carpathians Planning Group - Develop a Trans Carpathian Planning Group including local and national governments, local NGOs, elected representatives, scientists and representatives of local users. Establish a Secretariat

National Policy - Develop National Policy on easements and incentives for select land uses around the protected areas

Curriculum Development - Develop a curriculum and plan for the inclusion of Conservation Biology in University and Forestry School curricula. Develop syllabi for constituent elements of the curriculum and initiate instruction.

Management Resources Program **$210,000**

2.23 The Management Resources Program will enable coordinated management of the discontinuous reserved areas of the Carpathians Biosphere Reserve and the implementation of the above protection program.

These investments will include:

Computer Equipment and Geographic Information System Facilities - (Annex 1). These systems will be planned after consideration of the real needs for the Biodiversity Program detailed above and after consideration of the need for contiguous data sets and approaches with Poland and Slovak

Transport and Communications - provision of transport and communications for enforcement, protection and management -- including provision of electronic mail capabilities. At the present these resources are either in short supply or non-existent. They are the essential tools for management and will be necessary to implement both the Biodiversity Protection Program above and it's implementation (Annex 2).

Assistance with Demonstration Activities - These activities will result from the planning detailed in the Biodiversity Protection Component and will likely include the planning and conduct of farming and forestry activities based on the results of the component and those ecological farming activities underway in Poland and Belarus.

Public Education & Awareness Program **$40,000**

2.24 There is an identifiable need to develop and implement a communications program to provide support for the CBR. Objectives of a communication program, which would include media relations, community information and extension, interpretation[13], environmental education and publications, would be:

- to promote public awareness, understanding and appreciation of the natural and cultural heritage;
- to promote concern for its conservation and recognition of its importance to the overall quality of the national and global environment; and,
- to promote public awareness, understanding and appreciation of the aims, achievements of the Department of Protected and Recreational Areas in its implementation of Government policies for the conservation of the natural heritage of Ukraine.

13/ Interpretation is a term used to describe the programs and activities aimed at giving visitors greater awareness, understanding and appreciation of the features and significance of areas reserved under the legislation (i.e. interpreting nature).

2.25 Funding from the project would enable the purchase of essential equipment and the production of multi-lingual publications for the Rahkiv visitor center. The funding would also develop a strategy identifying target groups and methods to create public awareness and attitudes consistent with the above objectives.

Training Program **$95,000**

Data Base and Computing - Annex 1 indicates the training needs for computer and GIS managers and technicians.

Professional Development and Language Training - To support the Biodiversity Protection Program and specifically the development of Trans Carpathians planning, managers and specialist staff need training in effective public participation and many of the other commonly accepted approaches to planning. Reserve managers indicated that local populations neighboring the forest are a significant cause of many protection problems. Neighbors can pose a long-term threat if they have been systematically excluded from reaping any of the benefits of a large area set aside for specific uses while suffering crop depredation, incursions of alien, free-spending tourists, and a host of restrictions. A central tenet of a Biosphere Reserve is the integration of the wise (i.e. sustainable) use of natural resources by those who make sacrifices so that some (i.e. endangered) natural resources can be protected. The incorporation of the surrounding rural population into management planning and decision making for the reserves is essential. This includes public participation/groups dynamics as well as small business planning and management. Such an approach is not among the management skills currently in systematic use in the CBR. Secondly there is a need for *reserve management* training that many of the current practitioners and their staff can gain immeasurable benefit. Training proposed here will be initiated to compliment the activities of other countries of the IBR and will include study tours and selected skills training after the identification of needs.

Project Management Program **$40,000**

2.26 The Department of Protected Areas (DPRA) in the Ministry of Environment would be responsible for the overall coordination of the project. This program would direct assistance to the main GEF Unit established within the Department as well as a Project Management Unit established at Uzghorod. Given the need for coordination with the International Biosphere Reserve and the introduction of new scientific approaches, funding will be provided for an international joint scientific committee. This committee will assist in project supervision and monitoring. A detailed Supervision and Monitoring Plan is outlined in Annex 5.

Central GEF Coordinating Unit Kiev. A small two person central GEF Coordinating Unit would be established in Kiev. This unit, to be housed in the DPRA, would be established to expedite investments from the Special Account, to facilitate international communications, to coordinate international professional development training, to monitor and evaluate project progress and to collate and forward quarterly and annual progress reports to the World Bank on project progress. The Project Administrative Manager (part time) selected to oversee this project should have strong communication and project management skills. The GEF Unit Coordinator shall have strong communication and

administrative skills, including a command of English was well as an ability to maintain the necessary accounting and procurement procedures. Funding for the GEF Unit Coordinator, the Bookkeeper/Secretary and necessary office equipment, furniture and operating costs will be eligible investments under the project. This unit shall be established and evidence provided thereto to the World Bank prior to grant effectiveness.

Uzghorod GEF Management Unit This unit would be established within the Regional Administration (at Uzghorod). Evidence of the establishment of this unit and the appointment of the full time Deputy Manager/Administrative officer shall be provided to the World Bank as a condition of Grant Effectiveness. It would be physically located at the Administrative Center (Uzghorod) and would be under the overall direction of the Oblast administrator of the DPRA at Uzghorod, assisted by the Scientific Director of the Biosphere Reserve. The Unit would employ a full time Administrative Manager (Deputy Manager) and a full time bookkeeper/assistant. It would be expected that the team would be selected with complementary skills and qualifications. The Head would be required to have professional qualifications in land/natural resource management and a knowledge of biodiversity protection and issues.

2.27 A number of additional organizations would be sub-contracted to carry out specific activities. The proposed Project Management Unit, assisted by its scientific advisors, will design, contract out, and supervise the agreed program. These additional institutions will carry out activities under the direction of the Project Management Unit.

E. Participation by NGOs and Local Communities in Project Activities

2.28 The project includes mechanisms for fostering participation by NGOs and local communities in reserve management, planning and related activities. Such participation is important because: (i) it will provide a mechanism for the development of the NGO movement and some NGOs are well qualified to assist with execution of certain project elements; (ii) NGOs and local communities can substantially increase the scope and effectiveness of certain components (by contribution of expertise and labor); and (iii) local community and NGO participation in reserve management and planning serve to increase support for (and minimize potential resistance to) reserve protection programs. Both international and domestic NGOs were consulted during the initial preparation of this project and would be encouraged to participate actively in the implementation phase as members of the Trans Carpathians Planning Group established under the project and as possible contractors for discrete project components.

F. Environmental Impact

2.29 The proposed activity will have a positive environmental impact by directly enhancing the management and protection of the Carpathians Biosphere Reserve of 39,000 ha and the Ukrainian component of the tri-national Biosphere Reserve of up to 14,000 ha. Project supported mechanisms for local community participation in reserve management and planning will, be significant components of the project and social impacts are expected to be positive as well. The environment screening category for the project is "C".

G. PROJECT COSTS

2.30 Estimated project costs are as follows:[1]

		US$ in Thousands				
		Local	Foreign	Total	% Foreign Exchange	% Total Base Costs
A.	**Biodiversity Protection Program**					
	1. Reserve Inventory	4.0	10.0	14.0	71.4	2.6
	2. Acquisition Plan and Investigations	10.0	0.0	10.0	0.0	1.9
	3. Flora and Fauna Inventory	20.0	2.1	22.1	9.5	4.1
	4. Systems and Extinction Model	10.0	5.0	15.0	33.3	2.8
	5. Genetic and Species Studies	35.0	10.0	45.0	22.2	8.4
	6. GIS and Critical Habitat Analysis	3.0	7.0	10.0	70.0	1.9
	7. Trans-Carpathians Planning	5.0	5.0	10.0	50.0	1.9
	8. Development of National Policy	8.0	2.0	10.0	20.0	1.9
	9. Curriculum Development	10.8	1.2	12.0	10.0	2.3
	Sub-Total	105.8	42.3	148.1	28.6	27.8
B.	**Management Resources Program**					
	1. Computer Equipment and GIS	0.0	120.0	120.0	100.0	22.5
	2. Transport and Communications	32.5	32.5	65.0	50.0	12.2
	3. Assistance With Demonstration	25.0	0.0	25.0	0.0	4.7
	Sub Total	57.5	152.5	210.0	72.6	39.4
C.	**Training Program**					
	1. Data Base and Computing	8.0	2.0	10.0	20.0	1.9
	2. Prof. Dev. and Lang. Training	85.0	0.0	85.0	0.0	15.9
	Sub-Total	93.0	2.0	95.0	2.1	17.8
D.	**Public Education & Awareness**					
	1. Completion of Visitor Center	20.0	0.0	20.0	0.0	3.8
	2. Equipment	8.0	2.0	10.0	20.0	1.9
	3. Publications and Strategy	2.0	8.0	10.0	80.0	1.9
	Sub-Total	30.0	10.0	40.0	25.0	7.5
E.	**PROJECT MANAGEMENT**					
	1. Assist Central GEF Unit - Kiev	7.5	7.5	15.0	50.0	2.8
	2. Uzghorod Project Management Unit	25.0	0.0	25.0	0.0	4.7
	Sub-Total	32.5	7.5	40.0	18.8	7.5
Total BASELINE COSTS		318.8	214.3	533.1	40.2	100.0
	Physical Contingency	16.6	10.0	26.6	37.6	5.0
	Price Contingencies	14.8	5.5	20.3	27.2	3.8
Total PROJECT COSTS		350.2	229.8	580.0	39.6	108.8

1/ Excludes $10,000 for training from MacArthur Foundation

H. FINANCING PLAN

2.31 Estimated project financing plan is as follows:

Table 3.2 PROJECT FINANCING PLAN
(US$ Thousands)

Source	Local	Foreign	Total
		(US$ Million)	
GET Grant	0.250	0.250	0.500
MacArthur Foundation Grant	0.000	0.010	0.010
Government	0.070	0.000	0.070
TOTAL	**0.320**	**0.260**	**0.580**

2.32 Core financing for this project would be provided by the GEF ($0.5 million), by Ukraine (estimated in-kind services and staff costs) and the MacArthur Foundation provision of a grant for professional development ($10,000).

I. PROCUREMENT

2.33 The Grant would finance the procurement of equipment for undertaking geographic information system analysis (GIS) work, air monitoring, two vehicles and communications equipment (US$250,000) and supporting technical assistance (US$100,000) (See Annex 4 for a partial listing). The Grant would also finance -- for about 30% of the total grant -- the salaries, operations and maintenance costs of the Project Management Program and such incremental costs associated with the Biodiversity Portection, Management Resources and Training Programs. It would include the costs of contracted field staff to implement technical activities. Procurement will be carried out in accordance with the *Procurement Guidelines of the World Bank* (May 1992).

2.34 The project also includes eight short-term assignments (estimated cost US$65,000) for which individual consultants (both foreign and local) would be engaged following the procedures outlined in the *Guidelines for the Use of Consultants* (August 1981). The selection of individual consultants will be on the basis of comparison of CVs from at least three candidates. The Grant would also finance expenditures incurred retroactively with effect from June 1, 1993 for external professional development and training at an estimated cost of $35,000.

2.35 Equipment for the Geographic Information Systems (GIS), including vehicles (total aggregate of $200,000) will be procured through international shopping by obtaining three quotations from three different countries. Equipment and related goods (not to exceed total aggregate of $50,000) which are of proprietary nature, will be procured through direct contracting in accordance with procedures acceptable to the Bank. All contracts will be post-reviewed.

Table 3.3 PROCUREMENT ARRANGEMENTS
(US$ Thousands)

	Items	Procurement Method		Total Costs
		ICB	Other	
(1)	GIS, Air Monitoring and Supporting Equipment	-	100.0 [a] (100.0)	100.0 (100.0)
(2)	Communications and Transport Assistance	-	150.0 [a] (150.0)	150.0 (150.0)
(3)	Technical Assistance	-	110.0 [b] (100.0)	110.0 (100.0)
(4)	Incremental Salaries, Operations and Maintenance	—	220.0 [c] (150.0)	220.0 (150.0)
	TOTAL	**-**	**580.0** **(500.0)**	**580.0** **(500.0)**

NOTE: Figures in parenthesis are GET Grant.
[a] International Shopping ($200,000) and Direct Purchase ($50,000)
[b] According to World Bank Consultant Guidelines
[c] Project Management Program and contracted field staff to implement technical activities.

J. DISBURSEMENT

2.36 A special account would be established in a financial institution acceptable to the World Bank. An initial deposit of $50,000 would be made into this account by the World Bank. Retroactive finance for expenditures incurred from June 1, 1993 for professional development and training ($35,000) is provided. All categories of expenditure (listed in table below) would be eligible for disbursement from the special account. For each payment made out of the account, project management would furnish to the World Bank such documents and other evidence showing that such payment was made exclusively for eligible expenditures. Disbursement will be fully documented except for (i) salaries, operation and maintenance, and (ii) contracts of less than US$20,000 equivalent. These will be made on the basis of Statement of Expenditure (SOE) and documentation supporting the SOEs will be retained at the PMU and audited annually. The account would be replenished upon submission of this documentation. The Disbursement Plan for GET grant funds is as follows:

2.37 The special account, all project accounts and SOEs will be audited at the end of each fiscal year by independent auditors acceptable to the World Bank (the fiscal year is the same as the calendar year). Such audits would be carried out in accordance with international standards undertaken by auditors qualified for this task. Audit reports for the preceding calandar year would be made available to the World Bank no later than by the end of June of each year.

Table 3.4 DISBURSEMENT PLAN

	Items	Disbursement	
		Amount (US$ million)	% Financing
(1)	Goods and Equipment	0.15	100 %
(2)	Technical Assistance	0.10	100 %
(3)	Salaries, Operations & Maintenance	0.15	100 %
(4)	Un-allocated	0.10	----
	TOTAL	0.50	

K. PROJECT BENEFITS AND JUSTIFICATION

2.38 The forests and associated resources of Ukraine are important to the overall economy of the country. By inappropriate management practices and by environmental abuse, their value and contribution to society has been reduced. This current project offers a unique opportunity to conserve a significant component of the whole forest resource in co-operation with Slovak and Poland. In essence, the project will develop sound management principles for protected areas and adjacent land uses which will address a significant proportion of the Carpathian ecosystems which have great value in terms of the worlds biodiversity resources in temperate climates. It enables genetic resources to be retained which would permit genetic sustainability to occur and as such the forests would be in a far better position to withstand natural as well as unplanned changes, i.e. global climate change possibilities.

2.39 The Project's specific benefits would:

- Greatly reduce the loss of species and now unique relict ecosystems by conservation and management of the forest and alpine associations, a significant proportion of which are not yet protected. This GEF Project strategy is important in assuring the maintenance of the forest and alpine fauna as well as flora.

- Enable man to restore ecosystems destroyed by either natural or anthropogenic factors by re-introducing populations into their natural or equivalent habitats after having reduced the influence of the most striking limiting factors.

- Stabilize ecosystems by maintaining a high level of genetic variability within species. Thus the species can adapt themselves to the site, even if the site conditions are changing to a certain extent.

- Increase the forest economy at a long term by being able to use the full amplitude of genetic variability available, e.g., by replacement of poorly adapted species by better adapted ones and tree improvement programs.

L. SUSTAINABILITY

2.40 The project will be a catalyst for the establishment of a Trust for recurrent funding which will enable the results of the project to be maintained over time. Several of the project components will address mechanisms and economic measures for the sustainability of the protected area as well as for the surrounding communities.

M. PROJECT RISKS

2.41 Although there are no major risks, implementation could be affected by some institutional weaknesses at the level of the Department of Protected and Recreational Areas, instability in sustainable forest practices, and delineation of authority and responsibility for the areas (e.g. a diffusion of authority and responsibilities outside the MEP), as well as the field level given the major reductions in allocations for staff and essential management functions. A commitment will be sought at negotiations that the government will maintain the current level of funding for the CBR in real terms during the life of the project.

III. PROJECT IMPLEMENTATION

3.1 The institutional structures supported under this project to implement the program are included in the Project Management program. Overall coordination will be the responsibility of a unit to be established in Kiev within the Department of Protected and Reservation Areas. This unit will also assist with project preparation activities for the GEF Danube Delta international waters project as required. To implement the project at the field level, a management unit is to be established within the Regional administration at Uzghorod. Project monitoring and evaluation are an important and ongoing impact of implementation. Annex 5 indicates a significant emphasis to evaluate the project as it is progressively implemented. Annex 7 details the identified implementing organizations for specific project components under the coordination of the Kief GEF Unit.

IV. AGREEMENTS AND RECOMMENDATIONS

3.1 During negotiations on the Grant Agreement, assurances were obtained as follows:

a. **Joint Scientific Committee** The Ministry for Environmental Protection shall establish a Joint Scientific Committee to ensure appropriate coordination, monitoring, evaluation and progress, no later than October 30, 1993.

b. **Grant Effectiveness** The grant would be declared effective upon submission of documentation satisfactory to the Bank that the Project Coordinator in Kiev and the Project Manager in Uzghorod has been appointed.

c. **Accounts** A separate 'special' account would be established in a commercial bank for the project. This account would be audited annually by an auditing firm acceptable to the Bank.

d. **Project Management** A Project Coordination Unit (Ministry of Environment, Kiev) and a Project Management Unit (PMU) would be established within the Carpathians Biosphere Reserve at Uzghorod prior to disbursement of the grant.

V. GLOSSARY

Biodiversity: The variety of life in all its forms, levels and combinations. Includes ecosystems, habitats, species and genes.

Biosphere Reserve:
A unique category of area combining both conservation and sustainable use of natural resources. Each biosphere reserve conserves a representative example of a biotic region. There is a core area for strict protection for a species or habitats surrounded by a support or buffer zone in which sustained development takes place with the focus on developing uses and activities which are compatible with sustained conservation goals.

Carrying Capacity:
Capacity of an area to support the life it contains while maintaining its productivity, and capability of renewal.

Conservation: The management of human use of ecosystems and natural resources to ensure such use is sustainable.

Ecosystem: A community of organisms together with the non-living components of their environment. Ecosystem boundaries are often physical, and are defined so that inputs and outputs can be determined.

Ex-situ: The management of genetic resources outside of their natural range.

Gene Bank: A center for the storage and management of genetic resources.

Genetic Resources:
The heritable materials contained within and among species that may provide economic, scientific or societal values.

Geographic Information System (GIS):
A system using maps and display of data (forest cover, pollution damage, habitats etc.) to overlay, analyze, and display themes to help solve land management problems.

In-situ: The management of organisms in their natural state, and habitat, or within their normal range.

Man and the Biosphere (MaB):
A UNESCO international program of research, training, demonstration and information dealing with rational conservation and use of natural resources.

Reforestation: The introduction of trees and other species on land from which forest had been removed.

Sustainable Development:

Improving the quality of human life while living within the carrying capacity of supporting ecosystems.

Sustainable Use:

Use of renewable resources (species and ecosystems) at a rate within their capacity for renewal.

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

PROTECTED AREAS OF UKRAINE

1. **Nature Reserves**: Nature reserves were formally part of the zapovedniki system of the USSR which meant that they were strictly protected for scientific and educational purposes. Eleven of these reserves attracted a classification by IUCN[1] as Category I reserves (the highest category of protection) in 1990. Recent legislation and the addition of new areas to the reserve network, including reclassification of some of the zakazniki (smaller, less rigorously protected areas of the older USSR system), have increased the number of reserves to fifteen. Presently, the main objectives of nature reserves are to preserve natural complexes and sites for scientific research and monitoring, to develop recommendations on nature conservation, to spread ecological knowledge, to assist in the training of ecological specialists and to co-ordinate research in the territories of game reserves and areas of outstanding natural beauty. There are no formal zoning requirements for nature reserves, however; projects of "territorial management" (i.e. land use planning) must be approved by the Ministry for Environmental Protection and management of the reserve may provide for the needs of its employees by allotting plots of land for pasture, hayfields, vegetable gardens etc. within established norms. Recreation is not specifically indicated as an appropriate activity, and travel by unauthorized persons is prohibited.

2. **Biosphere Reserves**[2] These areas are set up to preserve the most typical nature complexes of the biosphere, to carry out ecological monitoring, and to study habitat and its changes under the influence of anthropogenic factors. As such, they can include nature reserves, national parks and other territories of natural heritage. Three zones are established for biosphere reserves: (i) a reserve zone which has the functions and objectives of a nature reserve, (ii) a buffer zone which has objectives related to protection from negative economic activities on the reserve zone, and (iii) an anthropogenic landscape zone (transition) which includes traditional land uses, settlement and recreation sites, and other types of limited economic activity.

3. Biosphere Reserves have been created in Ukraine as additions to the existing reserve system. Unlike many other neighboring countries, the original size of the zone of strict protection was maintained with the change to an expanded area under the biosphere reserve designation. The most recent biosphere reserve proposal is for the Carpathians Mountains (not to be confused with the nature reserve or national park in the Carpathians as well). It comprises a number of discontinuous areas to make up the biosphere reserve itself. This reserve has several individual massifs each with appropriate core (strictly protected), buffer and transition zones. In this way the reserve captures a high percentage of endemic flora and fauna of the whole Carpathian system.

1/ Protected Areas in Eastern and Central Europe and the USSR,(An Interim Review), The World Conservation Union (IUCN) 1990.

2/ Biosphere Reserves are created as part of the Man and the Biosphere Program (MaB) of UNESCO.

4. **National Parks** The national parks are designated to preserve valuable natural, historic, and cultural sites, provide tourism opportunities and recreation, conduct research, and carry out ecological and educational work. Each national park has four zones: a reserve zone similar to nature reserves; a regulated recreation zone in which all activities with a negative influence are forbidden, such as hunting, fishing, and tourist camps; a stationary recreation zone intended for accommodation, and, an economic zone intended for economic activity to fulfill the objectives of the park.

Table 2 : Reserves and Parks of Ukraine as at January 1991

	Area (ha)	Agency Responsible	Expenditure			Employees		
			Total	State	Other	Res/Tech.	Guards	Total
RESERVES								
1. Askanya Nova	11,312	Inst. of Ag. Research	1,089	980	109		21	162
2. Dinsakiye plavni (Danube Delta)	14,851	Academy of Science	74.5	37	0.5	6	5	15
3. Kanovsky	2,027	Min. High Education	270	220	50	14	14	76
4. Kardazsky	2,874	Academy Science	230	180	5	24	13	
5. Carpathians*	19,899	Ministry of Forestry	458	-	458	17	51	133
6. Lugansky	1,608	Academy of Science	43	-	-	1	12	18
7. Cape Martyan	240	Academy of Agriculture?	14.0	8.5	.6	6	3	9
8. Polessky	20,104	Ministry of Forestry	199	157	43	3	22	67
9. Medobari	10,455	Ministry of Forestry	112	83	29	2	38	116
10. Rastochya	2,085	Min. High Education	219	206	13	12	16	56
11. Ukraine Steppe	2,755	Academy of Science	87	69	18	4	8	32
12. Chernomorsky	57,048	Academy of Science	239	229	10	9	17	68
13. Yaltinsky	14,523	Ministry of Forestry	442	350	92	1	56	142
14. Dneprovsko-Drilsky	3,766	Ministry of Forestry	155	-	-	12	17	40
15. Crimea	44,175	Ministry of Forestry	540	420	120	5	85	153
NATIONAL PARKS								
1. Carpathians	50,303	Ministry of Forestry	1,167	-	1,167	4	134	436
2. Sinevir	40,400	Ministry of Forestry	455	-	455		82	364
3. Shatsky	32,430	Ministry of Forestry	428	405	23	2	45	106
BIOSPHERE RESERVES								
1. Askanya-Nova	33,307	Inst. of Ag. Research	Information not available					
2. Carpathians	38,930	Awaiting detail	"		"			
3. Chernomorsky	87,348	Acad. of Science of Ukraine	"		"			

* Carpathians Reserve and Stuciga Forest are the protected area components of the newly approved Carpathians Biosphere Reserve (CBR).

5. **Regional Landscape Parks** These areas are set aside to preserve typical and unique natural sites in a natural condition, as well as to provide conditions for "organized rest of people." They are usually set aside without withdrawing the land from the landowners or users. However, there are provisions, should they be necessary, for zoning of activities and withdrawal of land.

6. As Table 1 of the main report indicates there is also a whole range of additional protected areas. Generally these other areas are managed at the oblast level and are less important in terms of biodiversity. Typically, they are less limited adjuncts to the strictly protected areas.

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

MANAGEMENT OF FOREST FRAGMENTATION

1. **Introduction** We will discuss some of the tenets of the emerging field of Conservation Biology because it systematically and objectively considers the interplay of habitat fragments, species loss, and habitat management - the precise elements of this GEF project (and others). The formulation of a useful project requires some background and our approach is to briefly give a description of the basis for what is being devised in the work plan in non-technical terms.

2. **History** The fragmentation of temperate zone forests only seems less of an issue than that of tropical forests because it has been occurring for many centuries in Europe. The forests which blanketed over 80% of Europe began to undergo modification at the hands of neolithic man over 5,000 years ago. By the Norman conquest much of the forest had been lost. Great Britain had lost its bear, wolf, capercaillie, boar and goshawk by the beginning of this century. This anticipated a similar episode (much more rapid) in North America which lost its lions, elk, wolf, passenger pigeon and ivory billed woodpecker from eastern deciduous forests. With the rise of navies and populations, the destruction of European forests led to the constitution of forestry schools in France and Germany by the mid 18th century, assuring the conversion of the original forests of Europe to the genetically altered, relatively homogeneous tree factories imbedded in the field-village-city matrix of today. Even many of the game parks are manicured and artificially maintained (e.g. the animals are fed). The only remnant relict lowland mixed forests of Europe occur on the Polish-Belarus border at Bialowieza and in beech dominated groves of the Ukrainian Carpathians. The small remnant montane and alpine forest fragments found in the Carpathians are the subject of the effort described below.[1]

3. **The Goal** We propose to control, understand and manage the forest fragmentation process to ensure the long term presence of viable populations of flora and fauna which are sensitive to habitat loss and in danger of disappearing. This is unusually germane and compelling consideration in this case because we are provided an array of natural fragments to be managed as a single system. The opportunity to manage for biological diversity using recently developed science is uniquely afforded and should be taken advantage of.

4. **The Issue** Small remnant patches of the original forest systems constituting an even smaller total area of habitat systems are imbedded in an inhospitable landscape matrix which will not support many of the original species and which discourages their dispersal between the remaining habitat fragments. Among the questions of importance to managers of these natural resources systems are:

- how much available habitat must be set aside?
- in what distribution of sizes?
- should they be spread or clustered?

1/ Except where otherwise noted, many of the concepts and data cited below are found in the authored chapters of *Soulé, M. E. 1986. Conservation Biology - The Science of Scarcity and Diversity. Sinaeur Associates Sunderland, Massachusetts, USA, 584pp.*

- what is the optimum shape?
- what happens to the natural communities under the types of stresses anticipated?
- what kind of species losses can be anticipated with different community structures and stresses?
- which species are likely to invade?
- how do invaders effect changes in communities?
- are there "keystone" species and will a species loss cascade?
- if species are lost, will they recover if original conditions are restored, or selective reclamation is effected?
- can minimum viable populations be determined?

5. **The Biological Consequences of Fragmentation Theory** The evolutionary and ecological significance of fragmentation or insularization lies partly in its effects on populations of the species of flora and fauna of the natural pre-fragmented forest. The illuminating theory came first from considerations of island biogeography - a field as old as Darwin and Wallace's theory of evolution. In fact this emerging concern of natural science emphasizes the filial position of ecology to evolution and evolution to population genetics - the debt of Darwin to Mendel. The theory of island biogeography states that the number of species on an island (or habitat fragment) is an equilibrium between immigration and extinctions. The former (immigration) is determined by the size and isolation of the island or fragment, and some characteristics of the species - i.e. relative dispersal abilities (finches but no rhinos in the Galapagos). However, we will examine below the process and meaning of the term extinction of the equation. The theory of island biogeography fails to say how species interact in communities of plants and animals. The theories associated with community ecology will illuminate how species react under stresses such as harvest and invaders from adjacent modified systems. In addition to protection, this is important to crafting appropriate land uses near protected areas, as well as devising restoration strategies.

6. **The Reaction of Populations and Communities to Fragmentation Process** Ecologists (particularly plant ecologists) have long measured the increase in the number of species they would find as they repeatedly inventoried larger areas. Eventually, no additional species could be contributed by increasing the area sampled and a "species-area" curve could be drawn showing how large an area was needed to include all species. For example, the formula has shown that the reduction of an eastern U.S. forest habitat to 5% of its size will result in the loss of 50% of its species (although empirically we observe less than 2% loss). In Hawaii, however, half of the original forest remains but 66% of the species have been lost since 1800. Clearly, other forces are at work. The fragmentation of natural ecosystems into small remnant areas can lead to the extirpation of plant and animal populations in them because of:

- edge effects - the effects of edge are due to the surface area to volume relationship. Fence builders know that smaller areas have a greater proportion of edge than large areas. In this case, it is exposed edge and one result is the increased nest predation on temperate forest songbirds by animals associated with suburban and agricultural systems such as feral pets, jays, grackles, weasels, squirrels, raccoons and from nest parasites such as cowbirds. This effect has been measured up to 600m into the original temperate forest patch and can severely impact song bird recruitment. Another effect is the change in microclimate and soil conditions at the edge with increased light and temperature from adjacent open areas. Lovejoy et al., 1986 document a 60% mortality in original tropical

forest vegetation at the edges and the affects on bird densities were seen to about 50m into the forest. The seed rain of secondary plant species overwhelm natural forest seeding near the edge. Invading secondary butterfly species were found competing for nectar up to 300m with forest butterflies into the forest. At effects up to 600 m, at least 1.25 km^2 would be a minimum size for temperate forest reserve if songbirds were the only species of interest. The process of edge related mortality can lead to the autocatalytic "edge creep" effect and continual patch constriction.

- inadequate carrying capacity for the spectrum of species representative of the original forest. The demands for the behavioral component of carrying capacity can be determined by the size of territories and home ranges of the subject species - e.g. 40 km^2 for the European goshawk, several hundred for a wolf pack. In terms of forage, red deer may average 3,000 kg/yr consumption, about 5 ha production. A typical herd of ten would require 50 ha of foraging areas if they were the only herbivores. The roe deer, rodents and lagomorphs, birds and others also need forage. However, the genetic carrying capacity - i.e. the genetic implications of fragmented habitats (discussed below) dictate more than one mating pair or even breeding group per patch. In this way, the minimum carrying capacity required can be calculated from behavioral, metabolic, and genetic requirements of each species of the original forest community.

- secondary extinctions (the cascading effects) due to interrupted links in coupled communities - predator/prey, parasite/host, plant/pollinator. For example, the large predators which are lost because of their large home range requirements, naturally regulated smaller predators and omnivorous which consume forest songbird eggs. Generally, the lower trophic levels are more connected and most losses do cascade with a variety of consequences.

- missing habitat elements which are only occasionally or seasonally required can result from fragmentation - e.g. the ability to graze a catena (a small change in relief which provides seasonally changing resources, avoiding over use of any one), micro habitats, water, etc.

- the genetic changes which result from isolated and diminished populations is increasingly recognized as a subtle and deadly consequence of fragmentation. Selection of a healthy mate in large populations generally hides the expression of maladaptive but infrequent recessive genes through the contribution of a generally adaptive dominant gene from one parent. In small isolated populations, mating between close relatives (even healthy ones) increases the proportion of deleterious pairs (one from each parent) of recessive genes since related parents have similar genetic structures. The offspring have then lost genetic variability (increased homozygosity) and have fixed undesirable characters such as poor milk yield, low egg production, decreased immunity to disease, low vigor and intelligence, and smaller size. The affect is known as inbreeding depression and it reduces a central measure of evolutionary and ecological success - "fitness." Fitness is the measure of successfully passing on one's (or a populations) genetic qualities in the genetic endowment to breeding age offspring. Reproductive performance of parents and the survivorship of the offspring determine fitness. The loss of vigor in inbred individuals can cause their death and reduce fitness. The loss of variability in a breeding

population can reduce the fitness of the populations over generations and reduce its ability to adapt to random, normal (stochastic) variation in the environment such as climate change. Based upon the mating system (e.g. a single dominant male) and number of breeding adults, a coefficient of inbreeding can be calculated for a population. In typical livestock improvement programs, a level of 10- 15%/ generation is common if the unfortunate and predictable "mistakes" can be culled by the animal scientists who carefully keep stud books on the best parents. In isolated populations, inbred individuals may breed before they are naturally culled, thereby diminishing population viability, particularly if predators such as wolves have been controlled. At the other end of the mating spectrum, note that extreme outbreeding can also be costly and deleterious - i.e. via the risks of dispersal through unfamiliar territory (the springtime roadkill effect) to aggressive competitors for mates (weekend singles bar affect), or even through hybridization (which usually produces sterile or inviable offspring). The trick - no surprise - is to select the best mate for reasons of fitness (at least in nature), and most animal species have behavioral conventions and sanctions to help achieve this. Conservation and population biologists and other ecologists are calculating the "minimum viable population" (MVP) necessary to maintain fitness over the long run. The long run has been arbitrarily defined as a 99% chance of persistence for 1000 years (Schaffer 1981). As a starting point, the MVP can then be translated into carrying capacity requirements (e.g. What local resources such as forage are required at what rate of consumption?), which can then be used to calculate the area of a habitat system required to ensure population maintenance and which is to be preserved (minimum critical habitat - MCH),. At what point does the population size become so small that the risk of extinction is unacceptable? Several approaches analyze population viability: rules of thumb, analytic, and simulation. A rule of thumb (actually based in substantial theory) - the "50/500" rule (Franklin 1980, Soulé 1980) defines a short term population of 50 to prevent unacceptable inbreeding and a level of 500 to maintain enough genetic variability to adapt. To the extent that an ideal breeding population does not exist in nature (a few males do most of the breeding, etc) the rule expands to about 500/5000. Population extinction can occur because of random variations in its demography e.g. loss of vulnerable age class which is the main breeding segment), environmental stochasticity (e.g. habitat loss), catastrophe (flood fire, volcano) and genetic stochasticity of the kind described above (May 1963 and Schaffer 1981). Genetic stochasticity is the main concern with small populations of the kind found in forest fragments. These processes are interrelated. For example, a reduction of the forest into fragments leads to isolated populations of small size, which leads to inbreeding, leading to a smaller population and eventually to extinction. This is a form of positive feedback (uncontrolled) and is called extinction vortex.

7. **Corridor Development and Management** The importance of corridors in protected area planning and the maintenance of biological diversity is an increasingly current topic of interest and research (cf. Sanders and Hobbs 1991 and Beier and Loe 1992). Unfortunately, empirical evidence is largely anecdotal, and the science of corridors is in its infancy. Corridors tend to be linear features which connect more extensive area of previously contiguous habitat. They, therefore suffer from vulnerability to edge effects as noted above. Nevertheless, landscape connectivity is a fundamental element of conservation biology. The conservative response to the current uncertainty attending the width, representativeness, management and uses of corridors is to retain them wherever possible until we

know more about function and geometry. The basic types of corridors are defined by their function - for dispersal (by "passage" species such as migrating deer or predators) or habitat (for "corridor dwellers" -often small mammals, reptiles, resident birds, and insects which reside in the corridor for extended periods). The most critical measure of the utility of a corridor is how well it fulfills its function by providing space for animals to travel, sites suitable for plant propagation, facilitating genetic interchange for metapopulation sustainability, a way of responding to catastrophe and environmental change, and provision of avenues for recolonization. These five functions have been recognized by American courts in determining the adequacy of environmental analyses and mitigations. The functions will reflect such features as vegetation types present, length and width, topography, and species present, and will serve to determine the adequacy of the corridor. This is more meaningful than establishing an arbitrary width. A checklist with 6 steps for planning and evaluating corridors has been developed:

- identifying the habitat elements the corridor is supposed to connect;
- selecting several species of interest which serve as "umbrella indicators" conferring the greatest benefits to the most species in need;
- evaluating the requirements of each umbrella species;
- evaluating the ability of the corridor to accommodate entry and movement of the species (and identifying impediments such as human disturbance, silvicultural practices, etc.);
- drawing the corridor(s) on a map and describing it, future management and uses; and,
- designing and monitoring an evaluation program.

The checklist has been recommended in the work plan for this project.

8. Although the theoretical basis for protected area design and management has been developing along some pretty novel lines for about 20 years, there is a surprising, even appalling lack of empirical support. Natural opportunities such as the Bialowieza and the Carpathian complex are invaluable. Very few confirmations in nature of the progress of inbreeding and its effects on the fragmented forest community exist except for numerous and spectacular extinctions around the world and endangered species listings in the United States. The data and inferences cited are therefore tentative and should be tested through research and the emerging process of Adaptive Management (Lee 1977). The following list summarizes some of what we generally know and what we might do:

(1) for a minimum breeding population of 5,000 red deer, an area of about 25,000 ha would be required;

(2) about 4,000 ha are needed to support a pair of goshawks;

(3) a minimum of some 125 ha would be necessary to insulate any breeding songbirds. This would expand depending on the numbers and territorial requirements;

(4) a commercial forest buffer or other source of shade need to be at least 50 m deep and surround the forest;

(5) if the original forest area of the Carpathian system is calculated, and the percentage remaining is determined, we can predict how many species may have already been lost through further simulation models. As an initial estimate, in one European lowland forest, species with large area requirements and low resistance to fragmentation rapidly disappear when 60% of the forest is gone, and species with less rigorous requirements begin to drop out when 80% of the ordinal forest is transformed;

(6) some herbs (e,g. Dog's mercury) may need nearest neighboring forests at no more than 100 m;

(7) it is best to concentrate habitat in a single large tract rather than many small ones;

(8) corridors have been demonstrated to be essential in some systems where they had to be at least 200 m wide, although it would depend on the behavior of the species present;

(9) policies to assist in prioritizing reserve acquisition have been suggested - i.e. first secure larger fragments (usually the role of government and its national agencies, then encourage regional groups such as NGOs to acquire all representative habitats in smaller fragments, then local groups and individuals can get the available areas through title, easements and other devices;

(10) Circular properties are more secure than other shapes;

(11) Management programs and instruments will be necessary to overcome the ecological incompleteness and imbalance of fragments. Vegetation should be treated to ensure a complete range of naturally occurring habitats and to shorten the time to maturity of certain associations (e.g. through selective thinning adjacent to the reserve to achieve and old growth structure - Oliver 1991). Exotic plants and animals will need elimination. Nuisance animals will need control (such as cowbirds from the adjacent grasslands);

(12) policy stimuli and leadership will need to foster collaborative efforts reflecting the various fields of Conservation Biology, managers, felled workers, researchers, forest product users, theoreticians and modelers;

(13) new educational curricula must be developed for such contemporary protected area panning and management and should include more than the typical forestry topics. Even more necessary are communications and group dynamics and public relation skills - i.e. the disciplines embraced by Conservation Biology including community ecology, economics, population genetics and epidemiology;

(14) research must begin on (among other topics) species deletion impacts (the experimental removal of species), species requirements (forage, behavior and seasonal habitats requirements, etc). Breeding systems, and the use of corridors, a thorough inventory of population and forest fragment sizes and trends, competitive interactions with sympatric native species and invaders, trophic connectiveness, the identification of keystone plant/pollinator/dispersor systems, population impacts of multispecies harvests, electrophoretic studies of genetic variability of source, fragment and founder populations,

the biological and physical effects of different types of edge, the utility of predation in the population genetics of the prey and the response of prey to predator control/removal, and many others. This list is not offered to substitute for the inductive reasoning, hypothesis formulation and research interests of the research community, but rather to point to some of the topics which would be necessary to inform Conservation Biology approach;

9. **Cost and Level of Effort** The review and list correctly imply a lot of activity to support the creation of a Carpathian Biosphere Reserve distinguished by existing fragments and the possibility of designing additional elements. A preliminary estimate of the priority tasks and resources required is given below:

Task Activity (includes TA)

(1) Inventory reserves, forest fragments (by stage of succession, and history of use and ownership). Enter GIS. $25,000

(2) Create an acquisition plan based on size, naturalness, geometry and pattern of dispersion (not faunal and floral character). Investigate planned uses, potential for modifying uses important to the plan (e. g. leaving corridors, selective thinning and extended rotations) $10,000

(3) Inventory plant and animal populations in target areas including invaders and exotics $25,000

(4) Initiate systems and extinction model $15,000

(5) Begin genetic studies of selected (from model) animal species $15,000

(6) Begin studies of keystone/dispersor/pollinator systems. $10,000

(7) Study species male control by model requirements $35,000

(8) Study species (#7) movements $20,000

(9) Use GIS analysis of movements, home ranges, and employ carrying capacity calculations (from #'s 3,7 and 8) to derive minimum critical habitat requirements $10,000

(10) Develop Trans Carpathian Planning Group including local; land national governments, local NGOs, elected representatives, scientists and representatives of local users. Establish a Secretariat $20,000

(11) Develop National Policy on easements and incentives for select land uses around the protected areas $18,000

(12) Develop a curriculum and plan for the inclusion of Conservation Biology in University and Forestry School curricula. Develop syllabi for constituent elements of the curriculum. Initiate instruction $30,000

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

THE ACQUISITION AND USE OF A GEOGRAPHIC INFORMATION SYSTEM (GIS)

I. INTRODUCTION

1. Briefly, a GIS can use spatial data which are displayed as "themes" (forest cover, pollution damage, threatened habitat, etc.) to objectively analyze and display the solution to a spatial land management problem. Such useful products can include, for example, the least cost siting of a logging road, areas of highest return on habitat development activities, dispersion of pollutants, etc. Such data are usually acquired through remote sensing of the environment from a platform such as a satellite, or aircraft. The aerial photographs or images of digital information transmitted from a satellite are then "processed" manually or statistically to make them meaningful for aiding the achievement of the goals of the project. Perhaps the greatest failures of GIS technology lie not in the technology but in the failure of the resource scientists familiar with the area of interest, to educate both the image (ground truthing), as well as the computer scientist who provides the image and does the initial processing. Lack of precise communication at this point can lead to expensive but useless products whose categories are meaningless in terms of real habitat or forest types.

2. Forestry applications of GIS are increasingly common. Forest inventory, infrastructure, wildlife habitat, geotechnically suitable sites for extraction activities, and other themes can be overlaid. Likewise, the least expensive environmentally acceptable travel sheds can be spread over a compartment, silvicultural treatments allocated, and other analyses performed of use to foresters. Graphic output can include hard copy maps or digital files.

3. Other environmental applications of GIS of particular use in the conservation of biological diversity are emerging. One common problem is in inventorying valuable resources such as endangered species. Often they are fugitive, furtive, and their ranges are not fully known. In one application which involved assessing impacts (in this case of roads) to one such important but poorly located species (very similar to the black grouse), field studies were conducted on twenty habitat variables such as vegetation type, and distance from water, at the few known population sites. Statistical analyses revealed that only four of the environmental features contributed to the presence of the bird on its mating display grounds - the critical environmental requirement in its annual cycle. These four map variables were overlaid and the priority areas for habitat preservation were predicted over the whole forest. Furthermore, forest succession and encroachment due to effective fire control efforts were predicted and the habitat losses due to the loss of mating grounds were also predicted for twenty years. Another use of the GIS was in predicting the impacts of poaching due to the siting of a mine in a rich wildlife area. Surveys revealed that people would travel up to two hours to recreate and a "travelshed" of two hours on three different grades of roads and trails was created by the GIS. The travelshed was overlain on key habitat and revealed that only 3% of the area described by drawing a circle of two hours travel at 80 kph (the traditional method) needed to be patrolled. The GIS analysis produced an efficient focus of effort and savings of project money.

II. SYSTEM SELECTION

4. The acquisition of a GIS will, to a degree, lock the user into the hardware and software system selected. It must be able to satisfy the requirements of the Department while being adaptable to future needs and compatible with the systems of related users (and sources of data) such as national mapping agencies, and other resource agencies. A seminal step is inventorying the activities and systems of other parts of Government. The next step is in conducting a workload analysis. This lays the groundwork for making appropriate choices which will have a long-lasting effect. It reviews current uses which are being made of spatial information, projects future uses, and assesses those uses which can be replaced by such an automated system as a GIS. How many maps are used for how long? How many users? Are uses centralized or distributed? How many maps are created by the different uses? How many overlays? The answers will reveal system requirements. Specifically, what will need to be purchased, the supporting infrastructural requirements, and staff. The product will be a 5-year implementation plan with annual costs and progress - i.e. a life cycle analysis. At this point the procurement people can craft a procurement contract and RFP for the system, including the training necessary before operations can be productive. At that point the potential vendors will provide considerable ad hoc planning advice. It should be stressed that although the process will take several months and an initial pulse of money, the savings from the up-front planning are inevitably considerable. As mentioned at the beginning of this Annex, the entire process must be closely supervised by knowledgeable resource scientists - i.e. the users (the biologists and foresters), not only the providers (vendors and programmers), or the system is guaranteed to be maladaptive. However, a well-planned GIS is a proven and essential tool in the kit of today's resource planners and managers. For example, the provision of GIS-aided impact assessment analysis by the National Ecology Research Center of the U.S. Fish and Wildlife Service for Forest Plans of the U.S. Forest Service has resulted in a 75% saving of time and money over traditional manual methods. Although the initial tasks involve inventorying existing resources and capabilities and projecting the demands and uses of a GIS, we have provided an initial estimate of such needs based upon our visits and discussions with the likely users. These estimates will be useful in budget estimates now, but may require revision after the systematic analyses conducted during the initial tasks.

III. TRAINING

5. The system will not work without trained user/operators. However, it should be stressed that there is no magic to acquiring the necessary skills. It is particularly useful if the operator is also the scientist - i.e. the scientist does not always have to go to a computer operator not informed about the technical demands and logic of the biologist or environmental engineer, meteorologist, etc. There are several excellent center which have the range of new equipment and the relevant resource scientists, which have taught the novice how to use GIS. A working knowledge will take about 2 to 3 months. A complete facility will take about a year of working on actual projects. One of the trainees (there should always be more than one trained), should be good at dealing with the hardware and software maintenance and updating for the lab at the institution. Things will break and the whole system should not be down for long.

IV. A GIS AT THE CARPATHIANS BIOSPHERE RESERVE

6. **Land Use Planning and Zoning** - Some resources are, in part, spatially defined. These include seasonal ranges of such wild animal species as the herbivores (e.g. cervids), as well as other important faunal elements upon which the ecosystem may depend - i.e. pollinators such as insects and bats. The distribution of forest stands and unique plant and animal associations is also mappable. Land use activities, physical features, cultural features are also mappable "themes." In support of the land use planning activities and corridor development planning, these resources will need to be inventoried and mapped. The GIS will assist in analyzing these resources and in planning their uses by "map modeling" - overlaying them, spreading them onto each other, subtracting some from others, etc. Locating the resources is the first requisite to planning for zones of their best uses.

7. **Pollution Monitoring and Analysis** - A GIS can be of immense value in projecting the dispersion and attenuation of pollutants from a source. The GIS applications software "spreads" the pollutants from their sources and will complement the use of the data which are now being collected by researchers at Belovezhskaya Puscha. The use of these spatial data will be coordinated with the land use planning described above. For example, forest thinning where pollutants are projected to increase, placement of monitoring stations where analyses indicate problems, the placement of research plots, the replacement of marginal agricultural sites in heavily polluted areas, the location of the most viable candidate sites for protection in the primeval protected area network, and other uses influenced by the projections of pollutants can be materially assisted with inventive applications of the GIS.

8. **Siting of Development Features** - As the implementation of the land use plan occurs, the siting of supporting infrastructure such as roads, tourist lodges, waste disposal/treatment facilities and other such features which attend development can be assisted with a GIS.

9. Although numerous uses will be made of this analytic tool, those mentioned above are indicative. The final point is the need to coordinate any GIS system development with the broader needs of the FRI and the Forestry Department. It is critical that the system be reviewed and found suitable in outline by the Forest Development Project planners.

GIS WORK PLAN, LEVEL-OF-EFFORT, AND BUDGET

(U.S. dollars)

WORK PLAN

First Year (month)

TASK	1	2	3	4	5	6	7	8	9	10	11	12
1. Inventory current activities and resources												
2. Workload analysis												
3. Implementation Plan/CBR												
4. Review Co-ordination with other projects												
5. Facilities enhancement												
6. Secure equipment, imagery/photos/maps												
7. In-situ training												
8. Training tour												
9. Initial analysis												

BUDGET

1. Initial Inventory of maps, Mapping Activities, and GIS Capabilities in Ukraine

   To be conducted by Project Management Unit by sub-contract - 2 months

2. Work Load Analysis and GIS Implementation Plan

   Consultants: Forest Ecologist/Land Use Planner - 1 month
   GIS (land use and forestry experience) - 1 month

   Total for Item 26,000

3.

Computer Hardware	#Units	$ Cost/Unit	COST
A. 486 PC (or equivalent) VGA Graphics Card 5.25 & 3.5 inch disk drives 300 Megabyte Hard Disk Math Co-processor Mouse (poss. use SUN system)	2	7,000	14,000
B. Hi-resolution Color Monitor (17")	2	1,500	3,000
C. Internal Backup Tape Device	1	1,500	1,500
D. Digitizing Tablet 36x48			

	inch with electric pedestal	1	5,000	5,000
E.	Color plotter 8-pen, 36" width	1	4,500	4,500
F.	Laser Printer	1	2,500	2,500
G.	Uninterruptible Power Supply (UPS)	2	750	1,500
H.	Additional Serial & Parallel Cables			300
I.	Supplies - Paper, Plotter, Pens, etc. for 2 years			5,000
	Total for Item 3			37,300
4.	Imagery, Geocoding, and Digital Merging			
	TM Imagery Data	2	4,350	8,700
	TM Geocoding	2	900	1,800
	SPOT Imagery Data	3	2,450	7,350
	SPOT Special Acquisition	3	600	1,800
	SPOT Geocoding	3	900	2,700
	SPOT Digital Mosaic	3	600/edge	1,800
	TM/SPOT Merge	1	3,000	3,000
	Total for Item 4			27,150
5.	Change Detection			
	Digital Change Detection	1	2,000	2,000
	GIS Data Conversion	1	250	250
	Total for Item 5			2,250
6.	Photographic Prints and Processing			
	TM	2	2,300	4,600
	TM/SPOT Merge 1:50,000	5	1,200	6,000
	Land Cover Classification	3	1,500	4,500
	Total for Item 6			15,100
7.	Computer Software			
	Arc/Info GIS	1	6,000	6,000

8.	Air Fare and Related Expenses	
	Assume 2 International trips, 75 Travel Days (consultant)	17,500
	Assume 2 Training trips, 150 days	30,000
9.	System Training	
	Consultant for 2 months including workshops	26,000
	TOTAL	182,300

* Two study tours (Task 8) are not budgeted here but in the Training Task of the overall project.

10. Therefore, a working GIS unit within the Carpathians biosphere Reserve would require about $ 182,300 to achieve a GIS capability. This does not include an image processing capability. Image processing of digital data from satellites is an esoteric activity quite removed from the interests and capabilities of the national park management. It should be the function of the Survey and Mapping Agencies of Government, or contracted from, for example, EOSAT at about $8,000/ TM image. The budget of $120,000 for this element assumes about $60,000 saved through shared training/consultant costs and some accrue by using shared imagery with the neighboring countries.

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

MONITORING, SUPERVISION AND EVALUATION PLAN

I. INTRODUCTION

1. Since the Ukrainian Transcarpathian Biodiversity Protection Project was derived from an extension of a related effort to foster biodiversity protection in the Eastern Carpathians with Slovak (GEF project) and Poland (Parks Component of the forthcoming Forest Development Loan) supervision and monitoring are essential elements of any complex project. They are much more than checking disbursements, reporting, and contractual observations. They are important in assisting all participants to step back and view the whole effort rather than focussing on managing its parts. The view afforded permits innovation, adaptive changes, mid-course corrections in changing environments, and the evolution of the project in ways which enrich it and foster the achievement of the goals of the project. Monitoring and evaluation are particularly important for projects that involve uncertainty or poor and missing data. Therefore, in these cases, assumptions, innovations, and techniques, must be closely monitored before waste or damage occurs.

MONITORING

2. With the number of innovative components in this project being implemented in a short time frame, a wider and more extensive program of supervision and monitoring is proposed than is commonly applied in Bank projects. For example, the life of this GEF project is two years, rendering the Annual Project Review less meaningful. Also, its thrust differs somewhat from the normal concerns of the implementing Agency. This will probably not be unusual for such new technical concerns as conservation biology in many areas of the world which most require such efforts. The normal checks and balances and quality assessment mechanisms of such Agencies may be initially confounded by the novel and unfamiliar elements of such Projects and may therefore benefit disproportionately from Bank supervision activities.

3. There is a distinct danger of a paper blizzard with lots of raw monitoring data but little analysis and useful synthesis. The Plan is more frequent (three times per year) as well as more scientifically oriented compared to the normal schedule of semi-annual staff/consultant efforts in regular Bank projects. The scheduled supervision visits respond to milestones proposed in the project.

SUPERVISION

4. Since this is an add-on to the Slovak GEF biodiversity project, there will be economies in supervision, which will be conducted following each Slovak GEF biodiversity project supervision. Three short supervision missions are planned for each year of the proposed two year project implementation period (estimated at about of one(1) week each, with office time projected of three weeks per year. Each of these missions should have the flexibility to adapt to the conditions at the time. The Core Team would include the Task Manager, the forest wildlife ecologist, and the parks specialist supplemented by additional scientists funded from trust funds.

5. The first supervision mission is proposed for October, 1993. At this critical juncture, the regional scientific three-country Scientific Committee workshop (as part of a tri-lateral trust) would be held, equipment and infrastructure procurement would be underway, the GIS implementation plan completed, and the Biodiversity Protection Program initiated. The second supervision mission will take place in Feb/March Feb/March 1994 when the work is largely in progress, and a follow up meeting, especially to discuss the project supported GEF biodiversity protection trust would be held.

Proposed Staffing Pattern	Oct 1993	Feb 1994	June 1994	Oct 1994	Feb 1995	June 1995	Oct 1995 Wrap-up
Task Manager	2	2	2	2	2	2	2
Forest Wildlife Ecologist	2	1	1	1	1	1	1
Parks Specialist	2	-	-	1	-	1	1
GIS Specialist (Trust Fund) non-GEF	1	-	-	1	-	-	-
Land Use Planner (Trust Fund) non-GEF	2	1	1	1	1	1	-
Proposed Supervision (GEF) Staff/Weeks	6	3	3	4	3	4	4

6. The proposed budget for this intensive supervision work is 27 staff weeks, 12 weeks for 1993, 11 staff weeks for 1994 and 4 staff weeks for the wrap up work in 1995. The estimated total supervision cost is estimated at $40,000 for 1993, $35,000 for 1994 and $13,000 for 1995, for a total supervision cost estimate of approximately $88,000 (inclusive of staff costs, consultant fees, travel and subsistence) according to the detailed program outlined in the matrix above. The supervising division expects at a minimum of 1.0 staff weeks of the specific scientific supervision work on the GIS and the Land Use Planner to be eligible for non-GEF Trust Fund support. This would leave a direct divisional supervision charge of 17 weeks for the full project cycle (6.8 per annum), which is well below regular GEF supervision coefficients on an annualized basis (12 staff weeks per annum).

EVALUATION

7. The project would be supervised in conjunction with the Slovak GEF Biodiversity Protection Project to keep costs to a minimum.

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

DETAILED COSTS

PROJECT TASKS AND TIMELINE

		US$ in Thousands				
		Local	Foreign	Total	% Foreign Exchange	% Total Base Costs
A.	**Biodiversity Protection Program**					
	1. Reserve Inventory	4.0	10.0	14.0	71.4	2.6
	2. Acquisition Plan and Investigations	10.0	0.0	10.0	0.0	1.9
	3. Flora and Fauna Inventory	20.0	2.1	22.1	9.5	4.1
	4. Systems and Extinction Model	10.0	5.0	15.0	33.3	2.8
	5. Genetic and Species Studies	35.0	10.0	45.0	22.2	8.4
	6. GIS and Critical Habitat Analysis	3.0	7.0	10.0	70.0	1.9
	7. Trans-Carpathians Planning	5.0	5.0	10.0	50.0	1.9
	8. Development of National Policy	8.0	2.0	10.0	20.0	1.9
	9. Curriculum Development	10.8	1.2	12.0	10.0	2.3
	Sub-Total	105.8	42.3	148.1	28.6	27.8
B.	**Management Resources Program**					
	1. Computer Equipment and GIS	0.0	120.0	120.0	100.0	22.5
	2. Transport and Communications	32.5	32.5	65.0	50.0	12.2
	3. Assistance With Demonstration	25.0	0.0	25.0	0.0	4.7
	Sub Total	57.5	152.5	210.0	72.6	39.4
C.	**Training Program**					
	1. Data Base and Computing	8.0	2.0	10.0	20.0	1.9
	2. Prof. Dev. and Lang. Training	85.0	0.0	85.0	0.0	15.9
	Sub-Total	93.0	2.0	95.0	2.1	17.8
D.	**Public Education & Awareness**					
	1. Completion of Visitor Center	20.0	0.0	20.0	0.0	3.8
	2. Equipment	8.0	2.0	10.0	20.0	1.9
	3. Publications and Strategy	2.0	8.0	10.0	80.0	1.9
	Sub-Total	30.0	10.0	40.0	25.0	7.5
E.	**PROJECT MANAGEMENT**					
	1. Assist Central GEF Unit - Kiev	7.5	7.5	15.0	50.0	2.8
	2. Uzghorod Project Management Unit	25.0	0.0	25.0	0.0	4.7
	Sub-Total	32.5	7.5	40.0	18.8	7.5
Total BASELINE COSTS		318.8	214.3	533.1	40.2	100.0
	Physical Contingency	16.6	10.0	26.6	37.6	5.0
	Price Contingencies	14.8	5.5	20.3	27.2	3.8
Total PROJECT COSTS		350.2	229.8	580.0	39.6	108.8

TRANSPORT AND COMMUNICATIONS EQUIPMENT

(Partial Listing Only)

1. A modest fifty thousand dollars is budgeted for transport and communications equipment. The nature of the dispersed components of the CBR of the management and coordinating units, and of regional collaborators in Poland and Slovakia underlines the significance of this element. Furthermore, the areas are remote and on rough, poorly maintained roads. The budget is designed to provide two vehicles and their maintenance, liberal helicopter rental time, and communications hardware (faxs), VHF sets, relays capabilities and software. This equipment has been identified as critical to undertake the project and full specifications will be developed during project implementation.

2. Vehicles and helicopters are widely available and are much less expensive than in the west. (For example, helicopter rentals are presently 1/10 of the cost).

Helicopter Hire		$ 5,000
Communications		
	1. 3 base stations	10,000
	2. 1 repeater station	16,000
	3. mobiles	3,000
	4. technical survey and design	5,000
Vehicles	2x 4WD	20,000
	1x project unit	6,000
		$65,000

4. Further equipment will be detailed with the development of each specific component.

Activity	Project Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
A. Biodiversity Protection Program																								
1.Reserve Inventory																								
2.Acquisition Plan & Investigation																								
3.Flora and Fauna Inventory																								
4.Systems and Extinction Model																								
5.Genitic and Species Studies																								
6.GIS & Critical Habitat Analysis																								
7.Trans-Carpathians Planning																								
8.Development of National Policy																								
9.Curriculum Development																								
B. Managemnt Resources Program																								
1.Computer Equipment and GIS																								
2.Transport and Communications																								
3.Assistance with Demonstrations																								
C. Training Program																								
1.Data Base and Computing																								
2.Prof. Dev. and Lang. Training																								
D. Project Management Program																								
1.Central GEF Unit - Kiev																								
2.Project Mgmnt Unit - Uzghorod																								

UKRAINE

TRANSCARPATHIAN BIODIVERSITY PROTECTION PROJECT

IMPLEMENTATING ORGANIZATIONS

A. Biodiversity Protection Program

1. Reserve Inventory -- Carpthian Biosphere Reserve Uzghorod (CBR)

2. Acquistion Plan and Investigations -- CBR

3. Flora and Fauna -- CBR

4. Systems and Extinction Model -- Uzghorod University and CBR

5. Genetic and Species Studies -- Institute of Cell Ecology and Bio-Engineering (Kiev) and CBR.

6. GIS and Critical Habitat Analysis -- Lvov University and CBR

7. Trans-Carpathian Planning and Development of a National Policy for Reserve Protection -- Ministry of Environment (Kiev), Ecology Institute (Kiev), GEF PMCU (Kiev) and GEF Project Management Unit (Uzghorod)

8. Curriculm Development -- CBR

B. Management Resources Program

1. Computer Equipment and GIS -- GEF Project Coordination Unit (Kiev), and GEF Project Management and Coordination Unit (Uzghorod)

2. Transport and Communications -- CBR

3. Demonstration Activities in Biosphere Reserve -- GEF Project Management Unit (Uzghorord)

C. Public Education and Biodiversity Intrepretation -- GEF Unit (Kiev) and CBR

D. Professional Development and Training

1. Data Base and Computing--Project Coordinating Unit (Kiev)
Project Management Unit (Uzghorod) CBR(Uzghorod)

2. Reserve Management and Planning-Same as above

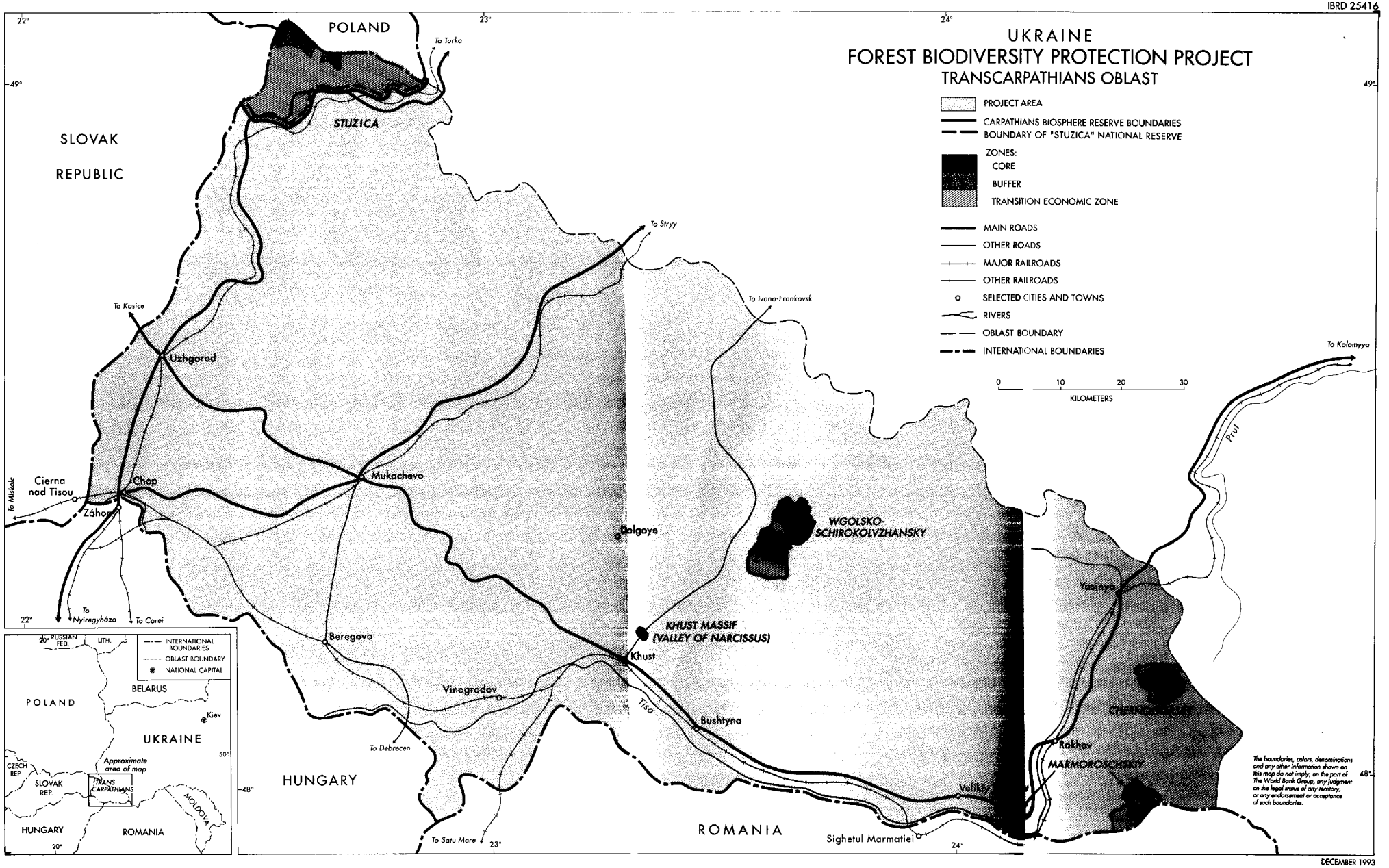
E. Project Management Program

1. Project Coordinating Unit (Kiev)

2. Project Management Unit-Uzgohorod

IBRD 25416

UKRAINE
FOREST BIODIVERSITY PROTECTION PROJECT
TRANSCARPATHIANS OBLAST



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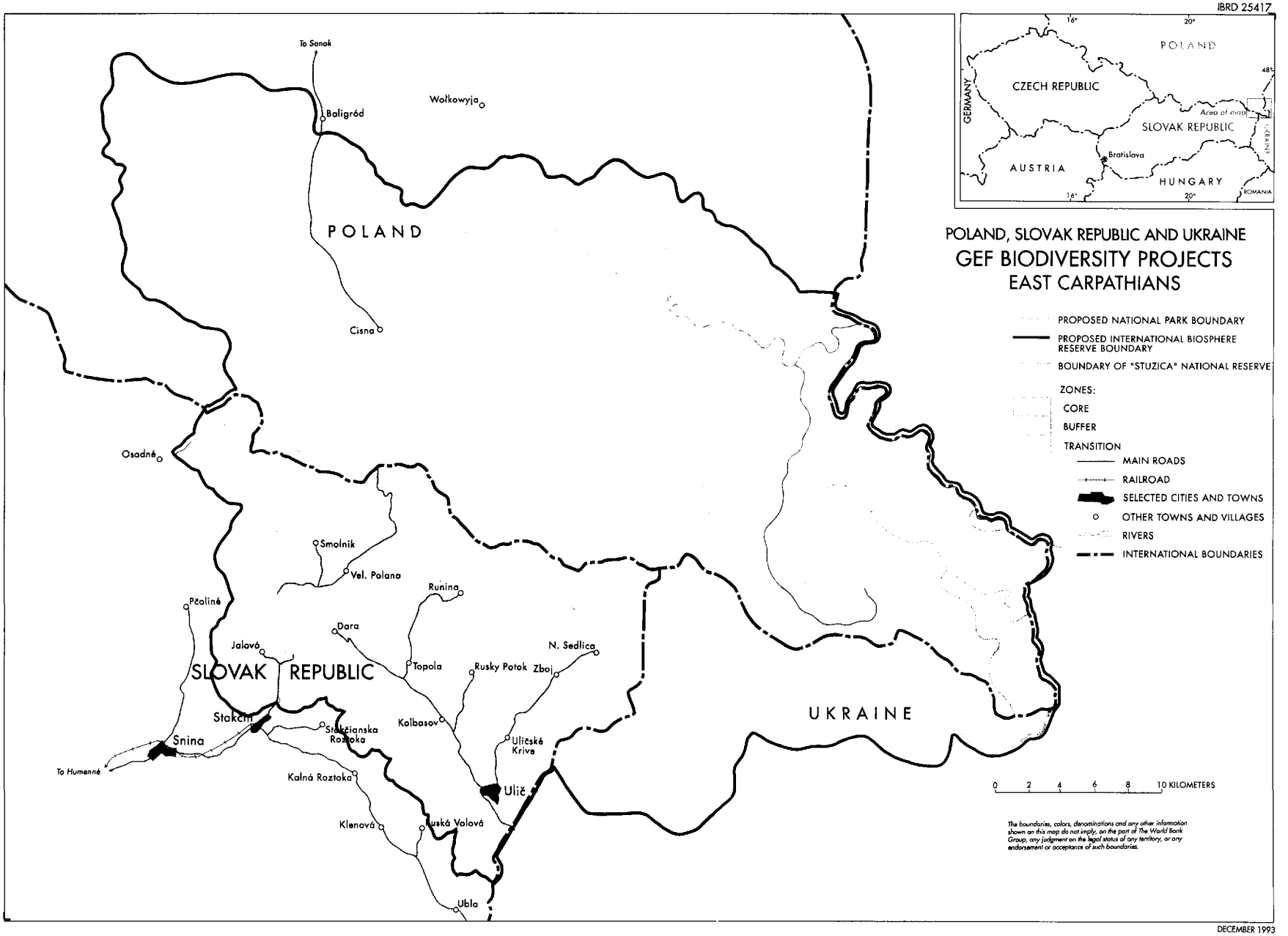
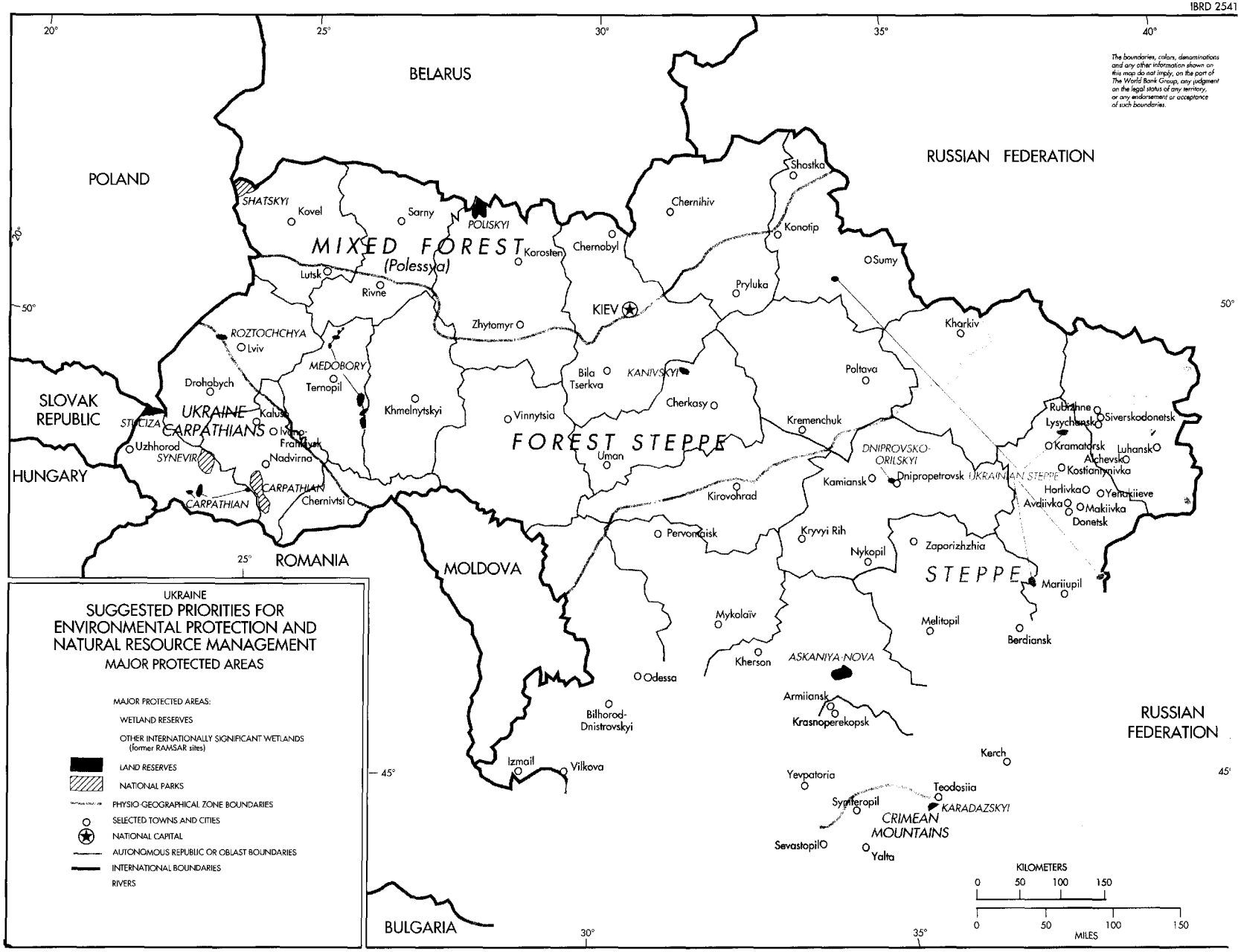
DECEMBER 1993

IBRD 25417



DECEMBER 1993


20°
25°
30°
35°
40°
50°
45°
The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.
BELARUS
RUSSIAN FEDERATION
POLAND
SLOVAK REPUBLIC
HUNGARY
ROMANIA
MOLDOVA
BULGARIA
UKRAINE
SHATSKYI
Kovel
Sarny
POLISKYI
MIXED FOREST
(Polessya)
Korosten
Chernihiv
Shostka
Konotip
Sumy
Chernobyl
Lutsk
Rivne
Pryluka
KIEV
Zhytomyr
Kharkiv
ROZTOCHCHYA
Lviv
MEDOBORY
Ternopil
Bila Tserkva
KANIVSKYI
Poltava
Drohobych
Khmelnytskyi
Cherkasy
Vinnytsia
Kremenchuk
UKRAINE CARPATHIANS
STUZICA
Kalush
Ivano-Frankivsk
Uzhhorod
SYNEVIR
Nadvirna
FOREST STEPPE
Uman
DNIPROVSKO-ORILSKYI
UKRAINIAN STEPPE
Kamiansk
Dnipropetrovsk
Kirovohrad
CARPATHIAN
Chernivtsi
Pervomaisk
Kryvyi Rih
Nykopil
Zaporizhzhia
STEPPE
Mariiupil
Berdiansk
Mykolaïv
Melitopil
Kherson
ASKANIYA-NOVA
Odessa
Armiiansk
Krasnoperekopsk
Bilhorod-Dnistrovskyi
Izmail
Vilkova
Kerch
Yevpatoria
Teodosiia
Simferopil
KARADAZSKYI
CRIMEAN MOUNTAINS
Sevastopil
Yalta
Rubizhne
Lysychansk
Siverskodonetsk
Kramatorsk
Luhansk
Avdiivka
Makiivka
Donetsk
KILOMETERS
0 50 100 150
0 50 100 150
MILES
UKRAINE
SUGGESTED PRIORITIES FOR ENVIRONMENTAL PROTECTION AND NATURAL RESOURCE MANAGEMENT
MAJOR PROTECTED AREAS
MAJOR PROTECTED AREAS:
WETLAND RESERVES
OTHER INTERNATIONALLY SIGNIFICANT WETLANDS (former RAMSAR sites)
LAND RESERVES
NATIONAL PARKS
PHYSIO-GEOGRAPHICAL ZONE BOUNDARIES
SELECTED TOWNS AND CITIES
NATIONAL CAPITAL
AUTONOMOUS REPUBLIC OR OBLAST BOUNDARIES
INTERNATIONAL BOUNDARIES
RIVERS

The World Bank

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