Republic of Belarus

Biodiversity Protection Project

Project Document
September 1992

THE WORLD BANK

GEF Documentation

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The GEF Administrator
1818 H Street, NW
Washington, DC 20433 USA
Telephone: (202) 473-1053
Fax: (202) 477-0551

CURRENCY EQUIVALENT

125 Belarus Ruble = US$ 1

WEIGHTS AND MEASURES

The metric system is used throughout this report.

GLOSSARY OF ABBREVIATIONS

ACU	-	Administrative Coordination Unit
BNP	-	Belovezhskaya National Park (Belarus)
BPF	-	Bialowieza Primeval Forest
CIS	-	Commonwealth Independent States (Belarus and Poland)
ECU	-	European Currency Unit
EC	-	European Community
GEF	-	Global Environmental Facility
GIS	-	Geographic Information System
GDP	-	Gross Domestic Product
IBRD	-	International Bank for Reconstruction and Development
ICB	-	International Competitive Bidding
IMF	-	International Monetary Fund
LCB	-	Local Competitive Bidding
MaB	-	Man and the Biosphere Program
PMU	-	Project Management Unit
SOE	-	Statement of Expenditure
TA	-	Technical Assistance
TMU	-	Technical Management Unit

FISCAL YEAR

January 1 to December 31

BELARUS

FOREST BIODIVERSITY PROTECTION PROJECT

Grant and Project Summary

Grantee: Global Environmental Facility

Beneficiary: Republic of Belarus

Amount: US$1.0 million

Terms: Grant from Global Environmental Facility

Onlend'ng: Not applicable

Financing Plan:

Source	Local	Foreign	Total
	(US$ Million)		
GEF Grant	0.5	0.5	1.0
Committed Bilateral Grants	0.0	0.0	0.0
Government	.25	0.0	.25
TOTAL	**0.75**	**0.5**	**1.25**

Economic Rate of Return: Not calculated, though substantial economic and environmental benefits.

Staff Technical Report: Report No. 11042-BY dated August 21, 1992

Map: IBRD R Map No. 24132

MEMORANDUM AND RECOMMENDATION OF THE DIRECTOR OF THE CENTRAL ASIA DEPARTMENT OF THE INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT TO THE REGIONAL VICE PRESIDENT ON A GRANT FROM THE GLOBAL ENVIRONMENT TRUST FUND TO THE REPUBLIC OF BELARUS FOR A FOREST BIODIVERSITY PROTECTION PROGRAM

Background

1. The forests of the Belovezhskaya National Park (adjacent to the Bialowieza Primeval Forest in Poland) are among the most important and unique in Europe.[1] The last remnant of the vast lowland European forest now found only at Bialowieza are the most important of these disappearing biological treasures. These areas remain because of the protection afforded their fauna by regal hunters since the tenth century. However, this rationale has disappeared with the royalty to be replaced by a broader appreciation of the values of such rare resources:

- they offer a glimpse at the environmental "baseline" in which European civilization was forged;
- they house threatened and endangered species and eco-system processes found nowhere else;
- they are at the margins of distribution for several commercially important forest species such as Norway spruce, and can clarify questions of adaptability important to their management;
- 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 the restoration of polluted natural systems;
- they are still of a viable size and can therefore offer the best opportunities to explore the preservation and management of natural forests in Europe;
- they can serve as models for the planning and management of shared transboundary resource systems. The initiative recently taken by a local joint bilateral (Poland and Republic of Belarus) technical group can constitute a model which is of benefit to other such protected areas.

2. If such areas are to be protected, even reclaimed, several issues which have lead to their current status will need to be addressed. These issues make this GEF Project particularly timely and useful.

1/ These forests have become a major source of germplasm for the afforestation of the rest of Europe.

Pollution is one problem. Inefficient and inappropriate land uses have resulted in accelerating human-related incursions and transformations threatening natural areas here. More benign land uses which are compatible with the natural resource base need to be encouraged, even as the tendency to high-grade for short term gain becomes increasingly evident with the dislocations of the transition to modern market economies. A mix of such appropriate land uses will shield the *sanctum sanctorum*—areas under strict protection. This Project is particularly timely for Belarus foresters and ecologists who will benefit from some of the modern approaches to biodiversity conservation and management emerging throughout the world.

3. This additional program to widen the protection program for the Bialowieza Primeval Forest, whose estimated cost is $1 million, would support a biodiversity management program to protect the forest ecosystem on the abutting 87,000 ha, located in the Republic of Belarus (see Map 2). Specific investments and technical services to be supported under this program would be developed in the quarterly meetings of the Joint Scientific Committee (Poland and the Republic of Belarus) to improve the management of the full area on both sides of the border.

Rationale for GEF Involvement

4. This project supports the environmental policy framework. The Belovezhskaya forests of Western Belarus are important zones of ecological biodiversity. These key endangered forests are sites *of international importance being among Europe's largest expanse of remaining natural forests and areas of high endemism.*[2]

5. The GEF project has been accorded high priority by Government. However, funds are not available from government sources to carry out the work proposed here and 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 the environmental damage to Belarus' forests.

6. There is a global environmental benefit. These forests contain rare, endemic species found nowhere else. Of particular significance, as a model for many similar areas around the world, is the attempt to treat in an integrated fashion, four major levels of biodiversity—at the molecular level with *ex-situ* genome conservation at the species level (e.g., research to delineate the seasonal ranges of species such as the European bison and lynx), at the habitat or community level with the identification and incorporation of currently unprotected forest associations, and at the landscape level with the buffer zone land use planning. The activation of the MaB will integrate this Project with activities at other MaB sites around the world. The Belovezhskaya shares transboundary ecosystems, and the models developed for its integrated management will be of international utility. The global significance of the two areas initially selected is confirmed and supported by their designations by UNESCO as possible Biosphere Reservies, and the World Wildlife Fund (International) by being identified among the "existing ecological bricks" of Europe.

2/ Endemism means that the population of a plant or an animal species which is isolated to some extent has formed a common gene pool by the interaction of the ecological factors with the genetic structure of the population during evolution. The result is an indigenous population being highly adapted to the site and containing genetic structures different from populations within the range where gene flow is frequent. An area of high endemism in an area, in which many populations of plant or animal species occur showing this mode of evolution and adaption.

7. 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 a force either 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 test bed. These will not be a one-off or eccentric set of activities.

Project Objective

8. The proposed GEF project will initiate programs to conserve the biodiversity of key endangered forests and to link these efforts to ongoing GEF supported work in the abutting Bialowieza Primeval Forest in Poland. It will provide institutional support to the Council of Ministers, the National Park and the Committee of Ecology, to undertake biodiversity conservation management activities.

9. The Project would start with an ecological perspective and would investigate both *in-situ* and *ex-situ* options 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 detailing options to ensure the conservation of species considered at risk.

Project Description

10. The GEF operation would support Belarus' 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:

(i) institutional support to the Belovezhskaya National Park, Council of Ministers and the Committee of Ecology to enable it to carry out its biodiversity conservation management activities including the establishment of facilities for a biodiversity protection program for the Bialowieza Primeval Forest ecosystem located in Belarus and scientific linkages to the ongoing GEF work in the abutting Bialowieza Primeval Forest in Poland; and

(ii) investment in programs to preserve endangered forest ecosystems for biodiversity conservation through provision of funding for pilot investments in air and soil monitoring equipment, land planning (GIS) equipment, air and soil monitoring equipment (fixed and mobile), protected area planning, financial support for a program for supporting transition to ecological agriculture for farms operating within the BPF, and professional development, training and consulting services.

Agreed Actions

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

(a) **Joint Scientific Committee** The Council of Ministers shall establish a Joint Scientific Committee no later than March 1, 1993.

(b) **Grant Effectiveness** The Grant would be declared effective upon submission of documentation satisfactory to the Bank that the Project Technical Manager and Administrative Manager have been appointed and a separate project account, subject to internationally accepted auditing standards, has been established.

(c) **Accounts** A separate 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.

(d) **Project Management** A Technical Management Unit (TMU) would be established at the level of the Belovezhskaya National Park and a Project Administrative Coordination Unit (ACU), prior to disbursement of the grant.

(e) **Joint Coordination Program** This joint "coordination program" would specify the joint conservation management actions to be taken by each party. A side letter to the Belarus grant agreement would be prepared on this issue and agreed during negotiations. A similar side letter would be prepared and sent to the Polish Government prior to the Belarus negotiations as a clarifying amendment to their December 12, 1991 agreement with the GEF.

Benefits

12. The principal benefits are to protect a zone of substantial international ecological importance. The Bialowieza Primeval Forest in Poland and the adjoining Belovezhskaya National Park in Belarus are unique in Europe and a source of endemic biodiversity.

13. Innovation is fostered by the integration of the various levels of biological diversity to address issues in conservation planning (as described above), by the unique (for Belarus) 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. 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.

14. The Project is designed for sustainability. The long-term viability is achieved through the building of institutions within Belarus, including some which are relatively disenfranchised but important to biodiversity such as the National Park and Protected Reserve Managements. Another facet which is 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.

15. There is a demonstration value and replicability through the use of integrated planning, of new technologies, and the development of bilateral organizational structures which foster international resource management approaches. As a test of this approach to regional issues in biodiversity, the Project can have significant demonstration value.

Risks

16. The major risks are primarily technical and managerial, technical in that the basic approach to biodiversity protection in the Belovezkshaya National Park be further delayed, resulting in continuing biodiversity degradation of the ecosystem, and managerial in that Government salaries are extremely low resulting in the top scientists and technicians expected to manage and implement the project leaving Government and Institute service. The project would mitigate these risks by implementing this project in 1992 and 1993 to initiate this protection program and by providing funding to support the work of the key scientists and technicians working on the project.

Environmental Assessment

17. The Project has been reviewed by the Regional Environment Division and it has been placed in the environment screening category "B". Monitoring and evaluation are built into the terms of reference for the Project Management who will be reporting on a quarterly basis. Another node of Quality Assessment and Control is the proposed small secretariat at Belovezhskaya National Park which would work closely with the unit in the Bialowieza Primeval Forest in Poland 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 which will be published in peer-reviewed journals of international quality. The international Joint Scientific Review Committee will review the Project and its progress on a semi-annual basis.

Attachments

SCHEDULE A

BELARUS

FOREST BIODIVERSITY PROTECTION PROJECT

COST ESTIMATES
(Current US$ Thousands)

	US$ in Thousands		
	Local	Foreign	Total
A. Belovezhskaya National Park			
1. Conservation of Biological Diversity	20	205	225
2. BPF Protection and Management	26	212	238
3. Geographical Information System (GIS)	9	191	200
4. Ecological Farming in Buffer Zone	23	28	50
5. Pollution Monitoring & Mitigation	0	100	100
6. Coordination w/ Poland	20	0	20
7. Professional Development & Training	0	70	70
8. Support of a Bialowieza Foundation	0	15	15
Sub-Total	**97**	**810**	
B. Berezinsky and Pripiatsky Protected Reserves	50	50	100
C. Project Management	**80**	**50**	**130**
D. Joint Scientific Review Committee	**7**	**13**	**20**
Total BASELINE COSTS	**234**	**923**	
Physical Contingency	11	44	55
Price Contingencies	8	32	40
Total PROJECT COSTS	**253**	**999**	**1,250**

SCHEDULE B

BELARUS

FOREST BIODIVERSITY PROTECTION PROJECT

ESTIMATED SCHEDULE OF DISBURSEMENTS OF GEF GRANT

PROCUREMENT METHOD
(US$ Thousands)

Items	Procurement Method		
	IS & DP[1]	Other[2]	Total
(1) GIS, Air Monitoring and Supporting Equipment,	400.0 (400.0)	— —	400.0 (400.0)
(2) Technical Assistance	— —	400 (400)	400 (400)
(3) Salaries, Operations and Maintenance	— —	450 (200)	450 (200)
TOTAL	**400** **(400)**	**950** **(600)**	**1,250** **(1,000)**

NOTE: FIGURES IN PARENTHESIS ARE GEF GRANT

1/ International Shopping and Direct Purchase.

2/ Includes services procured under Bank's consultant guidelines.

SCHEDULE C

DISBURSEMENT

Item	Disbursement	
	Amount (US$ million)	% Financing
(1) Goods and Equipment	0.3	100 %
(2) Technical Assistance	0.3	100 %
(3) Salaries, Operations & Maintenance	0.3	100 %
(4) Un-allocated	0.1	
TOTAL	1.0	

SCHEDULE D

DISBURSEMENT

	IBRD FISCAL YEAR		
	1993	1994	1995
Annual	0.3	0.4	0.3
Cumulative	0.3	0.7	1.0

Closing Date: October 31, 1995

SCHEDULE E

BELARUS

FOREST BIODIVERSITY PROTECTION PROJECT
TIMETABLE OF KEY PROJECT PROCESSING EVENTS

(a) Time Taken to Prepare . . . . . 3 months

(b) Prepared by Council of Ministers and Committee of Ecology with Bank Assistance

(c) First Bank Mission . . . . . June 1992

(d) Appraisal Mission Departure . . . . . July 1992

(e) Negotiations . . . . . September 14-18, 1992

(f) Planned Date of Effectiveness: . . . . . October 30, 1992

(g) List of Relevant PCRs and PPARS . . . . . None

GLOBAL

ENVIRONMENT

FACILITY

BELARUS

FOREST BIODIVERSITY PROTECTION PROJECT

TECHNICAL REPORT

December, 1992

Project Document

BELARUS

FORESTRY BIODIVERSITY PROTE ION PROJECT

Table of Contents

ANNEXES:

MAPS:

BELARUS

FOREST BIODIVERSITY PROTECTION PROJECT

TECHNICAL REPORT

I. INTRODUCTION

1.1 This project is the first phase of a new effort by Belarus to protect its endangered forest ecosystems. It will initiate programs to conserve the biodiversity of key endangered forest communities of the Belovezhskaya Primeval Forest and will provide institutional support to the Supreme Soviet of Belarus' Council of Ministers Committee for Ecology to undertake biodiversity conservation management activities.

1.2 The forests of Belarus are important to the Republic. The Republic of Belarus, with 10.3 million persons living on 20 million ha, has 8.1 million ha of forests, equal to approximately 34% of its land area. The forested area was increased from 23% in 1945 to 34% in 1973 and has been stabilized at this level since. Belarus protects nearly one-third of its forests from commercial cutting, classifying 1.7 million ha through the following types of reserves: National Parks and Protected Landscapes (363,400 ha)[1], greenbelts around cities and towns (450,000 ha), protected nature reserves (689,700ha)[2], and watershed protection belts (250,000 ha).

1.3 The Chernobyl incident has had significant impact on the Belarus forests with 1,286 million ha (20% of the total forest) being contaminated. As a result, in 1988 some 142,800 ha of this impacted area was designated as the Polessky Radiological/Ecological Protected Reserve. Fortunately, there have been no measurable impacts of Chernobyl on the proposed Bialowieza Primeval Forest project.

1.4 Five percent of the land area of Belarus is wetland. Of this, one million hectares, 312,000 is currently protected. This protection includes the Pripiatsky State Landscape and the Wetland Protected reservation of 63,000 ha as well as an expansion of the protected lands to include wetlands in the Belovezhskaya Puscha. A scheme has been launched to protect a further 712,000 ha of wetlands by the year 2010.

1.5 The last remnants of the vast lowland European forest now found only at Belovezhskaya are the most important examples of these disappearing Belarus biological treasures. These areas remain because of the protection afforded their fauna by regal hunters since the tenth century. However, this rationale has disappeared with the royalty, to be replaced by a broader appreciation of the values of such rare resources:

1/ Belovezhskaya Puscha (1939), Berezinsky "Man and the Biosphere Reserve" (1925), Pripiatsky Landscape and Wetland Protected Reserve (1969) and most recently, the Polessky Radiological/Ecological Protected Reserve (1988).

2/ Byelorussia also protects 152 relics of nature and 70 state owned protected areas, including 6 hunting areas, 6 landscape parks, 12 botanical gardens of wild medicinal plants, 20 protected cranberry bogs, 15 wetlands, 2 zoological and 7 biological sanctuaries, 1 memorial and 1 protected forest area, with a total area of 5.1% of the Republic. These areas,together with the national parks, contain 67%(1032) of the flora of the country, including 51 of the 80 species in the Red Book of Endangered Species of Belarus.

- they offer a glimpse at the environmental "baseline" in which European civilization was forged;

- they house threatened and endangered species and system processes found nowhere else;

- they are at the margins of distribution for several commercially important forest species such as Norway spruce, and can clarify questions of adaptability important to their management;

- 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 the restoration of polluted natural systems;

- they are still of a viable size and can therefore offer the best opportunities to explore the preservation and management of natural forests in Europe;

- they are a recognized priority of the Government and people of Belarus, as well as of international conservation organizations such as the World Wildlife Fund (WWF) (a "Green Lung of Europe") and UNESCO (as a proposed "Man and the Biosphere" site);

- they can serve as models for the planning and management of shared international resource systems. The initiative recently taken by a local joint bilateral (Poland and the Republic of Belarus) technical group can constitute a model which is of benefit to other such protected areas.

1.6 There are several innovative and unique features of the Belarus Project:

- the newly independent republics of the former Soviet Union have a remarkably diverse natural patrimony which is increasingly at risk. Furthermore, several environmental issues confront these countries. Among them are threats to one of the most extensive and well tended systems of nature preserves in the world - the "zapovedniki"[3]. These "zapovedniki" house a vast range of biological diversity. Their status as strict preserves has sometimes fostered both local resentment and/or the desire to exploit the natural resources in the difficult economic transition which is occurring. They are coveted by both neighbors and Central authorities. This Project is an attempt to develop a specific working model for enfranchising these invaluable sites in a CIS State through establishing their value as natural areas. The model will be broadly useful in the emerging states of the region and is therefore timely;

3/ Strict Preserves - over 144 or nearly 2 million ha exist in the CIS states.

- the forest is the only home for several threatened species or populations threatened with extinction (e.g. the European bison). This forest is the last remnant of a type of landscape and associated communities which covered much of Central and Eastern Europe.

- several biological issues exist only in the Belovezhskaya which are not only important for the species concerned, but which are significant well beyond the borders of this forest. For example, a fatal disease of the bison is only found here. Knowledge about this scourge is important to healthy populations of bison in North America and to some of the most important commensals of man - domestic cattle and other bovines. Its etiology and cure are not yet clear, but it must be studied at Belovezhskaya;

- because this is the last intact remnant of a widespread forest type, it is the only place on earth where ethnobotanical work on traditional uses of forest products (e.g. as a pharmacopeia and garden) can take place. The local population has not yet fundamentally altered its forest use, although modernization is a threat to both the forest and traditions;

- the Belovezhskaya is at the meeting point of Western European and Continental European flora and fauna. Because some species such as Silver Fir, and Norway Spruce are at the limits of their ranges at the Belovezhskaya, their genetic variability and adaptiveness can only be studied at such sites.

- finally, work in Belarus is a key step in the emerging effort to achieve economies of scale and minimize the time taken for addressing disappearing resources through a series of <u>regional activities</u> through GEF Projects.

1.7 If such areas are to be protected through reclamation and restoration, several issues which have led to their current status will need to be addressed, making the GEF Project timely. A concern of resource managers and foresters is the possibility of the Central Government logging the site for revenue in the difficult economic transition ahead. Such trans-boundary issues are common for this part of Europe and solutions derived will have more general application. A central issue is the development of an appreciation and delivery of actual benefits of the local population from the forest. Neighbors can pose a long-term threat if they are systematically excluded from reaping any of the benefits of a large area set aside for specific uses.

1.8 This Project involves the surrounding rural population in both the planning and benefits of the Project and the stimulation of small nature-based enterprises. Such enterprises would provide alternative incomes and be designed to support the conservation of the protected area adjacent to the buffer or surrounding zone.

1.9 The 80,700 ha which buffers the BPF characterizes the rural Belarus life in which traditional values persist and change has not greatly impacted life

styles and material culture. Although the best data is nearly 10 years old, it is still only indicative. About 19,500 people lived in 108 villages - a density of 24/km^2. There is one State farm which tills about 27.2% of the land, 9.9% being fallow in the buffer. The remainder of the landscape consists of 36% forest, 12.3% pasture, 3.9% swamp, 1.6% water, 1.2% bush, and 7.9% unclassified. These areas would constitute the outer planning and land use zone for the BPF and would be the focus of the Conservation Plan. In this outer zone reaching about 5 km from the edge of the BPF, development is reviewed by the BPF staff who must, for example, assess the environmental impacts of industrial and agricultural development.

1.10 The Government and the people of Belarus and many in the world community are concerned at the potential loss of critical flora and fauna in parts of Belarus's forests. As a result, the Government has assistance from the Global Environmental Facility for the identification, development and financing of key biodiversity protection and management measures. Even though there is a sense of urgency to start this project, there is still time for well planned, development approaches to protect the majority of the biological systems now being threatened.

1.11 The Project would investigate both *in-situ* and *ex-situ* options to conserve biodiversity. This would support a programmed approach involving scientific study of the flora and fauna of the selected key endangered forests. This program would include an analysis of the threats to their viability from human pressures and would detail options to ensure the conservation of species considered at risk.

1.12 While the project has been accorded high priority by Belarus, sufficient funds are not available from government sources to carry out the urgent biodiversity protection work proposed here. Belarus does not want to borrow external resources for it at market rates of interest. This GEF project would provide the Government with urgently needed additional financial resources to develop a program to protect the biodiversity of plants and forests in Belovezhskaya Primeval Forest and its buffer zones in Western Belarus (see Map 1).

1.13 Protection Strategy and Project Rationale. At Bialowieza, the Polish Government has designed a program to cover the biodiversity protection needs in the Polish portion of the BPF. The agreement which initiated the application of GEF support was signed on December 12, 1991 ($4.5 million). There are many added scientific advantages in extending the program to cover the part of the BPF which lies in the Republic of Belarus. For example, the movements of pollutants and wildlife do not respect the border and cannot be understood without data from both countries. Therefore this relatively small (US$1M) but scientifically important project has been identified for implementation on the Belarus side of the border.

1.14 The objective of the GEF operation would be to support investments (including technical services) to the Belarus Supreme Soviet Council of Ministers State Committee for Ecology to carry out its biodiversity conservation management activities in Belarus. The project would complement the establishment of facilities for biodiversity protection of the Bialowieza Primeval Forest area of

Eastern Poland. A critical element of support is planned for regional initiatives which address common, recurring regional needs such as certain types of professional development (e.g. in tourism management, geographic information systems, small business and project management, conservation biology, social surveys, workshop management, etc.), a common information management system, and MaB activities. Large economies of scale will accrue to a regional approach to these needs.

II. THE FOREST AND WILDLIFE SECTOR AND THE ENVIRONMENT

A. Forest Resources

2.1 The Belarus commercial forests (exclusive of parks and preserves) cover 33.4% scattered throughout the national territory. The dominant species is Scots pine. The overall age structure of the forests is skewed, with a scarcity of old ages (generally 80-100 years depending on the species). Only 2.4% of the commercial forest are in older age classes. The dominant species, pine, spruce, oak, and beech, are well suited to enable Belarus to expand its position as a producer of high quality, high value wood and wood products.

2.2 The Belovezhskaya Protected Forest Reserve is 87,600 ha (gradually increased from 67,000 ha since 1957). Currently, 68,000 ha are natural, 9,500 are planted, 3,000 ha are wetlands, 1000 ha are consumed by Park infrastructure, and 800 ha are unforested. The average stock of commercial tree species is 265 m^3/ha with a total stock of 20.6 million m^3, 44% of which is mature. Young trees (0-40 yrs) occupy 9,800 ha, 40-60 yrs on 30,000 ha, 60-80 yrs on 9,000 ha, and 80 yrs+ on 27,800 ha. From the data presented in paragraph 2.01, the older age class is about 16 times more common in the more pristine forests of the Belovezhskaya. The species composition of the forest dominants reflects a natural state for the once vast European lowland forest:

Species	%
Scots pine	55.0
Scots pine (riparian)	3.7
Norway spruce	10.3
red oak	4.6
ash (excelsior)	1.8
hornbeam (betulosa)	0.9
birch (viricosa)	4.8
birch (pubescens)	3.4
alder (glutinosa)	15.

2.3 Ten thousand ha in the BPF of Belarus are strictly protected with no permitted use in the core area, excluding hunting for wildlife management purposes for which specific licenses are issued[4]. On the remaining abutting 77,600 ha about 25% of the more commercially attractive dead trees are salvaged. Hunting is light and sustainable with a maximum of 300-400 red deer taken (100

4/ Licenses issued for hunting in the BPF, inclusive of the core area generate an annual income of about $150,000, including permits, accommodation and guide expenses.

last year), primarily by foreign clients, and 20 bison are culled annually by local staff. About 30 wolves are killed each year. Encircling the 87,600 ha forest is an additional buffer area of 90,000 ha of mixed agriculture and forest land which is a transition buffer for the BPF. In this buffer zone commercial uses and developments must be assessed for their impacts by the BPF staff. Aerial application of fertilizers and pesticides is prohibited.

2.4 The system of Parks and protected areas in Belarus consists of Zakazniki under a temporary ten year protection program until plans can be formulated and the area is re-or declassified as Zelonia zona (protected forests around urban areas), Zapovedniki (which are strictly protected with all uses prohibited), and National Parks (primarily protected but allow some recreation). The BPF is unique in the system of reserves for both the former Soviet Union and Belarus. The "Belovezhskaya Puscha" is the only National Park in Belarus (gazetted in 1991) established both for research and for limited public access.

B. Biodiversity in Perspective

2.5 Concern is rising for the maintenance and conservation of biological diversity. Once considered an academic subject, there is now a realization that the maintenance of biological diversity influences and impacts the quality of life, productivity and stability of society.

2.6 There are many definitions for biodiversity but they all have the following common elements: biological diversity includes all living elements and their processes in some spatial arrangement; a plot, a valley, a mountain or a country. Biological diversity is assessed at the genetic, species and community level. More recently, the landscape level has become the fourth feature. Biological diversity also has some additional general features. These are living systems and as such are dynamic and ever changing. They are not static in their composition nor development over time. Biological diversity refers to both natural and man-made biological systems. In referring to biological diversity, one must consider more than mere numbers of individual components, but must consider intra-and interrelationships, interactions and processes. Natural events such as floods, droughts and natural fire all shape, impact and change the dynamics of natural diversity, but rarely shift the stability of natural system for very long periods of time. In contrast, man's influence directly or indirectly can alter permanently the stability of natural diversity.

2.7 In central Europe, including Belarus, the natural systems are subjected to a series of ecological risks including excessive inputs of toxic pollutants, pesticides and nutrients. Direct physical destruction of biological systems are taking place by land clearing, compaction, poor harvesting procedures and industrial waste. All of these activities are drastically shifting the composition and structure of biological systems to an unstable condition. For example, the forests of Belarus are currently receiving approximately five tons of pure sulphur per km^2 of forest.[5]

5/ Lonkiewiez et. al, 1990. National Report on Forestry in Poland for 10th World Forestry Congress

2.8 There are a number of strategies for the conservation and protection of biodiversity. The choice of strategy or strategies will depend on the nature of the biological system to be protected. In Belarus, there is an array of conditions that must be dealt with. As noted, some systems are seriously impacted and others are not. In addition, in the forested regions, there are both natural and man made forests. Some form of forest management has been practiced for approximately 200 years in Belarus. An element of this management has been the movement by man of tree seeds from one region to another. Thus conservation programs for both natural and highly managed systems would be considered in this program.

2.9 There are two basic forest conservation systems: *in-situ* (conservation in place) and *ex-situ* (conservation done outside the target area). Whenever possible, *in-situ* management is the most desirable and will constitute the focus of activities at the BPF in Belarus. However, the forest is a rich source of adapted plant material and will constitute a major resource for restoration activities elsewhere. In this way, both major and minor elements of the various biological systems can be protected as a unit. There will be less chance of unintentional loss of essential biodiversity with this practice.

C. Forest Biodiversity on the Belarus-Polish Border

2.10 The position of the BPF forest at the intersection of Western and Continental Europe results in an unusually rich biological community known in areas of forest diversity as an "ecological knot." There are over 900 known plant species, 220 bird species and 56 mammal species. Some guilds of mammals and birds such as the raptors (particularly owls) and Talpidae (moles) are particularly rich, while other species such as the wild ox (auroch) have become extinct in the BPF.

2.11 To illustrate the significance of the forest for endangered species, of approximately 351 European bison which reside in the former USSR, all are in Belarus. However, the 13 Bison in Pripiatsky Nature Reserve, and the 23 Bison in Berezinsky Nature Reserve and Biosphere Reserve do not constitute viable breeding populations, as they are too small and suffer inbreeding, resulting in reduced health and productivity.

2.12 Another example is the capercaillie grouse (Tetraonus gallus). It is particularly rare in this region and there are no breeding males on the Polish side of the forest. Ecological studies of habitat requirements, captive breeding, and transplant work needs to begin with the 25 males on the Belarus side.

2.13 Similarly, the silver fir is represented by only 61 individuals in the entire forest. The hydrologic factors which resulted in its decline can now be controlled, and therefore an opportunity exists to attempt to regenerate the species over its former range, before the provenance is lost.

2.14 Currently, the populations of ungulates are artificially maintained by extensive, expensive artificial feeding. The 2,000 red deer, 3,000 wild boar, 200 roe deer and 100 moose are at 2 - 3 times the carrying capacity of the native forage resources. The effects of such artificial population densities on the

natural pattern and processes of the forest including the dynamics of the 40 wolves and 40 lynx are not fully understood beyond a recognition of their artificiality.

D. Priority Areas for Protection.

2.15 Belarus forestry and environmental specialists have identified several priority forest areas for immediate attention under the proposed biodiversity protection program. In Western Belarus (See Map 1), the bulk of Project grant finance would assist Belarus in further protecting the internationally significant Belovezhskaya Primeval Forest (BPF). Some limited Project grant finance would also be provided to initiate protection efforts (linked to the BPF) in the Berezinsky and Pripiatsky Nature Reserves.

2.16 The "Belovezhskaya" Primeval forest area on the Belarus/Polish border covers some 145,000 ha., one of the last remaining natural assemblages of biodiversity in central and eastern Europe containing unique species of native plants, forests, and animals. Of the 145,000 ha, 58,000 is in Poland and 87,000 ha in the Republic of Belarus. The Belarus area is to be proposed as a UNESCO designated "Biosphere Reserve", while the Polish side already has Biosphere Reserve designation. Some unusual and spectacular species which represent relict and endemic fauna and flora include the European bison, lynx, wolf, moose, masked shrew and numerous varieties of orchids and other flora.

2.17 This forest is also of unusual ecological value because it lies at the distributional limits of several important species. The adaptive tolerance and ecological amplitude of species are often studied at the extremes of their range. Such variability is also expressed in the genome of each species. This is a critical consideration for species such as Norway spruce and oak which are experiencing extreme environmental stress and require study and experimentation. The Belovezhskaya Forest is a significant "natural" laboratory waiting to be used in the development of packages of restoration and mitigation activities in other regions of Belarus.

2.18 The international nature of the forest and the importance of coordinated management also renders the Belovezhskaya forest a useful "model" for developing coordination mechanisms essential to the survival of such transnational resources. The movement of animals, propagules, pollutants and other important management variables does not recognize the political boundaries, and necessitate coordinated management across seasonal ranges.

E. Berezinsky and Pripiatsky Nature Reserves

2.19 The biodiversity in two additional protection reserves, Berezinsky in central Belarus and Pripiatsky, in southern Belarus, is also endangered.

III. THE PROJECT

3.1 The BPF represents the largest natural remnant of the vast lowland forests which covered the greater part of the European continent. Despite human activity since Neolithic times, it has maintained in parts its basic primeval

conditions. The current natural richness and variation of the flora of BPF provides a unique opportunity to strengthen the existing protected core area of the BPF by better management, protection from local air and water pollution and an inclusion of the as yet unrepresented unique natural associations in the protected area.

A. Summary Description

3.2 The Project has the following objectives:

a. To provide the resources, financial and professional, necessary to ensure the maintenance of the current Belovezhskaya Protected Forest Reserve(BPF) as an unmodified natural system;

b. To broaden the constituency of support across government and the public for both the protection and conservation of biological diversity;

c. To integrate national efforts in biodiversity protection and conservation with international support and information networks;

d. To link the Belovezhskaya Forest Protected Reserve to the Bialowieza Primeval Forest in Poland and to maintain the linked transboundary forest as an international reference area.

3.3 The project would conserve the biological diversity of the forest ecosystems of the Belovezhskaya Primeval Forest (BPF) through two major project initiatives, the first focussing on the BPF and the second on the Berezinsky and Pripiatsky reserves. There are eight components of the BPF initiative, which is the major area of focus. These are outlined below:

B. Beloveshkaya Primeval Forest

The eight components of the BPF initiative are:

- developing a number of ex-situ and in-situ conservation measures (seed and plant parts storage and collection in-situ conservation of native populations and the determination of genetic diversity);
- developing a program of protection and management (conservation planning, expansion of protected areas, applied research);
- implementing a Geographical Information System to assist with land and conservation planning;
- fostering ecological agriculture on farms operating within and abutting the BPF;
- designing a program for mitigating local air and water pollution;
- furthering cooperation with Poland;

- providing professional development and training opportunities; and by,

- providing support for a foundation to develop a mechanism for on-going funding.

C. Berezinsky and Pripiatsky Reserves

3.4 The project would also fund specific linked activities in Berezinsky and Pripiatsky reserves which are closely linked with those being implemented for the BPF.

3.5 Immediate needs include:

- an investigation of a deadly disease of the bison;

- an investigation of the ecology of the capercaillie grouse and the conduct of a program to transplant the capercaillie grouse to ensure the persistence of this population at Belovezhskaya.

- a more in depth analysis of the scale of pollution from related biotic or abiotic hazards to communities and individual plant species. This may be especially needed for the dominant keystone tree species such as oak, ash, and Norway spruce as well as sensitive plant communities. Early pollution detection is essential before losses become permanent.

- initiation of several specific training programs such as computer uses and GIS, and new methods of the new field of conservation biology;

- collaboration with several of the transboundary studies and effort of the Polish GEF Project - seed collection and pollution monitoring.

D. Detailed Project Description

3.6 Component One. In-Situ and Ex-Situ Conservation in the BPF

In-situ conservation of a number of natural plant communities is well underway in the BPF, however, such is not the case for areas outside the protected core of the National Park. Even within the National Park, individual tree species, individual trees, selected understory plants and associated fauna are threatened. To maintain the threatened individuals, both *in-situ* and *ex-situ* conservation strategies are proposed. For the dominant woody species, individual trees 200 years or older will be the highest priority for collection and preservation of genetic material. When *in-situ* methods are not available nor appropriate, then a series of *ex-situ* methods including clone collections from trees 200 years or older will be initiated. Seed production orchards from these clones for each natural site in the forest will be established. Seed production orchards from seedlings will be established to ensure future sources of natural material for the various sites. Long term storage of seed and pollen will be also conducted at a variety of existing banks.

3.7 As knowledge accumulates for less well known taxa, a similar program would be initiated to maintain herbaceous plant material. Every effort will be made to maintain natural communities. The initial sample will also include 11 species of woody shrubs and appropriate other flowering plants that are elements of natural communities.

3.8 To accomplish the objectives of protecting existing natural plant communities in the Forest and to strengthen the natural biodiversity in the Park, the following activities would be supported under the GEF project.

- Seed and Plant Parts Collection and Storage. ($25,000)

  To ensure that only native trees are employed in both maintenance and restoration in BPF, specialized sampling, collection, and small-scale extraction equipment is required. In the case of forest trees, only very large trees 200 years or older will be sampled (to ensure their native character). To ensure that this material is viable at some future date, long term low temperature storage is required for seeds, pollen, and plant parts.

- *In-Situ* Conservation of Native Populations. ($50,000)

  Conservation of native populations will be maintained in part by the establishment of common gardens in their native sites in order to procure seeds for future restoration activities. A 1.2 ha clonal seed production stand will be developed for maintaining the progeny from 200 year old or older Scots pines and other species. The existing facilities for holding ungulates will be configured as experimental pens for food habit/nutrition and veterinary studies. Likewise, holding facilities for breeding threatened gallinaceous birds (e.g. capercaillie grouse) will be developed with appropriately trained keepers.

- Determination of Genetic Diversity. ($50,000)

  It is now feasible to determine the genetic structure and diversity of selected individual plants and animals, as well as their populations by means of iso-enzyme scanning and separation equipment. Working closely with associated Universities in Belarus, various plant and animal populations will be individually identified through these methods. Endangered animals with confused heritage and small isolated populations which are at genetic risk such as the bison and lynx, will also be evaluated, coordinated with ongoing work at zoological parks, and stud books updated.

3.9 Component Two. Protection and Management.

To support the protection of a viable and complete primeval forest at Belovezhskaya, six activities would be supported under the GEF Project:

- **Conservation Planning** ($215,000)

"Conservation" is generally defined as "wise use." It is used herein to mean a carefully planned mix of wise use and selective protection of natural resources in and around the BPF. The relationship of the Conservation Management Plan to the goals of the GEF project stated on page 2, is that the planning process will build on the results of the individual project components to fully achieve the goals inherent in the protection of biodiversity. The research components and the development of the GIS capability are examples of this interrelationship, and the Conservation Management Plan will provide the longer term framework for the protection of the biodiversity of the BPF.

PLANNING		IMPLEMENTATION		MONITORING AND PLAN REVISION
GOALS	OBJECTIVES	STRATEGIES	TACTICS	PRODUCT'S

The Conservation Plan will function to insulate the strictly protected areas of remnant natural forest ecosystems from incompatible land uses and accidental introduction of exotic species. It will also permit the continued existence of native species, such as bison, wolf, and avifauna whose ranges exceed the area (10,000 ha) under strict protection (Map 1). In keeping with the Man and Biosphere designation, uses which do not compromise the natural forest ecosystem, but which afford residents of the area economically attractive activities will be carefully planned and zoned. Project funds will support an inventory of public knowledge, desires, capabilities and needs, the development of supporting data and descriptions of candidate land uses, zoning and mapping, and a training/education component. To ensure coordination with the ten-year planning cycle of the BPF as well as regional and National land use planning, $10,000 of the funds allocated for this element will be used for a consultancy with the Central Planning Institute which is responsible for all planning.

A Conservation Plan will be developed which examines the technical, institutional, environmental, social and economic aspects of the conservation of the Belarus part of the Belovezhskaya forest. The plan will have three main goals:

(a) the conservation and management of the area's natural ecosystems and habitats;

(b) the conservation and management of the area's natural (water, land, biological), historical and cultural resources in a sustainable multi-goal/multi-use context. Specifically this implies the conservation of biodiversity, the concerns of

the needs of the local population, and associated touristic, urban, and agricultural developments; and,

(c) the evaluation of related development schemes from the perspective of conservation and sustainable development. This will involve reviewing their economic viability, social impact and environmental implications.

The plan will provide a framework for implementation and will initiate a process in which all concerned parties will have a chance to participate. It will also propose to government authorities a practical strategy, technical methodology and adaptations to existing institutional structures to ensure sustainable development and conservation of natural and cultural resources in and around the area. It will ensure clarity of goals, objectives, strategies and factors in the common understanding of tasks, responsibilities and authorities for all participants. This is essential for morale as well as efficiency.

Project funds will support an inventory of public knowledge, desires, capabilities and needs, the development of supporting data and descriptions of candidate land uses, zoning and mapping, and a training/education component. The conservation plan objectives will be to provide guidelines to decision makers, at the Republic and local levels, for the conservation of crucial and irreplaceable natural ecosystems and cultural resources, while assisting in creating an ecologically and economically viable future for the area's human population.

The Planning Process will involve the following phases:

(a) Identification of the significant resources of the BPF, the agricultural lands around the BPF, and the threats and trends on these resources;

(b) Development of appropriate management objectives for the sustainable protection of these resources. These objectives will be measurable indicators which will reflect the goals of the project (page 2). They can be used in project monitoring and supervision;

(c) Development of appropriate management strategies, including the investigation of a legislative basis to support the provisions of the final plan;

(d) Production of a Draft Conservation Plan and a public consultation process; and,

(e) Production of a final plan and acceptance by government.

Methodology - It is expected that the Conservation Plan will be produced within 18 months from the start of the GEF project. A Steering Committee would be established to manage the project and a consultancy team composed mainly of local consultants would be assembled for the project. The project will need to a adopt a multi-disciplinary approach. An initial planning workshop would be held in May, 1993 with wide participation to refine the goals, issues and Terms of Reference for the project and detail the scope of the plan activities and the planning process.

Assistance will be sought from appropriate government agencies, particularly the Planning Institute which is currently developing a ten year plan for the region. In addition, academic institutions will be involved in the plan's preparation.

Meetings will be held at each stage of the planning process, with relevant senior government officials to discuss and refine their tentative observations, conclusions, and recommendations. These discussion meetings will enable the planning team both to receive information and to discuss ideas and issues. The meetings will operate at the local and national level. Locally, government staff, representatives and members from community groups and resource users such as farmers, forest managers and potential business enterprises will be contacted.
Annex 4 further identifies the planning activities and tasks and provides a proposed Conservation Plan format.

- The Expansion of Protected Areas to Include Remaining Natural Associations ($15,000)

The viability of such a small area needs to be further protected. On the Polish side, only 35 percent of the natural forest associations enjoy strict protection. The remainder is vulnerable to timber harvesting activities. However, they have been identified and once located, can be protected. In the Belarus BPF, the location of endangered remnant communities needs to be investigated through a survey of relict natural forest associations and rare taxa.

- Supporting Applied Research. ($100,000)

Because of the urgency of protecting the biodiversity of the BPF and the considerable information from three decades of research in the area, the identification of areas for protection can be made. However, not enough is known about the BPF ecosystem pattern and process to permit the designation of keystone species and other management elements important to the Conservation Plan. For example, a "protected area net" needs to embrace the seasonal ranges of important wildlife species. Knowledge of nutrient and chemical cycles will enable the natural restoration of abandoned marginal farmland. To achieve the biodiversity goals of the GEF project, some initial applied research has been designed in three

topical areas of concern to support the other elements of the Project:

(1) social and economic studies of the demographic characteristics of residents, their attitudes and decision processes, and their uses of the natural resource base;

(2) forest pattern studies of ecosystem composition, distribution and structure; and

(3) studies of forest ecosystem processes which define the forest and will enable management and rehabilitation in the buffer.

The Director and Staff of the Research arm at the BPF have a very clear set of research priorities which fall into the three categories and which are completely consonant with the goals of the GEF Project:

Highest Priorities

1. Studies of the bison disease issue, the highest priority of all studies as the potential for a catastrophic loss is clear;

2. Studies of the genetics, ecology, captive breeding, and translocation of the capercaillie grouse, as well as two other species of gallinaceous game birds. With the only remaining 25 males left in the BPF, Belarus does not wish to dilute adapted populations by introducing genetically different birds.

Others

1. Studies of the natural movements of the bison, their tranquilization, and translocation;

2. Studies of the movements of the primary wild ungulates (moose, roe and particularly red deer, and boar).

3. The population dynamics of the wild ungulates which will provide information for the reduction of these populations as they are managed toward carrying capacity and away from artificial feeding. The reduction must mimic natural populations and processes as much as possible.

4. The distribution of ungulate species by habitat types. This information is basic to planning and managing land uses around the forest and assessing the impacts of such management on wildlife. This particularly applies to the management of wildlife in managed forests, and the mitigation of animal damage to forests and crops;

5. Telemetric studies of the movements of predators - initially wolves and lynx. This closely complements work in the Polish BPF.

6. Continuation of the major studies (150 one ha plots) of forest dynamics/plant succession underway since 1952. Innovations would involve gradient analyses (correlations of plant communities with environmental variables such as soil type aspect, micro-climate etc.) employing GIS.

7. Now that control of ground water is possible, attempting the re-introduction/dispersion of silver fir from the existing 22 trees;

8. Introducing an experimental demonstration farm of 2000 ha to test ecological agriculture;

Research Activities Funded in Other Portions of Project

1. Clarification of the genetic structure of the bison in Belarus, Poland, and the Caucasus, as well as in zoos;

2. Preserving the genetic resources of ancient oak, pine, and spruce stands through the use of cuttings, animal control, seed tree cuts, orchard plantings, and seed banking in cooperation with Polish scientists;

3. Ethnobotanical studies of traditional human uses and knowledge of the forest.

4. Studies of discrete population groups based on attitudes toward nature and natural resources, and their decision-making process.

- **The Application of Environmental Impact Evaluations.** ($25,000)

Adapting existing protocols for the conduct of environmental (including social) impact evaluations will insure that appropriate uses are fostered in the buffer zone. Many of the problems which plague the BPF could have been avoided or mitigated with such procedures.

- **"Man and the Biosphere" Unit at Belarus.** ($15,000)

The Belovezhskaya Primeval Forest has been proposed as a "Man and the Biosphere" Reserve. The existing designation needs to be activated to provide the oversight, coordination, brokering and information dissemination activities which the innovations of this integrated approach to biodiversity protection require. An important element is the active participation of local NGO's. A very modest MaB Unit at Belovezhskaya will be started and supported through the GEF project.

In many significant ways, the MAB activities will foster the scientific cooperation which is described next.

- **End-of-Phase I Meeting and Transition.** ($25,000)

  The results of research, the public review of the Conservation Plan, and opportunity to incorporate results and reactions in an updated Plan will be achieved during a review/plenary meeting marking the termination of Phase I of BPF activities. This meeting is expected to be held in late 1993. The resulting plan will be the product of all parties of concern. It will constitute the basis of a package of future additional investments for the land uses compatible with biodiversity goals of the BPF.

3.10 **Component Three. Computer Assisted Mapping (GIS).** ($185,000)

Because the changes and impacts on species and communities are uneven and have various degrees of significance in terms of stability of the system involved, there is an urgent need to remap the BPF in light of hazard assessment. Because of the complexity of the potential data base for such an assessment, a GIS (Geographic Information System) would be included for data management under the project (Explained more fully in Annex 6).

3.11 **Component Four. Ecological Agriculture** ($50,000)

One State farm operates within the Belovezhskaya Primeval Forest. Primary production focuses on basic grains (wheat, rye), forage crops, and potatoes. Dairy and pork production are the primary cash producers, and many of the farm personnel also work as loggers in the abutting forest. This project component would foster expansion of ecological farming practices and provide technical assistance and cash incentives as necessary to farmers to shift from chemicals to ecological agriculture. This component would be managed by specialists recruited for this purpose by the Project Technical Management Unit. Funds from the project would support pay for these specialists and for their technical analysis of the impact in the Belovezhskaya Primeval Forest of changing from conventional farming methods to ecological chemical-free farming methods on small family farms on (a) farm yields, farm income, and farm employment; (b) soil, water, and product quality; and, (c) would estimate and compare the costs of these two farming systems on farms in the Belovezhskaya Primeval Forest (details given in Annex 5).

3.12 **Component Five. Risk assessment of Pollution - Monitoring and Mitigation.** ($100,000)

The Belovezhskaya project area is impacted by both air and water pollution. Air and water monitoring within the project area would be carried out with project support and sources of both air and water pollution within and abutting the project area would be identified. Once these sources are located and identified, project funds would support the detailed engineering and designs for the installation of mitigation equipment to eliminate local pollution impact on the project area. One possible idea would be the conversion of coal-burning steam generation plants to wood-burning operation.

3.13 In order to determine the pollution load on individual plant communities both in the BPF and the buffer zone, a mobile automatic air and soil monitoring station is required. To determine the impact of pollution on individual woody and herbaceous plants reproductive systems, a non-destructive x-ray sampling machine is needed. To manage and process the data from the risk assessment activity, a high powered personal computer with cartographic plotter is necessary.

3.14 An array of field data including temperature, moisture, irradiation, and wind instruments are required on a routine basis to complete field measurements. In order to protect sensitive lab equipment and ensure quality laboratory data, electric power stabilization equipment is necessary.

3.15 Component Six. Scientific Cooperation at Belovezhskaya with the Republic of Poland in Forest Management. ($20,000)

Some 40 percent of the area of the Bialowieza Primeval Forest is in the Republic of Poland. Regular meetings of local scientists from Bialowieza (Poland) and Belarus have begun to explore joint efforts in scientific forest protection and management as well as the exchange of scientific data on pollution sources, wildlife populations and foraging impacts, and mapping of possible future abutting protected reserves (Map 2). These scientific contacts would be encouraged under the Project with funds provided to support quarterly local scientific meetings at the Belovezhskaya Station. This initial work should contribute substantially to the proposed investment and technical support prepared for the Poland zone of the Bialowieza Forest ecosystem for which $1.5 million has been provided for a separate, but complementary GEF project (see Annex 7).

3.16 As part of the project, a joint "Coordination Program" would be prepared by Poland and Belarus within nine months of grant signing. This "coordination program" would specify the joint conservation management actions to be taken by each party. A side letter to the Belarus grant agreement would be prepared on this issue and that a similar side letter would be prepared and sent to the Polish Government as a clarifying amendment to their December 12, 1991 agreement with the GEF.

3.17 Component Seven. Professional Development and Training ($90,000)

Support for professional development and training is an integral element of the Project. Funds are to be provided for training in biodiversity protection, mitigation of tourism-related impacts, GIS, mitigation planning, small business development and management, information and data base management, and other selected topics.

3.18 To ensure that current concepts of biodiversity are applied and equipment is properly employed, additional professional and staff training is required. Such activities include on-site training, seminars, and attendance at professional meetings inside Belarus, and externally. This element will support regional training initiatives as well.

3.19 Component Eight. Support For Belovezhskaya Primeval Forest Foundation ($15,000)

To sustain the biodiversity protection program for the foreseeable future, a Belovezhskaya Primeval Forest Protection Foundation is proposed. The GEF would organize the legal and financial structure of such a Foundation and encourage contributions from eco-debt conversion resources and from bilateral and international (EC, Foundations, etc.) donors. Some $15,000 would be expended from the initial GEF Core Grant to develop the legal and financial underpinnings for the foundation, operating procedures and the terms of reference for its operation.

3.20 II. Biodiversity Dependencies between Belovezhskaya, Berezinsky and Pripiatsky ($100,000)

There are six biodiversity protection initiatives that are essential for the successful protection of key species and components of the internationally significant biodiversity of the Belovezhskaya. For technical reasons these cannot be carried out in the Belovezhskaya alone,and must include suitable sites found in Berezinsky and Pripiatsky reserves. This approach has been agreed to by the management of both areas.

3.21 These initiatives are:

- Preservation of the European Bison

  The bison population at Belovezhskaya of 315 animals is under a serious disease threat for which no treatment has as yet been devised. The Pripiatsky and Berezinsky reserves already contain populations of bison which are too small to be genetically stable and need to be increased. There are two aspects to the issue - the first, loss of viability through inbreeding. In fact the populations were all greatly reduced at the end of the First War - the first bottleneck. The outlier population near Berezinsky was founded from 5 animals from the Moscow zoo. A population of at least 50 is needed to avoid inbreeding. Two such bottlenecks are potentially serious and an evaluation of the genetic structure is needed as soon as possible, with the goal of outbreeding from the likely existing founder effects. If it is not evaluated and a mixing of the herds effected, reductions of viability, disease resistance, productivity, milk production and other predictable consequences of loss of heterozygosity can be expected. One can speculate on the possible contribution of such effects to the serious disease of male bison at Belovezhskaya. The three Reserves must be managed together as a single gene pool, preferably in this Project. The second aspect is the location of suitable areas as transplant sites. These can be former bison range areas in the region which have the carrying capacity to support a minimum critical population. Surveys for such areas need to be well informed (e.g. about movements and feeding ecology), and be cooperatively initiated within Belarus or bilaterally.

- **Preservation of the Capercaillie Grouse**

  The capercaillie, like the American turkey, is represented by local populations, many of which are now greatly reduced in number. The populations are distinctive and transplants tend to dilute the fitness and adaptability of the host populations. The birds of Bialowieza are near extirpation, e.g. no males have been found on the Polish side of the Bialowieza Primeval Forest and should be managed from the local population to preserve this important element of the original biota in this threatened forest system. Substantial experience with breeding and maintaining the endangered capercaillie grouse has been achieved at Berezinsky. As part of the recovery program at BPF (particularly on the Polish side) this technology needs to be transferred to achieve the goals of Component 3 of the Project.

- Genetic Resources Management Policy

  The appropriate policy responses to the work at Belovezhskaya, will be more broadly acceptable if the work has been linked to other elements of the resource management system of Belarus in other parts of the country. These should include a genetic resources management policy which addresses and defines the constraints on translocations of genetically distinct populations and animal damage control policies (deer damage to forest regeneration, rogue bear control, etc.).

- Migratory species

  The three reserves share avifaunal resources and have wetlands and share other similar habitats and the same species of birds. The effects of Chernobyl have not been looked at in terms of this potential agent of dispersal. Migratory bird management and its meaning for rare species such as the black stork needs coordination.

- **Training and Technical Coordination**

  Large economies of scale in professional development will accrue with region-wide training programs. A consultant in, for example Geographic Information Systems, small business development, public relations, or tranquilizing and transplanting animals can deal with 15 participants as well as two. Beyond the value of getting vital methodologies and procedures down quickly, the contacts and interactions of colleagues dealing with the same regional issues can greatly facilitate, for example, the identification and permitting of bison dispersal across boundaries.

- **Data Management**

  Standards for measurements, procedures, and data base management need to be discussed and agreed upon in the three Reserve areas. The same analytic hardware and software systems will be required to effect

data exchanges. Maps should be in the same baseline scales. A common access to an on-line data base such as the key word searchable Dialog data base for forestry, wildlife, Park management, and agriculture is needed to insure that research is informed by the global experience.

E. Project Costs and Financing

3.22 Estimated project costs are as follows (detailed project costs are given in Annex 3):

COST ESTIMATES
(Current US$ Thousands)

	US$ in Thousands		
	Local	Foreign	Total
A. Belovezhskaya National Park			
1. Conservation of Biological Diversity	20	105	125
2. BPF Protection and Management	26	212	238
3. Geographical Information System (GIS)	9	191	200
4. Ecological Farming in Buffer Zone	23	28	50
5. Pollution Monitoring & Mitigation	0	190	190
6. Coordination w/ Poland	20	0	20
7. Professional Development & Training	0	70	70
8. Support of a Bialowieza Foundation	0	15	15
Sub-Total	**97**	**810**	**908**
B. Berezinsky and Pripiatsky Protected Reserves	50	50	100
C. Project Management	**80**	**50**	**130**
D. Joint Scientific Review Committee	**7**	**13**	**20**
Total BASELINE COSTS	**234**	**923**	1157
Physical Contingency	10	44	54
Price Contingencies	7	32	39
Total PROJECT COSTS	**251**	**999**	**1,250**

Project Financing Estimated project financing plan is as follows:

Table 3.2 PROJECT FINANCING PLAN
(US$ Thousands)

COMPONENT	GEF CORE PROGRAM	GOVERNMENT	COMMITTED BILATERAL GRANTS	TOTAL	FOREIGN EXCHANGE	LOCAL
A. BELOVEZHSKAYA NATIONAL PARK						
1. Conservation of Biological Diversity	205	20	—	225	205	20
2. BPF Protection and Management	212	26	—	238	212	26
3. Geographical Information System (GIS)	191	9	—	200	191	9
4. Ecological Farming in Buffer Zone	30	20	—	50	30	20
5. Pollution Monitoring & Mitigation	100	—	—	100	100	—
6. Coordination w/Poland	—	20	—	20	—	20
7. Professional Development & Training	70	—	—	70	70	—
8. Support of a Bialowieza Foundation	15	—	—	15	15	—
SUB-TOTALS	813	95	—	908	813	95
B. BEREZINSKY AND PRIPIATSKY PROTECTED RESERVES	100	—	—	100	50	50
C. PROJECT MANAGEMENT	130	—	—	130	50	80
D. JOINT SCIENTIFIC REVIEW COMMITTEE	13	7	—	20	13	7
TOTAL BASELINE COSTS	924	234	—	1,158	924	234
Physical Contingency	44	10	—	54	44	10
Price Contingencies	32	8	—	40	32	8
TOTAL PROJECT COSTS	1,000	250	—	1,250	1,000	250

3.23 Core financing for this project would be provided by the GEF ($1.0 million) and by the Government of Belarus. There may be other important investments that would could attract cofinancing partners which would be identified.

F. Procurement

3.24 Goods and equipment listed in Annex 1 would be carried out through international shopping with a minimum of three quotations from two different countries. Bidding documents would be reviewed to ensure that they are satisfactory to the Bank. Consultant services would be obtained in accordance with the World Bank guidelines on the use of consultants. The estimated procurement plan is as follows:

Table 3.3 PROCUREMENT METHOD
(US$ Thousands)

Items	Procurement Method		
	IS & DP[2]	Other[3]	Total
(1) GIS, Air Monitoring and Supporting Equipment,	400.0 (400.0)	– –	400.0 (400.0)
(2) Technical Assistance	– –	400 (400)	400 (400)
(3) Salaries, Operations and Maintenance	– –	450 (200)	450 (200)
TOTAL	400 (400)	850 (600)	1,250 (1,000)

NOTE: FIGURES IN PARENTHESIS ARE GEF GRANT

1/ Local Competitive Bidding for civil works

2/ International Shopping and Direct Purchase.

3/ Includes services procured under Bank's consultant guidelines.

G. Disbursement

3.25 A special account would be established in a Bank acceptable to the World Bank. An initial deposit of $100,000 would be made into this account by the World Bank. 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. The account would be replenished upon submission of this documentation. The Disbursement Plan for GEF grant funds is as follows:

Table 3.4 DISBURSEMENT PLAN

	Items	Disbursement	
		Amount (US$ million)	% Financing
(1)	Goods and Equipment	0.3	100%
(2)	Technical Assistance	0.3	100%
(3)	Salaries, Operations & Maintenance	0.3	100%
(5)	Un-allocated	0.1	
	TOTAL	1.0	

H. Accounting, Reporting and Auditing

3.26 The project accounts would be audited annually by a firm whose qualifications are acceptable to the World Bank. A quarterly report on Project progress and statements on project expenditures would be submitted to the World Bank by the Project Manager.

I. Monitoring, Supervision and Evaluation Plan

3.27 Since the Project involves a series of innovative components, including an innovative ecosystem protection program for the Project area, a detailed monitoring, supervision and evaluation program has been developed (See Annex 1). The project would be supervised by the World Bank three times a year, normally in conjunction with the supervision of the Polish GEF Forest Biodiversity Project.

IV. PROJECT IMPLEMENTATION

4.1 The Council of Ministers would be responsible for the overall implementation of the project. A list of project institutional responsibilities is given in Annex 4.

4.2 Project Management.

Technical Management Unit. This independent unit would be established by the Council of Ministers prior to the initial grant disbursement. It would be physically located at Belovezhskaya Puscha and work within the Research Center. One full time Project Technical Manager supported by a Scientific Advisor and two assistants would be appointed. 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.

Administrative Coordinating Unit. A supportive Administrative Coordinating Unit would be established in Minsk in the Council of Ministers. This unit would be provided to expedite investments from the Special Account, to facilitate international communications, to coordinate international professional development training, to expedite the outreach applied research conducted outside of the Belovezhskaya Project area, 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 appointed to head this unit should have strong language, communication and project management skills including and ability to maintain the necessary accounting and procurement procedures. One clerical assistant would also be appointed.

Overall coordination of the project will be the responsibility of the Chief of the Economic Organizations Department of the Council of Ministers.

4.3 Joint Scientific Review Committee

A Joint Scientific Technical Committee of six scientists, three internationally selected (wildlife in managed forests, conservation biology, and a land use specialist) and three from Belarus in related disciplines would be established no later than November 1, 1992. The qualifications and experience of the members of this Committee would be acceptable to the Bank. The Chairman would be designated by the Council of Ministers and the Review Committee would meet semi-annually to advise on the scientific progress under the Project. Expenses (travel, subsistence and honoraria for both Belarus and external) would be supported from the Project ($30,000).

4.4 A number of additional organizations would be sub-contracted to carry out specific activities (Annex 4). The proposed Project Management Units, 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 Units. Among the additional organizations that would be contracted to carry out project activities under the Project are:

The Man and Biosphere Unit, which will be constituted under the project, will be specifically responsible for conservation and transition planning at Belovezhskaya Primeval Forest. This unit with a staff of one will be attached to the Technical Management Unit.

Pollution Monitoring and Mitigation at the BPF will be carried out by a private sector engineering/environmental firm to be selected under World Bank procedures.

V. NEGOTIATIONS, EFFECTIVENESS AND DATED COVENANTS IN THE GRANT AGREEMENT

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

(a) Joint Scientific Committee. The Council of Ministers shall establish a Joint Scientific Committee no later than February 28, 1993

(b) Grant Effectiveness. The Grant would be declared effective upon submission of documentation satisfactory to the Bank that the Project Technical Manager and an Administrative Coordinator, whose qualifications and experience are satisfactory to the Bank, has been appointed and a separate account, subject to internationally accepted auditing standards, has been established.

(c) Accounts. A separate account would be established in a Belarus bank prior to disbursement of the grant. This account would be audited annually by an auditing firm acceptable to the Bank (para. 3.18 and 3.19).

(d) Project Management. An Administrative Project Coordinating Unit would be established in the Council of Ministers prior to disbursement of the grant.

(e) MaB Application Formal application by a Project Technical Management Unit would also be established and maintained in the Bialowieza Project area and will be made to the UNESCO MaB Secretariat in Paris for the designation of the Belovezhskaya as a Biosphere Reserve.

VI. PROJECT BENEFITS TO BIODIVERSITY IN BELARUS

6.1 The Belovezhskaya Primeval Forest protection program in eastern Poland is directed to protect the last remains of a unique low level forest ecosystem. By expanding its buffer zone, by linking protected reserves in the Forest, and by initiating natural restoration within the Forest, it is both possible and feasible to essentially restore a wide range of natural ecological processes that in a relatively short period of time can heal the wounds caused by man's inappropriate practices.

6.2 The forests of Belarus 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 restore the genetic variability of these forests and as such productivity in the fullest sense can also be restored. In essence, the project 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.

6.3 The Project's specific benefits would:

- greatly reduce the genetic erosion and losses of genetic resources which are part of the heritage of nature. In the Belovezhskaya, this program of genetic conservation addressed the 113 known forest associations, two-thirds of which are not yet protected. This GEF Project strategy is important in assuring the maintenance of the forest fauna as well as flora. The endangered bison, for example, are known to consume 350 species of forage plants, thereby requiring a comprehensive representative of these forest ecosystems.

- 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 destroying 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; and

- 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 not adapted species by better adapted ones and tree improvement programs.

GLOSSARY

Afforestation:

Establishing trees on lands where they have not previously grown.

Biological Diversity (biodiversity):

The variety and variability among living organisms and the ecological complexes in which they occur.

Biosphere Reserve:

A unique category of protected areas combining both conservation and sustainable use of natural resources. Each biosphere reserve conserves example of characteristic ecosystems of one of the world's natural regions.

Buffer Zone:

An area surrounding a conservation or protected are which is extensive enough to insulate the protected core from the dispersion of exotic genetic material. Land uses in a buffer zone must be compatible with its primary function of maintaining the core.

Clone:

Group of genetically identical plants produced by vegetatively propagating a single plant over one or more vegetative generations.

Coppiced Forest:

A forest of trees grown from re-sprouts of the stumps following harvesting.

Ecosystem:

A community of organisms interacting with one another and the environment in which they are found. Ecosystem boundaries are often physical (such as watersheds, fields, or lakes).

Ex-situ:

The management of planted stands of trees outside of their natural range; the conservation or preservation of trees as seed, pollen, tissue culture or excised plant parts.

Gene bank:

An institution or center that participates in the management of genetic resources, in particularly, maintaining *ex-situ* or *in-situ* collections.

Genome:

Sum total of an organism's genetic information i.e. all hereditary traits.

Geochemical Cycling:

The movement of mineral elements and organic nutrients in an ecosystem.

Geographic Information System (GIS):

Employs an array of spatial information (maps) and displays such data as themes (forest cover, pollution damage, habitats, etc.) to overlay, spread or otherwise objectively analyze and display the solution to a land management problem.

Germplasm:

Living reproductive material including pollen, seeds and plants and their parts.

Germplasm collection:

A collection of many different varieties, species or subspecies representing a diverse collection of genetic material.

High Forest:

Forest consisting of trees grown from seed.

In-situ:

The managing of organisms in their natural state or within their normal range.

Keystone species:

A plant or animal species which largely determines the stability of an ecosystem through its functions in key processes such as reproduction or nutrient cycling.

"Man and the Biosphere":

A conservation, scientific and management program of the United Nations Educational, Scientific and Cultural Organization.

Provenance:

Origin or source for trees, an identifiable region in the natural habitat of a species from where the seed of the trees originally came.

Reforestation:

The introduction of trees on land from which they had previously been removed.

Seed Production Orchard (Seed Orchard):

A collection of selected trees planted and managed for the purpose of producing seeds.

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BELARUS

FOREST BIODIVERSITY PROTECTION PROJECT

MONITORING, SUPERVISION AND EVALUATION PLAN

I. Introduction

1. 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:

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 (Council of Ministers, Balovezhskaya Forest). This will probably not be unusual for such new technical concerns as biological diversity 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. As was the case with the response to the Environmental Impact Assessment requirements of the initial U.S. law of 1969 (NEPA), there is the distinct danger of a paper blizzard with lots of raw monitoring data but little analysis and <u>useful</u> 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. Three supervision missions are planned for each year of the proposed two year project implementation period (estimated at about 2 weeks each, with 1 week of report writing on return). Each of these missions should have the flexibility to adapt to the conditions at the time. The Core Team would include Task Manager, the forest wildlife ecologist, and the parks specialist supplemented by additional scientists. The first supervision mission is proposed for April 1993. At this critical juncture, the initial Joint Scientific Committee (Belarus-Poland) workshop would be held, equipment and

infrastructure procurement would be underway, the MAB staff would be finalized, the GIS implementation plan completed, and the applied research initiated. The second supervision mission will take place in July, 1993 when the work is largely in progress, and the initial JSC meeting with Polish counterparts would be scheduled. The penultimate supervision mission would occur in September, 1994 for the End-of-Phase I meeting which will summarize progress, and the land use demonstrations are just underway.

Proposed Staffing Pattern	April 1993	July 1993	October 1993	April 1994	July 1994	Sept 1994	June 1994 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	-	-	-
Ecological Farming Specialist (Trust Fund) non-GEF	1	1	-	1	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

5. 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 10 staff weeks of the specific scientific supervision work on the GIS, Ecological Agriculture and air and water monitoring work to be eligible for non-GEF Trust Fund support. This would leave a direct divisional supervision charge of 17 weeks for the full project, which is in line with regular GEF supervision co-efficients on an annualized basis (12 staff weeks per annum).

6. Evaluation:

As part of the project, a Joint Scientific Review Committee is to be established. This committee, half of which will be composed by international scientists, will advise on the scientific progress under the project. As importantly, they will monitor and evaluate the project particularly as it relates to:

- the protection of biodiversity
- the aims and objectives of the Global Environmental Facility

The Review Committee will also address the suitability of the initiatives taken in this project to other areas, and evaluate the success or otherwise of any of the stated "innovation."

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BELARUS

FOREST 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 travelsheds 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 BELOVEZHSKAYA PUSCHCHA

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 and bison), 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 elaborated in Annex II, 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 Puschcha. 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/Belovezhskaya												
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 anlysis												

BUDGET

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

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. 386 PC or 486 PC VGA Graphics Card 5.25 & 3.5 inch disk drives 300 Megabyte Hard Disk Math Co-processor Mouse	2	7,000	14,000
B. Hi-resolution Color Monitor	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

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* 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 Belovezhskaya Puschcha, 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.

BELARUS

FOREST BIODIVERSITY PROTECTION PROJECT

DETAILED PROJECT COSTS

PROJECT TASKS AND TIMELINE

TASK

1. Risk Assessment of Pollution - monitoring and mitigation ($100,000)
   - 1.1 Monitoring/plotting pollutants with Polish GEF
   - 1.2 Hydro-meteorological monitoring
   - 1.3 Plan and initial support for alternative energy

2. Seed and Plant Part Collection and Storage ($25,000)

3. In-situ conservation of native populations ($50,000)

4. Determination of Genetic Diversity ($50,000)
   - 4.1 Isozyme analysis of old and endemic plants
   - 4.2 Genetic loci analysis of bison from tissue samples

5. Expansion of Protected Areas to Include Remaining Associations ($15,000)
   - 5.1 Plant surveys
   - 5.2 Cadastral surveys
   - 5.3 Enabling legislation

6. Conservation Planning ($215,000)
   - 6.1 Establish steering committee/secure consultants
   - 6.2 Integrated planning workshop - goals/issues/activities
   - 6.3 Scoping (public and agency review)
   - 6.4 Data collection
   - 6.5 Thematic mapping/GIS
   - 6.6 Analysis
   - 6.7 Constraint analysis
   - 6.8 Plan preparation and alternative generation
   - 6.9 Develop business plans
   - 6.10 Environmental assessment
   - 6.11 Public review of draft
   - 6.12 Final Conservation Management Plan

7. Computer Assisted Mapping ($185,000)
   - 7.1 Study tour of GIS centers of excellence by PD
   - 7.2 Workload analysis
   - 7.3 Initiate training overseas
   - 7.4 GIS implementation plan with coordination review
   - 7.5 Procurement and facilities enhancement
   - 7.6 In-situ training

7.7 Initial analyses

8. Supporting Applied Research ($100,000)
   - 8.1 Bison disease
   - 8.2 Bison genetics
   - 8.3 Bison movements/behavior/translocation
   - 8.4 Ecology and breeding of endangered grouse
   - 8.5 Ungulate movements
   - 8.6 Ungulate population dynamics and harvesting
   - 8.7 Ungulate habitat use and forest/farm damage
   - 8.8 Predator movements
   - 8.9 Soil insects as bioindicators of pollutants
   - 8.10 GIS analysis of ants and forest nutrients
   - 8.11 Forest dynamics and succession
   - 8.12 Natural forest regeneration and experimental harvests
   - 8.13 Ecological effects of harvesting of dying trees
   - 8.14 Dispersion of silver fir
   - 8.15 Preserving ancient stands-cuttings/animal control/seeds
   - 8.16 Effects of pollutants on moribund stands
   - 8.17 Chernobyl radiation in natural vegetation
   - 8.18 Experimental farm for ecological agriculture
   - 8.19 Ethnobotanical studies of traditional forest uses
   - 8.20 Determine local population groups/attitudes/decisions

9. Application of Environmental Impact Assessment ($25,000)
   - 9.1 Public and agency Scoping
   - 9.2 Project systems workshop
   - 9.3 Top-up existing data from Conservation Plan
   - 9.4 Cost:benefit analysis of alternative Plan actions
   - 9.5 Cumulative effects analysis
   - 9.6 Mitigation and monitoring plans

10. Man and the Biosphere at Belovezhskaya ($15,000)
   - 10.1 Coordination with Belarus MaB
   - 10.2 Coordination meeting with Polish MaB at UNESCO
   - 10.3 Biosphere Reserve application

11. Scientific Cooperation at Bialowieza with Polish GEF ($20,000)

12. Ecological Agriculture ($50,000)

13. End of Phase I Meeting and Transition ($25,000)
   - 13.1 Display products and plans at donor meetings

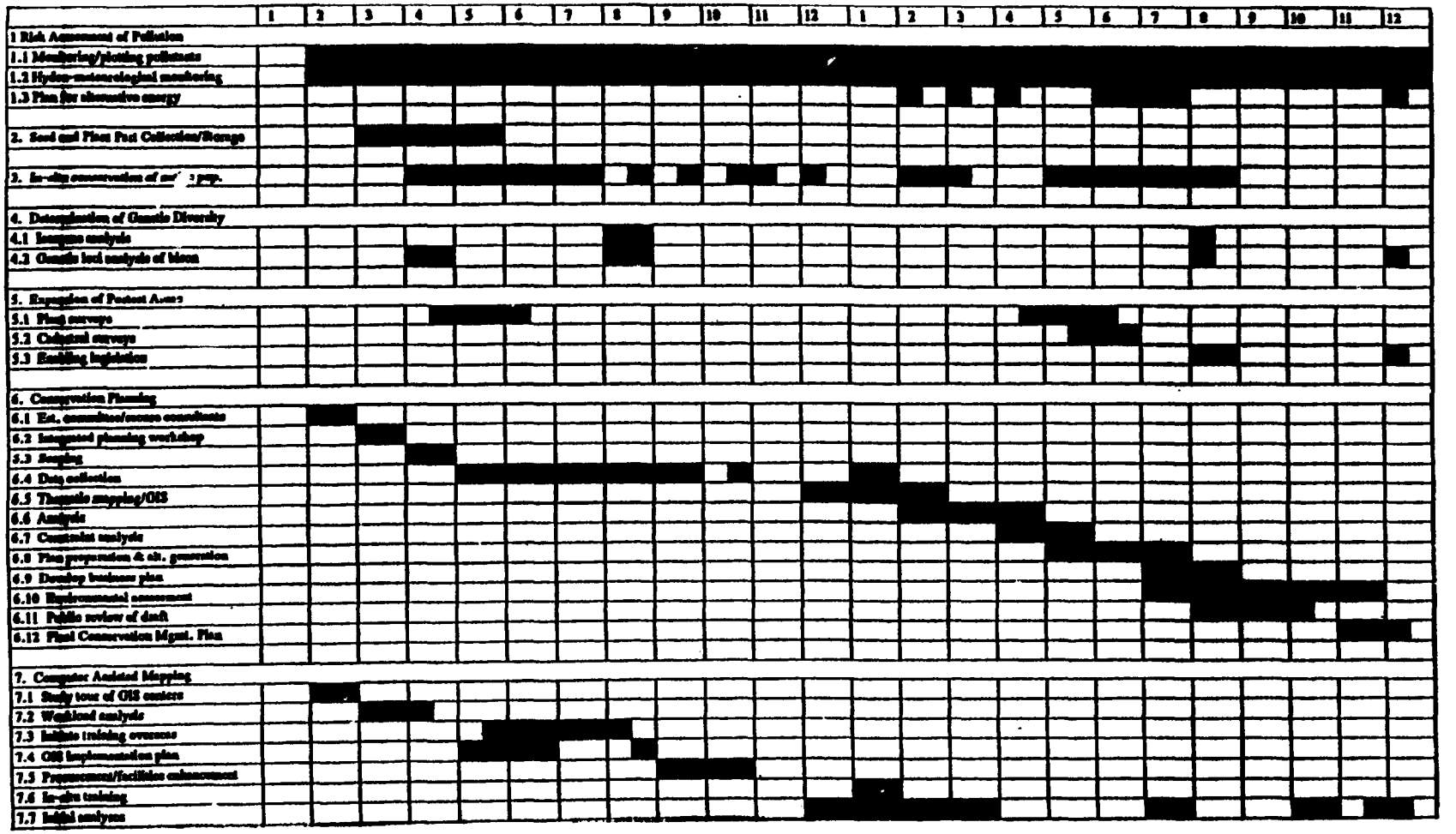
14. Developing the Bialowieza Transnational Foundation ($15,000)

15. Professional Development and Training ($90,000)
   - 15.1 Elaborate training plan in detail
   - 15.2 Assign Project TA to administer logistics
   - 15.3 Develop MOU's with relevant institutions
   - 15.4 Initiate professional development

16. **Project Management ($100,000)**

17. **Joint Scientific Review Committee ($30,000)**

18. **Biodiversity Dependant Applied Research Outreach ($100,000)**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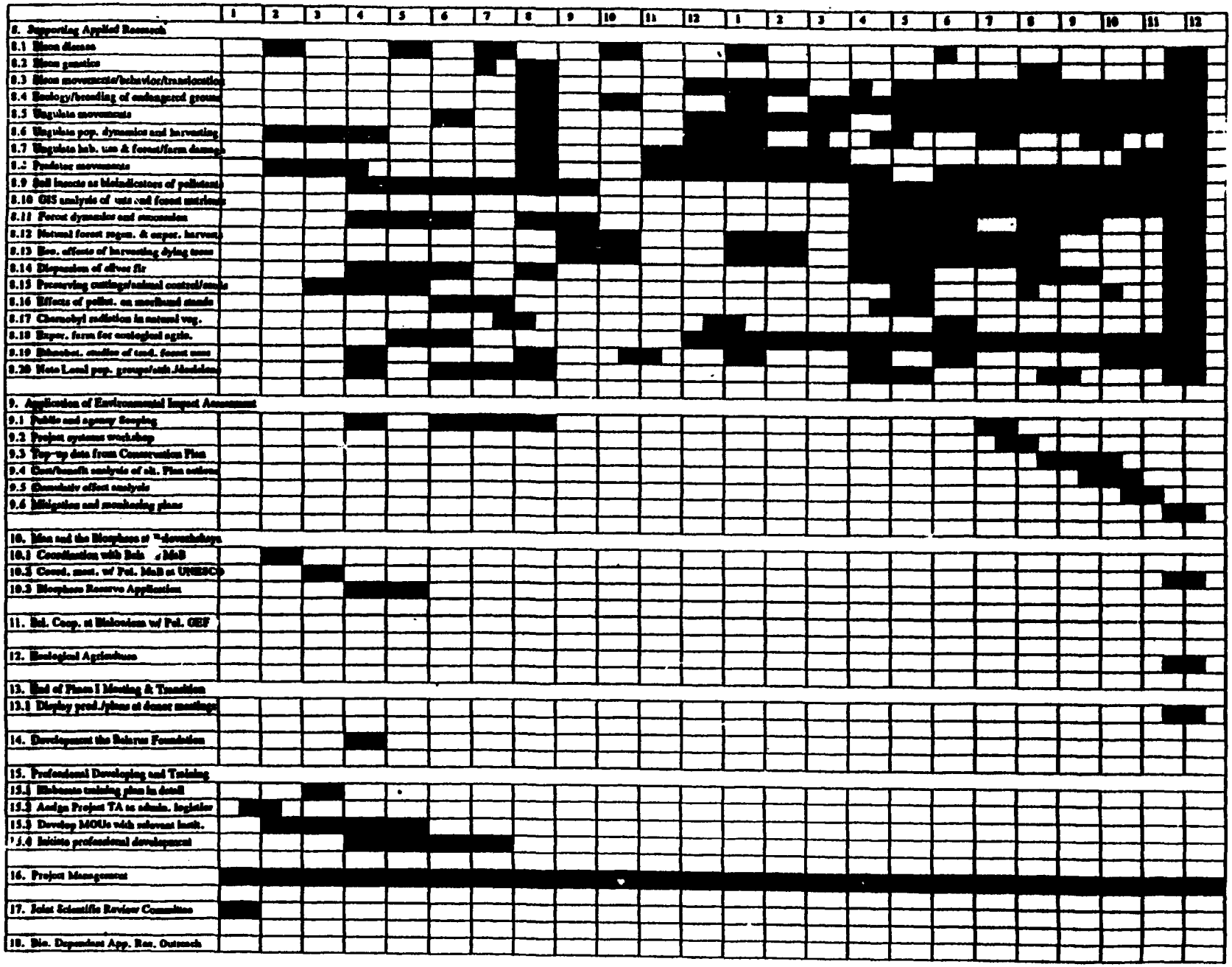
1 Risk Assessment of Pollution
1.1 Monitoring/plotting pollutants
1.2 Hydro-meteorological monitoring
1.3 Plan for alternative energy
2. Seed and Plant Pest Collection/Storage
3. In-situ conservation of
4. Determination of Genetic Diversity
4.1 Isozyme analysis
4.2 Genetic level analysis of bloom
5. Expansion of Protect Areas
5.1 Flora surveys
5.2 Cultural surveys
5.3 Enabling legislation
6. Conservation Planning
6.1 Est. committee/secure consultants
6.2 Integrated planning workshop
6.3 Scoping
6.4 Data collection
6.5 Thematic mapping/GIS
6.6 Analysis
6.7 Constraint analysis
6.8 Plan preparation & alt. generation
6.9 Develop business plan
6.10 Environmental assessment
6.11 Public review of draft
6.12 Final Conservation Mgmt. Plan
7. Computer Assisted Mapping
7.1 Study tour of GIS centers
7.2 Workload analysis
7.3 Initiate training overseas
7.4 GIS implementation plan
7.5 Procurement/facilities enhancement
7.6 In-situ training
7.7 Initial analyses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8. Supporting Applied Research
8.1 Bison disease
8.2 Bison genetics
8.3 Bison movements/behavior/translocation
8.4 Ecology/breeding of endangered grouse
8.5 Ungulate movements
8.6 Ungulate pop. dynamics and harvesting
8.7 Ungulate hab. use & forest/farm damage
8.8 Predator movements
8.9 Soil insects as bioindicators of pollutant
8.10 GIS analysis of vegetation and forest nutrients
8.11 Forest dynamics and succession
8.12 Natural forest regen. & exper. harvest
8.13 Eco. effects of harvesting dying trees
8.14 Diagnosis of silver fir
8.15 Preserving cuttings/natural control/canada
8.16 Effects of pollut. on moorland stands
8.17 Chernobyl radiation in natural veg.
8.18 Exper. farm for ecological agric.
8.19 Biotechnol. studies of tradi. forest uses
8.20 Hosts Local pop. groups/with Muskoka
9. Application of Environmental Impact Assessment
9.1 Public and agency Scoping
9.2 Project systems workshop
9.3 Pop-up data from Conservation Plan
9.4 Cost/benefit analysis of alt. Plan actions
9.5 Cumulativ effect analysis
9.6 Mitigation and monitoring plans
10. Man and the Biosphere at Muskoka
10.1 Coordination with Bala / MaB
10.2 Consul. mat. w/ Pol. MaB at UNESCO
10.3 Biosphere Reserve Application
11. Bil. Coop. at Biological w/ Pol. GEF
12. Ecological Agriculture
13. End of Phase I Meeting & Transition
13.1 Display prod./plans at donor meetings
14. Development the Bakrau Foundation
15. Professional Developing and Training
15.1 Biobasis training plan in detail
15.2 Assign Project TA to admin. logistics
15.3 Develop MOUs with relevant instit.
15.4 Initiate professional development
16. Project Management
17. Joint Scientific Review Committee
18. Bio. Dependent App. Res. Outreach

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 101. Belovezhskaya - Conservation of Biodiversity
Detailed Cost Table
US $,000

	Quantity			B.C. in US $,000			Breakdown of Totals Incl.Cont. US $,000			
	1993	1994	Total	1993	1994	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS										
A. Seed & Plant Coll. & Stge Equipment	3	2	5	15.0	10.0	25.0	27.2	0.0	0.0	27.2
B. In-situ Conservation										
Establishment of Seed Or.	1	1	2	10.0	10.0	20.0	21.8	0.0	0.0	21.8
Animal holding pens	1	1	2	10.0	10.0	20.0	21.8	0.0	0.0	21.8
Sub-Total				20.0	20.0	40.0	43.7	0.0	0.0	43.7
C. Determination of Diversty										
Isozyme Analysis (plants)	1	1	2	10.0	10.0	20.0	21.8	0.0	0.0	21.8
Genetic Loci An. (Bison)	1	1	2	10.0	10.0	20.0	21.8	0.0	0.0	21.8
Sub-Total				20.0	20.0	40.0	43.7	0.0	0.0	43.7
Total INVESTMENT COSTS				55.0	50.0	105.0	114.6	0.0	0.0	114.6
II. RECURRENT COSTS										
A. Seed & Plant Coll. & Stge										
Labor, Collection & Mtce	1	1	2	10.0	10.0	20.0	0.0	21.0	0.0	21.0
Total RECURRENT COSTS				10.0	10.0	20.0	0.0	21.0	0.0	21.0
Total				65.0	60.0	125.0	114.6	21.0	0.0	135.6

<1> Sampling, collection and storage equipment
Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:50

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 102. Belavezhskaya - Protection and Management
Detailed Cost Table
US $,000

	Quantity			Base Costs in US $,000			Breakdown of Totals Incl.Cont. US $,000			
	1993	1994	Total	1993	1994	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS										
A. Conservation Planning										
Labor	1	1	2	9.0	9.0	18.0	0.0	19.7	0.0	19.7
Consultants	1	1	1	15.0	15.0	30.0	32.8	0.0	0.0	32.8
Travel and per Diem	1	1	2	5.0	5.0	10.0	10.9	0.0	0.0	10.9
Equipment	1	1	2	5.0	5.0	10.0	10.9	0.0	0.0	10.9
Sub-Total				34.0	34.0	68.0	54.6	19.7	0.0	74.3
B. Expansion of Prot. Area <1>										
Plant Survey	1	0	1	5.2	2.2	7.5	8.1	0.0	0.0	8.1
Cadastral Survey	0	1	1	0.0	7.5	7.5	8.4	0.0	0.0	8.4
Sub-Total				5.2	9.7	15.0	16.5	0.0	0.0	16.5
C. Support for Applied Res. <2>										
Consultants	1	1	1	12.5	12.5	25.0	27.3	0.0	0.0	27.3
Travel & Per Diem	1	1	1	2.5	2.5	5.0	5.5	0.0	0.0	5.5
Equipment	1	1	2	5.0	5.0	10.0	10.9	0.0	0.0	10.9
Vehicles	3	0	3	39.0	0.0	39.0	41.8	0.0	0.0	41.8
Sub-Total				59.0	20.0	79.0	85.5	0.0	0.0	85.5
D. Application of EIA <3>										
Workshop	0	1	1	0.0	10.0	10.0	11.1	0.0	0.0	11.1
CB Analysis & Plans	1	2	3	5.0	10.0	15.0	16.5	0.0	0.0	16.5
Sub-Total				5.0	20.0	25.0	27.6	0.0	0.0	27.6
E. MaB Organisation <4>										
Labor	1	1	2	6.0	6.0	12.0	13.1	0.0	0.0	13.1
Travel & Per Diem	1	1	2	3.0	3.0	6.0	6.6	0.0	0.0	6.6
Sub-Total				9.0	9.0	18.0	19.7	0.0	0.0	19.7
F. End of Phase 1 and Transn	0	1	1	0.0	25.0	25.0	27.8	0.0	0.0	27.8
Total INVESTMENT COSTS				112.2	117.7	230.0	231.7	19.7	0.0	251.4
II. RECURRENT COSTS										
A. Vehicle Operation & Mtce.	1	1	2	4.0	4.0	8.0	0.0	8.4	0.0	8.4
Total RECURRENT COSTS				4.0	4.0	8.0	0.0	8.4	0.0	8.4
Total				116.2	121.7	238.0	231.7	28.1	0.0	259.8

<1> Consultants (local), minor equipment and per diem.
<2> Priority projects are identified in the main report
<3> Includes consultancy, travel and per diem
<4> Office to be located at Belovezhskaya Research Centre.
Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:50

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 103. Geographic Information System
Detailed Cost Table
US $,000

	Quantity			Base Costs in US $,000			Breakdown of Totals Incl.Cont. US $,000			
	1993	1994	Total	1993	1994	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS										
A. Initial Inventory <1>										
Projec Technical Unit	1	0	1	4.0	0.0	4.0	4.3	0.0	0.0	4.3
B. Consultants <2>										
Forest Ecologist/ LUP	1	0	1	20.0	0.0	20.0	20.4	0.0	0.0	20.4
GIS Specialist	1	0	1	20.0	0.0	20.0	21.4	0.0	0.0	21.4
Travel and Perdiem	1	0	1	6.0	0.0	6.0	6.4	0.0	0.0	6.4
Sub-Total				46.0	0.0	46.0	48.2	0.0	0.0	48.2
C. Computer Hardware										
Personal Computer <3>	2	0	2	14.0	0.0	14.0	15.0	0.0	0.0	15.0
Hi-Res Color Monitor	2	0	2	6.0	0.0	6.0	6.4	0.0	0.0	6.4
Internal Backup Tape Dev.	1	0	1	1.5	0.0	1.5	1.5	0.0	0.0	1.5
Digitizing Tablet	1	0	1	5.0	0.0	5.0	5.4	0.0	0.0	5.4
Color Plotter	1	0	1	4.5	0.0	4.5	4.8	0.0	0.0	4.8
Laser Printer	1	0	1	2.5	0.0	2.5	2.7	0.0	0.0	2.7
Uninterruptable Power Sup	2	0	2	1.5	0.0	1.5	1.6	0.0	0.0	1.6
Misc. Computer Supplies	1	1	1	3.0	3.0	6.0	6.6	0.0	0.0	6.6
Sub-Total				38.0	3.0	41.0	44.0	0.0	0.0	44.0
D. Imagery,Decoding,Merging										
TM Imagery Data	2	0	2	8.7	0.0	8.7	9.3	0.0	0.0	9.3
TM Geocoding	2	0	2	1.8	0.0	1.8	1.9	0.0	0.0	1.9
SPOT Imagery Data	3	0	3	7.3	0.0	7.3	7.9	0.0	0.0	7.9
SPOT Special Acquisition	3	0	3	1.8	0.0	1.8	1.9	0.0	0.0	1.9
Geocoding	3	0	3	2.7	0.0	2.7	0.0	2.9	0.0	2.9
TM/SPOT Merge	1	0	1	3.0	0.0	3.0	3.2	0.0	0.0	3.2
Sub-Total				25.3	0.0	25.3	24.3	2.9	0.0	27.1
E. Change Detection										
Digital Change Detection	1	0	1	2.0	0.0	2.0	2.1	0.0	0.0	2.1
GIS Data Conversion	1	0	1	0.3	0.0	0.3	0.3	0.0	0.0	0.3
Sub-Total				2.3	0.0	2.3	2.4	0.0	0.0	2.4
F. Photo. Prints & Process.										
TM	2	0	2	4.6	0.0	4.6	4.9	0.0	0.0	4.9
TM/Spot Merge 1:50,000	5	0	5	6.0	0.0	6.0	6.4	0.0	0.0	6.4
Land Cover Classification	3	0	3	4.5	0.0	4.5	4.8	0.0	0.0	4.8
Sub-Total				15.1	0.0	15.1	16.2	0.0	0.0	16.2
G. Computer Software										
Arc/Info GIS	1	0	1	6.0	0.0	6.0	0.0	6.4	0.0	6.4
H. System Training										
Study Tours 150 days	1	1	2	15.0	15.0	30.0	32.8	0.0	0.0	32.8
Consultant	1	1	1	15.0	15.0	30.0	32.8	0.0	0.0	32.8
Sub-Total				30.0	30.0	60.0	65.5	0.0	0.0	65.5
Total INVESTMENT COSTS				166.7	33.0	199.7	204.9	9.3	0.0	214.2
Total				166.7	33.0	199.7	204.9	9.3	0.0	214.2

<1> Init. Inventory of maps mapping activities and GIS capab. by PTU
<2> Specialists in ecosystem, mapping, land use, and related skills.
<3> 386 PC or 486, VGA Graphics card, 5.25 & 3.5 inch drives, 300 Meg HD
<4> Consultant for 2 months and 2 workshops (fees, fares and per diem)
Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:50

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 104. Ecological Agriculture
Detailed Cost Table
US $,000

	Quantity			Base Costs in US $,000			Breakdown of Totals Incl.Cont. US $,000			
	1993	1994	Total	1993	1994	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS										
A. Vehicles and Equipment										
4WD Pickup	1	0	1	10.0	0.0	10.0	10.2	0.0	0.0	10.2
Personal Computer & Prin	1	0	1	3.0	0.0	3.0	3.1	0.0	0.0	3.1
Sub-Total				13.0	0.0	13.0	13.3	0.0	0.0	13.3
B. Technical Advisory Panel <1>	1	1	2	2.0	2.0	4.0	4.2	0.0	0.0	4.2
C. External Specialists <2>										
Fees	2	3	5	2.0	3.0	5.0	5.2	0.0	0.0	5.2
Per Diem	1	1	2	1.0	1.0	2.0	2.1	0.0	0.0	2.1
Travel	3	4	7	1.5	2.0	3.5	3.7	0.0	0.0	3.7
Sub-Total				4.5	6.0	10.5	11.0	0.0	0.0	11.0
D. Belarus Specialists										
Fees	1	1	2	5.0	5.0	10.0	0.0	10.4	0.0	10.4
Per Diem & Expenses	1	1	2	1.0	1.0	2.0	0.0	2.1	0.0	2.1
Travel	1	1	2	1.0	1.0	2.0	0.0	2.1	0.0	2.1
Sub-Total				7.0	7.0	14.0	0.0	14.6	0.0	14.6
Total INVESTMENT COSTS				26.5	15.0	41.5	28.4	14.6	0.0	42.9
II. RECURRENT COSTS										
A. Vehicle Maintenance	1	1	2	0.5	0.5	1.0	0.0	1.0	0.0	1.0
B. Enumerators	1	1	2	1.0	1.0	2.0	0.0	2.0	0.0	2.0
C. Analysis of Samples <3>	1	1	2	1.0	1.0	2.0	0.0	2.0	0.0	2.0
D. Sundries	1	1	2	0.5	0.5	1.0	0.0	1.0	0.0	1.0
E. Report Production/Translin	1	4	5	0.5	2.0	2.5	0.0	2.5	0.0	2.5
Total RECURRENT COSTS				3.5	5.0	8.5	0.0	8.5	0.0	8.5
Total				30.0	20.0	50.0	28.4	23.1	0.0	51.4

<1> 2 external advisors: Agricultural Economist, Soil Chemist & Sociologist
<2> Mkt. Econ.(Y1-2 months,Y2-2months), Agronomist(Y1-1 month,Y2-1 month)
<3> Soil, water and plant sampling team (contract)
Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:51

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 105. Pollution Monitoring and Mitigation
Detailed Cost Table
US $,000

	Quantity			Base Costs in US $,000			Breakdown of Totals Incl.Cont. US $,000			
	1993	1994	Total	1993	1994	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS										
A. Mobile Monitoring Station <1>	1	0	1	150.0	0.0	150.0	160.6	0.0	0.0	160.6
B. Pollution Mitigation	1	1	2	10.0	10.0	20.0	21.8	0.0	0.0	21.8
C. Engineering Services	0	2	2	0.0	20.0	20.0	22.3	0.0	0.0	22.3
Total INVESTMENT COSTS				160.0	30.0	190.0	204.8	0.0	0.0	204.8
Total				160.0	30.0	190.0	204.8	0.0	0.0	204.8

<1> To be established in liaison with Poland
<2> Supporting Equipment to complete detailed engineering design
<3> Consulting Services for detailed engineering designs
Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:51

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 106. Coordination with Poland
Detailed Cost Table
US $,000

	Quantity		Base Costs in US $,000		Breakdown of Totals Incl.Cont. US $,000			
	93-94	Total	1993-94	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS								
A. Meetings, Conferences	1	2	10.0	20.0	0.0	21.8	0.0	21.8
Total INVESTMENT COSTS			10.0	20.0	0.0	21.8	0.0	21.8
Total			10.0	20.0	0.0	21.8	0.0	21.8

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:51

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 107. Professional Development and Training
Detailed Cost Table
US $,000

	Quantity		Base Costs in US $,000		Breakdown of Totals Incl.Cont. US $,000			
	93-94	Total	1993-94	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS								
A. Professional Development <1>	1	2	20.0	40.0	43.7	0.0	0.0	43.7
B. Training	1	2	15.0	30.0	32.8	0.0	0.0	32.8
Total INVESTMENT COSTS			35.0	70.0	76.5	0.0	0.0	76.5
Total			35.0	70.0	76.5	0.0	0.0	76.5

<1> Including seminars and meetings
Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:51

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 108. Support for the Establishment of the Bialowieza Foundation
Detailed Cost Table
US $,000

	Quantity			Base Costs in US $,000			Breakdown of Totals Incl.Cont. US $,000			
	1993	1994	Total	1993	1994	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS										
A. Estab. of Legal Framework	1	0	1	15.0	0.0	15.0	16.1	0.0	0.0	16.1
Total INVESTMENT COSTS				15.0	0.0	15.0	16.1	0.0	0.0	16.1
Total				15.0	0.0	15.0	16.1	0.0	0.0	16.1

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:51

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 201. Outreach Activities at Berezinsky and Pripyatsky
Detailed Cost Tab
US $,000

	Quantity		Base Costs in US $,000		Breakdown of Totals Incl.Cont. US $,000			
	93-94	Total	1993-94	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS								
A. Preserv. of European Bison	1	2	15.0	30.0	16.4	16.4	0.0	32.8
B. Pres. Capercaillie Grouse	1	2	10.0	20.0	10.9	10.9	0.0	21.8
C. Gen. Res. Mgt Policy	1	2	5.0	10.0	5.5	5.5	0.0	10.9
D. Migratory Species	1	2	10.0	20.0	10.9	10.9	0.0	21.8
E. Training and Tech. Coord.	1	2	10.0	20.0	10.9	10.9	0.0	21.8
Total INVESTMENT COSTS			50.0	100.0	54.6	54.6	0.0	109.2
Total			50.0	100.0	54.6	54.6	0.0	109.2

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:51

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 301. Project Management and Coordination
Detailed Cost Table
US $,000

	Quantity			Base Costs in US $,000			Breakdown of Totals Incl.Cont. US $,000			
	1993	1994	Total	1993	1994	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS										
A. Project Technical Unit										
Salaries etc.	1	1	2	30.0	30.0	60.0	0.0	65.5	0.0	65.5
Computers and Equipment	1	0	1	30.0	0.0	30.0	32.1	0.0	0.0	32.1
Sub-Total				60.0	30.0	90.0	32.1	65.5	0.0	97.7
B. Proj. Admin. Coord. Unit										
Salaries etc <2>	1	1	2	10.0	10.0	20.0	0.0	21.8	0.0	21.8
Computers and Equipmt.	1	0	1	20.0	0.0	20.0	21.4	0.0	0.0	21.4
Sub-Total				30.0	10.0	40.0	21.4	21.8	0.0	43.3
Total INVESTMENT COSTS				90.0	40.0	130.0	53.5	87.4	0.0	140.9
Total				90.0	40.0	130.0	53.5	87.4	0.0	140.9

<1> Head of Unit, Scientific Advisor and 2 Assistants.
<2> Head of Unit and 1 Assistant
Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:51

BELARUS
GLOBAL ENVIRONMENT FACILITY
PROTECTION OF BIODIVERSITY
Table 401. Joint Scientific Review Committee
Detailed Cost Table
US $,000

	Quantity		Base Costs in US $,000		Breakdown of Totals Incl.Cont. US $,000			
	93-94	Total	1993-94	Total	F.Exch	Local	Taxes	Total
I. INVESTMENT COSTS								
A. Travel and Meetings	1	2	10.0	20.0	14.2	7.6	0.0	21.8
Total INVESTMENT COSTS			10.0	20.0	14.2	7.6	0.0	21.8
Total			10.0	20.0	14.2	7.6	0.0	21.8

Unit Costs Scaled by 1000.0 - Values scaled by 1000.0 12/30/1992 8:51

BELARUS

FOREST BIODIVERSITY PROTECTION PROJECT

CONSERVATION MANAGEMENT PLAN

I. INTRODUCTION

1. The Conservation Management Plan (CMP) will be undertaken by a multi disciplinary team of national and international consultants.

2. The Planning Process will involve the following phases:

(a) Identification of the significant resources of the BPF and the threats and trends on these resources;

(i) The consultants will document and assess the range of information pertinent to the conservation plan through literature, field visits, and consultations with government and local population. Consultation will also be maintained with the Joint Scientific Committee and where appropriate with the MAB organization. Throughout this process, they will give particular attention to changes in the environment during the recent history and will identify the patterns of such changes.

(ii) In documenting and assessing the information pertinent to the conservation plan, the consultants will systematically collect and analyze data from: (a) written materials (studies of the area, management plans, project documents, maps and photographs); (b) interviews with Republic and local officials, project staff, researchers, community leaders, local population, etc.; and (c) field visits to the sites. Much of the existing data pertinent to the conservation plan will be available from government, universities, and researchers and from the results of the other activities of this GEF project.

(iii) Assistance will be sought from appropriate government agencies, particularly the Planning Institute. In addition, local academic institutions will be involved in the plan's preparation.

(b) Development of appropriate management objectives for the sustainable protection of these resources;

The consultants will develop appropriate management objectives from the information collected as part of (a) above.

(c) Development of appropriate management strategies, including the investigation of a legislative basis to support the provisions of the final plan;

After documenting and assessing the information and developing the management objectives, the consultants will identify the major factors (physical, institutional, legal, economic, and social) impacting on the sustainable conservation management of the area. In order to produce an operational conservation plan, they will then identify measures likely to be effective in influencing the major factors.

(d) Production of a Draft Conservation Plan and a public consultation process; and,

The consultants will embody these measures in a series of recommendations and identification of specific management actions to be undertaken during the three year period of the plan. The recommendations will address the role of government and local population in the conservation of the area, including the most cost-effective approach to sustainable conservation, and highlight the technical, financial, institutional, and policy measures which will enable the implementation of the plan. The measures which will be identified in this process will be possible activities to be funded from a Trust which will be established in parallel with this GEF project.

(e) Production of a final plan and acceptance by government.

Finally, the Draft Conservation Plan will be subject to consultation with all affected parties and be forwarded for formal approval by government.

II. PLANNING ACTIVITIES

3. The preparation of the plan will entail the following activities:

(a) Site Identification, Boundaries and Zoning - The conservation plan will review and identify the existing key natural and cultural sites for protection and determine their protection category. It will make recommendations on the limits of any areas to be further protected. It will review the current zoning scheme in line with the level of protection to be afforded to the identified areas, and including, where necessary, the definition of buffer and transition zones. This will include proposals for zoning and land uses in particular areas and will allow for adaptations needed as a result of increased knowledge, legislative, institutional and land

tenure developments, or environmental changes. This activity will build on the present zoning.

(b) Conservation of Main Ecosystems and Habitats - The conservation planning exercise will review the extent and condition of the forests and other ecosystems, taking account of the many different potential uses of this resource, develop proposals for future management. Proposals for the management of the forests, and the identification of any necessary research on this and any other relevant problems of forest management will also be made.

(c) Animal Populations and Monitoring - The conservation planning exercise will assess the status of the main animal populations and will define measures (e.g. protection of breeding sites) to protect the threatened species. It will assess the carrying capacity of the threatened species and review the current feeding programs.

(d) Botany - Recommendations for the protection of endemic and imported botanical species will be provided, including non-tree species.

(e) Activity Trends

(i) Land Tenure

The conservation plan exercise will review land tenure arrangements in the area. It will recommend any action or legal steps necessary to ensure both the protection of the forest's key natural and cultural resources, and land security for the inhabitants.

(ii) Agriculture and Livestock Production

Agricultural and livestock production systems will be reviewed to analyze their present and future impact on the conservation of the protected areas.

(iii) Tourism

The exercise will review planned tourism development in the light of conservation requirements, the market economy, and of potential economic development for the region. It will evaluate the tourist carrying capacity of the area and make recommendations for conservation wise tourism, including necessary regulations and the promotion of nature based tourism and hunting.

(iv) Infrastructure

The conservation plan will provide rules and regulations for road construction and extractive activity. It will also establish requirements, for sewage treatment and water reuse.

(f) Conservation Measures

(i) Land Use Planning

a. The exercise will review the current local and national process of land use planning. The integration of conservation into the planning process will be the prime concern. There will also be an analysis of how priorities identified by local people are incorporated into plans and of the weight given in the plans to the protection of the environment, nature and cultural resources conservation.

b. The conservation planning exercise will also consider, in its chapter on management targets, the current and future capacity of the proposed biosphere reserve to support human population, urban and tourism development, the extension of agriculture and pasture, and infrastructure development.

(ii) Reserve Management

The conservation plan will provide a program of reserve management. This will include interpretation and visitor centers, information kiosks, trails, etc.

(iii) Research Program

The conservation plan will assess the needs for scientific and social research directly related to the conservation of the key sites, species, and vegetation. A prioritized program will be drawn up and suggestions made as to the means required to stimulate and foster the program. It is intended to involve the existing researchers in this conservation planning activity so facilitating the definition of research needs at least in the biological domain. Stock will be taken of previous and ongoing research activities and resulting recommendations will be included in the program.

(g) **Local participation The consultants will work with the population of the archipelago to determine local perspectives, goals, aspirations and priorities. The conservation plan will provide a program for local participation in natural resource management and ecologically sensitive site specific interventions. The preparation of the program will include:**

(i) **the analysis of traditional and cultural practices which concern the conservation of nature and natural resources (e.g. traditional uses of land, use of medicinal plants, natural products);**

(ii) **the analysis of traditional natural resources management and control systems;**

(iii) **the identification of appropriate incentives to encourage local participation in resource management, and the potential for developing natural resource management and nature conservation agreement between local population and the authorities; the assessment of the extent to which, and the system under which, local communities can be given responsibility and authority for the management of certain areas, in return for an agreed benefit package negotiated with the authorities;**

(iv) **the review of present and potential role of the commune authority in improving local participation in the management of the area, and the identification of specific training and institutional support requirements; and**

(v) **the review of the existing local and national non governmental organizations (NGOs) with an interest in conservation and environmental matters in the area, including the assessment of their present capacity and recommendations as how their independent development can best be enhanced.**

(h) Training, Public Awareness and Environmental Education

(i) Staff Training

The exercise will identify staff training needs and propose a staff training program. This will include training to identify proposed development projects which may have an impact on the ecosystems.

(ii) Government and Commercial/Private Sector Training

The exercise will design a program to provide relevant training to Government staff and relevant private

individuals (NGO leaders, industrial and agricultural polluters, hotel managers, etc.) on nature conservation and natural resources management. The exercise will consider the relative advantage of long, short or medium term programs and in-service or overseas training. To as great a degree as possible, the training should be based on existing courses and institutions.

(iii) Public Awareness

At present only a limited number people in the area are aware of the local, regional and international importance of the special set of natural and cultural resources in the proposed biosphere reserve. If the conservation plan is to have any chance of long term success, this must change. The conservation plan exercise will propose a public awareness program aimed at an audience within the area and in some cases beyond. The program will identify key targets, define methods and resources to be used. The themes to be included in the program will focus on the forest and its linkages with the many other aspects of social, cultural and economic life in the area.

(iv) Environmental Education

A program of local environmental education will be included in the conservation plan based on the experience accumulated over a considerable period by the national park management. It will focus on the areas primary and secondary schools, though it could also develop a component for adult groups and NGOs.

(i) Legislation and Enforcement A list of recommendations will be prepared on any necessary modifications to existing and proposed legislation relating to the conservation of the area. This will include Republican laws and regulations relating to nature conservation, environmental protection laws, legislation controlling hunting, water management and land use in reserves, and buildings and historic settlements laws and regulations.

(j) A review of the requirements of relevant international conventions and classifications useful for nature conservation and ratified or signed by the country - especially the Unesco Biosphere Reserves - will be undertaken and provisions any related requirements will be provided for in the conservation plan.

(k) Environmental Impact Assessments A system for developing and reviewing EIA studies at the local level will be further strengthened. The conservation plan exercise will recommend changes to enhance conservation of ecosystems through the EIA process.

To that end, the conservation plan will catalogue all of the development schemes being implemented, evaluated, planned or conceived. In order to learn from experience, the plan will briefly review the environmental impact assessments undertaken for these schemes and make appropriate recommendations for future EIAs.

(l) As importantly the conservation plan will be subject to environmental assessment to provide an opportunity to develop local management skills in this activity.

III. TIMETABLE

4. The preparation of the conservation plan is estimated to require 12 months to be completed.

Month

TASK	1	2	3	4	5	6	7	8	9	10	11	12
1. Planning workshop	■											
2. Preparation of the draft plan		■	■	■	■	■	■	■				
3. Public consultation					■	■	■	■	■	■		
4. Final plan preparation										■	■	
5. Plan implementation												■

IV. PLAN OUTLINE

5. The following Plan outline will be amended as required in the planning process.

EXECUTIVE SUMMARY

PART I: DESCRIPTION

Chapter 1 General Information
- Location
- Description
- Planning contexts
- International context
- Republican/local context
- Reserves
- Sites
- Map Coverage
- Aerial Photographs
- Satellite Imagery

Chapter 2 Resources
- Physical Description
  - Geology
  - Geomorphology
  - Climate
  - Hydrology
  - Hydrogeology
  - Soils
- Biological Description of Natural Ecosystems
  - Vegetation
  - Fauna
  - The Human Population
  - Archeology
  - Settlement histcry
  - Demography
  - Population distribution
  - Cultural Description
  - Land use
  - Land tenure
  - Architectural heritage
  - Landscape

Chapter 3 Economic Development
- Activities
- Tourism
- Industrial activity
- Agricultural systems
- Pastoral systems
- Forestry systems
- Commercial activity
- Supporting infrastructure
  - Water supplies
  - Electric Power
  - Sewage disposal
  - Waste disposal
  - Transport
- Telecommunications
- Pollution

Chapter 5 Linkages between Natural and Economic Systems

Chapter 6 Development Projects
- On-going Government projects
- Planned Government projects
- On-going private sector projects
- Planned private sector projects

Chapter 7 Legal Framework
- Local
- Republic
- International

Chapter 8 Institutional Framework
- Local institutions
- Republic institutions
- International conservation organizations
- Institutional interrelationships

Chapter 9 Awareness and Training
- Awareness programs
  - General public
  - Schools
  - Publicity and media coverage
  - National
  - International
- Training
  - Conservation staff training
  - Other training

Chapter 10 Information Base
- Bibliography
- Register of research underway and planned

Appendices Summary table of factual information
- Data files, e.g.:
- Hydro-meteorological data
- Species lists
- Photographic file

PART II: OBJECTIVES OF THE CONSERVATION PLAN

Chapter 1 Rationale for the Protected Areas in the Primeval Forest

Chapter 2 Evaluation of the Significance of the Resources and Potential of the Area

Chapter 3 Objectives of the Conservation Plan
- Long-term objectives
- Short-term objectives
- Subsidiary objectives

Chapter 4 Specific Management Targets

PART III: FACTORS INFLUENCING POSSIBLE MANAGEMENT ACTIONS

Chapter 1 Constraints
- Legal factors and enforcement
- Institutional constraints
- Organizational/managerial constraints
- Cultural factors
- Constraints of land tenure
- Constraints of access to resources
- Staffing shortages

Chapter 2 Threats
- Environmental change
  - Human induced trends
  - Natural trends

Chapter 3 Opportunities
- Available funding sources and financing mechanisms
- Changes towards a market economy
- International conventions

Chapter 4 Environmental Soundness and Sustainability of Projects

PART IV: RECOMMENDATIONS

Chapter 1 Schedule of Priority Management Actions

Chapter 2 Management Actions
- Legislation and enforcement
- Institutional arrangements
- Administrative management
- Physical plan
- Protected area boundaries
- Protected area zoning
- Resource management
  - Water
  - Soil
  - Forests
  - Grazing and livestock
  - Pollution control
  - Ecosystem monitoring
  - Scientific research
  - Infrastructure and equipment
  - Staffing
  - Training
  - Awareness and education
  - User management and enforcement
- Plan implementation monitoring
- Plan evaluation and updating

Chapter 3 Budget for Management Actions

Chapter 4 Outline Management Actions for the Second Phase

Chapter 5 Implementation Timetables
- Phase I: 1993-1995
- Phase II:1995

Chapter 6 Summary Organigrammes

Chapter 7 Summary Maps

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FOREST BIODIVERSITY PROTECTION PROJECT

INSTITUTIONAL RESPONSIBILITIES

1. There are a number of institutions, both local and international which will be involved with the individual components of this project. Clear responsibilities for the Project Technical Management Unit, the Administrative Coordinating Unit and the Joint Scientific Committee have been detailed in the main body of the report.

2. The organizations so far identified to complete the project in cooperation with the two Units above include:

- Institutes from the Academy of Science (7);
- The management of Belovezhskaya Pushcha;
- The Research Institute of Experimental Veterinary Science; and,
- The Institute of Planning

3. The following table is designed to indicate the responsibilities/ collaboration so far identified for each organization. These roles correspond to the necessary skills and expertise to assist with specific project components, either as a formally contracted party or by the provision of on-going advice and data. The heads of each of the project units will be responsible for ensuring that the organizations listed below are involved in the project as appropriate.

TASK	RESPONSIBLE OR COLLABORATING ORGANIZATION(S)
1. Risk Assessment of Pollution - monitoring and mitigation	Inst. Forest Research Inst. of Botany Inst. of Ecology Belovezhskaya Pushcha
2. Seed and Plant Part Collection and Storage	Belovezhskaya Pushcha
3. In-situ conservation of native populations	Belovezhskaya Pushcha
4. Determination of Genetic Diversity	Inst. of Forestry Inst. of Genetics Research Inst. of Experimental Veterinary Science
5. Expansion of Protected Areas to Include Remaining Associations	Belovezhskaya Pushcha
6. Conservation Management Planning	Belovezhskaya Pushcha Inst. of Planning
7. Computer Assisted Mapping	Inst. of Ecology Belovezhskaya Pushcha

8. Supporting Applied Research	Belovezhskaya Pushcha Inst. Forest Research Inst. of Botany Inst. of Ecology
9. Application of Environmental Impact Assessment	Belovezhskaya Pushcha Inst. of Planning
10. Man and the Biosphere at Belovezhskaya[1/]	Inst. of Botany Inst. of Ecology Socio-Ecological Union
11. Scientific Cooperation at Bialowieza with Polish GEF	Belovezhskaya Pushcha
12. Ecological Agriculture	Agricultural Academy Inst. of Ecology et al
13. End of Phase I Meeting and Transition	Project Units
14. Developing the Belarus Foundation	Belovezhskaya Pushcha Project Units
15. Professional Developing and Training	Project Units International Organizations[2/]
16. Project Management	Council of Ministers
17. Joint Scientific Review Committee	Council of Ministers Project Units
18. Biodiversity Dependant Applied Research Outreach	Project Units

1/ In collaboration with the MAB unit to be established under the project as well as the MAB Secretariat of the Academy of Sciences.

2/ These would include international agencies and would be selected according to the individual training and staff development components.

4. It should be noted that the above listing is not comprehensive. It would be expected that there will be a number of collaborative and/or responsible organizations identified as the project develops. This will be particularly the case with the involvement of international organizations which will ensure that the opportunity is taken to build on world expertise.

5. As importantly, many individual project elements would be appropriately undertaken by specific consultants and will therefore not be limited to the institutions indicated above.

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FOREST BIODIVERSITY PROTECTION PROJECT

ECOLOGICAL AGRICULTURE

I. INTRODUCTION

1. Several Kolkhoz (cooperative farms) operate within the Belovezhskaya National Park and in the buffer zones adjacent. Primary production focuses on basic grains (wheat, rye), forage crops, and potatoes. Dairy and pork production are the primary cash producers of most of the farmers, many who work as loggers in the abutting forest. Farms operating within the boundaries of the park are not permitted to use pesticides and only carefully monitored chemical fertilizers. Farms operating within the adjacent 90,000 ha buffer zone (see Map) are restricted in a number of farming practices, especially in drainage, dams, aerial spraying and farm waste storage and disposal.

2. This project component would widen this practice and provide technical assistance and cash incentives as necessary to farmers to shift from chemicals to ecological agriculture.

Objectives:

3. To encourage further development of ecological farming methods within the Beloveskskaya National Park and its buffer zone by supporting the shift from conventional farming methods to ecological agrochemical-free farming methods on the Kolkhoz farms. This component would support work on:

(a) farm yields, farm income, and farm employment;

(b) soil, water, and product quality; and

(c) Cost comparisons of these two farming systems on farms in the Primeval Forest

II. BACKGROUND

4. In recent years, agricultural technology which depends substantially on chemical inputs and fossil fuels as a means of increasing yields and quality of produce, or maintaining already high levels of yield and quality, has become under review. The main focus of this review has been in the industrialized countries of Western Europe, the United States, and Japan, due largely to concerns about pollution of soil and groundwater, but also to fears of chemical residues in food which may affect human health.

5. Consequently, there has been a search for alternative approaches to sustaining agricultural, and particularly food production. Attention has been directed principally to farming based on organic measures to maintain soil

fertility, and to biological or physical means of controlling pests, diseases, and weeds. Various labels have been attached to this type of agricultural technology: *ecological agriculture* is synonymous with *organic farming* which is defined precisely by the International Federation of Organic Agricultural Movements (IFOAM). While not yet widely practiced by a large number of farmers, this movement is spreading and claims as to its potential are being made by its proponents.

6. Moreover, it is of paramount importance that ecological farming is economically viable for the producer.

Ecological Agriculture in the National Park and in the Buffer Zone

7. As concern about environmental damage increases in the Belovezhskaya National Park and its buffer zone, the role of current conventional agriculture, as a contributor to environmental pollution and degradation of the natural resource base, requires further attention. Attempts are now being made to quantify and value these *external costs* in order to reflect a more realistic economic framework with which to compare conventional and ecological farming systems.

III. THE PROJECT COMPONENT

Objectives

(a) To study the impact on the Kolkhoz farms in the Beloveshskaya National Park and within the adjacent buffer zone of further changing from conventional to ecological farming methods on the small family farms, on (a) farm yields, farm income, and farm employment; and (b) soil, water, and product quality.

(b) To estimate and compare the costs of these two farming systems in this buffer zone.

Procedure and Methods

(a) The project is designed as a 2-year program, with two principal stages:

  (i) Stage 1 - the establishment of baseline data, preliminary reports, review of farm sampling and methodology

  (ii) Stage 2 - the implementation of a program to further foster ecological agriculture within the national park boundary and to initiate ecological agriculture on farms within the buffer zone of the national park

IV. DETAILED COST ESTIMATES

	Quantity			Base Costs US$ Thousands)			Including Contingencies (US$ Thousands)		
I. INVESTMENT COSTS	1992	1993	Total	1992	1993	Total	Foreign Exchange	Local	Total
A. Vehicles and Equipment									
4WD Pickup	1	0	0	10	0	10	10.2	0	10.2
Personal Computer & Printer	1	0	1	3	0	3	3.1	0	3.1
Sub-Total				13	0	13	13.3	0	13.37
B. Technical Advisory Panel[1]	1	1	2	2	2	4	4.2	0	4.2
C. External Specialist[2]									
Fees	2	3	5	2	3	5	5.2	0	5.2
Per Diem	1	1	2	1	1	2	2.1	0	2.1
Travel	2	5	7	1.5	2	3.5	3.7	0	3.7
Sub-Total				4.5	6	10.5	11	0	11
D. Local Experts[3]									
Salary Supplements/Fees	1	1	2	5	5	10	0	0	0
Per Diem	1	1	2	1	1	2	0	0	0
Travel	1	1	2	1	1	2	0	0	0
Sub-Total				7	7	14	0	0	0
Total INVESTMENT COSTS				26.5	15	41.5	28.4	14.6	42.97
II. RECURRENT COSTS									
A. Vehicle Maintenance	1	1	2	0.5	0.5	1.0	0	1	1
B. Enumerators[4]	1	1	2	1.0	1.0	2.0	0	2	2
C. Analysis of Samples[5]	1	1	2	1.0	1.0	2.0	0	2	2
D. Sundries	1	1	2	0.5	0.5	1.0	0	1	1
E. Report Production/Translation	1	4	5	0.5	2.0	2.5	0	2.5	2.5
TOTAL RECURRENT COSTS				3.5	5	8.5	0	8.5	8.5
TOTAL				30	20	50	28.4	23.1	51.4

1 Three external advisors: Agricultural Economist, Soil Chemist and Sociologist
2 Mkt. Econ. (Year 1 - 2 months, Year 2 - 2 months), Agronomist (Year 1 - 1 month, Year 2 - 1 month)
3 500/month x 6 months x 4 persons, $250/month x 6 months x 3 persons
4 Five enumerators (Farm Economic Survey)
5 Soil, Water and Plant sampling team (contract)

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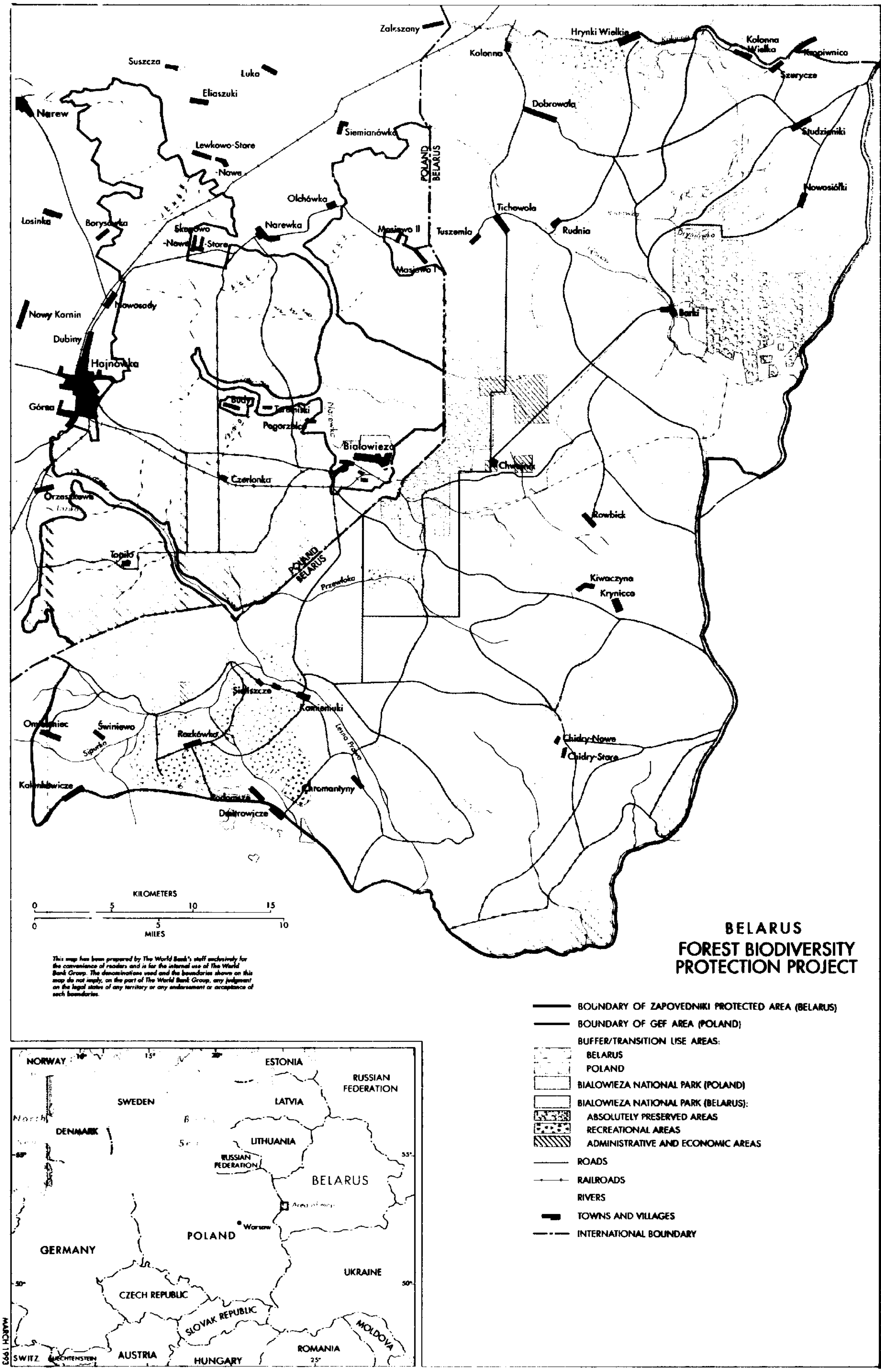
BELARUS
FOREST BIODIVERSITY
PROTECTION PROJECT
BOUNDARY OF ZAPOVEDNIKI PROTECTED AREA (BELARUS)
BOUNDARY OF GEF AREA (POLAND)
BUFFER/TRANSITION USE AREAS:
BELARUS
POLAND
BIALOWIEZA NATIONAL PARK (POLAND)
BIALOWIEZA NATIONAL PARK (BELARUS):
ABSOLUTELY PRESERVED AREAS
RECREATIONAL AREAS
ADMINISTRATIVE AND ECONOMIC AREAS
ROADS
RAILROADS
RIVERS
TOWNS AND VILLAGES
INTERNATIONAL BOUNDARY
KILOMETERS
0 5 10 15
0 5 10
MILES
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POLAND
BELARUS
Zalesszany
Hrynki Wielkie
Kolonna Wielka
Kopiwnica
Szurycze
Kolonna
Suszcza
Luka
Eliaszuki
Narew
Dobrowola
Siemianówka
Studzianki
Lewkowo-Stare
-Nowe
Nowosiółki
Olchówka
Tichowola
Rudnia
Losinka
Borysówka
Narewka
Masiewo II
Tuszemla
Masiewo I
Nowosady
Nowy Kornin
Barki
Dubiny
Hajnówka
Górna
Budy
Teremiski
Pogorzelce
Bialowieza
Chwojnik
Czerlonka
Orzeszkowo
Rowbick
Topilo
Kiwaczyna
Krynicca
Przewloka
Sielisczce
Kamieniuki
Omelianiec
Świniewo
Rackówka
Chidry-Nowe
Chidry-Stare
Chromantyny
Kalinkowicze
Dmitrowicze
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MARCH 1993
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The World Bank

Global Environment Coordination Division
Environment Department
1818 H Street, NW
Washington, DC 20433 USA
Telephone: (202) 473-6010
Facsimile: (202) 522-3256