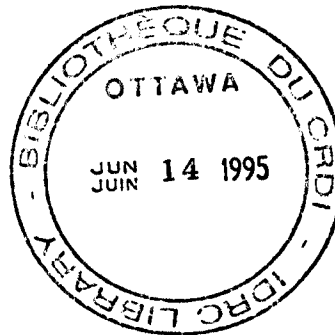


**ENVIRONMENTAL
MANAGEMENT
DEVELOPMENT
IN UKRAINE**

DNIPRO RIVER BASIN

PROGRAM SUMMARY

January 1994



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Acronyms

EMDU	- Environmental Management Development Ukraine
EMIS	- Environmental Management Information System (program activity)
ENGO	- Environmental Non-Governmental Organization
GIS	- Geographic Information System
HRD	- Human Resources Development (program activity)
IDRC	- International Development Research Centre
MEP	- Ministry for Environmental Protection (Kiev)
NGO	- Non-Governmental Organization
SCWR	- State Committee for Water Resources (Kiev)
USCPW	- Ukrainian Scientific Centre for the Protection of Waters (Kharkiv)
WPC	- Water Pollution Control (program component)
WWTP	- Water/Wastewater Treatment Plant

Soviet communism's unchecked power and its obsession with heavy industry, economic growth, national security and secrecy all combined to produce an environmental catastrophe of unrivalled proportions. No other great industrial civilization so systematically and so long poisoned its air, land, water and people. None so loudly proclaiming its effort to improve public health and protect nature so degraded both. And no advanced society faced such a bleak political and economic reckoning with so few resources to invest toward recovery. Communism has left Russia and the other republics too poor to rebuild their economies and repair the ecological damage at the same time.

*in "Ecocide in the USSR"
by Murray Feshbach and Alfred Friendly*

EXECUTIVE SUMMARY

Ukraine is the most environmentally degraded Republic of the former Soviet Union, with 70% of its population living in environmentally dangerous areas. There is, however, no reliable overall picture of the state of the environment. Environmental degradation in the Ukraine includes contamination by radiation from the Chernobyl disaster, excessive use of toxic pesticides and herbicides in agriculture, soil salinisation from irrigation, and high level of air pollution.

The contamination of the water supply is especially serious because Ukraine has limited sources of fresh water. The average amount of fresh water per capita is well below the average levels available in the former Soviet Union. The most important source of water is the Dnipro river, which drains some 60% of the surface area of Ukraine and provides drinking water to some 70% of the population.

The nearly 20 billion cubic meters of untreated effluent dumped into the Dnipro each year represents over a third of the annual flowthrough of some 52 billion cubic meters.

The costs of this environmental degradation are enormous. In 1989, the Supreme Soviet Environmental Committee reported that 80% of the diseases in the USSR relate, directly or indirectly, to environmental problems. Unchecked pollution will continue to retard agricultural and industrial production and labour activity. The physical infrastructure will continue to run down.

Addressing these problems will require major changes in policy and regulations, environmental practices in the productive sector, and a long-term program of investment in both the public and private sectors. The capability of the public sector to manage these changes must be strengthened and better coordinated.

The Ukrainian government has given a high priority to the rehabilitation of the Dnipro and requested assistance for this activity. IDRC and the Bureau of Assistance for Central and Eastern Europe have cooperated in developing this program.

The program has a number of interrelated activities in recognition of the need to develop a multidisciplinary approach to river management.

The goal of the program is to contribute to the environmental rehabilitation of the Dnipro river system, through the collaborative efforts of institutions and organizations from Ukraine, Canada, and other countries.

The general program objectives are:

- To help establish the capacity of Ukrainian institutions to manage the Dnipro river system and the uses that are made of it,
- To contribute to reduction of water pollution in the southern Dnipro, specifically in Zaporizhzhia city and oblast.
- To forge long-term collaborative links between Canadian and Ukrainian public and private sector organizations, and to encourage the exchange of information and experience between Ukrainian researchers and policy-makers and their counterparts elsewhere.

The program's delivery strategy is based on two principles:

- Regional focus on the southern Dnipro sub-basin, more precisely on Zaporizhzhia city and oblast. Zaporizhzhia is one of two major industrial cities located on the southern Dnipro, with municipal and industrial plants as major sources of water pollution.
- Emphasis on short-term, relatively low-cost, high-payoff solutions, which can bring immediate improvement. Support will be given to environmental audits in a few selected enterprises in one priority industrial sector, and in one municipal water agency. These audits will identify low cost "housekeeping" measures able to significantly improve water and energy management. In some cases research on or demonstration of alternative technologies bringing "win-win" solutions will be supported.

This program is designed for three years. It will have two components comprising seven activities:

- Environmental Management Capacity Building component, and
- Water Pollution Control component

A. Environmental Management Capacity Building:

- **Human Resources Development** - support for training of selected decision makers and senior inspection and technical managers from MEP's and SCWR's central and regional offices (primarily Zaporizhzhia). Preference will be given to short-term, on the job training, and demonstration of modern methods of river basin and water quality management. This will also include objective oriented workshops in Ukraine and carefully prepared study tours in Canada. Most of these activities will be tied to and complement other projects.
- **Environmental Management Information System** - for the Dnipro river basin will be designed and reviewed with the large number of institutions who will use this system. A pilot information system will be tested in Zaporizhzhia and after modification, manuals will be produced and training courses provided. Other information technologies such as remote sensing or GIS, which can add a powerful new dimension to environmental management, and which are already used in some institutions might be incorporated into this activity. Regional environmental management capacity in the Zaporizhzhia oblast will be strengthened by intensive training, and integration of existing databases.
- **Policy and Public Education** - will strengthen economic analysis capability for MEP and regional environment management. Capacity is weakest in this area in Ukraine and the executing agency will devote considerable time but limited expenditure in this area. A number of training courses are anticipated, some in collaboration with other agencies. A proposed project on future pollution emission patterns as the economy is restructured and subsidies are reduced, can use existing input-output methodology already employed elsewhere. This activity will also support development of a more effective planning process and project selection criteria for the National Dnipro Rehabilitation Plan. Projects at the regional level will use mature students from the new MBA program at Dnipropetrovsk University in conjunction with its foreign consultants to provide economic assessment of audit and technology projects.

Public education activity will support development and distribution of environmental education materials (primarily brochures, pamphlets) and exchange of TV documentaries. Water pollution control and water saving will be emphasized. Examples will be drawn from existing Canadian and international materials, which could be adopted to Ukrainian environment, translated and published at low cost. The major Ukrainian partners will be local NGOs, such as Green World.

B. Water Pollution Control:

- **Baseline Water Quality Study:** Existing data on the Dnipro's water quality is unreliable. A diagnostic study is a prerequisite for any future activities aimed at reducing water pollution in the Dnipro. USCPW and the Institute of Hydrobiology plan to undertake the Baseline Water Quality Study of the Dnipro river in spring 1994. Two parallel expeditions (land and river) will be undertaken. These institutes have requested external support for sampling and analytical methodology training, as well as for obtaining key pieces of modern laboratory equipment. A part of this project will be cofinanced by other donor agencies. IDRC will help both institutes to organize the baseline study, and will provide short-term training by a Canadian expert. Some critical pieces of laboratory equipment will be provided.
- **Environmental Audits:** The agroindustrial sector which is an important source of pollution has been selected a priority for environmental audits because the long term economic prospects for this sector are promising. Three enterprises within this sector (one of them a sugar beet processing plant) will be chosen for the audits. A Ukrainian-Canadian team will develop short term action plans designed to improve plant safety procedures, institute aggressive in-plant sweeping and cleaning programs, repair operating and control equipment to reduce leaks and emissions, institute operating plans to reduce energy and water use, identify waste minimization opportunities and improve management of waste including contaminated hazardous wastes. Some actual improvement work might be supported. Environmental audits could be a useful step in preparation for any subsequent restructuring and privatisation of industry.
- **"Green" Technologies:** There are opportunities to significantly improve environmental conditions at minimal cost by introduction of new technology. This component will support research and testing of new technologies existing elsewhere. This might involve the testing of some existing Ukrainian technology which is not being utilized now. Environmental audits will help identify opportunities for technological improvement in the audited enterprises. Priority will be given to demonstration of such technologies which could be easily implemented and which have potential for replication in other enterprises. One of these "win-win" technologies demonstrations is expected to include utilization of sugar beet processing wastes of fuel and/or fertilizer.

Technologies which could have a direct positive impact on health will be also demonstrated under this activity group. They will be related to drinking water supply, eg. examination of technical and economic feasibility of a more extensive groundwater utilization, including feasibility study of a groundwater bottling plant.

- **Municipal Water Pollution Control:** The Vodokanal authority in Zaporizhzhia is responsible for water supply and treatment of wastewater in the city. Its treatment plant on the left bank of the Dnipro is the second largest source of pollution in the region. This project will support an audit of the Vodokanal operations to identify low cost, "housekeeping" improvements; training of the plant's management; and demonstration of selected technologies which would reduce the volume and/or toxicity of effluent and/or improve drinking water quality.

A program of this size offers sufficient resources to have a significant impact on the capability of the Ukrainians to implement a pollution control program that can directly affect the health of individuals and facilitate investment decisions by creating stable environmental regulations and procedures. The most direct and measurable effects will be felt in the training of individuals, which is given a high priority in the program.

The most important benefits may be evident when additional resources come in for supporting a major rehabilitation program. Such a program could not be mounted now with any assurance of success until some of the preconditions are met through the activities of this proposed program.

1. Program Overview

Priority

This program was identified following a review by IDRC early in 1993 of the needs in different sectors in Ukraine. The findings were reviewed with senior Ukrainian authorities who indicated that they would like to give highest priority to the rehabilitation of the Dnipro. The importance of this program was confirmed again in two follow-up missions to Ukraine in May and November of 1993. Specific examples of this are given in the following program outline. A Letter of Intent signed with the Minister for Environmental Protection indicates the agreement of the Ukrainian government to the general objectives of this program.

Bureau Involvement

Following the first mission, discussions were held with the Bureau of Assistance for Central and Eastern Europe on the possible scope and functions of such a program. Close consultation has been maintained between IDRC and the Bureau including joint participation in the second mission in May that developed this program and in the Environmental Strategy Conference in Kiev in November. It is anticipated that the Bureau will continue to have a close involvement.

Objectives

This 3-year program is devoted to the development of environmental management capacity and practices to ensure the effective management of the Dnipro river, and to development and implementation of short and medium term measures contributing to the reduction in water pollution of the southern Dnipro.

Achieving these objectives will require support for a number of interrelated activities. An integrated system approach is necessary because these objectives cannot be met by a series of individual discrete projects. A number of limiting constraints have to be addressed before an overall, effective strategy can be put into place.

The difficult situation in Ukraine and the limited experience of Ukrainian institutions in environmental issues has led to the proposal for IDRC to assume a high degree of personal interaction. This program is seen as an ideal vehicle for IDRC to use its experience in capacity building through encouraging national institutions to take responsibility for their own development.

IDRC will provide some fulltime personnel resources, as well as consulting the expertise available from the more than 100 professionals in the Centre involved in different aspects of environmental development.

Although emphasizing the development of Ukrainian capability, the proposed program also has the objective of promoting Canadian-Ukrainian linkages in both the public and the private sectors. Participation of public and private institutions from other countries and multilateral agencies is also welcomed.

Benefits

A program of this size offers sufficient resources to have a significant impact on the capability of the Ukrainians to implement a water pollution control program in the Dnipro river basin that can directly affect the health of individuals and to facilitate future investment decisions in this region. The most direct and measurable effects will be felt in the training of individuals, which is given a high priority in this program. Some of the other benefits will be less easy to measure, although there may also be direct short-term benefits arising out of reduced pollution from pilot projects with individual firms or the municipal sector.

Although the program does not have an explicit objective of promoting democratic values, it will attempt to break down the barriers that exist between institutions through collaborative work; promote greater exposure to institutions and networks in other countries, particularly Canada; and develop access to information. There is a small public education sub-activity built into this program as well as a major focus on developing a more reliable set of information bases on the actual state of the Dnipro. The policy of the previous political regime to suppress all information on the environment is one of the constraints that needs to be removed.

The most important benefits may be evident when additional resources come in for supporting a major rehabilitation program because such programs could not be mounted now with any assurance of success until some of the preconditions are met.

2. *The State of the Dnipro*

The Dnipro river is the third largest river in Europe. It has its source in the Smolensk region of the Russian Federation and flows through the states of Belorussia and Ukraine. With an area of some 300,000 square kilometres, the river basin covers 11 counties in the Federation and Belorussia and 19 oblasts in Ukraine.

Ukraine is a densely populated country (pop. 52 million) with some of the world's richest farmlands and a high level of industrialization. The Dnipro is the country's main watercourse for supplying water to irrigation and industry as well as being a transportation artery, with large river ports, linking the Black Sea through Ukraine to Belorussia and Russia. Beginning in the 1920s, and culminating in the 1950-60s, six major reservoirs, together termed a "cascade," were built on the Dnipro to provide hydropower and irrigation water to the farm belt and by means of canals, to the drier lands of the southern Ukraine and Crimea. The current flow of the Dnipro has been reduced by nearly one-half of its original flow of 52 billion cubic metres per year at its mouth because of these water demands.

In addition to Chernobyl (which receives significant attention) the central Ukraine region of the Dnipro river basin has been declared the environmental priority region. In the opinion of Nikolay Vorontsov, the former USSR Environmental Minister, "environmental degradation on the left bank of Dnipro river, including Zaporizhzhia, Krivoi Rog, and Dnipropetrovsk is comparable in scale to the areas affected by Chernobyl."

The Dnipro river is extremely polluted with nearly 20 billion cubic meters of untreated effluent being dumped into the river each year. This represents over a third of the annual flowthrough of some 52 billion cubic meters. Nearly 3 billion cubic meters of this effluent is toxic. The Dnipro carries nuclear runoff from the Chernobyl region down into the Black Sea.

Current pollution levels, both surface and groundwater, impose major economic and health risk constraints upon water use, thereby limiting options for future development. Of principal concern are wastewater from:

Large Urban Areas: especially the cities of Zaporizhzhia, Dnipropetrovsk (some 250km from the Black Sea), Zhitomir, and Dniprodzerzhinsk. Large urban areas often have malfunctioning wastewater treatment plants, and smaller municipalities have no treatment facilities. The current economic climate in Ukraine places major constraints on upgrading of existing treatment facilities, or the construction of new works.

Major Industrial Complexes: Include primarily agroindustrial concerns (sugar beet, cattle breeding, alcohol), metallurgical complexes at Zaporizhzhia and Dnipropetrovsk, and chemical industries including fertilizer production. Because municipal wastewater treatment plants are designed to treat biodegradable wastes, it is important that nonbiodegradable wastes are removed before the effluent is discharged into the municipal sewer of treatment plants. Fuel wastes including heavy metals (mercury, lead) and inorganic chemicals are particularly harmful.

Water-quality monitoring stations show a steadily worsening trend in surface water quality, particularly in the Dnipro, Desna, Seim, and Psel rivers, and the self-purification capacity of these rivers has declined.

Recognizing the critical state of the Dnipro and its effects on health the Ukrainian government has included rehabilitation of the river among its top priorities. A Presidential Decree of March 1993 created the "Extraordinary Commission on the Ecological State of the Dnipro River and Potable Water Quality". The task of this interministerial body, chaired by the Minister of Environmental Protection, is to coordinate preparation and implementation of the Dnipro rehabilitation program. The Extraordinary Commission reports to the Cabinet of Ministers. The rehabilitation program will be incorporated into the National Socio-Economic Development Program.

Despite the critical economic situation and a high budget deficit, the Ukrainian government allocated 260,000 million karbovancov (approx. US\$ 85,000 at June 1993 rate) for preparation of the rehabilitation program and 7 billion karbovancov (approx. US\$ 2.3 million at June 1993 rate) for program implementation in the fiscal year 1993/94.

3. *Program Goal and Objectives*

The goal of this program is to contribute to the environmental rehabilitation of the Dnipro river system, through the collaborative efforts of institutions and organizations in Ukraine, Canada, and other countries.

The general objectives of this program are as follows:

- To help establish the capacity of Ukrainian institutions to manage the Dnipro water system and the uses that are made of it through the development of management and technical skills;
- To contribute to the reduction in water pollution in the southern Dnipro, specifically in Zaporizhzhia city and oblast;
- To forge long-term collaborative links between Canadian and Ukrainian public and private sector organizations, and to encourage the exchange of information and experience between Ukrainian researchers and policy-makers and their counterparts elsewhere.

4. Program Delivery Strategy and Components

The program will be conducted over a 3-year period. It is designed to be implemented within the framework of the Ukrainian State Program for Dnipro Rehabilitation. In view of limited funding, the program will address only those critical issues where external assistance is most urgently needed (managerial knowhow, technology development).

The program's delivery strategy is based on two principles:

- Regional focus on the southern Dnipro sub-basin, more precisely on Zaporizhzhia city and oblast. Zaporizhzhia is one of two major industrial cities located on the southern Dnipro, which municipal and industrial plants are the major water pollution sources.
- Emphasis on short-term, relatively low-cost, high-payoff solutions, which can bring immediate improvement. Support will be given to environmental audits in a few selected enterprises in one priority industrial sector, and in one municipal water/wastewater treatment plant. These audits will identify low cost "housekeeping" measures able to significantly improve water and energy management. In some cases research on or demonstration of alternative technologies bringing "win-win" solutions will be supported.

The framework of the program has been developed based on consultations with the Ukrainian Ministry for Environmental Protection (MEP), the State Committee for Water Resources (SCWR), and over 20 other governmental bodies and research institutions. This structure addresses the most important problems indicated by MEP and other institutions working on the Dnipro rehabilitation. We expect to refine this program over time through subsequent analysis and consultation with the Ukrainian partners.

The program will have two components comprising seven activities:

- **Environmental Management Capacity Building**
 - Human Resource Development
 - Environmental Management Information System
 - Policy and Public Education
- **Water Pollution Control**
 - Baseline Water Quality Study
 - Environmental Audits
 - "Green" Technologies
 - Municipal Water Pollution Control

While this proposal lays out a fairly detailed set of proposed activities during a three years period at the request of the Bureau of Assistance for Central and Eastern Europe, it must be stressed that the general political and economic situation in Ukraine may have a profound effect on what can actually be achieved during this period. This applies particularly to these activities which depend on government decisions and resources. The specific projects mentioned in this document may vary considerably from the outline given here as they are defined through more intensive discussions by the institutions concerned.

EMDU PROGRAM
WATER MANAGEMENT - DNIPRO BASIN

**ENVIRONMENTAL
MANAGEMENT
CAPACITY BUILDING**

HUMAN RESOURCES
DEVELOPMENT

ENVIRONMENTAL
MANAGEMENT
INFORMATION SYSTEM

POLICY AND
PUBLIC EDUCATION

**WATER POLLUTION
CONTROL**

BASELINE WATER
QUALITY STUDY

ENVIRONMENTAL AUDITS

"GREEN" TECHNOLOGIES

MUNICIPAL WATER
POLLUTION CONTROL

5. Environmental Management Capacity Building component

Ukraine lacks an adequate capacity to effectively manage its environment and natural resources. The MEP was created only in 1991 and is still in the process of evolving. It has 15 functional departments, 3 "entities," and regional offices in 25 oblasts and 2 cities.

A number of other organizations that have mandates and activities that affect the environmental management of the Dnipro. The program mission to Ukraine identified areas of overlapping responsibility between the MEP and other institutions, most notably the State Committee for Water Resources. A good illustration of this is the development of competing data bases referred to elsewhere.

Objective

The objective of this component is to help establish and strengthen the capacity of Ukrainian institutions to manage the Dnipro river system and the uses that are made of it.

This will require support for decentralized environmental management structures (at the oblast level), support for training, development of effective environmental management tools (information system), development of a market-oriented economic mechanisms, and an increase in environmental awareness of Ukraine's population.

This objective of capacity building is not amenable to a set of large, discrete projects. It requires a series of small and interrelated measures that together result in the development of management capability. This is the view of a number of external agencies with which IDRC consulted.

A good deal depends on the creation of trust between the executing agency and the institutions concerned. Those individuals who exhibit a capacity for management and leadership must be identified and encouraged through training, travel, and other means to assume more of a leadership role. This is a labour intensive approach and thus IDRC will devote full-time staff to developing a good understanding of the situation and to identify individuals to work with and develop. This is a key area where IDRC has developed a comparative advantage over the last two decades in its work in other regions where management capability has been an important constraint.

The main methods used to develop this capability will be working groups, training, consultant advice, pilot projects, and study tours and assessment of experience in other countries, particularly Canada.

Structure

This component will consist of 3 activities:

- Human Resources Development;
- Environmental Management Information System - pilot system development;
- Policy and Public Education.

5.1. Human Resources Development

The objective of this activity will be to provide Ukrainian environmental professionals with short term training in the key areas of environmental management. It is expected that at least 200 Ukrainian environmental managers at the top, middle and technical level from MEP, particularly Zaporizhzhia regional office and other organizations will be trained. Approximately 40 environmental managers will visit and go through short-term training in Canada.

Most of this training will take place in Ukraine through workshops and seminars. At the same time, the program management needs to bear in mind the considerable value of exposing Ukrainians to the approaches followed in Canada and the program's objective of promoting Ukrainian-Canadian links. In general, given the higher cost of doing any training in Canada, only the most senior staff and trainers will be brought to Canada in this program.

A large number of potential training courses have been identified. Most are of short duration and it would be not expected to fund any degree training. Longer term courses are likely to be in area related to socioeconomic analysis as this is the weakest area. Other courses will be short and will present specific new approaches rather than basic training.

The selection process for trainees will vary according to the different types of training. It will be targeted to those individuals who are going to be directly involved with the project whereas more general training courses will need selection procedures. These will be developed with the host training institutions.

Not all of these courses will be necessary or feasible for funding within the resources of this particular grant. There are some other external agencies interested in providing training and IDRC will try to identify appropriate Ukrainian personnel who could go to such courses.

Strengthening managerial skills and infrastructure within MEP, and project development and management techniques among Ukrainian officials and scientists, will be required to implement the program successfully. A first activity - "Project Management Skills and Infrastructure Development" will provide the Ukrainian management team with the required means and skills to effectively manage this program. The second project will support workshops in Kiev and Kharkiv on project development and management, targeted towards the potential partner institutions.

5.2. Environmental Management Information System

Management and decision-making require timely and accurate information. In the former Soviet Union, data on public activities was strictly confidential and accessible only to a small group of officials. Specially prepared statistical reports were made available for international publication. Economic and social policy decisions were made at the top political level (the Planning Committee) and relayed down for execution by industry and state institutions. The function of information as a means of power was well understood in the command system, under which Ukraine spent most of the century. As a result, organization and dissemination of information and independent management at the enterprise or public organization level was extremely weak.

Information sharing is an important means of empowering people, improving management, and creating more involvement. Unfortunately, due to a lack of tradition of cooperating with each other, different institutions are developing separate information systems, resulting in duplication and overlap. Better organization of information is urgently needed.

Another important issue is the weakness of the information infrastructure and a lack of skills among higher and middle-level management staff in using computers. An effective management system will be even more important as the MEP becomes larger over time. Information will also become an essential tool in increasing accountability of MEP's managers at both the national and the regional levels.

There are concerns about the quality of measurement undertaken by the different institutions now surveying water quality and this issue will be addressed by a baseline water quality survey.

It is clear, however, from our initial assessment and Ukrainian requests that there are serious bottlenecks in the efficient processing, inputting and distribution of information, including water quality data. This activity will address these issues.

Objective

The objective of this activity is to support Ukrainian efforts in developing an environmental management information system for the Dnipro basin, specifically:

- To design an Environmental Management Information System (EMIS) for the Dnipro river basin.
- To test a pilot system in MEP branch in Zaporizhzhia.

As this is a relatively complex process, implementation will be carried out in three stages:

- A. System Analysis, Feasibility Study and Design
 - Overall Needs Assessment
 - Data Availability and Data Requirements Assessment
 - Data Collection/Monitoring System Development
- B. Pilot Management Information System Development
 - EMIS Requirements Analysis and Design
 - Communication System Design
 - Pilot System Implementation (testing)
- C. Zaporizhzhia Regional Environmental Management Development

The full implementation of an environmental management information system is well beyond the capacity of this program but the methods, organization and information infrastructure developed during this program will become the core of a sustainable environmental decision support system. The projects will focus on environmental aspects of the management of the Dnipro river basin.

Activities in this program area will result in a design of EMIS for the Dnipro basin, with defined functions, user connections, databases and communication links. The recommended Environmental Management Information System will be delivered in the form of a report. A concrete output of this activity will be an installed and functional EMIS component in Zaporizhzhia.

It is expected that the system will be integrated with GIS and will store and process digitized data collected through remote sensing. Training in EMIS utilization, as well as in GIS technology for environmental management and in interpretation of remotely sensed images will be provided. Some projects (eg. data collection through remote sensing) will contribute to an inventory of pollution sources and provide data for other EMDU projects.

Zaporizhzhia Regional Environmental Management Development

Environmental management capability must be developed at the regional as well as at the national level. Monitoring, enforcement and remedial programs are necessary at the city and oblast levels. This activity will focus on the development of a more effective environmental management program at one of the most seriously affected oblasts. Zaporizhzhia in the southern portion of Ukraine has been identified as a priority "hot spot" in Ukraine, requiring environmental improvement most urgently. With a population of some 900,000, it has an extensive and highly polluting industrial base of 1100 industrial plants in 130 industries.

Zaporizhzhia was chosen for this pilot project because of the responsive leadership at the city and oblast administrations and some of the environmental agencies in the city. The Deputy Administrator of the oblast and the Mayor's office have both promised their full support for this program in Zaporizhzhia.

While some elements of an EMIS must be established on a national level for decision support and management of national standards, EMIS must be made operational also on the regional level. Data must be collected and disseminated from all regions as well. The existence of the Zaporizhzhia Ecological Centre established by the oblast authorities and jointly funded by the city and the MEP also creates a unique opportunity to develop a model environmental management information system in the region.

This centre which collects data from nine different agencies, including the SCWR, Vodocanal, MEP, Ministry of Health, and Zaporizhzhia city, is one of the best locations in the Ukraine for the development of a regional environmental information centre. The Centre which will now be taken over by the USCPW in Kharkiv effectively becomes the first regional information centre of the MEP.

A number of other components in this program are centred on the Zaporizhzhia oblast, specifically Green Technologies, Municipal Water Pollution Control and parts of Human Resource Development.

Objectives

- To create a closer linkage between the enforcement, research and information divisions of the MEP and strengthen regional management capability.

- To create an on-line environmental data base, which can serve not only the MEP but all agencies in Zaporizhzhia, which have responsibility for management of water in the region.

5.3. Policy and Public Education

This activity deals with the most difficult, sensitive and least developed area in the Ukraine. An adequate water supply is going to be crucial not only for health and quality of life but for economic development. Water must be treated as an integral economic resource since Ukraine already uses some 70% of all surface water in the country compared to only 50% in France and 30% in Germany. Per capita availability of water is only some 1000 cubic meters in Ukraine compared to 219,000 cubic meters in Canada. Water management in the past was primarily oriented to ensuring adequate levels for irrigation, industrial use, municipal water requirements and navigation. Substantial resources were devoted to meeting these end uses with little regard to costs and conservation. Lack of an appropriate water pricing structure has historically been one of the main water management problems. Industry pays at market rate for water use but the public is charged only symbolic amounts. Water used for agriculture is free.

The fragmented nature of water administration in the Ukraine with significant overlap in mandates and responsibilities militates against any systematic or coordinated programs to address the water management problems.

Although some changes have been introduced both to control water use through the use of water charges and to regulate the discharge of emissions through the principle of polluter-pays and fines for levels and toxicity of effluent, there appears to be no organized procedures or institutional structures in place to pursue these changes in a rational manner. One of the main problems is that a real market economy has not yet been created. Experience elsewhere shows that state-owned enterprises are not sensitive to policies that use economic incentives or penalties because they do not focus much on costs. This is certainly the case in Ukraine at present. As the private sector grows in Ukraine, a wider range of instruments can be used but they are likely to be fragile and care must be taken not to choke off these new firms with unrealistic regulations and fees.

Establishing sound environmental policies has proven to be one of the most difficult challenges for all governments and there are many examples of inadequate environmental programs even in those countries with well established programs and strong public support. Ukraine will certainly be not in a position to establish a sound environmental strategy and to follow through with appropriate policies until it develops capability and carries out a great deal of analysis. Therefore the objectives of the program in this area must be modest with an emphasis on short term problem solving projects.

One important constraint is the lack of skilled professionals who can be drawn into this work. Economists and related social scientists have weaker skills than professionals in the natural sciences. The MEP does not yet have a department or division which deals with socio-economic analysis. There are some institutions in the Academy of Sciences and in the universities which have some capability but it will require more in-depth discussions and work with these institutions to be able to assess their capabilities.

In this context then, it will be necessary to proceed carefully with training and small projects to assess and develop capability before proceeding with more ambitious projects. This will constrain the overall program considerably since it is this activity, which should provide the basis for a national environmental action plan which sets out priorities, identifies the kinds of regulatory and enforcement regimes and functions that should be put in place and the degree of decentralization and other overarching features of an environmental program in Ukraine.

Objectives

To help develop environmental policies which take account of limited resource availability and changing economic conditions in the country.

To assist the MEP and NGO's to produce effective educational materials, both print and audio-visual, to educate and involve the public in environmental issues relating to the Dnipro and to change public attitudes and practices.

Training: There are other agencies active in Ukraine including several other programs supported by the Bureau for Assistance to Central and Eastern Europe and efforts will be made to ensure collaboration and reliance on these programs in addressing training needs in environmental economics and social analysis.

Economics: Lack of information at the micro level makes it difficult to develop broader national policies so projects need to be initiated on specific sectors and issues to develop a more realistic information base for subsequent global strategies. Some of these can be carried out as complimentary exercises to the enterprise and industry specific studies that will be carried out in the Water Pollution control component.

Analysis of the Zaporizhzhia Vodokanal agency indicates that these agencies are particularly good target groups for economic analysis. However, like other organizations, they have not given sufficient attention to the benefits that can be derived from promoting greater efficiency reducing inputs and or their cost. A number of small studies will be supported to demonstrate the benefits and costs of different policies such as cost-benefit analysis of an extended program of pipeline rehabilitation, a metering program and new treatment facilities. The Dnipropetrovsk University MBA program will be encouraged to participate in these studies.

Other projects which look at promising changes in technology will also be subjected to economic analysis to determine their commercial feasibility.

The Dnipro Rehabilitation Plan: This series of projects will provide the basis for development of a more comprehensive and realistic Dnipro Rehabilitation Plan, which is capable of attracting external support. The USCPW at Kharkiv has been given a mandate to develop a rehabilitation program for the Dnipro. It has already had the annual plan for 1993 approved and funded and has now prepared a 1994 plan for approval by the Extraordinary Committee on the Dnipro which includes most of the central and line Ministries involved. However, the rehabilitation plan in its present form is highly ambitious (180 priority enterprises). Attempting to implement such a plan now is a difficult if not impossible exercise because information on the costs and benefits of specific projects is missing. The specific studies at the industrial plant and water treatment agency level and the costs and benefits of different technological options which will be supported in this section will help form the basis for developing a more realistic estimate of the costs and benefits of any plan.

Parallel training work with the Kharkiv Institute in developing a more effective planning process and criteria will help provide the kind of planning capability that can use such data to make realistic trade-offs and choices. One of the nineteen divisions at the Kharkiv Institute is involved with the development of project selection criteria, priority setting and resource allocation techniques.

A consultative process with the Kharkiv Institute, the MEP and the Extraordinary Committee on the Dnipro will be instituted to pursue development of a longer range rehabilitation program. The speed at which this plan can be developed and its comprehensiveness will depend on whether the government continues to give high priority to the Dnipro and the degree of external donor interest.

Public Education: In spite of considerable advances in the level of public awareness in environmental issues in Ukraine over the past few years, much remains to be done in terms of raising the population's understanding of major environmental issues and enhancing public participation in environmental decision making. Clear rules for public participation and access to environmental information are still largely lacking. The use of public hearings in major environmental cases, for example, is not yet established. Information on emissions, discharges, hazardous chemicals, compliance agreements and problems of noncompliance is still not widely and systematically available to the public.

A number of NGO's have been created to promote environmental awareness and press for change. These NGO's have taken a particular interest in the rehabilitation of the Dnipro. Although there has been a rapid spread in such environmental organizations in other countries in the region which these organizations could draw on, their links with other groups such as the Regional Environmental Centre in Budapest, appear to be weak. The NGO's have generally adopted an adversarial role to government agencies. Yet there may be areas such as educational projects where the two groups may be able to find common ground. There is a severe shortage of educational material for the public. The MEP and NGO's are aware of this and several NGO's are trying to address this but they lack the funds and expertise to produce effective materials.

The MEP and NGO's will be encouraged to create a working group to review the existing weaknesses in public information and to design a more effective strategy. Modest studies to assess public expectations and priorities for environmental action, the level of understanding of what changes are necessary and the economic implications of such changes may be necessary.

This information can be used to determine the most appropriate kinds of public information programs and how to improve public participation in environmental programs in Ukraine. Canadian experience with public education programs will be also reviewed.

Support will be provided for improvement of the educational material now being produced and for the incorporation of materials produced elsewhere, which is relevant for Ukraine. It is expected that approximately 5 brochures and pamphlets will be adopted, translated and published with a print run of several thousand each.

A distribution strategy will be developed with one of the main target groups being youth and other people in the Zaporizhzhia region.

6. Water Pollution Control component

The objective of this component is first, to measure actual environmental conditions in the Dnipro, and second, to contribute to the efforts to decrease pollution of the Dnipro through development, and assistance in implementation, of low-cost, short term, action plans in selected enterprises, and in one municipal water agency. These action plans would be supplemented in some cases by testing and demonstration of more efficient and cleaner technologies.

This component will consist of 4 activities:

- Baseline Water Quality Study
- Environmental Audits
- "Green" Technologies
- Municipal Water Pollution Control

6.1. Baseline Water Quality Study

While a number of agencies and research centres collect data on water quality this evidence does not correspond to the data collected by the GEF program on Black Sea rehabilitation. While the Ukrainian government and the various agencies involved in water management are convinced that the Dnipro is seriously at risk, external experts have suggested that the overall quality of the Dnipro may not be as bad as projected by government reports. A more reliable picture of the level of pollution of the Dnipro is thus essential for any programs aimed at reducing water pollution in the Dnipro.

A baseline water quality study will help to identify any especially polluted sections of the river and contribute to identifying health or ecological risks. It would also support international efforts to address the serious pollution problems of the Black Sea.

Objectives:

- To create a reliable data base on water quality of the Dnipro.
- To determine what existing measurements (historical and present) are reliable and what deficiencies in equipment and staff performance need to be corrected.
- To train Ukrainian scientists in water sampling and analytical methodology and in use of modern monitoring and analytical equipment.

The USCPW in Kharkiv (MEP) and the Institute of Hydrobiology (UAS) have advanced plans to undertake the baseline water quality study of the Dnipro river in 1994. Two parallel expeditions will be undertaken, one using the recently completed, relatively modern scientific ship belonging to the Institute of Hydrobiology, and the second, using ground transportation and portable laboratories, taking water samples from the shores of the river. The Dumanski Institute of Colloid and Water Chemistry (UAS) will undertake analysis of heavy metals and components requiring advanced instrumentation.

The team on the ship will concentrate on monitoring biological parameters, while the ground team will gather chemical data.

The two institutes involved in the study preparation requested external assistance in water sampling and analytical methodology training, and in acquisition of some pieces of analytical equipment. The United States Agency for International Development (USAID) has expressed interest in collaboration.

More complex biological tests of fish tissue to detect micropollutants may be verified in Canada. At present almost all monitoring in Ukraine is focused on traditional physical and chemical analysis of water itself. This method makes it difficult to detect the level of exposure to micropollutants, such as heavy metals, pesticides, and chlorinated hydrocarbons, which are dangerous even in low concentrations.

6.2. Environmental Audits

Problem

Reports by the Ministry for Environmental Protection indicate that pollution of the Dnipro from industrial wastes is above the ecological capacity of the river system. The government has attempted to address the problem of industrial emission by identifying 180 priority polluters and preparing investment plans aimed at reduction of pollution in each of these plants.

This ambitious strategy will be almost impossible to implement given the state of Ukraine's economy. It is also unlikely that international donors will come up with major funding for large environmental projects until there is a clearer picture of which firms are potentially viable and management changes and business plans are drawn up to provide some assurance of viability.

In the meantime a lot can be done by addressing the short term needs of some selected industrial sectors, which are most likely to survive. Experience from other Central European countries indicates that development and implementation of short-term, low-cost action plans for individual enterprises can reduce pollution by an average of 50%, while at the same time cutting their operating costs.

Environmental audits have been successfully used in the West and recently also in Central Europe, to develop such action plans by identifying low cost safety, operational and environmental improvements and measures to reduce energy, water and other inputs.

Objectives

The objectives of this program activity are:

- To conduct environmental audits in 3 enterprises in the agroindustrial sector.
- To develop action plans, which would improve environmental practices and possibly reduce operating costs of these enterprises.
- To assist these enterprises' management in implementation of some parts of the action plans, particularly those related to water pollution abatement.
- To train (on the job) Ukrainian inspectors/experts in preparation and execution of effective environmental audits.

The agroindustrial sector, has been selected as appropriate for environmental auditing and with good prospects for future growth. With the medium size of an average enterprise in this sector, changes can be introduced at relatively low costs. At the same time, the agroindustrial sector accounts for a substantial amount of Dnipro pollution.

Criteria for enterprise selection will be based on:

- Their economic condition,
- Their status as priority polluters,
- Complexity and nature of the problem,
- Uniformity of the problem (potential for replicability),
- Willingness of the top management to cooperate during the audit, and to follow up on recommended actions.

A Canadian-Ukrainian auditing team will include Canadian environmental audit experts, and Ukrainians from environmental inspection department of Zaporizhzhia oblast and the Legal Department of USCPW.

Materials on environmental audits will be translated and informal training in audit procedures and quality management provided to Ukrainians participating in audits. It is expected that some Ukrainians who have gone through short-term training in Canada will be already familiar with environmental auditing techniques and procedures.

Post-audit activities will include preparation of the final report and an action plan, which will include proposed actions to address each finding, responsibility for corrective action and implementation timetable. The executing agency might assist the enterprise in implementation of some inexpensive parts of the action plan, particularly those which would reduce water pollution or water use.

It is expected that the results of one or two of these environmental audits will be written up as Ukrainian case studies to be used in on-going courses at the Environmental Education and Information Centre in Kiev.

6.3. "Green" Technologies

The lack of concern for the environment or regulations addressing environmental practices in the previous regime has resulted in levels of emissions of pollutants far higher than those prevailing in other industrial countries. In a number of cases, higher pollution levels are due to inadequate technology as well as poor operating procedures. In other cases, it appears that equipment or technologies already available could be introduced not only at relatively low costs but could even pay for itself quickly through reducing inputs and operating costs. Such cases represent what is called a "win-win" situation.

Even where new technologies are readily available, however, it is unlikely that they could be introduced without some testing, training and modification at least in operational practices. In some situations, considerable research may be necessary to modify or develop new processes that take account of more unique conditions in Ukraine. Such examples can be found in the agrofood sector where the composition of plant wastes is different from that prevailing in other regions.

The scientific capability of Ukraine is of a high standard but has rarely been directed to practical uses. Scientists were discouraged from undertaking practical research except in selected areas, often involving military applications. Scientists must be given encouragement and an opportunity to become more problem oriented and to develop closer links with end-users and their needs.

Some projects which could develop improved technologies have already been identified but further work is needed to refine these. It is expected that two to four technology projects will be selected based on such criteria as environmental and economic impact, availability of alternative technologies, replicability within Ukraine and willingness of plant management to cooperate and participate in research and testing of new technologies.

6.4. Municipal Water Pollution Control

The availability of water supplies and the treatment and disposal of wastewater are severe problems for the large industrial cities of the lower Dnipro. Each city has an agency called Vodokanal which is responsible for the provision of water to the city and treatment of wastewater.

In Zaporizhzhia city water consumption by both industry and public utilities is 546 million tons per annum. About 57 million cubic meters of untreated water (municipal waste) goes into the river each year. Zaporizhzhia is served by a wastewater treatment plant on each bank of the Dnipro river. The plant on the left bank has a treatment capacity for 175,000 cubic meters per day, but receives an inflow of 350,000 cubic meters per day. Both treatment plants have operational problems in the treatment and disposal of sludge. For example, at the left bank plant there is an accumulation of 150,000 tons of air dried sludge of which much will eventually drain back into the Dnipro. The Vodokanal authorities would like to build a new treatment plant but there is little likelihood that the US\$55 million required will be available for a number of years or that sufficient revenue could be generated to pay off such an investment.

There are also problems in the supply of water. The management of Vodokanal, believe that some of the shortfall of 80,000 cubic meters per day could be made up by the introduction of a leakage control scheme.

At present, little effort is made to either quantify or to bring under control leakage from distribution system. Estimates of leakage in the order of 25-35% are reported. Due to the absence of sufficient distribution zone meters of the automatic logging type, there is virtually no data available to make a reasonable estimates of losses by leakage. Water use is metered only at the pumping station and some key users such as industrial enterprises. However, they are certain that pipeline losses are high. Forty per cent of the pipes are worn out and some pipes are 30 years old. Some experiments have shown that an additional 15% of all water is lost by leakages at the household level.

Tariffs for water use are skewed towards private users with individual consumers paying only 50 coupons compared to 2700 coupons by industrial users. The Vodokanal sets prices for industrial users while the national government sets prices for household users. Since water charges to households can take up to 6% of average monthly income there is a limit to the rate at which these charges could be increased. It will be difficult therefore to move the Vodokanal towards self-sufficiency in revenue and require a whole series of changes to prices, and efficiency measures in water delivery and use.

Objectives

The objective of a project with the Zaporizhzhia Vodokanal will be to support measures which will improve the self-financing capability of the Vodokanal agency and to provide safe drinking water and adequate treatment of sewage pumped into the Dnipro.

Proposed Actions

This project would consist of three groups of activities:

- Deficiency report of the Vodokanal agency and support for development of a short term action plan.
- Training of the plant's managers and technicians.
- Demonstration of selected technologies or management practices contributing to better quality of supplied drinking water or reduction in pollution.

A Canadian expert in water and sewer treatment will carry out a review of the whole Zaporizhzhia Vodokanal agency and discussions with senior management on key improvements that can be made.

A workshop on Vodokanal management and water/wastewater treatment technologies will be supported and key personnel will visit several facilities in Canada. This study tour will include visits to the physical treatment facilities as well as an in-depth review of their administrative and financial operations.

The third component will support further analysis and testing of more cost efficient measures. One of these could be support for a test of the cost and efficacy of introducing improved water meters since existing water meters break down after a short period of time. Another study, which may be supported would be an assessment of the degree of hazardous wastes in the sludge residue at treatment plants. It may be possible to use this sludge as fertilizer if hazardous waste material is not serious or how easy it would be to eliminate or reduce to safer levels hazardous waste in the sludge.

The consultant will work with Vodokanal authorities and IDRC staff will help select one or two of these project possibilities, which offer the highest potential payoff. Areas that will be addressed first in the initial assessment include possible drinking water treatment process improvements in operation of the rapid gravity sand filters, mechanical dewatering of sludge, or improvements in drinking water treatment, including alternatives to overchlorination, elimination of algae, aluminum or heavy metals. Wastewater treatment process assessments might include improvements in design and operation of anaerobic sludge digestion, improvements in aeration efficiency, and utilization of methane gas from anaerobic digestion of sludge. Other new water distribution and treatment technologies are expected to be introduced which will provide cost-effective measures to reduce water losses and to improve drinking water quality.

7. Collaborating Institutions

While the Ministry of Environmental Protection in Ukraine will be the lead agency involved in this program, it is expected to involve a number of other government ministries such as the State Committee for Water Resources and research centres in the Ukrainian Academy of Sciences which have responsibility or expertise in water management issues.

This program is designed to promote greater cooperation with Canadian institutions, given the interest of Ukrainians in greater contact with external agencies and drawing on their experiences. A number of Canadian agencies including federal and provincial departments of the environment, universities and municipal agencies have already expressed interest in cooperative projects in this program. Environment Canada and the Quebec Department of Environment have already provided assistance during the formulation phase of this program.

In addition, discussions have already been held with other external funding agencies with a view to cooperating in funding or programming initiatives in Ukraine.

Opportunities in environmental engineering and management are also expected to develop with Ukrainian agencies and newly privatized industries as the result of this program.


Program Budget


The total Canadian contribution to this program will be \$5 million CAD. It is expected that Ukrainian government agencies, oblast/municipal authorities and scientific institutes will provide substantial support particularly in the provision of staff and facilities as Canadian institutions which develop collaboration with Ukrainian partners are also expected to provide additional benefits in-kind.

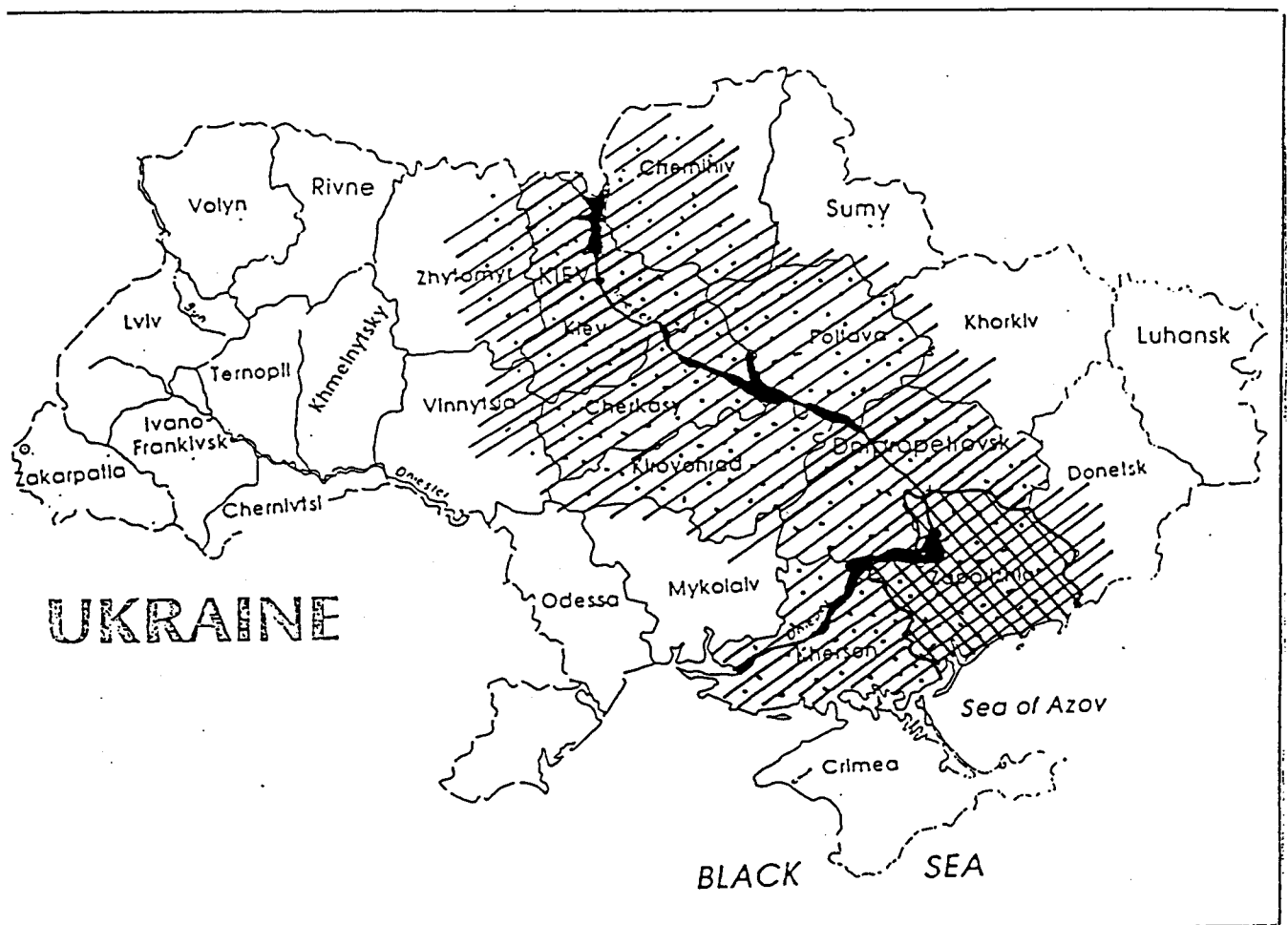
However, the resources required even during the early stages of this rehabilitation program go well beyond these amounts and IDRC will look to cooperation with other donor agencies to provide a more concerted effort to address the critical issue of improving water quality of Ukraine's most important river.

UKRAINE - GEOGRAPHICAL SCOPE OF THE PROGRAM

— - the Dnipro River

 - the Dnipro River Basin

 - Zaporizhzhia Oblast - activity concentration area





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