
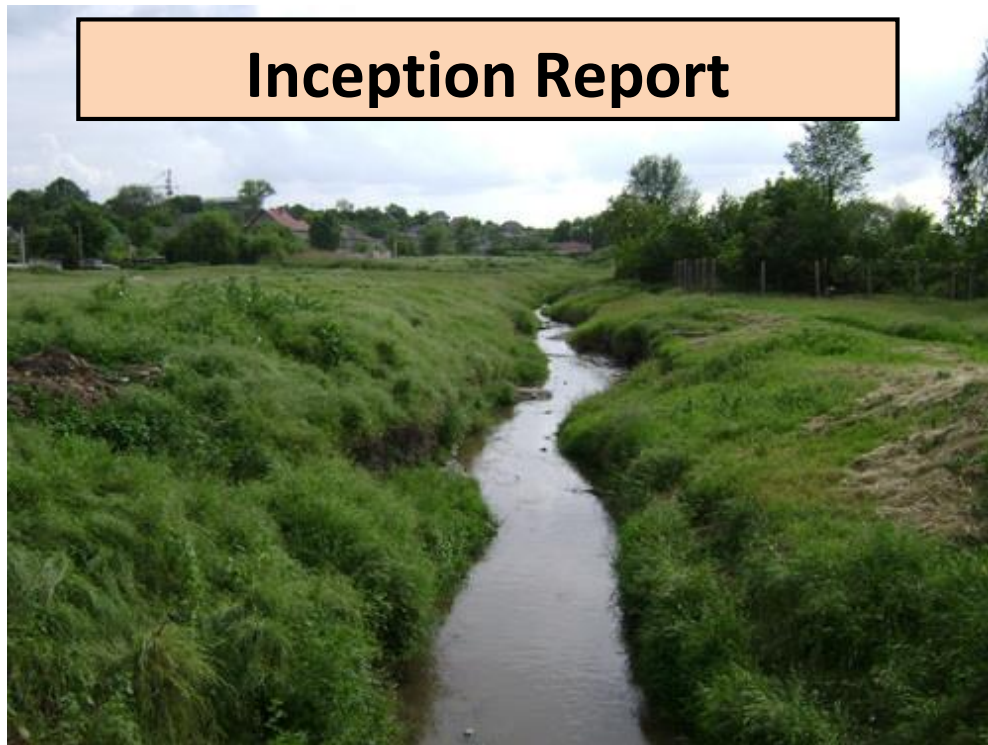
	<p><b>Environmental Protection of International River Basins (EPIRB)</b></p> <p>Contract No 2011/279-666, EuropeAid/131360/C/SER/Multi</p>	
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This project is funded by  
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A project is implemented by a Consortium led by  
Hulla & Co. Human Dynamics KG



## Pilot project

**“Initial Development of Water Resource Management Information System (WRMIS) including GIS mapping of water abstraction and wastewater discharge locations for the Prut pilot area in the Republic of Moldova.”**

*Prepared by State Enterprise “Basin Water Management Authority”*

September-October 2014

# Contents

Introduction.....	3
Implementation Strategy .....	4
1.1. General Approach .....	4
1.2. Works and planned activities .....	4
<b>1.3. Staffing .....</b>	<b>5</b>
1.4. Study Area .....	6
2. Analysis of the existing data.....	6
2.1. Work Planning and establishing the necessary resources .....	6
2.2. Preliminary evaluation of the requirements regarding the description and characteristics of the intake and discharge points .....	7
3. Methodology for collection, codification and storage of abstraction data .....	7
3.1. Analysis of existing data, for the Prut hydrographical river basin .....	7
3.2. Applications of standards for data presenting.....	8
3.3. Data collection with field measurements, working with the water users and the collection of spatial data with support of <a href="http://www.geoportal.md">www.geoportal.md</a> and <a href="http://www.gismediu.gov.md">www.gismediu.gov.md</a> ; .....	8
3.4. Development and the publication (graphical and attributive data) of GIS layers; .....	9
3.5. Drafting methodology on data reporting to meet the requirements of environmental, statistical demands in collaboration with water users.....	9
3.6. Develop proposals on modern information system promoting free exchange of data among various agencies.....	9
3.7. Publishing the GIS layers on the environment portal: <a href="http://www.dbga.md/siga.html">http://www.dbga.md/siga.html</a> and <a href="http://www.gismediu.gov.md">www.gismediu.gov.md</a> .....	9
4. Data collection report .....	10
4.1. Systematization of obtained data .....	10
4.2. Precision analysis of the data and their accuracy .....	10
5. GIS layers .....	10
5.1. Identification of the informational layers and the structure table of the attribute table .....	10
6. Final report.....	10
7. Timetable.....	11

## Introduction

This Inception Report was realized within the *Contract for The Contractor shall develop Water Resource Management Information System (WRMIS) including GIS mapping of water abstraction and wastewater discharge locations for the Prut pilot area in the Republic of Moldova, as defined in the Terms of reference (Annex 2) of the present Contract for the needs of the EU-funded project “Environmental Protection of the International River Basins” (SC № 2011/279-666, EuropeAid/131360/C/SER/Multi). Ares(2014)2623153. The services shall be carried out in accordance with all terms and conditions set down in this Contract, the attached Standard Business Conditions signed on September, 2014 between Hulla & Co. Human Dynamics KG (Client) and State Enterprise “Basin Water Management Authority” (BWMA, Contractor).*

The Inception Report describes the Strategy to be implemented by the BWMA team for *The Contractor shall develop Water Resource Management Information System (WRMIS) including GIS mapping of water abstraction and wastewater discharge locations for the Prut pilot area in the Republic of Moldova, as defined in the Terms of reference of the present Contract for the European Union Project “Environmental Protection of the International River Basins” (EPIRB). The Implementation Strategy is based on the approaches and methodology proposed in the Terms of Reference (ToR) of the Contract, Technical Proposal of the BWMA, Water Framework Directive (WFD) and the guidelines for WFD implementation, Moldavian Laws, Normative Acts and Strategies.*

The Inception Report includes the description of the realization concepts and approaches of Contract main phases and deliverables, the input and output of the project as well as the timeline for planned activities and staffing for Contract implementation.

Project	<b>Water Resource Management Information System (WRMIS) including GIS mapping of water abstraction and wastewater discharge locations for the Prut pilot area in the Republic of Moldova</b>
Funder	<b>European Union</b>
Beneficiary Country	<b>Republic of Moldova</b>
Beneficiary	<b>State Enterprise Basin Water Management Authority of Moldova</b>
Contracting Authority	<b>Hulla &amp; Co. Human Dynamics KG</b>
Commencement date	<b>September, 2014</b>
Period of Contract	<b>15 months</b>
Document title	<b>Inception Report</b>

# Implementation Strategy

## 1.1. General Approach

**The main purpose of this project is to develop initial Water Resources Management Information System**

One of the key objectives of the work is identification at office and in the field (using GPS device) of the water catchment points and wastewater discharge points for the Prut hydrographical river basin based on annual report of water users. This activity will also include:

- Working with the Water Users from the pilot area and also taking spatial data from [www.geoportal.md](http://www.geoportal.md) and [gismediu.gov.md](http://gismediu.gov.md) (sites that geospatial provides data for water resources);
- Creating wastewater discharge points within the environment geoportal [www.gismediu.gov.md](http://www.gismediu.gov.md) ;
- Rectification of the water catchment points and wastewater discharge points position, which were classified as “approximate” or “unknown” by field measurements with GNSS (GPS) equipment;
- Filling water use data and water quality data for the identified points of the water catchment points and wastewater discharge points for the Prut hydrographical basin based on annual report of water users;
- Realization of economic analysis of water use taking into account the principle of recovery of costs of water services;

In order to develop this pilot project will be studied the experience of the EU and its implementation in neighbors countries as Romania will be directed to apply the benefits of information technology. In order to comply with the information standards, will be generated reports, decisions and generate new information will apply international standards and that attributive information structure. Because of the large investments that are needed to connect integrated development resources Water Management in the Prut River Basin will be initiated the work on data collection in the most important points of water capture and overflow, will in the future be completed and supplemented with other useful information.

All problems and issues related to the study area will be discussed during the field visits within stakeholders, local authorities and public.

## 1.2. Works and planned activities

The main phases and deliverable of the project are shown in the table below:

**Table 1. Main Phases of the Project**

Phase	Deliverables
1. Analysis of the existing data	1.1 Work Planning and establishing the necessary resources
	1.2. Preliminary evaluation of the requirements regarding the description and characteristics of the intake and discharge points
2. Methodological report for collection, codification and storage of abstraction data	2.1. Analysis of existing data, water user reports, identification of the surface water supply, irrigation intake points and wastewater discharge points for the Prut hydrography basin, based on annual report of water use and their mapping;
	2.2. Development of standards for coding, classification, processing of intake and discharge data and methods / procedures for its

	collection.
	2.3. Data collection with field measurements, working with the water users and the collection of spatial data with support of <a href="http://geoportal.md">geoportal.md</a> ; <a href="http://gismediu.gov.md">gismediu.gov.md</a> ;
	2.4. Development and population of GIS layers;
	2.5. Drafting methodology on data reporting to meet requirements of environmental, statistical demands in collaboration with water users.
	2.6. Develop proposals on modern information system promoting free exchange of data among various agencies. Special efforts should be made to develop and continuously upgrade technological capability to collect process and disseminate reliable data in the desired time frame.
	2.7. Publishing them on the environment portals: <a href="http://www.dbga.md/siga.html">http://www.dbga.md/siga.html</a> and <a href="http://www.gismediu.gov.md">www.gismediu.gov.md</a> . This GIS data will comply with Shared Environment Information System (SEIS) standards that will be available for environmental assessment and management purposes;
3. Data collection report	3.1. Systematization of collected data;
	3.2. Precision analysis of the data and their accuracy;
4. GIS layers	4.1. Identification of the informational layers and the table structure of the attribute table;
	4.2. Data Completion and checking the implementing method
5. Final report	The Final Report will contain the following: graphical and attributive information about the water users and discharge points in the Prut River Basin, as well as some recommendations for visualization and auto generate report.

### 1.3. Staffing

For the development of “Water Resource Management Information System (WRMIS) including GIS mapping of water abstraction and wastewater discharge locations for the Prut pilot area in the Republic of Moldova”, State Enterprise Basin Water Management Authority of Moldova has a team of highly qualified national experts, including young Master students and PhD researchers in GIS and GPS technologies, Water Resource Management: list of team experts and project responsibilities are outlined in the table down.

Expert	Field of expertise	Project Responsibility
Vasile GRAMA	GIS and Water Management	Project Coordinator, drafting methodology
Mihail TURCULET	Sustainable Development, GIS Expert, Data Collection	Data Collection, Maps elaboration, Field work
Alexandru TABACARU	GIS Expert, Data Collection	Data Collection, Maps elaboration, Field work, drafting structure of layers
Andrei IACOVLEV	Data Collection	Data Collection, Maps elaboration, Field work
Ana MOROZAN	Accountant	Budget planning and expenses
Natalia TURCULET	Hydrological Expert	Data Collection and Public Relations
Marin MALSKII	Environmental Engineer	Data Collection and Public Relations
Lozovanu MARIANA	GIS Expert,	Data Collection, Maps elaboration
Corianu TATIANA, Phd,	GIS Expert	Data Collection, Maps elaboration

## 1.4. Study Area

River Prut's length is 967 km, the basin has an area of 27540 km<sup>2</sup>, northwest to southeast, is narrow, asymmetrical, with the right side more developed upstream and central basin. The average width of the basin is 51 km.

In the Basin there are about 600 villages, more than 50 wine factories, 11 towns (Cahul, Leova, Nisporeni, Ungheni, Costesti, Glodeni, Edinet, Briceni, Lipcani, Cantemir, Falesti), more than 1000 agricultural users for irrigation purposes, but according to statistical data there are for about 650 water users.

Left main tributaries are the rivers: Liucika (56 km), Cerneava (63 km), Ryngaci (42 km), Vilia (50 km), Lopatnic (57 km), Racovat (67 km), Ciuhur (90 km), Camenca (93 km), Nîrnova (49 km), Lăpușna (70 km).

## 2. Analysis of the existing data

### 2.1. Work Planning and establishing the necessary resources

In Moldova, the drinking water is obtained from surface water sources and groundwater and the drinking water distribution system covers about 45% of consumption, of which 78% is directed to the urban population.

According to Articles 23 of the Water Law no. 272/2011, entered in force in 2013 there are two kinds of water using General and Special. It considers general use and does not require an environmental permit for special use of water use for the following purposes:

- a) human consumption and other household needs;
- b) watering the animals without the use of permanent structures;
- c) irrigation land around the house;
- d) bathing and recreation;
- e) capture and use of water for firefighting or other emergency.

(2) Irrigation performed by a person legally supplied with water through a centralized irrigation system managed by an association of water users for irrigation or other person holding an environmental permit for special use of water does not require such a authorization.

The use of water that does not fall under Art. 22 are considered special use and can be made only on the basis of environmental permit for special use of water.

(2) The special use of water considered the following activities:

- a) abstraction of water from surface water sources and groundwater for water supply for human consumption;
- b) abstraction and use of water from surface water sources and groundwater technical and industrial purposes, including food processing and agro-industry;
- c) capture and use of irrigation water from different sources;
- d) water use in aquaculture and fisheries;
- e) the discharge of sewage;
- f) the use of water for hydro-electric power generation;

Information about intake and discharge water points is presented for water usage limits approval for special use of water resources, without making a cartographic presentation. It is therefore difficult the monitoring process, and in case of intervention and analysis cannot be applied the modern information tools. Also information about the amount of water used is collected by statistical institutions are being send periodically paper reports (the digital information and communication is absent).

Inputting the spatial data generated from various sources is foremost step for GIS analysis. In the present study, drainage network, contour map, spot heights, surface water bodies and village location maps were generated from the OrtoFoto Plan, Cadastral Plan, GISmediu.gov.md.

Because the existing data are held by various institutions, both state and private, with a format that does not meet the requirements for the proper development of an Integrated Water Resources Management and the Prut Basin Plan, it aims to identify intake and discharge points, their reporting on cartographic materials with attaching attribute data. Information collected will be presented in digital format, with possible updates and completion.

## **2.2. Preliminary evaluation of the requirements regarding the description and characteristics of the intake and discharge points**

Necessary information for the directory schemes and programs of measures, including establishing requirements for water and recovery of water potential and flood protection on the national territory, the stages of development, is available to the central authority in the water sector and Agency "Moldovan Waters"<sup>1</sup> by the central and local public authorities, the main users of water, and non-governmental organizations interested in watershed planning.

To ensure the water needs, are used the following capture types:

- Intake water points from underground sources through drilled wells;
- Intake water points from underground sources, capturing springs;
- Intake water points from underground sources through drainage;
- Intake water points from surface sources of rivers, canals branch, natural or artificial lakes and water intakes for irrigation and drainage catchments draining systems.

At present Moldova lacks a normative act in which is described the needs of their characteristics and how to collect data intake and discharge points, also missing a classification of water users. For this reason, it is proposed to collect information about users who take a special amount of water used, both in rivers and in ponds or underground water. Another user group will be those who use water resources without leading to modification of quantities such as fisheries, recreational purposes etc. In a separate category is included water users collected from the drainage works.

Also, in accordance with Article 7 of the Framework Directive, the Member States must identify all water bodies used or that will be used in the future to capture water for human consumption, providing an average of more than 10 m<sup>3</sup> / day or serving more than 50 people. Also, Member States must monitor all water bodies that provide more than 100 m<sup>3</sup> / day (mean). Regarding describing characteristics of discharging points will be appreciated after detailed study.

## **3. Methodology for collection, codification and storage of abstraction data**

### **3.1. Analysis of existing data, for the Prut hydrographical river basin**

As normative act for drafting data collection methodology will be used the European legislation in force.

The ownership of the info regarding the intake points:

- Starting with the Register environmental permit for special use of water owned by the State Ecological Inspectorate;
- permit for special water use must be coordinated with the Public Health Center, responsible for the water quality;
- BWMA which is coordinating the limits for the water using;
- National Bureau of Statistics of Moldova which processes all the statistical data and publishes it for the public;

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<sup>1</sup> Agency "Apele Moldovei" is under of Ministry of Environment is responsible for coordination of environmental special authorization for water using, as well these functions are executed by SE "Basin Water Management Authority".



All docs are submitted to One Stop-Administrative Shopping in traditional format on paper that is scanned and may be subject to processing query and be entered in the information system. They also do not contain information about the location.

It is proposed to be used all existing materials: statistical data, annual reports materials, cadastral existing orthophoto plans and training for water users and local authorities in order to complete the database for intake discharge points.

It is proposed to be identified:

1. Water users depending on the volume of water taken and how they use it:
  - For water supply with drinking water for the population, industry and agriculture.
2. Identify the overflow points, depending on the pressure on the environment.

For this it is proposed to conduct field measurements in the case if new users starting to work for which there is no data mentioned in the public institutions mentioned above.

It is expected to make positioning with the coordinate system MOLDREF 99.

The objects will be represented as point objects or polygons, depending on the type of equipment used for sampling and water overflow.

### **3.2. Applications of standards for data presenting.**

Efficient water management in a basin as large as the Prut requires the coordinated efforts of multiple originations. Collaboration is necessary to develop the practices which will form the basis of this relationship. The data collection will be organized at a national level.

The coding, classification and the processing of the intake and discharge data will correspond and to **Water Law** Nr. 272 of R. Moldova and Government Decision Nr. 881 of R. Moldova from 07.11.2013. Also team will try to use templates proposed by the ICPDR (International Commission for the Protection of the Danube River).

First of all the intake and discharge points will receive the country code and the reference number of the hydrographical basin where it is situated, also it will receive all the necessary attributes.

### **3.3. Data collection with field measurements, working with the water users and the collection of spatial data with support of [www.geoportal.md](http://www.geoportal.md) and [www.gismediu.gov.md](http://www.gismediu.gov.md)**

According to the documentation used in the past the process of identification of intake and discharge points was determined with geodesic coordinate system with the accuracy of  $\pm 1'(\pm 1870 \text{ m})$  which also is not satisfactory to be reported on Geographical informational layers and performing various queries in Geographical Informational System (GIS).

During joint fields surveys team will measure water intake points from the Prut river which are used for water supply and wastewater treatment and discharge points of wastewater treatment plants. Measurements will be done with GPS surveying.



### **3.4. Development and the publication (graphical and attributive data) of GIS layers;**

The progress of digital technology, particularly geographic information systems (GIS) and decision support systems (DSS) have significantly improved the basis for decision-making in river basin management in many countries. These tools are especially useful for setting priorities and developing management options. However, it is important to recognize that such tools are only means to complement, not replace competent and trained managers.

Initially it was proposed to develop two GIS layers: abstraction and discharges points, but the characteristics of the water intakes and data processing requires from team to develop more layers. This important issue will be drafted by team in the methodology in accordance with the TOR.

### **3.5. Drafting methodology on data reporting to meet the requirements of environmental, statistical demands in collaboration with water users.**

The initial development of Water Resource Management Information System will serve as a support for decision making and examine the rational use of water resources. It is planned to study the water demands from and the specialists in planning so that they can organized the database query according to the requirements submitted by them.

The Methodology will be elaborated and written in detail in the next stages according ToR at the end of November 2014.

### **3.6. Develop proposals on modern information system promoting free exchange of data among various agencies.**

**Interoperability** is the ability of making systems and organizations work together (inter-operate). Information exchange is crucial, while the term was initially defined for information technology or services to allow for information exchange, a more broad definition that takes into account social, political, and organizational factors that impact system to system performance. Task of building coherent services for users when the individual components are technically different and managed by different organizations.

Special efforts should be made to develop and continuously upgrade technological capability to collect process and disseminate reliable data in the desired time frame.

### **3.7. Publishing the GIS layers on the environment portal:**

**<http://www.dbga.md/siga.html> and [www.gismediu.gov.md](http://www.gismediu.gov.md).**

This GIS data will comply with Shared Environment Information System (SEIS) standards that will be available for environmental assessment and management purposes;

Making an inventory must be done in collaboration. When inventory is held in a metadata catalog online users benefit from immediate access to data. This means that partners can enter metadata catalogs data directly managing them. They can specify rights of access to metadata and data sets for specific groups of users of Water Resource Management Information System (WRMIS). It is also important to mention with the help of developed WRMIS to involve public in decision making process.

The Users of WRMIS can:

1. Seek and identify simple multi-language database interfaces using a keyword and / or a geographical interface;
2. Download data, or access interactive maps, since rights access they have been granted by the data producers;
3. Make data online data and produce a series of reports for authorized partners, they can also consult immediately update metadata and download the information they need.

## **4. Data collection report**

### **4.1. Systematization of obtained data**

Environmental indicators and indices are detailed and complex devices that attempt to describe not only ecological status but also the reactions of the biosphere to the demands placed on it by society.

The data collected will be selected depending on the importance and the pressure they have on the environment, which coordinates water use, Administration at the local level. Data collection report will be prepared at beginning of the March 2015.

### **4.2. Precision analysis of the data and their accuracy**

1. The precision of the spatial data

The identification of intake and discharge of waste water points that will be performed using Orthophoto that will contain errors (apprx. 1m), first of all because of the spatial resolution and second due to the human errors during the digitization process.

Field measurements with GPS (apprx. 20 cm).

2. Accuracy of qualitative data;

Will be determined after reports presented to public health center

- 3 Accuracy of quantitative data

Accuracy will be determined by the use of user equipment and quantitative evidence for the water consumption.

## **5. GIS layers**

### **5.1. Identification of the informational layers and the structure table of the attribute table**

The Data Base (DB) structure and composition will be developed according to European standards.

It is proposed to consist two chapters: Catchment points and discharge points in which will be indicated as attributes.

## **6. Final report**

Final report according ToR will be presented on 15 of September 2015. The report will include all activities undertaken by team and deliverables according to planned activities.

## 7. Timetable

The project duration is estimated to be of 15 months, as described in the table presented below. The assignment is divided into three phases with the following general schedule:

The approximate timeline and description of the deliverables for each Phase:

Activities	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
Analyzing existing data, water user reports, identification of the surface water supply, irrigation intake points and wastewater discharge points for the Prut hydrography. Preparing inception report.															
Methodology for the codification, collection and storage of abstraction and discharge data															
Stakeholders consultation															
Data collection with field measurements, working with the Water Users and also collecting spatial data with support of <a href="http://geoportal.md">geoportal.md</a> ; <a href="http://gismediu.gov.md">gismediu.gov.md</a> . Preparing data collection report															
Developing GIS layers and filling with attributive information as a part of Surface Discharge Water Resource Management System and its component: Geographic Information System for water intakes and wastewater discharge points.															
Publishing GIS layers on the environment portals: <a href="http://www.dbga.md/siga.html">http://www.dbga.md/siga.html</a> and <a href="http://www.gismediu.gov.md">www.gismediu.gov.md</a>															
Final report including proposals for further extension and development of WRIMS															