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Nutrient management plan  
for biosphere reserve  
"Lower Prut / Prutul de Jos"  
and National Park "Orhei"  
and options for social and  
economic development  
based on traditional trades  
of these regions



**Nutrient management plan for  
biosphere reserve “Lower Prut / Prutul de Jos” and  
National Park “Orhei” and options for social and  
economic development based on traditional trades of  
these regions**

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## INTRODUCTION

This document is the Final Report of the National Commission of the Republic of Moldova for UNESCO funded Project “Nutrient management plan for biosphere reserve “Lower Prut/Prutul de Jos” and National Park “Orhei” and options for social and economic development based on traditional trades of these regions.

The overall goal of the nutrient management plan is to strengthen the capabilities of the biosphere reserve “Lower Prut” and national park “Orhei” authorities for reducing nutrient pollution and to improve regional and local cooperation in the areas, which could serve as a reference conditions for development of different planning documents in the country. Special efforts and assistance are provided by of the National Commission of the Republic of Moldova for UNESCO to different level of local public, sectoral and civil society authorities through MaB program in development of policy documents and case-studies aimed at pollution reduction, in line with of the National Commission of the Republic of Moldova for UNESCO and MaB priorities in management of the biosphere reserves and national parks.

The outputs and outcomes from this project will be utilized and further developed in the context of social and economic development in the Lower Prut region as well as in the Raut river basin (national park “Orhei”) with the development and upgrading of the basin wide Prut and Dniester (Raut) River Basin Management Plans.

The Project assists local public authorities with the development of a local approaches to the development of the planning activities in line with the EU environmental Directives and the countries’ commitments to the International Institutions.

The project addresses the following outputs:

| No. | Nutrient reduction                                                                                                                                      |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Development and implementation of local planning documents on nutrient reduction                                                                        |
| 2.  | Reduction of nutrients and harmful substances from agricultural point and non- point sources through improved agricultural and other sectoral practices |
| 3.  | Recommendations for the reduction of nitrogen and phosphorus emissions in rural localities through improved management of waste and waste waters        |
| 4   | Awareness raising campaigns on nutrient use and reduction measures                                                                                      |
| 5   | Public Participation / Access to Information                                                                                                            |

## 1. PROJECT GENERAL OBJECTIVE

The overall objective of this project is to develop nutrient reduction management/program of measures plan and on this base to provide recommendations to different level of authorities on nutrient reduction and thus support good state of ecosystems in the biosphere reserve area and National Park "Orhei".

The project goal is to facilitate a local approach to the development of the Nutrient reduction plans in line with EU Directives and of the National Commission of the Republic of Moldova for UNESCO priorities for the biosphere areas and national parks, by addressing best sectoral practices to achieve good ecological status of water ecosystems through introduction of pollution reduction measures, public access to information and participation in the making decision process.

Case-study areas included in the project are of internationally significance and coordinated local efforts to develop harmonized local policies for nutrient reduction are needed.

## **2. PROJECT MAIN ISSUES OF CONCERN**

### **2.1. UNDERSTANDING THE IMPORTANCE OF THE NUTRIENT REDUCTION FOR SOCIAL AND ECONOMIC DEVELOPMENT IN THE LOWER PRUT REGION (BIOSPHERE RESERVE) AND NATIONAL PARK "ORHEI"**

National papers for the social and economic development in Moldova include nutrient reduction activities in different sectoral development plans. Different level of authorities recognizes its necessity and planning of local nutrient reduction measures is reflected in local plans for social and economic development. Implementation of such documents is an issue of concern and actual project contributes to the elaboration of relevant measures aimed better nutrient management. IN ADDITION TO IT MOLDOVA SIGNED AND RATIFIED ASSOCIATION AGREEMENT WITH EU AND NUTRIENT REDUCTION IS PART OF THE PLANS FOR IMPLEMENTATION OF THE PROVISIONS OF THIS DOCUMENT.

### **2.2. COMMITMENT AND CAPACITIES OF DIFFERENT LEVEL OF AUTHORITIES TO UNDERTAKE NUTRIENT REDUCTION ACTIVITIES AND THROUGH THIS TO CONTRIBUTE TO THE SOCIAL AND ECONOMIC DEVELOPMENT**

The project facilitated target-oriented planning activities with involvement of different level of authorities from the Lower Prut region and national park with identification of activities/projects needed for nutrient reduction in the case-study areas by addressing common issues that are designed to achieve specific nutrient reduction objectives:

- sectoral development
- nutrient pollution reduction

- access to information and best practices/case-studies
- public participation in the making decision process.

### **2.3. OPPORTUNITIES FOR PLANNING OF NUTRIENT REDUCTION MEASURES**

The project offered opportunities for organizing of the target-oriented planning events, where actual situation analysis in regard to nutrients was presented to participants by project team and on the base of this local public authorities had an opportunity to propose projects and activities, which according to theirs' opinion could be implemented to reduce nutrient loads on ecosystems of the biosphere area "Lower Prut" and National Park "Orhei" and adjacent territories. They also received an information on good agricultural practices with presentation of respective advantages and potential benefits from the functioning of the Biosphere Reserve "Lower Prut" and National Park "Orhei".

### **2.4. AWARENESS-RAISING AND DISSEMINATION ACTIVITIES**

Target audience along the project implementation included local public, civil society, water and environmental authorities, as well as research institutions and Universities. Site (National Park and Biosphere Reserve) administrations were also involved in organizing of consultation and target oriented events.

### **2.5 PARTNERSHIP WITH ALL RELEVANT STAKEHOLDERS AND NETWORKING**

The project offered the opportunity to organize partnership with all relevant stakeholders, on developing of nutrient reduction measures and to facilitate local cooperation with attraction of investments through preparing of irrelevant portfolio.

## **3. DESCRIPTION OF THE TASKS**

The project was also aimed at promotion of a local/regional approach to the development and implementation of the nutrient reduction measures in the biosphere "Lower Prut" region and National Park "Orhei".

The activities of this Project have been targeted at:

- ⇒ Situation analysis on nutrient use and management in the Lower Prut region and National Park "Orhei";
- ⇒ Organizing of the target-oriented events and consultation meeting with different level of local authorities in order to identify necessary project and activities needed for nutrient reduction;
- ⇒ Organizing of sampling campaign as well as analysis of existed data on nutrient use and state of environment in biosphere reserve and national park;
- ⇒ Development of proposals and relevant plan with a program of measures for nutrient reduction
- ⇒ Dialogue, partnerships and networking;
- ⇒ Public access to information, communication and actively participation/involvement in the decision process.

### **3.1. PROJECT OUTCOMES**

The implementation of the project facilitates strengthening of capacities of local authorities to implement nutrient reduction measures/projects, activities based on the identified during the target oriented and consultation events.

Provided local authorities and civil society with the data on nutrient use, state of environment in regard to nutrients in the region with identification of main sources of pollution with nitrogen and phosphorus. In this context a sampling campaign was organized with the collection of samples of soil, water, vegetation and sediments with further analysis of nutrient content (nitrogen and phosphorus) in collected material.

The project created an opportunity for discussing of practical application of identified nutrient reduction measures and projects with identification of possible sources/institutions which could support implementation of nutrient reduction activities

The dialogue for the development of the nutrient reduction measures organized during consultation meeting and target oriented event provided useful recommendations for further development of the biosphere reserve and national park.

The project also identified that there is still much to do on raising awareness on nutrient reduction and promotion of responsible behavior in communities, which are located in the limits of National Park "Orhei", Biosphere Reserve area "Lower Prut" and adjacent territories.

Finally, the project facilitated development of tools to enabling the public access to information, communication and actively participation of public and other stakeholders in the decision process in nutrient reduction. This was recognized as a key issue and supported by local authorities during the meetings and discussions organized within actual project different level of public, sectoral and civil society authorities as well as research community.

### 3.2. CHALLENGES IDENTIFIED

- Poor cooperation between local authorities in management of National Park "Orhei" and Biosphere Reserve area "Lower Prut" due to insufficient financing, poor equipment of local labs with relevant equipment and training opportunities for the staff members. Participants also expressed commitment for further involvement of the National Commission of the Republic of Moldova for UNESCO as well as MaB program in the management of both sites;

- Poor involvement of civil society in decision making as well as insufficient capacities of local authorities to plan nutrient reduction measures;
- COVID 19 obstacles and restrictions on communication, or-

ganizing of public events etc. Consequences to be evaluated in future;

- Identification of institutional responsibilities of local authorities in management of biosphere reserve and national park and insufficient cooperation with sectoral authorities to implement nutrient reduction measures and activities.

The Project had experienced a general need in identifying of the competent authorities to support the nutrient reduction measures implementation through increasing of financial support and more efficient use of human resources/capacities in implementation of the relevant activities.

### 3.3. LESSONS LEARNED

International experience in nutrient reduction existed in other regions (Danube River Basin, Black Sea basin, EU) could be effectively used in the Lower Prut region and National Park "Orhei". Target oriented event and relevant discussions in the regions showed the need to establish a close dialogue with potential stakeholders and investors in order to implement identified nutrient reduction measures and thus contribute to the social and economic development in both sites and adjacent areas. Discussions also showed high potential to use obtained experience in other parts of the country in order to achieve nutrient reduction for 20–25% by the year 2030 (National Program "Moldova 2030").

Some key missing for nutrient reduction measures implementation were identified:

- insufficient capacities on local level for the introduction of nutrient reduction measures on sectoral level (poor capacities of farmers and tourist operators, industrial units like vineries and mines to support low nutrient input);
- setting priorities for local planning;
- financial support to facilitate data collection and assessment including monitoring activities on the state of environment in

regard to nutrients;

- need to improve the current monitoring system to allow control of diffuse pollution (mainly agricultural activities);
- need to allocate time and funding for improving the dialogue and organize a training of main stakeholders on nutrient reduction.

### **3.4. STEPS NECESSARY TO IMPROVE NUTRIENT MANAGEMENT IN THE BIOSPHERE RESERVE "LOWER PRUT" AND NATIONAL PARK "ORHEI"**

The next steps to facilitate nutrient reduction proposed by project cover:

- Adapt existed on local level planning papers to nutrient reduction activities according to the results of the target oriented and consultation events performed during the project.
- Provide training opportunities for different level of authorities on fundraising on nutrient reduction measures.
- Provide case-studies on best nutrient reduction practices existed in actual network of the MaB of the National Commission of the Republic of Moldova UNESCO networks of biosphere reserve and develop relevant training with presentation of relevant case-studies.
- Develop educational programs for universities on biosphere and national parks management with inclusion of nutrient reduction planning.
- The necessity to establish relevant tools, mechanisms and human resources capable to follow the implementation of the nutrient reduction activities.
- Follow up on the exchange of information within MaB network for presentation of relevant best case-studies aimed at nutrient reduction from different regions with the presentation of potential benefits for different target groups of population and sectoral development due to the nutrient reduction.

### **Priority reform measures could include next issues:**

- handling of manure/organic wastes and sludge from livestock operations, including those forming in private households;
- minimization of use of chemical fertilizers and pesticides on adjacent territories;
- promotion of improved tillage methods and moisture conservation in soils (especially during droughts);
- management of restored wetlands and creation of buffer zones near water ecosystems as well as identification of potential areas for restoration;
- farmer education and outreach activities for different target groups of population, Universities and develop capacities in the use of environmental monitoring data in decision making process.

It is important to identify long-term solutions taking into account important of the National Commission of the Republic of Moldova UNESCO priorities and necessities to improve efficiency of ecosystem services. Its effective functioning could provide local population with additional benefits based on the win-win solutions.

## **4. PROJECT APPROACH**

Actual project has been developed in the frame of the local participation mechanism supported by the National Commission of the Republic of Moldova for UNESCO in order to contribute to the development of proposals for nutrient reduction based on organizing of consultation and target oriented planning events as well as the use of the results of sampling campaign, which served as a basic study for preparing of the situation analysis on the state of environment in both sites. This project was presented to different level of public, sectoral and civil society authorities in the frame of consultation and target oriented events. The results of these events served as a base for discus-

sions and identification of projects and activities needed for nutrient reduction in the Biosphere Reserve "Lower Prut" and National Park "Orhei". Developed proposals are submitted to the National Commission of the Republic of Moldova for UNESCO and administrations of mentioned areas for further activities in cooperation with central authorities and relevant stakeholders in the regions.

This outcome of the project could support implementation of next objectives reflected in national social-economic documents:

**Objective 1:** Creation of sustainable ecological conditions for land use and water management due to nutrient reduction.

**Objective 2:** Strengthening of capacities of local public authorities to implement nutrient reduction measures and reinforcement of community actions for nutrient pollution reduction and protection of ecosystems.

**Objective 3:** Increasing of the incomes of population through development of relevant trades based on green economy (organic farming, tourism, infrastructure development etc.).

## 5. PROJECT TASKS

### 5.1. INITIATE AND SUPPORT THE DEVELOPMENT OF THE NUTRIENT REDUCTION MEASURES IN THE BIOSPHERE RESERVE "LOWER PRUT" AND NATIONAL PARK "ORHEI"

Methodology for project implementation was based on next approaches:

- identification of functional zones. Based on the consultation with local public, sectoral and civil society authorities next functional zones for both sites were identified:
  - \* Forested areas
  - \* Agricultural lands

\* Wetland areas

\* Localities, roads, industrial units

- Sampling campaign. Sampling was organized in each of the zone with identification of the content of nitrogen and phosphorus in collected samples. For these purposes the concentration of mineral and total forms of nutrients were analyzed in soils, vegetation, water and sediments. Statistical data on nutrient use was also collected from statistical sources as well as literature data on content of nutrients in consumption patterns was also collected to estimate inflow of nitrogen and phosphorus to the studied areas and thus identify contribution of each zone to the nutrient loads in order to propose measures/projects/activities for nutrient management and reduction.
- Consultation events and target oriented planning workshop. Based on the sampling campaign and analysis of statistical data a situation analysis was prepared and presented. Discussions with authorities allowed to identify key issues for nutrient management as well as to develop recommendations for nutrient reduction for biosphere reserve and national park with preparing of the nutrient reduction investment portfolio for each site.
- Based on the outcomes of the target-oriented event and projects/activities/measures proposed by relevant authorities a number of recommendations were prepared to be included in local agendas for social and economic development.

### 5.2. GENERAL DATA ON STUDIED SITES

The Biosphere Reserve "Lower Prut" is located in the southern part of the country at the confluence of the Prut River with the Danube River. Its total surface is around 20000 ha. This area also represents the border with Romania and according to different agreements between Moldova and Romania, which were supported by the ICPDR, this site is also part of the Danube Delta region. It offers good opportunities for trilateral cooperation (MD-RO-UA) in the

frame of the "Danube Delta" Biosphere Reserve and other programs supported by international organizations active in this region.

### 5.2.1. Biosphere area "Lower Prut"

Actually, main activity in the Lower Prut region is agriculture, which gives around 90% of income for local population. In general income can be estimated as 100 euro/month per person. Cultivation of crops near the house allows local people to assure certain level of life and to sale some of domestically cultivated crops on the market in Romania or in administrative center – Cahul. Creation of the biosphere reserve promotes cultivation and labelling of purer products and thus could contribute to fostering of the social and economic development. It can also facilitate development of the rural tourism in the region based on the use of local cooking traditions, cultural services of tourists including organizing of folk festivals, exhibitions etc. Relevant experience has been accumulated in the region for last 10 years and is supported through organizing of public events like Danube Day, Days of local vine, meal etc.

Another issue is development of local infrastructure, which is based on the involvement of the region in the trilateral agreement "Lower Danube". Port facilities located in the village of Djurdjulesti created attractiveness to this region to investors, who also contribute to the development of folk traditions, local trades etc. Transport activities allowed creation of the conditions for attraction of tourists, increasing of local budgets, creation of new jobs, which could facilitate further development of the area, including organizing of nature restoration activities in wetland areas of Belevu and Manta lakes, plantation of forests on adjacent areas (ravines, landslides etc.) thus contributing to environmental restoration in the region.

Restoration of habitats in the lower part of the Prut River through recovering of the reed belts will facilitate improvement of water quality. According to estimations made in the frame of different studies such activity could lead to removal of 30–40% of nitrogen and till

40% of phosphorus from water ecosystems, thus reducing eutrophication phenomena. Productivity of the reed belts in restored habitats, according to the results of different studies performed in the region could be estimated as 2–2,5 tons per ha. Total restoration could be organized on the area of around 10000 ha with opportunity to use this material for different purposes like heating, construction etc.

Creation of the biosphere reserve also facilitates the development of organic farming. Actually, according to estimations of local public and agricultural authorities the potential for this trade could be around 3000 ha in the reserve and up to 15000 ha on adjacent area. According to estimations this could increase local budgets for 20% and increase for 20–25% incomes of local population with creation of around 500 new jobs. Development of this trade could be on the base of best practices existed in EU and attraction of investment in this domain could facilitate increasing of technological capacities of local farmers in cultivation of relevant crops as well as development of regional cooperation in rural development.

Proposed area is unique due to the hydrological regime of the site. Belevu and Manta lakes are typical flood plain water bodies, with relevant ecosystems. Reed belts give around 2–2,5 tons of the reed biomass per ha on the area of around 2000–3000 ha. Actual land use in the area are:

Grazing of wetland vegetation. Total amount of domestic animals is estimated of around 500 species (cows), which use grass vegetation resources of the area. Local communities expect further using of these resources after biosphere reserve creation and expect that due to better management of the area biomass productivity on restored wetlands will increase.

Oil fields in the upper part of the Belevu lake. Total extracted oil is around 20000–25000 tons/ year. It occupies around 30% of the lake territory (200 ha). Company dealing with oil extraction assures organizing of the oil fields according to the national legislation and

norms presumed in the Environmental Impact Assessment study. Actually, oil products concentration in the water is close to the admissible level and no serious damages to the state of environment due to the oil field were not reported.

Localities occupy around 10% of the proposed area. Actual style of life is based on the use of natural resources of the area based on traditional trades. Fishing is one of the occupations of local population. Actually, industrial fishing is prohibited according to the agreement between Romania and Moldova on the Prut River. Native fish species could be cultivated in special ponds in flood plain and artisanal fish practices could be applied giving extra jobs (100–200 jobs). Relevant experience exists in the area from Romanian side on the Bratu Lake (right side of the area).

Lower Prut region is mainly agricultural area. Main crops are: winter wheat, maize, multiannual plantations etc. these crops are also cultivated (on much less level) in the area proposed for biosphere reserve. Agricultural lands in the proposed area occupy around 10% of its territory. Practically no agrochemicals are used for crops cultivation. Application of fertilizers on adjacent territories is around 20–30 kg/ha. Mainly nitrogen chemicals are used. Average size of agricultural field in the area varies 0,5–2 ha. Main land use in the proposed area is presented by wetlands and floodplain forests.

There is no official statistics on tourism activities, but on the base of application of local population to local authorities to create home hotels one could estimate around 12000 tourist per year in the recent period. The trend is in a slow upward. Development of the biosphere reserve will increase number of tourists, especially, those based on local food and vine products, when labelling of local products could start.

Presumed economic activities could increase budgets of communities for 10–20% due to the development of traditional trades. Tourism and organic farming could increase incomes of local people

for 30–50%. Improvement of the state of environment will contribute to better quality of water resources used for bathing and for drinking purposes and thus to contribute to increasing of life duration.

Around 70–80% of lands on adjacent territories are under different crops. Main of them is: winter wheat, maize, orchards, vine yards etc. normally these lands are under industrial agriculture with application of agrochemicals (15–20 kg/ha). These lands belong to farmers and agricultural units. Average size of unit is 200–250 ha.

### 5.2.2. National Park "Orhei"

This Park has a total area of 33792 ha and is located in the central part of Moldova in the middle of the Raut river basin. Management activities are mainly assured by local public authorities and administration of the park.

Total population in the area is around 40000 people living in 18 rural localities. Main land use patterns are:

- Forests 13800 ha
- 8 vineries
- 5 calcars, sand etc. carriers
- 2 mines for calcar extraction
- nature protection zone 992 ha
- Protection zone and zone for short term recreational activities 16836 ha
- Recreational zone destined to long term recreation 723 ha
- Economic zone 15240,69 ha

Actually, main activity on adjacent to the national park areas is agriculture. This sector gives an essential part of incomes of local people and facilitates regional tourism activities. Lands adjacent to houses are also used for cultivation of local crops such as maize, wheat, orchards, local sorts of grape etc. These products are also used in local restaurants (decorated in national style) for organizing of the vine and gastronomy tours for visitors.

Rural localities occupy around 10–12% the national park territory. Main occupations of population are:

- extraction of calcar material from the mines;
- tourism, which according to estimations bring around 2000 people/day (mainly one-day visit);
- agriculture: crop cultivation within private household (mostly organic) and conventional on adjacent territories.

Application of fertilizers under conventional agriculture is rather low (20–30 kg/ha) and is mainly used on large areas 200–300 ha.

## 6. REDUCTION OF NUTRIENTS LOADS FROM AGRICULTURE

The project had identified the necessary steps to give all relevant further information on the national level in regard to nutrient management in both sites and adjacent territories, as well as provided a platform to discuss nutrient reduction opportunities with local public, sectoral and civil society authorities.

The project objectives fit to the national program "Moldova 2030" with the objective on agricultural development with a strong component on nutrient reduction from point and diffuse sources. It is also in line with a number of other sectoral programs aimed at development of local tourism, trades etc. including the territories of biosphere reserve and national park.

The activities within the component on nutrient reduction were mainly aiming at increasing ecological awareness of population in the studied areas on issues related to the agricultural pollution and its effects and way to improve the actual activities and thus to understanding the benefits of implementing the best agricultural practices.

Focus areas were aimed at the improvements in the handling of organic wastes coming from agricultural activities (including wastes

from households and tourist activities) and minimization of use of chemical fertilizers and increasing of organic fertilizers use (actually level of application of such fertilizers is very low <100 kg/ha).

Through the adapting of policy objectives and measures to implement EU Water Framework Directive/Common Agricultural Policy reform through awareness raising activities, Moldova could benefit from enhanced understanding on the impacts of the introduction of the Best Agricultural Practices, especially in such zones as biosphere reserve and national park.

More specifically, for biosphere reserve and national park, the main problems, legal, administrative, institutional and funding deficiencies were identified in relation to the agricultural sector with theirs' respective national contribution.

Still, due to the insufficient funding the application of fertilizers is rather low. The products local habitants sell on the peasant market are considered as somewhat ecological and sold at better prices than other products sold in stores.

Farmers are not obliged to label their products and testify in any way that their products are ecological, meaning that they did not use any chemical fertilizers or pesticides or treated seeds etc. and the demand for ecological products will increase and thus determine the supply.

Based on the provisions of different national and sectoral programs and planning documents the application of mineral fertilizers on national level and respectively in adjacent to the biosphere reserve and national park areas will increase. Actually, it is expected that in the nearest period (3–5 years) an average application of fertilizers will be for nitrogen around 50–70 kg/ha and 30–40 kg per ha for phosphorus.

Based on the results of the workshop, a proposal for priority measures in agricultural activities with an environmental concerns and optimization of the use of nutrients in the management of the

sites ("best agricultural practices") were proposed by participants (local public, sectoral etc. authorities).

Main project conclusions for this component include:

1. The need to ensure the harmonization of local nutrient management practices with the EU directives, Seville Strategy, etc.
2. There is also an obvious lack of methodological materials for that, financial resources to implement advanced agricultural practices on nutrient reduction are also limited. The analytical laboratories are mostly very poor equipped and not accredited; there is a lack of skilled personnel, etc.
3. There is a great need to implement local public awareness campaign with farmers and rural households in relation to appropriate manure/organic wastes stock and application, soil processing to avoid extra soil erosion, correct application of mineral fertilizers. Identify and design the nitrate vulnerable or the potential vulnerable areas.
4. Create and organize the integrated local support system of monitoring, and decisions making, which will collect, stock, evaluate and report the data regarding the quality of environment.
5. Elaborate programs to train and inform farmers and households on nutrient reduction (practices, case-studies, projects etc.) special attention should be given to strengthening of fundraising capacities of local communities and authorities.

Presented conclusions are based on the results of consultation and target oriented events performed in the frame of the actual and previous projects supported by of the National Commission of the Republic of Moldova UNESCO in Moldova.

Introduction of phosphate free detergents is an issue of concern for local public authorities (rural communities in the biosphere

reserve and national park) especially in regard with development of local trades and tourism activities, which arises the impact of enlarged tourism facilities through waste and direct release of domestic waste waters on environment (adjacent lands in the households) and related economic analysis is needed.

The project component methodology had included several activities, listed below with their specific indicators.

| Activity                                                                                                                                         | Indicator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Activity. Conduct relevant stakeholders' analysis on the development of agricultural practices and reduction of its impact on environment</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 1. Identify multiple stakeholders' groups as target audience                                                                                     | <ul style="list-style-type: none"> <li>• Target audience identified</li> <li>• The most appropriate, effective and highest impact level for project interventions chosen: local public authorities, farmers</li> </ul>                                                                                                                                                                                                                                                                                          |
| 2. Develop proposals on agricultural development in the biosphere reserve and national park                                                      | <ul style="list-style-type: none"> <li>• Informative package available. These packages contain informative publications on promoting best practices, impacts of nutrients pollution on water quality and ecosystem, etc. Benefits for consumer through the use of ecological products will be included</li> <li>• Proposals for dissemination of projects aimed at nutrient reduction prepared</li> <li>• Private farms, especially with organic practices increased in the areas for 10–20% by 2030</li> </ul> |

## 6.1. RESULTS

This component had a strong character of novelty but also of difficulty as strong awareness campaign had to be designed and organized to change consumer behavior and thus contribute to the reduction of pollution with nutrients from households in the biosphere reserve and national park.

The discussions carried out with the target audience showed again great lack of awareness and knowledge on the organic practices,

the impact of waste waters and wastes produced in the households on the state of environment and also showed difficulties in attracting the representatives of the farmer community into a dialogue on nutrient reduction activities in the both regions.

The responses of local public authorities during the workshop and consultation events organized in the frame of the project proved the need to organize strong informative campaign and also to take all necessary measures to ensure the involvement of the agricultural sector and tourism (private households) in the process for nutrient reduction.

The distribution of the informative publications on promoting of nutrient reduction measures in the agricultural and tourism sector development, impacts of nutrients pollution on water quality and ecosystem, benefits for customers through the use of ecological products, etc. will contribute to a better understanding of the issues and increase awareness of the authorities to repeat such informative campaign on a permanent base.

The methodology of this component considered the following activities:

| Activity                                                                                                                                                                | Indicator                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Activity. Organize stakeholders' dialog and theirs' involvement in nutrient reduction activities in the National Park "Orhei" and Biosphere Reserve "Lower Prut"</i> |                                                                                                                                                                       |
| Prepare stakeholders analysis for both sites                                                                                                                            | <ul style="list-style-type: none"> <li>Relationship with the potential stakeholders evaluated. Gaps and needs identified</li> </ul>                                   |
| Establish a network of all relevant stakeholders in the both sites                                                                                                      | <ul style="list-style-type: none"> <li>Modalities discussed and agreed</li> <li>Network and partnerships created</li> </ul>                                           |
| Transfer of know-how on the development of stakeholder's dialogue to partner regions                                                                                    | <ul style="list-style-type: none"> <li>Share best practices and results of the stakeholder dialogue with presentation of its results to local authorities.</li> </ul> |

|                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Activity. Develop information and communication strategy on nutrient reduction for both sites as well as for adjacent territories (possibly on national level)</i> |                                                                                                                                                                                                                                                                                                                |
| Propose communication strategy with input from stakeholders                                                                                                           | <ul style="list-style-type: none"> <li>Mechanism of having access to the relevant information related to the project activities (nutrient reduction) developed</li> <li>Production of basic communication tools (international and national information material, displays, information on the web)</li> </ul> |
| Awareness raising actions                                                                                                                                             |                                                                                                                                                                                                                                                                                                                |
| Organize public outreach                                                                                                                                              | <ul style="list-style-type: none"> <li>Information materials available to be distributed at the celebration of Danube Day, Dniester Day, Black Sea Day etc. Thematic Days</li> </ul>                                                                                                                           |
|                                                                                                                                                                       | <ul style="list-style-type: none"> <li>Publications related to the sectoral development, elaborated and distributed.</li> <li>Website operational and maintained active discussion forum, with invite feedback</li> </ul>                                                                                      |
| Promoting media work                                                                                                                                                  | Regular publishing of relevant materials and benefits from nutrient reduction                                                                                                                                                                                                                                  |
| <i>Activity. Networking and partnership</i>                                                                                                                           |                                                                                                                                                                                                                                                                                                                |
| Organize partnerships and networking                                                                                                                                  | <ul style="list-style-type: none"> <li>Extended and on-going engagement of partnerships functioning</li> </ul>                                                                                                                                                                                                 |
| Monitoring evaluation and reporting                                                                                                                                   | <ul style="list-style-type: none"> <li>monitoring network for National Park "Orhei" and biosphere reserve "Lower Prut"</li> </ul>                                                                                                                                                                              |

Active participation of project beneficiaries and other stakeholders from the initial planning process was ensured and was important to identify potential problems and solutions, generate support, and foster knowledge sharing.

The investigations along the project implementation proved that the current information infrastructure of involving the public is still weak in terms of network capabilities. However, there are a large number of non-governmental organizations in each site, which could

contribute to the nutrient reduction and be actively involved implementation of relevant nutrient reduction programs and plans based on active involvement in the decision-making process in sectoral development in the regions.

Through this project component, the dialogue among stakeholders will improved and dynamic partnerships and regional/local networking could be created.

## 6.2. WORKSHOPS

On the 29 of September the first workshop with local authorities was organized in the national park with participation of mayors of local communities from both sites. Project team has prepared a report based on data obtained from sampling campaign and statistical data. Local communities were informed on the status of ecosystems in the both sites, nutrient balances and potential partners, who could contribute to the nutrient reduction in respective regions.

Based on the conclusions at the workshop a report with proposals from local communities on development of nutrient reduction measures was prepared.

To assist in the development of the nutrient reduction management plan, the project team had discussed all issues related to the collection of data, sharing data between communities and needs of new methodologies for undertaking the remaining tasks.

An important interest of participants refers to the procurement of equipment to properly perform monitoring on nutrients, assurance of data quality and of appropriate methodology for undertaking risk of failure and economic analysis. Discussions also showed poor capacity of local authorities to use environmental monitoring data in the decision-making process and thus the efficiency of planning papers in this domain is rather limited.

Experience of other projects dealing with controlling agricultural pollution have been shared at the meeting: project "Developing Capacities to Promote Organic Farming to Reduce Nutrient Pollution in



the Danube River Basin, project "Public Involvement in the Process of Nutrient Pollution Prevention and Reduction in the Lower Prut Basin through Complex Monitoring of the Quality of the Environment" that covers Cahul district area and is being implemented by the relevant sectoral local authorities, etc.

Policy objectives and measures were discussed in the context of nutrient reduction. Main topics of the discussion at the workshop were:

- Promotion of organic agriculture in Moldova;
- Promotion of nutrient reduction in rural localities and animal farms;
- Development of the green carcasses in agricultural areas.

The problems identified during consultation events include:

1. Poor information of farmers and other stakeholders on organic agriculture practices.
2. Inadequate financial state of farmers, and low capacities of relevant national institutions to invest into development of organic farming.

3. Poor capacities of relevant local institutions, public administrations and farmers to assure implementation of necessary conditions into organic farming.
4. Insufficient capacities to procure and use of relevant agro-techniques and machines for organic farming by farmers.

Additionally, the necessity of organic wastes collection system in rural localities and construction of compost factories is essential for both sites. According to estimations, it could reduce nutrient loads from rural localities for 10–15%. Finally, the rehabilitation of trees protection strips, issues concerning land ownership, low degree of public awareness that leads to illegal trees and bushes cutting, reed burning in wetland areas, etc. were also discussed during the workshop and consultation events.

#### **Objective 1. Recommendations for the reduction of phosphorus from tourist activities (private households).**

In this section the approach to the work aimed at reduction of wastes and waste water produced by private households dealing with tourist activities.

This component has a strong character of novelty but also of difficulty as strong awareness campaign needs to be designed and organized to change the consumer behavior (waste waters are normally discharged to the lands near the houses). Additional improvement is also expected from the use of P-free detergents.

The most appropriate target audience having the highest impact of project interventions consist of schools, local communities, private persons etc. Informative publications on promoting phosphate-free detergents, impacts of nutrients pollution on water quality and ecosystem, benefits for consumer through the use of ecological products, etc. are available and could be distributed as an informative package. Local authorities will include provisions of the project in the promotion of more environmentally friendly methods linked to the economic benefits and change in consumer behavior as it is relevant

for public health and implementation of the nutrient reduction measures and activities.

#### **Objective 2. Reduction of nutrients and other harmful substances from agriculture through planning of local agendas.**

The activities within this component are mainly aiming at developing of local agendas in regard to introducing of good agricultural practices, increasing of ecological awareness of population in local communities on the issues related to the agricultural pollution and its impacts, opportunities to improve the farmers' behavior and understanding on the benefits of implementing the best agricultural practices. However, to facilitate a clear and realistic picture and provide the farmers with enough background knowledge and information it is necessary to provide relevant stakeholders with relevant case-studies with presentation of respective documentation, tolls and mechanisms for its implementation in local conditions. It will facilitate improvements in the handling of manure and sludge from livestock operations and minimization of use of chemical fertilizers and pesticides, as well as improve practices in farmer education and promotion of relevant nutrient reduction activities.

More specifically, the main problems, legal, administrative, institutional and funding deficiencies should be identified in relation to the agricultural sector. Based on the results of the workshop, a proposal for priority measures in local planning documents were recognized as an efficient support tool in the integration of environmental concerns and optimization of the use of nutrients and pesticides into farm management.

In the context of planning of nutrient reduction measures local authorities recognized necessity of presentation of case-studies implemented in other relevant sites and invited national of the National Commission of the Republic of Moldova UNESCO experts to prepare such materials in future with further presentation of developed case-studies to local communities.

**Objective 3. Recommendations for the reduction of phosphorus in the component of waste waters produced by local households (tourism activities).**

Animal farms (private animal breeding near the household) and private households are an important pollution source to environment in both sites. Removing animal residues from breeding farms pollutes first the water and, if water is not decontaminated, it affects soils and vegetation, too. Part of animal waste is used as natural fertilizer. Waste management had to deal with amounts of manure from livestock. Residues from animal breeding activities affect environment in rural localities. Currently, soil pollution in rural communities, is not monitored on a regular basis in the biosphere reserve and national park as well as adjacent territories.

Local stakeholders would benefit from protecting the environment since it is in their own economic interest to preserve natural resources for the future. Therefore, environmental measures could be considered as marketing instruments since they can create new markets for ecological agricultural products.

The households in both sites are not very much concerned with ecological farming. Still, due to lack of funding the consumption of pesticides and fertilizers is rather low. The products they sell on the peasant market are considered somewhat ecological and sold at better prices than products sold in some stores. Farmers are not obliged to label their products and testify in any way that their products are ecological, meaning that they did not use any chemical fertilizers, pesticides or treated seeds etc. When the economic situation will be improved, farmers and consumers would become more aware on environmental problems; the demand for ecological products will increase and thus determine the supply.

Protecting the environment and natural resources implies extra work and higher costs for farmers that should be compensated accordingly. There should be economic motivations for practicing envi-

ronmentally friendly agriculture in the sites of biosphere reserve and national park as well as on adjacent territories.

The discussions at the workshop showed:

1. There is also an obvious lack of methodological materials for financial management to implement the new planning documents on nutrient reduction.
2. There is a great need to implement public awareness campaign with farmers in relation to appropriate manure stock and its possible application, soil processing to avoid extra soil erosion, correct application of mineral fertilizers.
3. Implementation of the nutrient reduction measures should be organized through elaboration of the programs and action plans to improve planning practices in local communities.
4. Elaborate programs to train and inform farmers with the purpose of promoting and implementation of the best agricultural practices code.

In the frame of the target-oriented event local authorities proposed next activities to be developed in the biosphere reserve and national park in order to reduce nutrient loads and to improve nutrient management practices.

1. Practices for waste management (collection, recycling, etc.) to be improved. This proposal refers to private households dealing with tourism activities in order to reduce stocking of organic wastes in environment and to limit the use of waste water (without treatment) for domestic crop cultivation.
2. Extension of the protected zone. A concern is based on the creation of green carcasses near water ecosystems: lake Be-leu, Manta and Prut River (biosphere reserve) and Raut river and small ponds of the national park.
3. Elimination of the wastes originated from the winery bar-

rels. Zone is famous with the vineries and wastes are a concern for local public authorities, especially in localities. These wastes are also applied without treatment of adjacent to households' lands.

4. Planning of the tourist activities. Authorities proposed to include this issue in the planning papers on local level. At the same time, they also expressed an interest on presentation of relevant case-studies from other biosphere reserves and national parks.
5. Creation of cultural network for tourists and in this mode to regulate touristic activities in the regions. Unauthorized touristic routes and intensive use of natural resources by tourists contribute to pollution of environment in studied areas with nutrients and other substances.
6. Reconstruction of the out of use mines. Proposals refer to the reducing of leakages of groundwater with high nutrient content accumulated in this mine.
7. Promotion of local trades. Development of such activities will lead to the more efficient and rational use of local natural resources and will be based on traditional for the region's practices in agriculture, housekeeping, animal breeding etc.
8. Training on the use of organic wastes and benefits of their composting (manure, organic wastes including those from vineries).
9. Actual pandemic situation (COVID 19) initiated a project on creation of „health routes” in the national park and biosphere reserve (forests, wetlands, meadows etc.) as a tool to strengthen immunological capacities of population.
10. Promoting of the agricultural practices and land/soil protection measures to reduce superficial runoff. According to the estimations erosional process contribute up to 90% of

nutrients reaching water ecosystems. The proposal refers to reducing nutrient loads on the water ecosystems of the Manta and Beleu lakes in the biosphere reserve and small ponds in the national park through planting of forested strips on the lands (ravines, landslides, garbage dumps, etc.) adjacent water ecosystems of the sites.

11. To estimate capacities of the Raut river to produce energy on small hydro power stations (such activities are not in line with EU Water Framework Directive, but participants expressed great interest to this idea).
12. Waste incineration plants, especially near vineries.
13. Sediment removal from the small ponds (national park). Sampling campaign showed higher nutrient concentrations in the sediments in comparison with soils. The issue is to clean (remove sediments) such ponds and thus improve ecosystem functioning in national park and biosphere reserve (adjacent areas).
14. Development of water infrastructure with a special attention to the sewer system. Activities on the creation of the artificial wetlands for nutrient reduction were proposed as a relevant tool, which could be used and implemented in small communities.
15. Training courses on the reuse of organic wastes (composting, organic fertilizers).
16. Development of educational programs on the use of natural resources of national park and biosphere reserve for recovery of people after COVID 19. Creation of the network of facilities for COVID 19 recovery.
17. Trainings on strengthening of the fundraising capacities of different level of authorities in nutrient reduction. Special attention was given to agriculture (organic farming) and tourism management activities.

## 7. IDENTIFICATION OF SIGNIFICANT PRESSURES

Main issues of concern in nutrient pressures are point source of pollution, diffuse pollution and rural localities, which could be considered as a point as well as diffuse sources. Main issues of concern are:

- Chemical fertilizers used in agriculture, which are 1.56 kg P/ha and 6.91 kg N/ha. These values are rather low. It is also expected that in the next 5–7 years it will increase for 30–40% in the nearest 5–7 years.
- Domestic animals which have a density of 0.3 equivalent cows / ha in the studied areas.

Based on the analysis of statistical and research data next emissions values were estimated for the studied areas:

Nitrogen — 1000–2500 in kg/year/km<sup>2</sup>

Phosphor — deficit 3.8–5.0 in kg/km<sup>2</sup>/year

- Ratio N : P in agricultural soils circa 17 : 1.
- Normal 13 : 1
- Actually, mineral fertilizers application in Moldova is circa 65 kg N/ha/yr and phosphor circa 10–12 kg/ha/year (2018)

Totally circa 13–15% of nitrogen from adjacent lands reach water ecosystems in national park and biosphere reserve. Actually, the most important source of nitrogen and phosphorus in Moldova is erosion. In accordance with estimations, it gives annually around 2000–2300 tons of N and 130–200 of P.

Based on the data obtained during sampling campaign and statistical sources one could conclude that actual load of nutrient on the:

- Biosphere reserve "Lower Prut" could be estimated as 4 tons of N and 0.3 tones for P per year.
- National park "Orhei" could be estimated as 10 tons of N and 0.5 tons of P per year.

Presented figures show that average N emission per person is around 100 kg of nitrogen and around 5–7 kg of P for both sites. These figures show that total output of the nutrients is around 1.5 times more than average for the Danube River basin and relevant measures for nutrient reduction should be undertaken.

Actually, due to the structural changes in agricultural practices, approximately 0.3 cows per ha is being bred in the private households, without any treatment or deposited facilities for the manure.

Recently private households have become an important producer of meat in Moldova. Treatment facilities at the private households (including those in the biosphere reserve and national park) are absent and produced manure is not treated. It is stored directly near the settlements (in households) or is used on the adjacent to the house cultivated area. Thus, rural settlements can be estimated as a diffuse source of pollution especially for nutrients, BOD, bacteria and viruses.

Actually, the mode of the nutrient water quality assessment does not comply with European standards considering appropriate water quality control to prevent eutrophication and needs to be revised.

To adequately protect and reduce nutrient load into surface water the relevant Moldovan practices should be approximated to European ones as soon as possible. There exists a strong political commitment including on local level to introduce relevant standards for this however due to some reasons it is still under discussion (financial, institutional etc. constraints).

There is also an obvious lack of methodological materials for that, financial resources to implement the relevant documents, especially on local level are very limited as well as institutional capacities for this. The analytical laboratories are mostly very poor equipped and not accredited, there is a lack of skilled personnel, etc.

## 8. PROBLEMS ASSOCIATED WITH MINERAL FERTILISERS, MANURE APPLICATION AND LAND MANAGEMENT.

The environmental impact of fertilizers' use is also closely related to the state of environment in both sites and it is affected by:

1. the modalities in which farmers apply fertilizers to their crops and si gata tot;
2. the overall management of the farm in regard to erosion, poor respect of technologies in soil processing etc.

In particular, the changes in management practice required to optimize the use of mineral fertilizers and avoid their misuse related to the application of manure and slurry to agricultural land, as well as other soil management practices such as cultivations, moisture conservation etc.

Typical problems and "bad practice" identified by the national experts during project development included:

- there is a lack of information on "pollution" amongst farmers and no information on the importance of managing fertilizers and manures properly;
- the machinery used for spreading fertilizers is outdated and not appropriate for the modern agricultural operations;
- fertilizers and manures are commonly stored in unauthorized places where there is a risk of causing pollution;
- some farmers do not consider the nutrient requirements of the crops they are applying fertilizers (and manures);
- farmers and agronomists do not sufficiently recognize the potential value of nutrients in livestock manure;
- bad timing of fertilizer application is a common problem;
- fertilizers and manures are spread too closely to surface waters — rivers, lakes, ponds, streams and springs;
- fertilizers and manures are spread on sloping land where there

is the risk of surface run-off from heavy rain washing them into rivers and streams;

- most farmers/private households do not have good storage facilities for manure/organic wastes and waste water.

### 8.1. GOOD AGRICULTURAL PRACTICES TO REDUCE DIFFUSE POLLUTION

In order to reduce the risk of diffuse pollution by nutrients (N and P) from agriculture and private households it is necessary to encourage management practices are commonly promoted to reduce the risk of nitrate leaching:

- Ensure that fertilizer N is applied according to the crop's requirement and taking account of: the crop species/variety, expected yield and required quality the natural supply of N from the soil, including N released from soil organic matter, crop residues and applied manure/slurry.
- Avoid applications of N fertilizers and manure in autumn and very early spring when crop requirements for N are very low.
- Limit the application rate of organic wastes/manure to ensure that N supply does not exceed crop requirements.
- Take special care when applying fertilizers and manure/slurry on fields where there is a risk of run-off to surface waters.
- When applying fertilizers/manures, ensure that an adequate distance (a "buffer zone") is kept away from surface waters to avoid pollution.

### 8.2. RECOMMENDATIONS FOR PLANNING REFORM ON LOCAL LEVEL (BIOSPHERE RESERVE AND NATIONAL PARK)

Despite the relatively low levels (compared to many EU Member States) of mineral fertilizer and manure currently applied to agricultural land in studied areas, the local communities should take seriously the risk of diffuse pollution arising from fertilizer, organic

wastes, waste waters produced in private households and manure application, especially on households' lands.

The following tasks relating to fertilizer and manure application could be recommended to control nutrient pollution from main sectors of local economies.

**Recommendation 1: Develop training programs, educational activities for different target groups of population etc. at local/regional level on agricultural, tourism etc. practices (fertilizer, manure/organic wastes, waste water etc.) to reduce the risk of diffuse nutrient pollution.**

Activities to be undertaken:

- monitor the nutrient content in organic wastes and accumulation/use of waste waters, state of environment (soil, water, vegetation etc.) for nutrients to be quantified and thus contribute to more effective application/use of nitrogen and phosphorus;
- the nutrient losses due to different sectoral activities to be measured/estimated and the causes of these losses identified with development of relevant recommendations to reduce such losses;
- the underlying soil processes affecting nutrient availability (e.g., soil mineralization) need to be better understood and relevant measures to be developed.

**Recommendation 2: Develop appropriate recommendations and arrangements for promoting better management of fertilizers and organic wastes/manures on farms and private households.**

- **Raise Farmer Awareness of Good Practice** through providing of simple and easy to understand information materials, combined with well-targeted publicity campaigns and case-studies.
- **Develop and Promote Local Good Practices based on case-studies developed in other regions (Danube Delta, EU**

**countries etc.)** — local authorities should agree upon clear and simple voluntary good practice for fertilizer and manure management/application in cooperation with research institutions.

- **Use Economic Instruments to Promote Good Practice** This involves the establishment of certain conditions that farmers and private households have to meet in order to be eligible to receive different level of support (credits, loans, technical assistance etc.).
- **Develop Appropriate Agricultural Extension Services.** This could play a key role in raising awareness and improving the technical skills of farmers with respect to good practice for fertilizer and organic wastes management.

**Recommendation 3: Promote certified organic farming and other low input farming systems as alternatives for food producing in biosphere reserve and national park.**

- **Develop Relevant Legislation** — national legislation for the certification and inspection of organic farming systems in compliance with EU legislation.
- Perform a national and specific (biosphere reserve and national park) studies on the assessment of the nutrient loads on the state of environment. At the moment in Moldova does not exist the special report on the environmental impact of mineral fertilizers use in the last years. The latest reports are presented by Moldavian experts to the ICPDR and are aimed at calculation of total loads of nutrients in the Moldavian part of the Danube River basin.

## 9. ENVIRONMENTAL MANAGEMENT IMPROVEMENT

Basic component of the nutrient reduction programs/project/activities present program of measures, which assures achievement of the objectives for nutrient reduction. Developed program of measures is based on the analysis of presented pressures and impacts of nutrients on environment in the National Park "Orhei" and Biosphere Reserve "Lower Prut". Main pressures of nutrients were identified as: pollution from point sources, pollution from diffuse sources, touristic activities and stock of wastes in the sites and adjacent territories. Program of measures is based on the outcomes of the consultation events, target oriented planning workshop and sampling campaign organized in the frame of the project. It includes:

- measures aimed at introduction of best agricultural practices on adjacent areas and organic farming in the sties;
- wetland and habitat restoration activities;
- educational activities for different sectors development (agricultural, touristic, cultural etc.);
- strengthening of fundraising capacities of all level of authorities;
- public participation and involvement;
- COVID 19 recovery activities based on the use of natural, cultural and educational potential of the National Park "Orhei" and Biosphere Reserve "Lower Prut";
- development and exchange of information including the work of farmers' associations and research should be intensified.

According to the results of the consultation events and workshop recommendations elaborated in the frame of the project could be implemented within the period 2022–2030 as presumed for the National Program "Moldova 2030" and other sectoral programs. Project development showed high potential for further actions in order to reduce nutrient loads on the ecosystems of the National Park "Or-

hei" and Biosphere Reserve "Lower Prut". Local authorities and civil society expressed a strong commitment to cooperate with National Commission of the Republic of Moldova for UNESCO and MaB in the development and implementation of nutrient reduction activities and accept in local communities' relevant good practices accumulated in different regions.

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Relevant program of measures based on the outcomes of the consultation events and target oriented workshop is presented in the Annex 1.

**ANNEX 1. PROGRAM OF MEASURES FOR IMPLEMENTATION OF THE NUTRIENT REDUCTION ACTIVITIES IN THE BIOSPHERE RESERVE "LOWER PRUT" AND NATIONAL PARK "ORHEI" IN THE REPUBLIC OF MOLDOVA**

| Nr. | Name of project/activities needed to reduce nutrient impact                                                      | Period of implementation                              | Institutions involved                                                                                      | Estimative costs                               |
|-----|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| 1   | 2                                                                                                                | 3                                                     | 4                                                                                                          |                                                |
| 1.  | Options for waste collection and recycling including those from winery barrels for further use as a fertilizer   | 2022–2023                                             | Local public and sectoral authorities, wineries, private households                                        | 5000 euro per unit (household)                 |
| 2   | Identification of potential sites for habitat and wetland restoration within national park and biosphere reserve | 2022–2023                                             | Local and civil society authorities, research institutions                                                 | 20000 euro                                     |
| 3   | Creation of touristic facilities with nutrient reduction installations and relevant sewer systems                | During the whole period of the program "Moldova 2030" | Local public authorities, local business, private households                                               | 2000 euro per facility                         |
| 4   | Creation of cultural, educational touristic routes                                                               | 2022–2023                                             | Ministry of Culture, research institutions (development of maps based on GIS, interactive facilities etc.) | 10000 euro (with development of relevant maps) |
| 5   | Reconstruction/rehabilitation of the out of use mines                                                            | 2023–2025                                             | Local communities, private business, environmental inspectorate, research institutions                     | To be identified                               |
| 6   | Promotion and development of illustrative papers/documents on promotion of local trades                          | 2023                                                  | Local communities, research institutions, National Commission of the Republic of Moldova for UNESCO        | To be identified                               |

| Tools for monitoring                                               | Potential contributors                                                                                                                                                                                                              |
|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5                                                                  | 6                                                                                                                                                                                                                                   |
| Number of created facilities for organic waste treatment and reuse | Local communities, private business, Ecological Fund of Moldova                                                                                                                                                                     |
| Proposals for sites to be restored                                 | Local communities, administration of the national park and biosphere reserve, National Commission of the republic of Moldova for of the National Commission of the Republic of Moldova UNESCO (national MaB), research institutions |
| Number of facilities with respective sanitary system               | Local communities, private business, grants from international donors active in Moldova                                                                                                                                             |
| Number of tourists                                                 | Administrations of biosphere reserve and national park, research institutions (GIS development)                                                                                                                                     |
| Number of reconstructed mines                                      | Administration of mines, Regional Development Agency „Centru”                                                                                                                                                                       |
| Initiative approved by site administrations and local Councils     | Private households, art /folk actors, Ministry of Culture                                                                                                                                                                           |

| Nr. | Name of project/activities needed to reduce nutrient impact                                                                                                                                          | Period of implementation                                   | Institutions involved                                                                     | Estimative costs                                                                                                                                                         |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | 1                                                                                                                                                                                                    | 2                                                          | 3                                                                                         | 4                                                                                                                                                                        |
| 7   | Development of training capacities in the field of the use of organic wastes and presentations of the case-studies on benefits of composting (manure, organic wastes including those from vineries). | 2022–2023                                                  | Research institutions, MAB                                                                | 10000 euro                                                                                                                                                               |
| 8   | Estimation of potential of natural and cultural resources of the National Park "Orhei" and Biosphere Reserve "Lower Prut" in recovery of COVID 19 affected people                                    | 2022–2023                                                  | Ministry of Health, research institution, center for preventive medicine (local branches) | 7000 euro                                                                                                                                                                |
| 9   | Promoting of the agricultural practices (organic farming), land/soil protection measures to reduce superficial runoff.                                                                               | During the period 2022–2030                                | Local agricultural authorities, local communities, farmers                                | To be identified for every concrete project (e.g., nutrient reduction measures and options for agricultural development on adjacent to biosphere and national park areas |
| 10  | Production of small hydropower energy (not welcome in EU Water Framework Directive) on Raut River                                                                                                    | During implementation period of the project "Moldova 2030" | Private business, Ministry of Environment, local communities                              | To be identified                                                                                                                                                         |
| 11  | Sediment removal/cleaning of the small ponds (national park)                                                                                                                                         | 2023–2025                                                  | Private business, local communities, environmental inspectorate                           | To be identified                                                                                                                                                         |
| 12  | Development of water infrastructure with a special attention to the sewer system, collection and treatment of wastes and waste waters. Construction of artificial wetlands                           | Period of the national program "Moldova 2030"              | Local communities, private households                                                     | To be identified on the basis of concrete projects                                                                                                                       |

| Tools for monitoring                                                                     | Potential contributors                                                                                          |
|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 5                                                                                        | 6                                                                                                               |
| Number of training programs, trainees and trainers                                       | Ministry of Education and Research, Ecological Fund, Universities                                               |
| Number of people recovered after COVID 19                                                | Center for preventive medicine, local authorities, civil society, site administrations                          |
| Number of farmers and households involved                                                | Local communities, sectoral authorities, research institutions                                                  |
| Energy produced and utilized                                                             | Ministry of Economy, environmental inspectorate, research institutions                                          |
| Number of cleaned ponds                                                                  | Agency for Regional Development "Centru"                                                                        |
| Number of households with relevant water infrastructure, waste collection and processing | Agency for Regional Development "Centru", grants program of the institutions active in Moldova, Ecological Fund |

| Nr. | Name of project/activities needed to reduce nutrient impact                                                                                                                                                                   | Period of implementation | Institutions involved                                                                  | Estimative costs |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------------------------------------------------------------------------------|------------------|
|     | 1                                                                                                                                                                                                                             | 2                        | 3                                                                                      | 4                |
| 13  | Development of educational and training programs, case-studies etc. for different level of authorities on the topics relevant to nutrient reduction (reuse of organic wastes, composting, application of organic fertilizers) | Permanent training       | Universities (Agrar and Technical), Agency for Regional Development "Centru" and "Sud" | To be estimated  |
| 14  | Strengthening of the fundraising capacities of different level of authorities to implement in nutrient reduction measures and activities                                                                                      | Permanent training       | International institutions active in Moldova                                           | To be identified |

| Tools for monitoring                                                                           | Potential contributors                                                                                        |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 5                                                                                              | 6                                                                                                             |
| Number of trainings performed with year                                                        | Ministry of Education and Research                                                                            |
| Number of projects implemented in the biosphere reserve and national park in different domains | Agency for regional Development "Sud" and "Centru", National Commission of the Republic of Moldova for UNESCO |

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