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Pilot Project - Atmospheric Precipitation - Protection and efficient use of Fresh Water: Integration of Natural Water Retention Measures in River basin management

Synthesis of the Danube Regional Workshop

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Note to the reader

This note was prepared by Jovanka Ignjatovic, Imola Koszta and Daniel Gomez, with input provided by rapporteurs and facilitators from the work group sessions and contribution received from speakers and other workshop participants.

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1. The workshop backgrounds

In the context of the EU Green Infrastructure Policy, there is an increasing policy interest in the socalled Natural Water Retention Measures (NWRM) for improving the water status, in particular on hydromorphology and diffuse pollution. NWRMs have been brought to the water policy arena because of their potential contribution for water management[1], among other important contributions to attain environmental policy objectives. More specifically, "among the measures that can greatly contribute to limiting the negative effects of floods and droughts, is green infrastructure, particularly NWRM. These include restoring and maintaining floodplains and wetlands, which can hold water in periods of abundant — or excessive — precipitation for use in periods of scarcity. Green infrastructure can help ensure the provision of ecosystem services in line with the EU Biodiversity Strategy. Reducing soil sealing is another measure that can diminish flood risks. These measures should be included in both RBMPs and Flood Risk Management Plans (FRMPs) and, as mentioned, should become a priority for financing under the Common Agricultural Policy (CAP), Cohesion and Structural Funds" (COM (2012) 673).

[1] Other mentions to NWRMs in the Blueprint to Safeguard Europe's Water Resources (COM (2012) 673), its Impact Assessment (SWD (2012) 382) or the Stella Report develop a particular aspect: NWRMs are a type of Green Infrastructure; NWRMs are one amongst other kinds of measures to enhance resource efficiency; etc.

To respond to this interest, DG ENV launched a dedicated study entitled **Pilot Project - Atmospheric Precipitation - Protection and efficient use of Fresh Water: Integration of Natural Water Retention Measures in River basin management**. This study has a dual aim:

- To develop sound and comprehensive **European (web-based) knowledge on NWRM**. The knowledge base will structure available information on technical, environmental, socioeconomic, governance and implementation aspects of NWRM, mobilizing existing practical experiences, studies and stakeholders' knowledge.
- To contribute to the development of an **European NWRM "community of practice"** by bringing together all parties interested in the design and implementation of NWRM the creation of partnerships and information exchange. This is achieved by the development of **four informal regional networks:** the Danube river basin, the Mediterranean sea region, Northern Europe/the Baltic Sea and Western Europe.

a. Synergy with the ICPDR and its Expert Groups

In order to further liaise activities of the NWRM project with the activities of the International Commission for the Protection of the Danube River (ICPDR), regular communication was continued during the period between the First and Second Danube Region Meetings. It ensured close interaction and coordination with the ICPDR Expert Groups (EG)that are relevant and can benefit directly from the outcomes of the NWRM project.

Ms Jovanka Ignjatovic (REC) attended the ICPDR Expert Group meetings:

- 12th Hydromorphology (HYMO) Task Group Meeting, 27-28 February 2014, Vienna (AT),
- 25th Flood Protection (FP) EG meeting, 9 - 11 April, 2014, Brno (CZ),
- 39th River Basin Management (RBM) EG Meeting, 5 - 6 May 2014, Zagreb (HR)

delivering presentation about the "Pilot Project - Atmospheric Precipitation - Protection and efficient use of Fresh Water: Integration of Natural Water Retention Measures in River basin management" (the NWRM Project) project aim and providing an overview on current state of the NWRM project, the expected deliverables and results that are aimed to support countries in preparing the 2nd RBM Plans and improving water status for all purposes.

Agreeing on the approaches to be taken to address in the Danube basin Flood Risk Management Plan (FRMP) the measures concerning the natural water retention and flood retention as well as the application of cost benefit analysis in flood risk management have been prioritized, highlighting synergies in the implementation of the "Floods" Directive (FD) and Water Framework Directive (WFD). An overview of preparation of FRMPs at the national levels shows that in most of the Danube countries measures related to natural water retention have been proposed. At present, number of examples of natural water retention were provided by Germany and Slovakia. Hungary presented a project on water retention in the Tisza basin in combination with structural measures and warning systems upgrade that is ongoing (an upgrade of Vasarhelyi plan), while Romania included 23 NWRMs in the national strategy. Concerning prioritization of measures, the FP EG agreed that selecting the strategic level measures is already a basic prioritization criterion and that the measures with downstream effect shall have the key priority at the basin-wide level (natural water retention, warning systems, reduction of risk from contaminated sites in floodplain areas, exchange of information).

Even though the water retention belongs to the measures, due to a very prominent position of this type of measure a separate chapter will be dedicated to this issue in the Danube Flood Risk

Management Plan (DFRMP), indicating links to the solidarity principle and to WFD. At the 24th FP EG Meeting countries were asked to inform the ICPDR Secretariat about the measures concerning the natural water retention and flood retention by 28 February 2014 but not much information was received in the meantime.

After Ms. Jovanka Ignjatovic (REC) presentation on the NWRM Project it was agreed that the members of the Danube countries will provide missing information about the identified but also new Case Studies in their respective countries. All countries were asked to submit to the Secretariat the information on the natural water retention activities at the national level (one paragraph summarizing the activities accompanied by a photo or any other illustrative visual) by July 31. The Executive Secretary emphasized that DFRMP has to provide the best examples of the measures taken/ to be taken to demonstrate the proactive approach to the public.

Jovanka Ignjatovic was asked to provide the ICPDR with the Case Studies identified in the framework of the NWRM project which could be inserted as best examples into DFRMP by July 31.

Further inputs have been collected on issues concerning the aspects of the project which are important for the 2nd River Basin Management Plan (level A & B); the facilitation and increase of application of the NWRM measures in the Danube River Basin; additional information on identified Case Studies as well as participation in the consultation forum for the NWRM Project (http://nwrm.eu & https://www.linkedin.com/groups?gid=7424028&trk=groups_management_submission_queue-hdsc).

In order to maintain macro regional perspectives, continual exchange of information and consultation have been kept with ***the EUSDR***, in particular with Priority Area (PA) 4 regarding water quality restoration; PA 5 dealing with management of environmental risks and PA 6: concerning protection of biodiversity by floodplain and habitats restoration.-

All the information and inputs received from the ICPDR and its EGs, as well as from the EUDRS have been considered in relation to the content of the second Danube Region workshop. Due to the fact that most of the CS were identified in Natural Areas, and only few in other sectors, the Agenda and lecturers were elaborated / chosen accordingly.

b. The aim of the second Regional workshop

to further support **regional NWRM network of practitioners and interested parties within the Danube River Basin**, complemented by an EU-wide web-based discussion forum that will establish links and synergies between the different regional networks;

to further promote potential role NWRMs can play in future WFD, FD or adaptation plans and strategiesthroughout the Danube River Basin;

to link current activities at national, regional and basine wide level with the **Common Implementation Strategy (CIS) process**; **linking to existing collective initiatives and networks** of experts, water managers and stakeholders

to **exchange experiences** related to the NWRMs and learn about the current status and planned progress of developing and implementing a strategy and action plan on water management;

to identify the needs of authorities and key stakeholders regarding the preparation of the second WFD management cycle and the development of the 2nd DRBM Plan.

The present document provides a synthesis of the main elements and lessons learnt which emerged during the Second Danube Region Workshop, held in Bucharest, Romania on 23-24 of June 2014.

2. Why NWRM

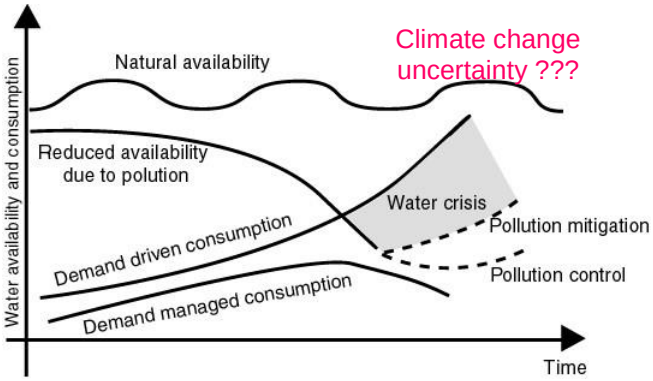
Importance and relevance of the projects related to the wetland floodplain restoration, their relevance to the RBMPs and requirements of other water related EU directives have been highlighted by ***Mr Mihai Costache***, Senior Adviser, Department for Waters, Forestry and Fishery, Romania, the, with some ideas and thoughts related to the application in Romania. As an example, a project idea for "*Danube floodplain focusing on floodplain restoration in the Danube basin"* proposed to be realized in the framework of the EUSDR was mentioned. It was stressed that a new system approach based on the hierarchical nature of riverine systems should be introduced with focus on components of the ecosystems, as existing stream corridors, community organization and landscape organization, but in parallel with structural measures which are in some cases needed too. These organization measures, realized at different scales, provide insight to the ecological response of the system in time, rise stability of the system and can provide effective tools for improving and mitigating impact of restoration actions on riverine landscapes. Taking into account these aspects, Romanian authorities and practitioners are aware of the need to include non-structural measures in the 2nd RBMP, in particular considering flood protection in urban areas, water harvesting, pollution control and reduction and mitigation of climate change effects during the dry season.

Non-structural flood management measures such as land use regulations; flood forecasting and warning; flood proofing; and disaster prevention, preparedness and response mechanisms; have limited environmental consequences and should be actively considered as viable options, both as basic or complementary measures. Therefore, the current workshop and the project outcomes are important and expected to provide an opportunity to learn from the gained experiences at Danube scale.

Mr Vladimir Rojanschi, Professor at Ecological University in Bucharest, depicted anthropogenic degradation of aquatic ecosystems, rivers, lakes, estuaries and coastal waters that is various, persistent and dates back for centuries in Europe. The ecosystems are affected by physical, chemical, hydrological and morphological modifications, all of which impose environmental pressures on the structure and function of aquatic communities. Human impacts on aquatic ecology have frequently been studies and numerous indicators for assessment and monitoring of various environmental impacts on aquatic ecosystems were developed. However, the simple reversal of degradation equally often does not show the desired and anticipated ecological effect and the biota continue to stay 'degraded'. Sometimes, the small spatial scale of many restoration measures does not fit to the broad-scale degradation at the catchment level, and sometimes monitoring activities are rather short-term and do not sufficiently account for long time periods required for restoration. In addition, the knowledge about a catchment's potential for recovery is often sparse. Water management has to be correlated with the new philosophy, creating a link between nature and humanity. In response, the knowledge about the linkages between environmental pressures and aquatic eco-systems should be shared between practitioners and experts and used to derive appropriate measures that would further rehabilitate and restore nature. Restoration ecology is often assuming that communities are beginning to recover as soon as the pressures are reduced or removed

Presenting key information about the NWRM project and the importance of NWRMs, ***Mr Benoît Fribourg-Blanc*** (OIEau, Coordination team) outlined main project objectives and expected deliverables: (i) sound, shared and comprehensive NWRM European (web-based) knowledge including a glossary, catalogue of individual NWRMs and a set of case studies; and (ii) the NWRM practical guide. These products are to support countries for the 2nd round of the WFD cycle and for that reason the main challenge of the project is to provide useful tools and methods. He also informed participants about the work of the EU WG PoM, stressing that NWRMs, considered as the multi-functional measures, are aimed to protect water resources and address water-related challenges by restoring or maintaining ecosystems as well as natural features and characteristics of water bodies using natural means and processes. The focus of applying NWRMs is to enhance the retention capacity of aquifers, soil, and aquatic and water dependent ecosystems with a view to improve their status. Appropriate application of NWRM supports green infrastructure, improves the quantitative status of water bodies as such, and reduces the vulnerability to floods and droughts. It positively affects the chemical and ecological status of water bodies by restoring natural functioning of ecosystems and the services they provide. The restored ecosystems contribute to both, climate change adaptation and mitigation.

General benefits of NWRM for water resources management were recapitulated in presentation provided by ***Prof. Čedo Maksimović***, PhD, Imperial College, London, Department of Civil Engineering, London, UK. Complexity of NWRM was analysed from different sectorial perspectives, taking into consideration global water balance and global water availability and consumption. The everyday practice shows that more and more people need water and each needs more as living standards rise. This leads not only in decreasing water availability but also increases water pollution that further reduces the volume of water available for use by human and other leaving organizams. In that respect, application of NWRM can Influence the (water) storage potential of the landscape, soils or aquifers Furthermore, climate change, global surface warming and temperature increase impact the state of the environment. Applying NWRMs, water-related ecosystems can be restored and maintained by natural means.



The effects of human activities and climate change on global carbon balance and the nitrogen, ammonium and phosphorus cycle might be successfully preserved and improved by realizing green Infrastructure measures, including NWRMs. Also, natural properties of landscape, soil, aquifers and environmental services they provide, are significantly enhanced.

Considering urban areas, a demonstration of an improvement of water cycle in urban ecosystem was analysed, with a sight of direct disposal with no treatment, of combined approach with treatment and in case of constructed wetland. To favour of climate change adaptation and reduction of vulnerability to floods and droughts', components of an urban drainage catchment and effect of urbanization on the surface runoff were discussed in details. On that respect, contribution of NWR measures as adaptation measures that use nature to regulate the flow

and transport of water so as to smooth peaks and moderate extreme events were demonstrated through various examples in Europe, India, etc. When a flood happens it is neither easy nor trivial to assess damages. Equally important as technical measures are legal and economic ones, including use of incentives, and should be considered with a suggestion of their integration.

Aspects of ground water storage capacities preservation and protection, ground water balance in urban regions and effects of sewers on groundwater level as well as interactions of surface water and groundwater flooding were tackled underlining needs for denaturalisation of urban streams and a turn to natural measures, the need to go "*Back to Nature*"

3. How the NWRM project helps, results and deliverable

Referring to the main project objectives and deliverables already presented in the opening session, ***Mr Benoît Fribourg-Blanc*** provided an overview on current state of the NWRM project and the expected deliverables and results that are aimer to support countries in preparing the 2nd RBM Plans and improving water status for all purposes. It should also support all stakeholders and policy makers and to guide them in searching for different information. The NWRM project is aimed to build a basis of a knowledge platform and an exchange of experiences between practitioners by preparing a set of tools that should serve to gather: (i) the knowledge - the catalogues of NWRMs and case studies (CSs) and a set of 12 policy questions; (ii) concepts and their connections - the glossary and (iii) the expertise: 4 regional for a and networks. Based on inputs and knowledge collected the practical guide will be prepared focusing on practical solutions for dealing with NWR measures.

Ms Jovanka Ignjatovic presented the outcome of the collection of case studies in the Danube basin. It is concluded that in the Danube River Basin NWRM are mostly applied in Natural Areas dealing with wetland restoration and creation; floodplains; re-meandering; revitalization of flowing waters; riverbed restauration; natural bank stabilization; restoration of lakes and levelling of dams/ longitudinal barriers. Several CSs have been identified in agricultural sector implementing measures concerning Restoring and maintaining meadows and pastures; field margins and headlands; soil conservation crop practices: intercropping; no tillage or reduced/conservation tillage and green cover. Furthermore, the two more CSs have applied riparian buffers in forestry (AT and HU) while only one example of implementing NWRM in Urban area has been identified in Austria introducing Green Roofs of Vienna.

Causes for applying NWRMs are mainly: river training; physical alteration for flood protection; physical alteration for agriculture, point and linear pollution control; while motivations are water quality improvement, restoration of hydraulic connection, achievement of the WFD ecological status, flood control and peak flow rate reduction as well as habitat conservation and protection. When comparing main obstacles with main driving forces, the existence of administrative and legal constraints and lack of trained stuff and monitoring data becomes evident. In addition, environmental objectives still have to be defined and ecosystem status targeted in many cases, despite the fact that commitments and supports provided by authorities. Involvement of and assistance by NGO and local communities are substantial in most of the cases with a strong motivation triggered by a possibility to use restored site for various educational purposes.

Collected information and experiences show that more resources should be allocated for data collect and investigation concerning areas and/or sector of interest. On the subject of pressures and impacts prioritisation approach should be used, objectives clearly defined and monitoring introduced from the

day 1, including a long-term monitoring program. n order to increase local support, awareness activities and participation of local stakeholders should be planed and performed continually.

Mr Gábor Ungvári, REKK, HU, talked about the opportunities for the Danube Region to provide ecosystem-based economic gains if considering that water retentions can play a key role in creating and supporting Ecosystem Services. Key feature is a capacity of the small water cycle in the landscape. It drives Primary production, Nutrien cycling and Soil formation / erosion, as well as Water circulation in the landscape as Production input and Transport medium.

When considering WFD and Flood Directive as legal drivers for applying NWRM, the most obvious elements of cost reduction are flood prevention and diffuse nutrient overload reduction, as well as prevented future costs that have immediate present value in the calculations. The key issue to achieve complex gains via NWRMs are land use agreements that tackle Asymetric cost – benefit distribution and recently recognized connections between stakeholders without clarified allocation of responsibilities – beyond the parcel effects. EU money can be used to gains from protection, by improving ecosystems' conditions and its services. At the same time, it has to be kept in mind that improvement of protected area has its limits. For that reason, it is necessary to optimize services and avoid conflict with naturalness. Protected areas are usually not big enough to mitigate the detrimental effects generated through time and space, with still an open question how to consider non-protected private land. Several examples how gains can be achieved through management (Great Miami River – Ohio, US; Aurino stream, Italy, Seymaz river; CH, have been shared with participants) by emphasizing differenced when considering single or complex issues.

Some conclusions and suggestions for further discussions have been raised, by stressing that knowledge barriers are not technical and biophysical but organisational and institutional. The EU funds play important role by initiating projects in the region but it is only a temporary solution if funds are not secured for a continuation of that process. Economic gains come from „No regret solutions" and multi-purpose application in rehabilitation projects, while to achieve considerable gains land use agreements with private owners have to be in place.

Mr. Costache was interested to now, whether these economic aspects are criteria for choosing the scenarios to be applied for particular type of measure and whether a set of indicators is to measure their efficiency. It was pointed out that the project is going to identify these indicators and provide some guidance and tools to do the analysis in order to choose one or another type of measure.

Mr. Cedo Maksimovic asked whether there was any particular case in which stakeholders were involved in the analysis of the benefits and their willingness to pay for it. Mr Ungvari answered that actually it is a big weakness of these analyses, as willingness to pay does not really ensures payment.

Ms. Mihaela Popovici highlighted that these type of assessments are very difficult. The total economic value is the sum of different values: the direct value, under use value and option/opportunity value. The WFD requires considering the recovery and environmental and resources costs. The opportunity cost calculated for the lost production, is the compensation, something with what stakeholders can be attracted.

Mr. Liviu Popescu informed the participants about a project of GWP CEE, which has started 1,5 years ago, dedicated to integrated drought management. There are 6 pilot projects with the aim to identify the best measures for water retention in soil. In addition, there are also some case studies targeting forests affected by these issue.

4. Observations from stakeholders and observers

This session was created in order to collect feedbacks from stakeholders considering work that has already been done though the project and to gain more and new information on CSs and project deliverables.

Ms Daniela Peicea, Giurgiu County council, provided a presentation on the Comana wetland restoration Project, providing additional information to those already collected for this previously identified CS for Romania as a "Light" CS.

Mr Daniel Mihai Nita, Transylvania University Brasov, spoke about experiences in torrents management in Romania. He highlighted the link between nature and society in light of improper land use, land use pattern transforming pastures to arable land, mining activities, road construction, livestock and vehicle trail and destructive logging. He presented some of structural and nonstructural measures that are/can be used in torrential watershed management. Comparing past and present practice he highlighted a need to go "*Back to Nature" and to* introduce ecological strategy by letting rivers to run.

Ms Maria Cheveresan, DHI Romania, in her presentation shared with participants several examples (SCs) where mathematical modelling was used a management tool in dealing with needs and problems of wetlands and Ramsar sited in Romania and beyond. It includes improved ecosystem services by flood mitigation, sediment trapping, water treatment and recreation and habitat and refuge conditions that are worsen by excess nutrients, sediments and chemicals. In addition by modelling hydrological/hydraulic processes a powerful planning tool can be developed that can predict needs to be reached by management plans required for Ramsar sites and transboundary wetlands, restoration and remediation design and information management.

Mr Cristian Tetelea, WWF , Romania, presented WWF work experiences related to wetland/floodplain restorations, drawing attention that one of the main reasons for increased frequency of floods in the Danube river Basin is a change of land use pattern by converting floodplains into arable lands. He stressed that each site has its own characteristics that should be considered when opting for a solution. Benefits of ecosystems restoration should be included in the costs and legal issues have to be settled prior to the technical work. The majority of floodplain restoration projects have involved non-complex land ownership aspects and were limited to single sites. Recent policy shifts require a larger-scale and integrated approach to restoration, which increases the number of stakeholders and, at the same time, increases the complexity of the schemes. Floodplain restoration is also dependent on the success in changing the traditional attitudes regarding flood defense practice. Sat the same time, institutions have to manage all stakeholders and interests, putting in place the right regulations, laws, planning instruments and funding mechanisms.

In the second part of the session colleagues were sharing common experiences gained during data collection about implementation of the NWRM at national level in Danube countries. ***Mr Ventzislav Vassilev,*** REC Bulgaria, shared details about the case studies from Bulgaria which were mainly applied in the area of wetland restoration primary targeted for flood reduction. Only one of them focuses on nutrient reduction. ***Ms Mateja Sepec Jersic***, REC Slovania, pointed out the complexity of the database used for collecting information on the individual case studies. She was asking how to deal and what to do with CSs when significant amount of data does not exist or when some CS cannot be, even, considered as a case study due to its size or purpose or significance, etc. ***Mr Bogdan Barbu/ Ms Imola Koszta,*** REC, mentioned that most of Romanian CSs are in natural areas, lacking data on technical

issues and monitoring. It was also emphasize that the commitment of local people was crucial in the successful implementation of the case studies.

Mr Gerhard Nagl, suggested that, having I mind problems with land ownership and funding, longer period for planning should be considered, applying several options and approach.

Mr Gabor Ungvari drew attention to the issue of interventions that have been introduced in the past, such as interventions used in Hungary in 50's. Even though beyond the scope of the current project it could provide interesting information. Green infrastructure is a new concept, but NWRMs have been used by professionals and their experience can be valuable.

In order to preserve all data and information gathered, ***Ms Jovanka Ignjatovic*** invited participants to help with further data collection and identification of new cases, even in case of small interventions as mentioned by Slovenia. 90% of the case studies identified in the Danube region are in natural areas, additional effort will be put in identifying other CSs in other sectors.

Mr Cedo Maksimovic added that measures in urban sector are more complex and that´s a probable reason for a less number of examples than in other sectors. In that respect there is a constant need for additional funds to be identified and utilized.

Mr Liviu Popescu informed participants about a new initiative with Coca Cola focusing on water retention areas, where all Danube countries are eligible and there are some millions that can be used for new projects.

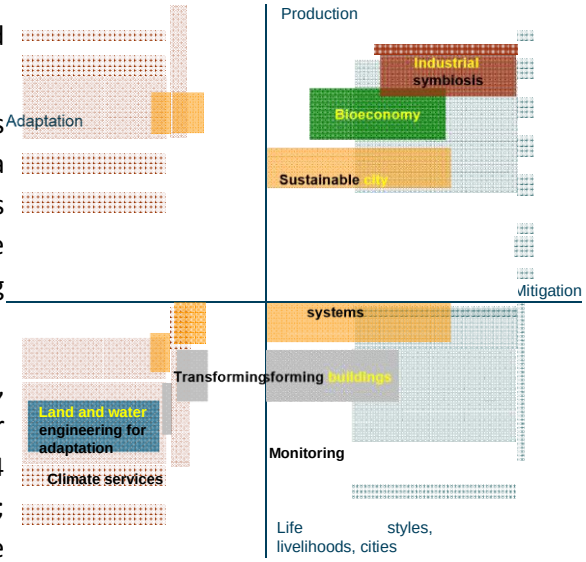
5. Multi-benefits of NWRM project.

The term "multi-benefits" as used in this report is synonymous with the term "benefits of integrated water management approach" when applying NWRMs. Forces such as population growth, environmental constraints, climate change, and integrated land use planning are driving a fundamental change in water management. The EC is tying substantial water management funding to the preparation of the second WFD management cycle, which emphasize multi-benefit, integrated method and strategies. Yet, the Blue Print shows insufficient use of economic instruments in water management that would provide "the right price signal and the resources needed for a further implementation of measures targeting water efficiency, ecosystem protection, natural water retention or water availability"[2]. Coupled with a lack of policy integration in support to specific measures, current state does not reflect this desire for more multi-benefit approach. Instead, the actions are focuses on priorities of either water supply and treatment agencies, or agriculture, navigation and energy sectors. This mismatch between today's actions and tomorrow's needs is common across the EU. To the degree that EC can help develop more multi-benefit projects, it will be a leader in the EU effort at integration. In that respect, the multi-functionality of NWRMs can contributes to their cost-efficiency, making them good candidates for sustainable climate adaptation measures under the EU climate change adaptation strategy and Common Agricultural Policy (CAP). It is recognized that many water management challenges are best approached by combining two or more of the following benefits: flood reduction, water supply, water treatment, habitat enhancement, aesthetics, recreation, and water quality. Most NWRMs can be considered not only as components of the EU's Green Infrastructure strategy but a holistic policy initiative integrating nature and biodiversity conservation, sustainable development,

[2] IMPACT ASSESSMENT, SWD(2012) 382 final

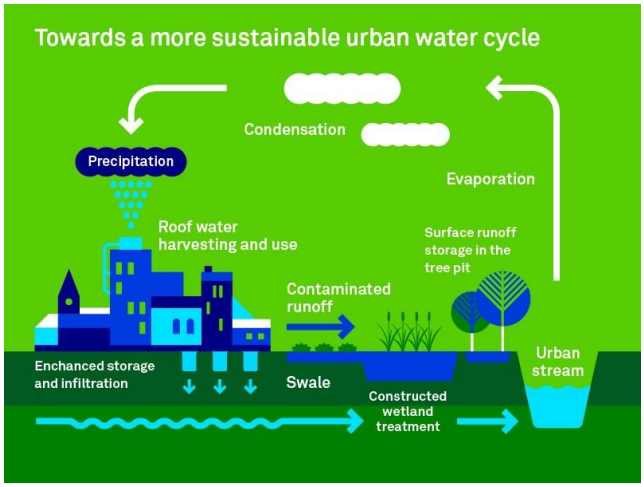
employment opportunities and recreation, as well. Multi-benefit approach that combines interests of all these groups are not sufficiently identified or pursued.

Mr. Čedo Maksimović, Department of Civil Engineering, Imperial College, London, UK, presented the Blue-Green Dream (BGD) project that is supported by the EIT's Climate Knowledge and Innovation Community (KIC) programme, the part of the Sustainable City Systems challenge platform (http://bgd.org.uk/). In the focus of the BGD project is to enhance synergies between urban water systems (blue) and vegetated areas (green) and to provide solutions to support urban adaptation to climate change. The BGD offers a new paradigm for planning, designing, constructing, operating and maintaining urban water systems (blue assets) and urban vegetated areas (green infrastructure) not as separate systems, as is the case today, but as a synergistic network. It suggests an integration of sectors and measures to meet needs of the future innovative spatial planning and design of new cities and retrofitting of the existing ones.



The BGD project deals with thematic areas as industry, bio-economy, sustainable cities and land and water engineering for adaptation by connecting them via 4 platforms: production; life styles, livelihoods, cities; mitigation and adaptation. Issues that are tackled by the project are: urban creeps and the role of impermeable and permeable driveways, poor drainage; floods and droughts; tidal surges; pollution of water bodies; urban heat islands; energy inefficient systems; poor ecosystems and human health issues.

Current research that is underway tests and further develops Blue Green Solutions for delivering improvements in various areas of water management including: Water Balance, nutrients and Pollution Migration, Microclimate and Heat Islands, Energy Efficiency, Maximising the Benefits of Different Plants and Ecosystem Services. This research is aimed at maximising the efficient use and control of water flows through green roofs, green walls, swales, and rain gardens. Blue Green Solutions are transformative, enabling cities to evolve from being mere consumers of water resources, to providers, including rain water, groundwater and recycled grey water, hence reducing the burden on existing infrastructure and building resilience to climate change into urban environments.



Using the evidence gathered from the demonstration sites, the project is also developing planning and educational tools. In particular, it is improving construction management via the use of Building

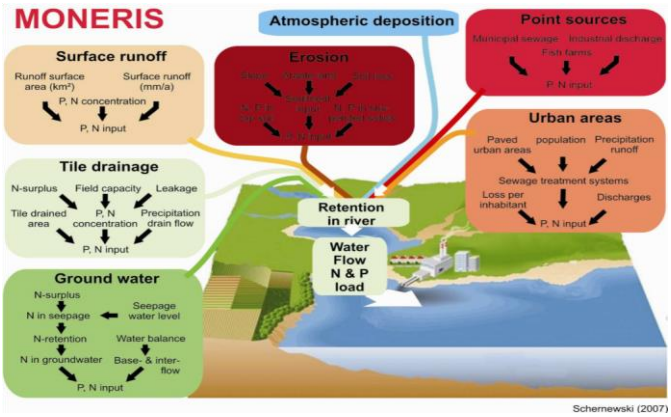
Information Modelling (BIM) to optimise deployment and coordination of blue and green assets from the conception phase onwards, hence maximising cost savings and benefits.

Application of NWRMs in urban areas in order to increase energy and interaction with nature is an important aspect of the work and will is going to be further explored and utilized by the project partners.

Ms Mihaela Popovici, International expert, focused her presentation on utilization of NWRM in sustainable agriculture practices concentrating on EU policy context, examples on NWRM, implementation experiences in the Danube Basin and policy recommendations. In connection to the examples of NWRM, buffer stripes were emphasized, the cross compliances and Statutory Management Requirements concerning Nitrate Directive (SMR 4) and Pesticide Directive (SMR 9). They are an effective measure to achieve objectives of WFD and CAP**,** with multi-purpose benefits when applied. To mention some of them as: protection of drinking water resources quality, blocking the movement of nutrients and pesticides into watercourses and soil erosion reduction.

In the Danube River Basin, buffer stripes are widely used on arable land with a width of: 10 - 30 m in Germany, Bavaria; 10- 20 m in Austria or 5- 15 m in Slovenia. In Slovakia buffer strips are used on entire territory, while in Romania widths are 1 m for land with slope < 12% and 3 m for land with slope > 12%. In Croatia, they are included in National Action Plan (NAP) concerning implementation of the Nitrate Directive while in Moldova 70 ha of buffer strip are introduced with 75% of efficient. According to the Water code in Ukraine, width is 2.5, 50, 100 m, and on slopes the width of buffer strips doubles.

Examples from Austria and Czech Republic considering conversion of arable land into permanent pasture are demonstrating positive results in reducing content of nitrogen and phosphorus that reaches water bodies at risk because of soil erosion and fertilization, while conversion to extensive grassland has greatest benefits if the grassland is used extensively and if the conversion is permanent. The measure allows reducing nitrogen and phosphorus losses due to lower inputs in the area. In case of irrigation, it reduces water abstraction needs and soil erosion through the permanent grass cover. At the same time biodiversity in the area is improved and investment costs of this measure are the costs for compensation of farmers a*n*d economic costs include the loss of production.



Several examples of NWRM concerning wetlands in the Danube Basin were named referring to their benefits at national and transboundary levels (for more information please check the presentation). In parallel analyses and discussion of their costs (investment, opportunity, restoring and maintenance costs) has been initiated. Concerning implementation of the NWRM / wetlands and scenarios assumptions for the transboundary river basins, the MONERIS model has been presented**.** The

model has been used in the Danube River Basin when preparing the first RBMP and a joint Program of Measures (PoM).

Considering identified barriers towards implementation of NWRM, Historical, Financial, technical and planning issues were mentioned. In addition, need for increased effectiveness, knowledge exchange and options to maximize benefits concerning water and nature, agriculture and forestry was underlined.

Final recommendations concerning application of NWRM in agriculture can be summarized as a need for: EU policy relevance and EU support; incorporation of NWRM in the 2nd RBM Plans and FRMP; agricultural policies to consider impact of agriculture sector on water bodies; identification of direct impacts, benefits, costs and barriers for implementation. As a conclusion, ***Ms Mihaela Popovici,*** stressed the need for a Guide concerning implementation of NWRM in sustainable agriculture practices.

Ms Lidija Globevnik proposed cooperation between Austria and Slovenia in projects focusing on Mura river.

Mr Gerhard Nagl, *(DEF)* stressed the complexity of water management and proposed a bigger integration concerning biodiversity issues. He was interested whether there are already some links between the Blue-Green Dream concept and the WFD and the CIS process. ***Prof. Cedo Maksimovic*** explained that the project was inspired by the WFD, and the fact that RBM Plans are dealing mainly with water quality issues, but do fail to address complexity and interactions with other elements. The Blue-Green Dream involves complementary measures which give added values to the implementation of the WFD.

Mr Gabor Ungvari pointed out the difficulty retrofitting the existing/historical buildings according the BGD concept compared to planning cities from sketch. Furthermore, he was interested about existing EU limits concerning emissions to the Black Sea.

Mr Cedo Maksimovic confirmed the difficulty to change the old cities and introduce green spaces, however retrofitting is not impossible and can be done step-by-step.

Mr. Liviu Popescu added the importance of afforestation as the consequences of deforestation can be felt in the cities.

Ms. Mihaela Popovici indicated that the common strategic goals, which are targeted to restore the Bleak Sea to the environmental condition from 1960', include limitations concerning nitrogen and phosphorus. However, there is no a common, binding approach as not all the Black Sea countries are the EU Member States.

Ms. Madalina Iliuta, Ministry for European Funds, Romania, provided information on financing opportunities and priorities in different environmental sectors for the period 2014-2020. Among identified challenges at national level, the infrastructure challenges and resources challenges were emphasizes concerning implementation of the EU water policy and application of NWRM. In particular, resources challenges are aimed to deal with "a range of natural and man-made environmental risks arising from or exacerbated by climate change - recurrent floods, drought, costal erosion" and propose "priorities for funding on climate change adaptation, risk prevention and management". Extension and modernization of the water and wastewater infrastructure continues to be one of the most important priorities in improving Romanian living standards. Concerning development on water, the main development id needed to extend public access to water and wastewater services, in the context of the Water Framework Directive and its River Basin Management Plans. Certain funds have also been

allocated to improve energy efficiency. The Partnership Agreement is currently under finalization and green infrastructures related to transport and urban areas are part of the regional Operational Programme.

6. Building common understanding

In order to know more about practices and interests in different Danube countries, and to facilitate further regional cooperation between Danube countries in collaborative actions and projects three ***Thematic Group Sessions (TGSs)*** were held in parallel. These sessions were designed as a continual activity in promoting the NWRM project aims and to strengthen bonds of Danube network in a communicative spirit. Each Working Group (WG) was aim to provide a good professional debate with the purpose of deepening mutual knowledge about the problems and methods while applying the NWRM in the field. Experts and professionals facilitated discussion in each TGS, with the role to ensure participation and to synergize the richness of the deliberations based on the groups collective experiences, lessons and concerns. This has been achieved through the use of participatory methodologies as group discussions on:

i. Agriculture and Forestry,
ii. Urban Areas and
iii. Natural Areas

The TG participants were invited to discuss and contribute to the final synthesis documents on NWRM by addressing some of key questions, as :

a) What can be achieved with NWRM?
b) What is the policy relevance of NWRM
c) Mechanisms to stimulate implementation of NWRM, and
d) Any other question/topic TG participants consider important to be tackled

i. ***The TGS on Agriculture and Forestry (TGS a)*** was facilitated by Ms. Mihaela Popovici.

In brief, the group underlined that concerning human activities in agriculture and Forestry, NWRM as multi-functional measure can contribute to foster recovery of biodiversity and reduce nutrient load. With the main focus to enhance the retention capacity of soils, wetlands and other water-dependent ecosystems these measures can reduce soil erosion, needs for water retention during flood events, as well as increase availability of water for use in agriculture.

In relation to the policy relevance of NWRMs, participants stressed in order to achieve the Green-Blue European infrastructure in the future, it is necessary to reach policy coherence and integration considering requirements of the WFD and FD in agriculture and forestry. Incorporation of NWRM into 2nd RBMPs and FRMP is essential. There is a constant need to increase capacities of authorities and all practitioners in general and in mobilizing existing funds, as well as to increase the acceptance and awareness of NWRMs in agriculture and forestry.

The initiative of the NWRM project to build network of experts and practitioners that can meet and communicate experiences through the Danube Region and beyond was assessed as one of the most important mechanisms to stimulate implementation of the NWRMs in agriculture and forestry. This should not stop with the end of the project but the project team shall try to

find a way to keep it in the future. There is also a need to improve mechanisms to deal with land ownership and associated property rights when implementing NWRMs.

ii. ***The TGS on Urban Areas (TGS b)*** was chaired by Prof. Čedo Maksimović.

The TG participants concluded that urban liveability could be improved by applying NWRM in terms of standard, health, longevity, economics, policy relevance; as well as water quality, hydrology, hydromorphology / natural design – biodiversity. They can help to mitigation of floods, droughts, damage and enrich ecosystem performance and services. Keeping as much water as possible by multi-functionality of NWRMs we ensure source control of precious storm runoff by using, recycling and recharging.

There is a need to improve synergies between all relevant EU Directives by multifunctional solutions, and from that point of view, application of NWRM. Interest of NWRM results in cost-savings and in that respect future strategy planning should include NWRMs' multifunctional (decentralized) solutions as they allow modernize urban planning, provide economic motivation and optimization of cost-savings. This may bring benefits to the society by paying less and living better.

Considering mechanisms to stimulate implementation, there is a need for further adjustment of the legal framework to the new reality at State, regional and city levels. Furthermore, financial and other incentives, technical guidelines, capacity building methods including elearnings, raising awareness of decision-makers, broad promotion and Public Relations (PR), convincing case studies, projects and access to multiple funding sources should be further developed in order to increase application of NWRMs in urban areas.

iii. ***The TGS on Natural Areas (TGS c)*** was chaired by Mr Gábor Ungvári.

Integration was the key work In the TG dealing with Natural areas. Integration of NWRMs in future RBMPas a cross-compliance solution considering WFD, Natura 2000, Nitrate Directive, etc. In the first WFD cycle these were isolated cases that could/should be expanded in the second cycle. Their relevance for flood and drought issues is recognised but it is rather difficult to implement t them on a small, isolated cases. In addition, the effects are significantly dependent on the scale of implementation.

Rehabilitation of Danube floodplain started in 2006as a feasibility study and the group opts for restarting it again. In should be an integrated flood control project with dyke strengthening, flood monitoring and control and floodplain restoration. Nutrient load, as an issue that is not easy to deal with, should be also considered.

Participants from Romania and Bulgaria underlined similarities in post 80^{s} development in their countries, characterized by collapse of irrigation and drainage systems, lack of national strategies or codices concerning implementation of NWRM and cost recovery matters, isolate cases and steps toward reconstruction actions and complete absence of multipurpose effects monitoring. It is difficult to find common indicators that identify impacts at decent costs. In addition, institutions do not do monitoring unless it is their obligation by law or bylaws. The WFD compliant monitoring is not fully suitable for NWRM projects' as they required project specific monitoring.

Concerning policy relevance, NWRMs are compliant and should be used when fulfilling requirements of the WDF, FD and Climate change policy and included in feasibility studies.

In conclusion**,** NWRMs may significantly contribute to the Green Infrastructure initiative and enrichment of Europe's natural wealth. Promotion of smart, sustainable and inclusive growth can be further ensured by positive experience on NWRM gained in the Danube region that achieved to control sources, helped to mitigate natural disaster/damages and improve the ecosystem performance.

Development of customized tools for specific environmental, economic and cultural conditions could empower societies and support them to accept innovative concepts, including NWRMs.

Synergies between EU Directives should be improved by multifunctional solutions and NWRMs should be considered as cross-compliance solutions. Relevant legal framework should be upgraded at different levels (local, regional, national), planning adjusted to the new reality, and incentives for implementing NWRM measures should be put in place.

For increasing the implementation and acceptance of NWRMs it is crucial to imcrease awareness of decision-makers concerning benefits of NWRMs as a resource for cost recovery (future strategic planning), as well as acceptance and supporting attitude of citizens.

In addition, implementation of NWRMs could be stimulated by financial and other social incentives, improvement/development of guidelines (technical) and capacity building. Promotion activities could start with young people and social networks, followed by development of convincing projects, pilot studies, and dissemination of success stories. Important precondition is open access to multi-funding sources for application of NWRM in various sectors. With this respect, the EU funds represent a big opportunity, but also the World Bank, the European Bank for Reconstruction and Development (EBRD), etc. and other potential bilateral donors.

During this process, there is a need to keep in mind what is feasible for the Danube Region. Priorities age given to "green" infrastructures that are still to be built and implement the latest technologies that are more adapted to the climate changes. To do that in a possible and cheaper way there is a necessity to reduce a gap between potential and feasibility in the region

Concerning expectations from the project, participants highlighted a need to develop a practical guide for implementation of NWRM and tools to promote innovative and cheap solutions. More support is expected from the EC for this kind of measures and to simplify funding mechanisms in order to speed up the uptake and implementation of innovative technologies.

Participants expressed their appreciation to the activities of the project and suggested to support follow up of current project and continuation after the lifetime of the project. Furthermore, they stated satisfaction with the information communicated during the workshop and its outcomes, with an expectation to be regularly updated about the project progress and deliverables.

Annex I - Workshop Agenda

EC project on Integration of Natural Water Retention Measures in river basin management

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Draft AGENDA

The 2nd Danube Region Workshop

23-24 June 2014
Venue: Ibis Gara De Nord Hotel, Enescu B conference room
143, Calea Grivitei Sector 1 Bucharest, Romania

The aim of the regional workshop is:

- to further support **regional NWRM network of practitioners and interested parties within the Danube River Basin**, complemented by an EU-wide web-based discussion forum that will establish links and synergies between the different regional networks;
- **to further promote** potential role NWRMs can play in future WFD, FD or adaptation plans and strategies throughout the Danube River Basin;
- to link current activities at national, regional and basine wide level with the **Common Implementation Strategy (CIS) process**; **linking to existing collective initiatives and networks** of experts, water managers and stakeholders
- to **exchange experiences** related to the NWRMs and learn about the current status and planned progress of developing and implementing a strategy and action plan on water management;
- **to identify the needs** of authorities and key stakeholders regarding the preparation of the second WFD management cycle and the development of the 2nd DRBM Plan.

Organizer:

The Regional Environmental Center (REC)

Support:

REKK Kft (REKK Inc.) (Hungary)

ACTeon (France)

22/23.06.2014

Arrival will be during June 22/23, 2014. Participants arriving by plane or train will be collected at Bucharest Henri Coandă International Airport / railway station and transferred in groups to the Hotel

Monday, June 23, 2014

12:30	***Arrival and Lunch for participants***	
13:00	***Registration of participants***	
13:30	**Welcome and introductory statements**	**Chair: Ms Jovanka Ignjatovic, REC** *Ms Anamaria Stroia, Director of CO Romania, Regional Environmental Center (REC)* *Mr Mihai Costache, Senior Adviser, Department for Waters, Forestry and Fishery ROMANIA* *Mr Vladimir Rojanschi, Professor, Ecological University Bucharest* *Ms Jovanka Ignjatovic, REC (Opening remarks, goals of the meeting and introduction of participants)*
14:00	**1. Why NWRM?**	**Chair: Mr Benoît FRIBOURG-BLANC, OIEAU, FR**
	Quick summary to NWRM initiative	*Mr Benoît FRIBOURG-BLANC, OIEAU, FR*
	Benefits of NWRM for water resources management	*Prof. Čedo Maksimović, PhD, Imperial college, London, Department of Civil Engineering, London, UK*
	Discussion	
15:00	***Coffee break***	
15:30	**2. How the NWRM project helps, results & deliverables**	**Chair: Ms Anamaria Stroia, REC-CO RO**
	Overview feedback on current state of the NWRM project	*Mr Benoît FRIBOURG-BLANC, OIEAU, FR*
	The Danube Region - What do the Case Studies show?	*Ms Jovanka Ignjatovic, REC*

	NWRM & WFD/FD – Opportunities for the Danube Region to provide ecosystem based economic gains	*Mr Gábor Ungvári, REKK, HU*

	Discussion	*All*
16:30	**3. Observations from stakeholders and observers**	**Chair: Mr Gábor Ungvári, REKK, HU**
	Comana case study	*Ms Daniela Peicea, Giurgiu County council*
	Experience in torrents management in Romania	*Ms Daniel Mihai Nita, Transylvania University Brasov*
	Lessons on technical and procedural aspects regarding NWRM and recommendations for way forward (a stakeholders/NGO point of view)	*Ms Maria Cheveresan, DHI Romania* *Ms Cristian Tetelea, WWF* *Mr Ventzislav Vassilev REC Bulgaria* *Ms Mateja Sepec Jersic REC Slovania* *Mr Bogdan Barbu/ Ms Imola Koszta, REC Romania* **All participants are invited to express interest to contribute**
	Discussion	
18:00	**Conclusions of Day 1**	**Chair: Ms Jovanka Ignjatovic, *REC***
19:30 -	***Joint dinner, Thalia Restaurant*** *(http://www.restaurantthalia.ro)*	

Tuesday, June 24, 2014

9:00	***Welcome coffee***	
9:30	**4. Multi-benefits of NWRM**	**Chair: Ms Jovanka Ignjatovic, REC**
	Blue-Green Dearm Project	*Prof. Čedo Maksimović, PhD, Imperial college, London, Department of Civil Engineering, London, UK*

	Natural water retention measures and sustainable agriculture practice	*Ms Mihaela Popovici, International expert*
	Financing opportunities in water management, programming period 20142020	*Ms. Madalina Iliuta, Ministry for European Funds, Romania*
	Discussion	
10:15	**5. Thematic Group Sessions**	
	Agriculture & Forestry, Enescu A conference room	**Chair: Ms Mihaela Popovici** **Co-chair: Ms Jovanka Ignjatovic, REC**
	Urban Areas, Shopin conference room	**Chair: Prof. Čedo Maksimović,** **Co-chair: Ms Anamaria Stroia REC Romania**
	Natural Areas Enescu B conference room	**Chair: Mr Gábor Ungvári, REKK, Co-chair: Mr Ventzislav Vassilev REC Bulgaria**
12:00	***Coffee break***	
12:15	**6. Building common understanding**	**Chair: Mr Gábor Ungvári, REKK, HU**
	Reporting from the TGs	the TGSs presenters (*to be selected by the TGs members*)
	Discussion on key lessons learned and future steps in support of the NWRM implementation	**Ms Jovanka Ignjatovic, REC** **Mr Gábor Ungvári, REKK, HU**
	Discussion	
13:00	**Closure of the Workshop**	**Chair: Ms. Jovanka Ignjatovic, REC**
13:30	***Travel costs reimbursement***	
13:30	***Lunch***	

Annex 2 – List of participants

PROJECT:	DGENV Unit C1
PROJECT LEAD CONTRACTOR	OFFICE INTERNATIONAL DE L'EAU
Service contract:	Pilot project - Atmospheric Precipitation - Protection and efficient use of Fresh Water: Integration of Natural Water Retention Measures in river basin management, Contract N° 07.0330/2013/659147/SER/ENV.C1
MEETING OF:	2st Danube Region Workshop - June 23-24, 2014, Bucharest, Romania

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4	BG	**Veradina Pavlova**	Ministry of Environment and Water	vpavlova@moew.government.bg	**Natural**	
5	BG	**Boryana Dimitrova**	Executive Environment Agency	watermon@eea.government.bg	**Agriculture**	
6	HR	**Marija Pinter**	Ministry of Agriculture	marija.pinter@voda.hr	**Agriculture and Forestry**	
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10	DE	**Alina Solomon**	Embassy of Germany	wi-100@buka.auswaertiges-amt.de	—	
11	PL	**Ignacy Kardel**	Faculty of Civil and Environmental Engineering	i.kardel@levis.sggw.pl	**Agriculture**	

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22	SI	**Branka Bracic-Zeleznik**	Public Water Utility JP VODOVOD-KANALIZACIJA d.o.o. Ljubljana	branka.bracic.zeleznik@vo-ka.si	**Urban**	
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24	UK	**Cedo Maksimovic**	Imperial College London (University)	c.maksimovic@imperial.ac.uk	U	
		International Organizations				
25		**Maria Cheveresan**	DHI Group	m.cheveresan@dhigroup.com	N	
26		**Cristian Tetelea**	WWF Romania	ctetelea@wwfdcp.ro for shorter ~~cionescu@wwfdcp.ro~~	~~**Agriculture**~~ N	
27		**Camelia Ionescu**	WWF Romania	cionescu@wwfdcp.ro	**Agriculture**	

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		NWRM Team				
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		REC Team				
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