WATER CoRe

ACTION PLAN FOR WATER SCARCITY AND DROUGHT PREVENTION

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I. ACTION PLAN FOR WATER SCARCITY AND DROUGHT PREVENTION

for

COVASNA REGION

1. The Region - Covasna Region - Romania

Covasna County is one of the 42 counties of Romania, situated in the middle of the country having 3709.8 km2 of surface, tallying 1.56 % of the total area of the country (Fig.1).

The region has 5 cities among which Sfântu Gheorghe is the biggest while the rest of the regions population lives in villages and communes. Most localities can be found in valleys and depressions located along the rivers crossing the county.

The total population of the region is 222.434 inhabitants, having 61.341 (2010) inhabitants staying in the capital city of Sfântu Gheorghe. The population density is 60/km², meaning that the area is not abundantly populated, having a distribution of entities described in (Fig. 2).

Fig 1. Location of Covasna County perimeter

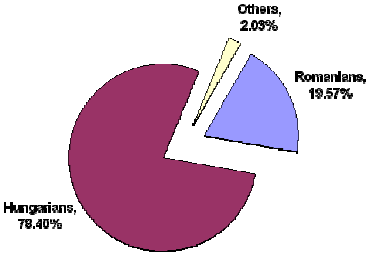

Fig 2. Population distribution

Administration – Romania has 42 administrative units lead by a County Council and by the Prefecture. The County Council is elected for a four-year term and it is responsible for coordination of activities in the Local Councils from the five towns and forty communes. The Prefecture is lead by a Prefect named by the National Government and represents the Government at the county level. The Prefecture coordinates the activities of County Public Authorities. Covasna Environmental Protection Agency (P12) is one of the county public authorities coordinated by the Prefecture and meanwhile it is subordinated to the National Environmental Protection Agency and the Romanian Ministry of Environment and Forests (P10).
The National Meteorological Administration (P11) is subordinated to the Romanian Ministry of Environment and Forests.

Geography – Covasna is situated at an altitude of 550 to 671 meters in an intermountain basin of the Carpathian curve, therefore it can be characterized like a depression, having hot summers and cold winters. The topography of the region can be divided into three groups. The biggest would be covered by mountains, with a 60% of coverage, the second group would consist of plains covering 31% and the remaining 9% would be added by the hills. The highest peak from Vrancea Mountain is Lăcăuti Peak (1777 m).

Hydrography and land use – The territory of Covasna County has accumulated over the past couple of million years a rich layers of aquifers, creating a permanent hydrographic system (fig. 3). Spread throughout the area of the county one can find numerous natural mineral water and fresh water springs. Generally these springs originate from the mountain regions, and after several intercalations, form wide network of fresh surface water deposits. The biggest river of the region, River Olt collects most of these springs, covering 81% of the total hydrographic basin. In the remaining 19%, the same is done by the River Buzău-Ialomiţa. Both of these rivers take the collected water south to the River Danube. There are three lakes in Covasna County all artificial, yet very popular recreation sites during the warm summer period, Lake Reci, Lake Moacşa and Lake Belin. Lake Reci is part of one of the protected areas of the county.

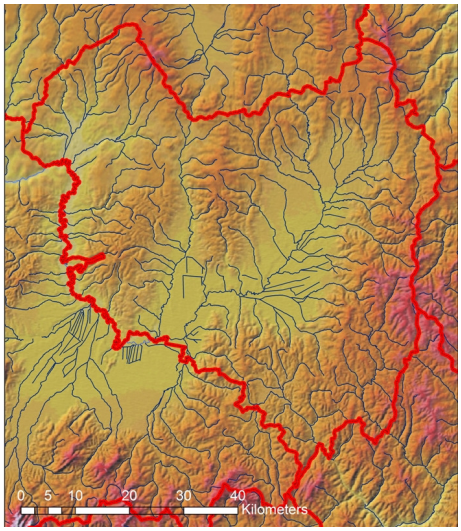

Fig 3. Covasna Counties hydrographic basins

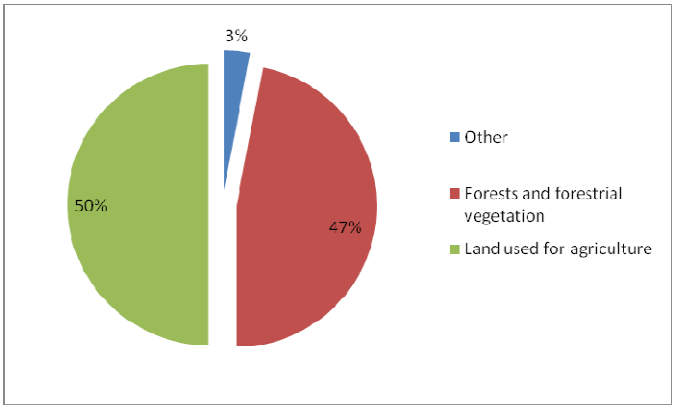

Fig. 4 - Land use

Covasna county, as shown in the Fig. 4, has the following land use distribution: - 50% agricultural land, 47 % forests and other lands with forest vegetation and 3 % other land categories.

Climate – The climate is temperate continental, with hot dry summers and cold dry winters, with an average annual temperature varying between 2-8 ℃ (Fig 5.). The absolute maximum is above 35 ℃ and the absolute minimum is lower than - 32 ℃. The average annual precipitation varies between 600 -800 mm/year (Fig 6.). The climatic resources have a wide distribution range due to the physical-geographical conditions.
The dominant wind direction in the summer period is NW while in the winter period it is NE.

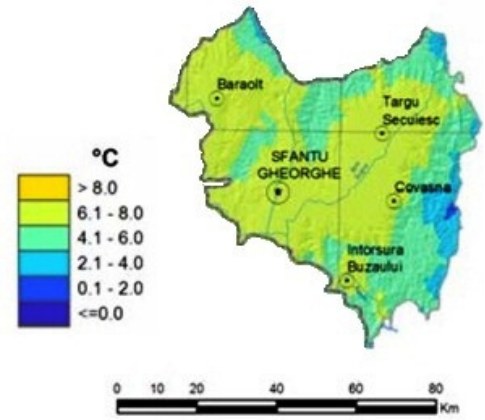

Fig 5. Covasna county mean of the temperatures

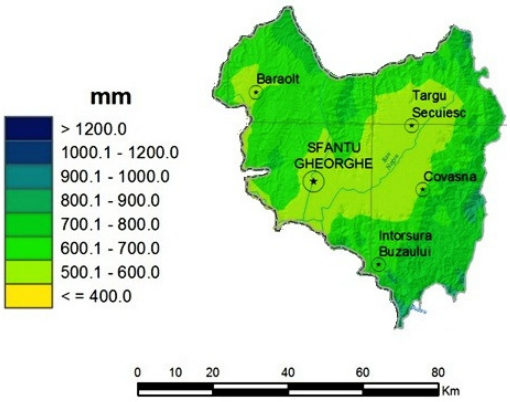

Fig 6. Covasna county mean of the precipitation

Economy – The available data reflects that in 2008 the amount of 3998,2 million lei were produced, with a distribution of 49,2% services and 30,5% industry.

Tabel 1. GDP evolution in Covasna County for the period 1998-2008

	UM	1998	2000	2005	2008
GDP	Millions of LEI	413,3	891,0	2541,8	3993,2
Agriculture	%	27,1	27,4	18,0	14,3
Industry	%	33,0	32,1	31,6	30,5
Construction	%	4,1	2,2	3,8	6,0
Services	%	35,8	38,3	46,6	49,2
GDP/ capita	Euro PCS		5493	6715	8826
GDP/ capita. In proportion with the national average	%	105,7	107,2	85,0	74,8
GDP/ capita. In proportion with the European average	%	28,5	29,9	29,2	35,2

(Source: "Centre Regional Development Agency, Regional development Plan")

At the end of 2010 in Covasna County there were 4231 active companies out of which 85,9% are considered micro-enterprises, 11,8% small enterprises, 2% middle size enterprises and just 0,3% big enterprises. Around one third of the total number of enterprises

had trading as the primary activity and the manufacturing sector puts up around one sixth of the total. Excluding the sector of electricity production and distribution as well as the water and gas producing and distributing enterprises, the number of small and micro sized enterprises goes beyond the 90% mark.

The predominant industries in the county are wood, textiles, electrical components, food and beverages.

Other information of interest – Covasna County is home to a big amount of the brown bear (Fig. 8) population among other big carnivores like wolfs or big cats. Not only the fauna is diverse, the flora of the region is rich in rare and protected species of plants (Fig. 7 and Fig. 9).

Fig. 7The natural birch reserve Reci

Fig. 8 - Ursus arctos

Fig. 9 - Fritillaria meleagris

The carbo-gaseous, bicarbonated, sodic, clorurated, feruginous mineral waters (fig. 10) and the therapeutic mofette gas (Fig.11) are the results of post-volcanic manifestations in Covasna region. Their therapeutic features make Covasna a one-of-a-kind resort, at European level, focused on the prevention and treatment of cardiovascular affections.

Fig. 10 – Mineral water spring

Fig.11 - Mofette

2. Water scarcity, drought and Climate Change (CC) – EU policy framework

Related on water scarcity and droughts policy, several EU policies and initiatives contribute to efforts for adaptation to climate change impact on water resources management:

- EU Water Framework Directive (WFD/2000/60/EC) and the Water Scarcity and Droughts EU Policy (EC 2007b) refers to:
  - to protect and restore the water environment across Europe by 2015 and to ensure the long term sustainable use of water;
  - to develop adaptation measures and sets out a number of policy options for addressing impacts of water scarcity and droughts in next decades.
- The Blueprint to safeguard Europe's water resources is a communication to be released by the end of 2012 that will address the evolution of water resources, including water's vulnerability to climate change and anthropogenic pressures (i.e. land use management). It will focus on different water resource management aspects that are related to adaption (land use management, indicative water efficiency targets, economic instruments, innovation, governance and knowledge base);
- The White Paper of the European Commission "Adapting to climate change: Towards a European framework for action" (COM/2009/147) issued in April 2009 sets out a framework to reduce the EU's vulnerability to the water scarcity and drought;
- Starting with March 2012, the European Climate Adaptation Platform (CLIMATE-ADAPT) is a publicly accessible web-based platform designed to support policy-makers at EU, national, regional and local level in the development of climate change adaptation measures and policies. The CLIMATE-ADAPT have been developed with the support of the European scientific and policy making community, and will help users to access, disseminate and integrate information on:
  - Expected climate change in Europe
  - The vulnerability of regions and sectors at present and in the future
  - National, regional and transnational adaptation activities and strategies
  - Case examples of adaptation and potential future adaptation options
  - Online tools that support adaptation planning
  - Adaptation related research projects, guideline documents, reports information sources, links, news & events.

Examples of information networks on DROUGHT

- **At global level:**
  - The World Meteorological Organization (WMO)
  - UNCCD Convention
  - The Global Water Partnership (GWP)
- **In Europe:**
  - EU / WFD and WS&D policy
  - The United Nations Economic Commission for Europe (UNECE)
  - The European Water Partnership (EWP)
  - CLIMATE-ADAPT Platform

- ADAM Digital Compendium on Adaptation is a the portal for the dissemination of the trans-disciplinary analysis results carried out in the EU ADAM project
- The Drought Management Centre for South and Eastern Europe (DMCSEE)

- Research projects:

- Research into climate change scenarios: PRUDENCE, ENSEMBLES, STARDEX, CECILIA, CLAVIER, CIRCA ERA-Net, CCWATERs, etc;
- Research on droughts and water scarcity: XEROCHORE, European Drought Observatory (EDO), MIDMURES, REDSIM, DESIRAS, I-ADAPT, Desert-net, DROUGHT-R&SPI;
- Research into climate change impacts on the aquatic environment and water cycle: CLIME, KLIWAS, CLIMWATERADAPT, WATCH, CIRCE; WATER2ADAPT;
- Research into mitigation / adaptation options and costs: AquaStress, ADAM, ClimateWater.

Drought management and adaptation options

The basic Framework to minimize the adverse impacts on the economy, social life and environment when drought occurs is the development of a specific integrated drought management plan (IDMP). In other words, the IDMPs must be the first set of policy options for future action in order to develop the best water management practices and improve preparedness measures drought impacts

Guiding principles:

- Diagnose the causes that led to drought in the past and/or may lead to it in the future;
- Monitor current drought conditions in order to detect water deficit early;
- Develop a comprehensive set of indicators at appropriate temporal and spatial scale in order to predict drought impacts;
- Diagnose and improve knowledge of water deficit based on past and future trends, incorporating climate change projections;
- Analyze how predicted changes in mean annual rainfall will affect the socio-economic life and environment;
- Incorporate climate change adaptation in water management by continuing the focus on sustainability (sustainable balance between water availability and demand).
- Follow an integrated approach based on a combination of measures (compared to alternatives based on water supply or economic instruments only);
- Assess other climate change adaptation and mitigation measures on their impact on drought risks.

3. Political background concerning Water management in Covasna Region

In Covasna county the strategy for development in the sector of water supply and sewerage systems, the Water Master Plan, has been developed by Covasna County Council. The Intercommunity Development Association “AQUACOV”, established within County Council is responsible for the administration of the public water system’s infrastructure. AQUACOV has delegated the operation of the water infrastructure to the Regional Operator of Covasna County SC Gospodărie Comunală SA.

Water management in Covasna region is attributed to the two Water Management Systems, Covasna and Buzău, as the rivers from Covasna County belongs to two Water River Basins, Olt and Buzău – Ialomiţa. The Water Management Systems are subordinated to the National Administration "Romanian Waters" and to the Ministry of Environment and Forests. They are responsible for implementation and enforcement of the provisions from the River Basins Management Plans - Qualitative component of Water Management, as well as the management of the county network for hydrologic, hydro-geologic and water resources quality measurements.

4. Study visits and Lessons learnt from WATER CoRe project

24 Study visits have been carried out by P 10 (Ministry of Environment and Forest), P11 (National Meteorological Administration) and P12 (Environmental Protection Agency of Covasna) and several bilateral contacts have been established for a better understanding of the selected good practices applied in other partner regions.

They are listed below according to the main topics tackled by the project, followed by the lesson learnt and the regional transfer strategy – if applicable (Chapter 5.).
Also, the detailed description of each good practice is included in the project deliverable 'Good Practices Handbook'.

A1 - Demand-side management, technical measures

A1-1 – Groundwater Management Plan Hessian Reed (Hessen)

Short description of the practices exchanged
The groundwater management plan for the Hessian Reed is a planning and steering instrument for water management. It's purpose is to ensure a sustainable water supply for the urban areas while avoiding settlement cracks, meanwhile to prevent damage to be done to the forests and wetland and to avoid the drying up of wheels. The water demand is huge in the urban area and having water shortages in the woodlands and wetlands increases the need.
Due to the high demand a regulation needs to be put in place taking into account sometime contradictory demands.

Lesson learnt through the practice
Even the size of the Hessian Reed exceeds the Covasna County's, though EPA Covasna (PP 12) consider that many aspects of the management plan can be transferred after tailoring (downscaling) to the needs and natural properties of the region. The way of successfully dealing with sometimes contradictory needs can always be inspiring to developing regions such as Covasna.

Applicability in the Regional/Local context

Although it has just recently been thought of, adaptation strategies need to be put in place in order to prepare from a technical point of view for the extreme weather conditions faced mostly in the spring and autumn time. If the foundations for the IT background of such a project can be laid then possibly in the future the project or some part at least might become transferable to our region.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		x

A1-4 - EMR software - Irrigation Environmental Evaluation (AIW) (Aragon)

Short description of the practices exchanged
The EMR software (environmental and agricultural evaluation of irrigation) runs daily water balances and quantifies pollutants in the drainage (salts, nitrates and major ions). Via a simple water balance in the soil, EMR quantifies the water needs and evaluates the irrigation quality from efficiency and water deficit indicators, while the agri-environmental impact is quantified for all irrigation from water usage rates and salt and nitrate pollution.

Lesson learnt through the practice
To assess the irrigation quality and its agri-environmental impact in the time period defined by the user are useful the EMR indices in order to evaluate the irrigable area from a particular basin at different scales and data.

Applicability in the Regional/Local context
National Meteorological Administration (P11) can test the EMR software in order to improve the calculation method of water soil balance and the water deficit indicators. These tests will improve the analysis of mechanisms soil water balance in order to provide information to the farmers regarding the necessity of applying irrigation in the droughty areas of Romania.

	Yes, totally	Yes, partially
To be Transferred		X
Applicable in the future		

A1-12 – Aqua Project (Life 97 Environment / IT/ 000106) (Emilia – Romagna)

Short description of the practices exchanged
The Aquasave Project is dealing with the saving potable water in the city. Having an experimental resource management in place, it involves 8 flats (around 22 individuals). The system maximizes reuse, by reusing the water coming from showers, bathtubs or washing machines for flushing toilets. Besides the reuse of the grey water, the rainwater is collected. After the rainwater is collected and treated it is sent to dishwashers and washing machines.

Basically the grey water is collected from all residences within the project and after filtering it is sent to a collection tank. After a second filtering it is disinfected and sent to a storage tank to be captivated for further use managed by the automated system. The rainwater collection and purification system works in a similar way. It collects, than filters and finally disinfects the collected rainwater. This way the water is ready to be used for dishwashing or to be used in washing machines. The final rinse is done by tap water and the whole system is totally automated

Lesson learnt through the practice
Water saving techniques need to be considered very strongly in Covasna region due to the low amount of rain fall. The citizens of Covasna region might be inclining towards introducing such systems, for multiple reasons. Awareness raising in this topic is crucial and finding funding for implementation. Many take the water for granted due to the imaginary high availability. There are signs pointing in the direction of water shortages in Covasna County, mostly in summertime. The abundance of local storms with a high amount of precipitation in a short amount of time can be expected. Run-off water causes floods in the lower areas of the country, in the cases of such storms. This "wasted" water can be used for supplying households and having the benefit of reducing the water demand.

Applicability in the Regional/Local context
EPA Covasna (PP12) consider this project transferrable to Covasna County, but only if governmental funding can be obtained to subsidize the interested citizens, due to the amount of investment needed for building the system; much like how the current Green House Programme is running.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		X

A1-17 – IRRINET (Emilia Romagna)
Short description of the practices exchanged
IRRINET is an expert system providing an 'irrigation advice' for the main water demanding crops. The system combines several data sources: meteorological data from ARPA-SMR (Regional Environment Protection Agency- Department of Agro-Meteorology); soil data from the regional "Hydro-Geologic and Seismic Service" and crop parameters as defined by the CER, including the application of the most effective irrigation strategy for every crop considered. Since 2009 IRRINET has evolved in IRRINET Plus which implements economic calculation of the irrigation profitability, providing farmers with further information other than optimal irrigation volume and time, assessing the economic benefit related to the next irrigation through a traffic light advisory system.

Lesson learnt through the practice
IRRINET as informative system has been set up form farmers in order to decide how much to irrigate. This visual tool is accessible by whoever have interest on it and is tailored for a large number of crops.

Applicability in the Regional/Local context
NMA (P11) can import some characteristics of IRRINET system to compare the pattern of soil water balance used by experts from Agrometeorological Laboratory to estimate soil water deficit and thus time watering during drought conditions. The NMA system is based on specialized applications (AGRO-SYNOP, AGROSERV and AGRO-TEMPSOL) which combines the Soil-Module (soil data), Phenology Module (crops parameters), Rainfall-Module, Air Temperature Module and calculate at daily step the soil moisture reserve and water deficit at field scale (winter wheat and maize crops). The Geographical Information System (GIS) is used to zoning the thematic maps at national/regional/local level in order to identify the vulnerable area to drought conditions.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		X

A1-18 – Novel Water reuse Technologies (Emilia Romagna)

Short description of the practices exchanged
A new water treatment device has been designed, utilizing a membrane bioreactor and a modular field treatment system. This enables small communities or industries with 10.000 EI or less to safely discharge waste water into irrigation canals. The water treatment technologies coupled with irrigation strategies and technologies make an easy to use, flexible management.

Lesson learnt through the practice
It is big challenge to solve the small communes waste water treatment related problems. It is a great and efficient way to tackle the problem caused by the scale at which the operation needs to be done. The potential of solving the urgent need to treat the waste waters of the Covasnian communes is worth the effort.

Applicability in the Regional/Local context
The Covasna region is one of the least populated area of Romania, therefore the small communes with not more then 1500-2000 citizens are very common. The waste water treatment of these communes is not yet settled therefore this good practice shows great interest. If the membrane used treatment reactor is applicable under the harsh conditions of the continental winters then it can be a great alternative for treating the communes of Covasna County's waste waters.

	Yes, totally	Yes, partially
To be Transferred		

Applicable in the future		**x**

A2 - Demand-side management, economic and financial instruments

A2-1 – Benchmarking of water supply and waste water companies in Hessen

Short description of the practices exchanged
The Ministry of Environment of Hessen, the Association of municipalities and communities of Hessen and the Hessen branch of the German Association of water management, waste water and waste encourage all water supply and waste water companies in Hessen to a voluntarily participation in a benchmarking project. This project aims for a sustainable performance of benchmarking systems of water companies (dealing with supplying water, the treatment of waste waters) by increasing their economic efficiency. Detailed individual evaluation and recommendations are provided to the participating water companies, like energy saving measures or tips on how to reduce water loss.

Lesson learnt through the practice
The Green Week, in Bruxelles 2012 had a relevant title to this good practice: “Every drop counts”. From an economical point of view of water companies the fewer amount is wasted the better, especially in times when water becomes rare by the day that goes by. The lesson learnt by EPA Covasna from this project is about the involvement and development of partnerships with water companies and the association of the municipalities for such projects

Applicability in the Regional/Local context
The good practice is most convenient since the Regional Operator for Covasna County has just recently launched a large scale project covering most of the counties communes and all it’s cities.

	Yes, totally	**Yes, partially**
To be Transferred		**X**
Applicable in the future		**X**

A2-10 - Groundwater charge (North Brabant)

Short description of the practices exchanged
The aim of the project was groundwater saving and using the revenues for research and financing of a groundwater monitoring network. In order to prevent an unlimited use of groundwater, the province of North-Brabant charges the use of groundwater at 0,019 Euro/mc.

Lesson learnt through the practice
Presently, according to Governmental Decision no. 328 /2010, the contribution for using groundwater in Romania is 0,012595 Euro for each cubic meter. This is too less to cover the costs for groundwater research and for maintenance of national groundwater monitoring network. Also, imposing this charge, we didn't succeed totally to discourage and limit groundwater abstraction, because this contribution is much less than the cost of surface water distributed by public network. So, based to the Dutch practice, Romanian Ministry of Environment and Forest intend to elaborate a proposal for a new Governmental Decision, in order to raise groundwater contribution.

Applicability in the Regional/Local context
The cost of drinking water distributed by public network differs by region, but it is over 1 Euro/cubic meter everywhere in Romania (for example in Bucharest is 1,166 Euro/cubic meter). So based on a study of supportability and on the example of A2-10 - Groundwater charge, we can transfer this practice and we will apply it, probable partially, in the next future.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		x

A2-11 – Proposal for new mitigation strategies to face water shortage (in urban planning and regional development), especially in optimization of water uses (Herault)

Short description of the practices exchanged
The study program is based on improving the general knowledge on water consumptions and the definition of an action plan. The program is conceived to carry on an economic analysis of this action plan and secondly to assess the commitment and approval of citizens by applying a governance process.

Lesson learnt through the practice
In the content of the program are included the following: a statistical analysis of water consumptions, factors of variability, water consumption ratios of public facilities, modelling of evolution phases accordingly with three hypothesis of urban growth (natural trend versus active urban planning), analyse the users approval for water savings policy, analyse of rain water recovery devices (sanitation water use).

Applicability in the Regional/Local context
These studies and analyses related water consumption are examples for the Ministry of Environment and Forests and they can be transferred as good examples and good practices in future local or regional plans or projects. EPA Covasna considers also that the practice can be adapted and applied for the Local Environmental Action Plan.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		x

B – Drought management

B-5 – Local Action Program to cope with drought and desertification (Emilia Romagna)

Short description of the practices exchanged
The LAP E-R is focused on the improper use of the land and of the water resource in areas characterized by climatic fragility with growing drought phenomena. Through meteorological and agro-meteorological indicators it was possible to identify the regional areas more subject to climate change, with the highest anomalies in precipitations and in the temperature regimes: the crest elevations, the low and medium hill areas, in particular of Romagna.

Lesson learnt through the practice
The adaptation measure (water storage basins) results insufficient because it does not intervene on the water demand, which grows faster than water storage. But, the Local Action Program (LAP) proposes varying adaptation measures grouped as follows: structural solutions, solutions for the agro-alimentary re-equilibration and for share the social and environmental values of the resource.

Applicability in the Regional/Local context
Some solutions proposed by the LAP can be analyzed in order to evaluate the possibility of implementation within a region with similar conditions. The identification of adaptation measures by exchange information and methodologies can develop the best practices guides for farmers to increase the awareness of climate change threats for agriculture.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		X

B-7 – Drought observatory and web site (Emilia Romagna)

Short description of the practices exchanged
An integrated drought information system based on a website provides information to support the application of the regional plan for water protection for drought management. The drought observatory is the core of the web site and it provides tools and data to study

drought and desertification within the region, gathers updated documentation and informs institutions and citizens properly.

Lesson learnt through the practice
The Bulletins on drought are produced weekly during critical seasons, monthly during the year, with measured data and forecasting. Frequently the information is updated applying new indicators and data from meteorological and hydrological monitoring networks.

Applicability in the Regional/Local context

The structure and content of Bulletin can be used as a model for the Agrometeorological Department from NMA (P11) in order to compare with a similar product produced by the Romanian experts. Thus improve access to diversified products but have a common goal, namely improving the access of information and predictions products trough Internet Web sites.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future	X	

B-12 – Regional List of Priorities under normal circumstances in using water for agriculture and other economic interests (North Brabant)

Short description of the practices exchanged
The aim of the project is to increase regional self reliance and reliability in agricultural water use, by introducing preferences. The first priority is reducing water demand, by stimulating other types of waters besides the tap water. The following being better use of local water, the use of an external water supply and extracting ground water.

Lesson learnt through the practice
EPA Covasna learnt through this practice that it is not sufficient enough to have a list with the national priority measure created for the entire country. Therefore initiatives must come from the regions in order to improve the document and to justify and highlight the most important measures.

Applicability in the Regional/Local context
The policy guidelines developed by the Province of Noord-Brabant are applicable in Covasna County as well as they could be in any other region and they fit in the local list of priorities from a technical point of view. If governmental support can be obtained they can very well be fitted.

	Yes, totally	Yes, partially

To be Transferred		
Applicable in the future		x

C – Adaptation to climate change

C-1 – KLIMZUG - Regional Network for climate change adaptation - Northern Hessen; Sub-project: Impacts of climate change and adaptation strategies for the water resources management of the rivers Eder and Fulda (Hessen)

Short description of the practices exchanged
The KLIMZUG network in North Hessen consists of research institutions and representatives of the North Hessian business, administrative and educational sectors. The aim of the research project was to quantify the impact of climate change on water resources management and to develop adaptation strategies. Variables that are taken into account are changes in land-use, limited use of protected areas of rivers and flood plains, and adapted operation of hydraulic constructions to a more effective use of water resources. Simulations and investigations are carried out with the help of hydrological and hydrodynamic-numerical models as well as geographical information system (GIS).

Lesson learnt through the practice
The project is still in progress and the results of the governance-innovations could be interesting for other regions in the process of climate adaptation.

Applicability in the Regional/Local context
The adaptation strategies designed in the research project could be a guideline for river basin with similar or appropriate climatic conditions in other regions of partner countries. In this context, is necessary to know the impact of climate on the water resources management and to work out corresponding adaptation strategies.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		X

C-2 – Integrated Climate Protection Programme of Hessen/INKLIM 2012 (Hessen)

Short description of the practices exchanged

The main objectives of INKLIM 2012 were the updating of CO2 emission data and the calculation of technical/economic scenarios, the analysis of Climate Changes and impacts on a regional scale as well as development of instruments and measures for effective climate protection together with an assessment of related costs.

Lesson learnt through the practice
The integrated approach of Climate Changes impacts on various inter-related sectors for policy development may prove an example for others regions. Specific to the Programme was the integrated consideration of both GHG reduction measures and adaptation measures to Climate Changes.

Applicability in the Regional/Local context
The INKLIM 2012 can be used as scientific support for Romania's climate adaptation policy in order to investigate the economic analyses regarding the costs of Climate Changes for some priority sectors like agriculture, forestry and water. The comprehensive analyses can set up a regional Climate Changes database and developed up-to-date climate scenarios to improve the results obtained in regional climate change scenarios over 2020-2050 regarding crop systems and yields on droughty areas.

	Yes, totally	Yes, partially
To be Transferred		X
Applicable in the future		

C-3 – Adaptation Strategies for Climate Change and Extreme Weather Conditions and Measures for a Sustainable Groundwater Management (AnKliG) (Hessen)

Short description of the practices exchanged
The overall aim of the project is to develop adaptation measures and strategies for a sustainable ground water management. The assessment of the climates changes effect on various sectors is one of the good practices objectives. Quantifying the future water demand for drinking water and irrigation, the assessment of the extent of ground water utilization as well as the reveal of limitation on ground water management are the other major objectives.

Lesson learnt through the practice
It is not enough to say that Covasna region is facing the effects of climate change it has to be measurable and quantifiable. In order to do so models need to be made and more scenarios need to be considered, in order to reveal the capabilities and limitations of the local groundwater management, in order to quantify the impact of climate change.

Applicability in the Regional/Local context
Although it has just recently been thought of, adaptation strategies need to be put in place in order to prepare from a technical point of view for the extreme weather conditions faced mostly in the spring and autumn time. If the foundations for the IT background of such a

project can be laid then possibly in the future the project or some part at least might become transferable to our region.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		x

C-11 – Inclusion of guidance on the climate change in the watering community office (Aragon)

Short description of the practices exchanged
The project aims to creation a platform that offers farmers daily recommendations for watering according to the agricultural and climate conditions. With it, they will be given a tool to optimize the use of a scarce asset, such as water. These benefits in matters of adaptation of agriculture to probable conditions of low rainfall are joined by the information which is offered on the portal about the benefits of the energy audits on watering under pressure as well as on other techniques to achieve a more efficient use of water.

Lesson learnt through the practice
The applicability of project refers to the implementation of a collective management water scheme and direct participation of the main actors in the watering community: farmers, local authorities, technicians, etc.

Applicability in the Regional/Local context
The research approach on the climate change in the watering community office confirms the necessity of development agricultural weather information concerning wide variety of agricultural technologies to a better management of agricultural decisions.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		X

C-17 – Impact of Climate Change for Food Production in Western Balkan region Project (REC Hungary)

Short description of the practices exchanged
The project aims to support the decision makers to acquire the knowledge and models to develop long term strategies for adapting the agricultural food production sector to the

current and foreseen climate change impacts. An important outcome of the project is the review of the existing national climate projections up to 2020 and 2050 for each country in Western Balkan region. Another objective is related with the effects of CC on different parameters of agricultural crop production (such as crop yield, harvesting time) and fish production.

Lesson learnt through the practice
The project goals are based on the availability of historical climatic data and future projection of climate scenarios for 2020 and 2050 periods. On the other hand, the projections must to be modeled for 2020 and 2050 periods, describing the range of impacts.

Applicability in the Regional/Local context
The NMA (P11) can use the project results to compare the data obtained from the observed and simulated crop variables, including dates of flowering, maturity, season length and grain yield for agricultural crops. This information substantiates the identification of specific adaptation measures to the current and foreseen climate change impacts.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		X

C – 24 - Deltaplan Dry Rural Areas (North Brabant)

Short description of the practices exchanged
The project is promoting the efficient use of available water in rural areas coping with seasonal water scarcity by introducing national adaptation measures in the National Strategy for Climate Change. The project aims at defining regional adaptation strategies by stimulating self-support in fresh water supply (buffering and infiltration), diminishing water demand and the sensitivity for water shortages (new crops, robust nature and re-allocation of land use) and promoting efficient use of available water - ex. - irrigation.

Lesson learnt through the practice
Due to climate change in the summer there are more and longer dry periods. In order to prevent in the future water scarcity in different area of Romania, adapting measures will be introduced in the National Strategy for Climate Change. These measures will include a better cooperation between water managers from Water Administration from basin level and farmers. Also the data from research field in drought and water scarcity will be necessary to be available and used by all involved responsible entities.

Applicability in the Regional/Local context
The adapting measures in water saving will be putting into practice at regional and local level due to the cooperation between water responsible, agriculture directorates and farmers.

	Yes,	Yes, partially

	totally	
To be Transferred		
Applicable in the future		X

C-26 – Knowledge for Climate – Dry Rural Areas (North Brabant)

Short description of the practices exchanged
Knowledge for Climate as a national programme for climate change adaptation developed knowledge's regarding the effects of climate change on regional development in the short and medium terms. The project is focused to three main themes: rural areas in terms of water supply and demand strategies for agriculture and nature; governance in order to deals with CC adaptation in regional networks; decision support systems to develop and transfer the information in the science-policy interface.

Lesson learnt through the practice
Rural areas are the most vulnerable to the water stress under CC variability. In this context, an increasingly dynamic water management system means that a climate change will put this transformation under a lot of pressure, floods and droughts causing problems more often.

Applicability in the Regional/Local context
Romanian partners are going to promote the "Knowledge for Climate" approach in order to aware decision makers and farmers to possible consequences of climate change and to offer suggestions in taking appropriate adaptation and mitigation options. The research based on selected and relevant case studies can highlight the applicability and success of such a programme.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		X

D - Strengthening public participation and awareness raising

D1 - Children's books on travelling water drops (Hessen)

Short description of the practices exchanged
The project consists in two storybooks for children of the ages 3 to 10 years old.
"Ein Wassertropfen auf Reisen" – The travelling water drop – this storybook is focussing on water saving attitudes. The two water drops, Plitsch und Platsch enjoy their way of life with their friends at a beautiful spring in the woods. One day this source runs dry. Therefore Plitsch and Platsch begin to investigate who may be made out that mankind consumes a lot

of water. Together with their friends Anna and Peter they start to develop ideas for saving water.
"Plitsch und Platsch. Abenteuer am Bach" - Plitsch and Platsch. Brook Adventures – this storybook is focussing on the brook biotope. The story emphasises the dimension of close to nature waters and sensitises children on problems that may occur out of water pollution. While having a downstream boat trip Plitsch and Platsch meat a lot of typical plants and animals. They also realise a waste water treatment plant and learn by their friends Anna and Peter how to analyse the water quality.

Lesson learnt through the practice
The 2 booklets for children are very instructive and educative (about 500.000 of copies were printed and distributed in Germany). They improve the awareness amongst children about the importance of correct water consumption, about taking care of water and environment. All of these activities will conduct to a good health of the natural resources in the future.
They have an important role in increasing the awareness and education among the children of 3 to 10 years old about saving and correct practices in the use of water.

Applicability in the Regional/Local context
A number of 2000 of booklets were printed by the Ministry of Environment and Forest, in Romanian language and distributed in schools in Bucharest, next to Bucharest and in Covasna county. Taking into account the success of these brochures it is recommended to reprint the 2 children booklets.

	Yes, totally	Yes, partially
To be Transferred	x	
Applicable in the future	x	

D-2 - The Green Pack Programme (REC Hungary)

Short description of the practices exchanged
The Green Pack is a multimedia environmental education kit, making it a lively source of information for all who are interested. The kit is intended for primary and secondary school teachers and for their students being developed on environment protection topics and sustainable development as well. Being inspired by political processes and adapted by 14 different countries it was developed by collaboration between national education and environmental ministries. Besides the different national versions of the kit it has a general English edition as well.

Lesson learnt through the practice
The importance of education can't be underlined in a better way than expressing the weight of eco-education of primary and secondary school students. The topics tackled in the kit consist of challenges that are awaiting the next generation to come. Therefore it is imperative to have it introduced into the school system, at least in Covasna county. What better way to do this, than making a game out of it. All human beings tend to understand and comprehend the message of the kit having it in a lively and interactive shell.

Applicability in the Regional/Local context

Having Hungarian schools in Covasna County it can be transferred immediately, though it is preferred to have it updated with region specific data and translated into Romanian.The leader of the local School Inspectorate has declared it to be fit into their educational context. The local School Inspectorate has already expressed willingness to have it introduced into their system therefore the founding stone has been laid and it's a matter of finding the proper funds and political support.

	Yes, totally	Yes, partially
To be Transferred		X
Applicable in the future	X	

D- 6 - Acqua, risparmio vitale (Water, vital saving) (Emilia Romagna)

Short description of the practices exchanged
The regional communication campaign "Water, vital saving" started a process of important cognitive changes (to favour a larger acknowledgement on the issue of water consumption), of action and behaviour (to propel choices and domestic behaviours which bring along an higher saving) and of values (raising awareness towards the water thematic), which allowed to make the citizens more informed and conscious of the problematic related to water domestic consumption. In the communication plan of the campaign, the main instrument has been a brochure, rich in useful suggestions and coloured images, delivered via mail to the Emilia-Romagna households in almost 2.000.000 copies; other instruments have been a web site, radio and TV commercials, poster and advertisements as well as a bookmark. In occasion of the major national fairs and public events dedicated to environment, many brochure have been distributed to citizens and participants and when possible also thousands of "kits" for domestic water saving (flow reducers and faucet aerators). The slogan of the campaign was: "Half full or half empty? Whatever you think save water!"). The encouraging results obtained from the demonstrative initiatives and the projects put in place by the Region have concretely shown that, with small efforts, such as simple domestic attentions and minimised economic investments, it is possible to obtain water savings up to an high 12-18% for drinking water.

Lesson learnt through the practice
The key elements for a successful and effective campaign have been the informative documentation provided to the public, together with the distribution of the kits for domestic water saving.

Applicability in the Regional/Local context
It is a good and successful example that can be easily transferred to Covasna region. If local and regional authorities will join their effort to find the necessary funds then the good practice can be implemented after adapting to local environment.

	Yes, totally	Yes, partially
To be Transferred		X

Applicable in the future		

D- 14 – The Water footprint – WFP (North Brabant)

Short description of the practices exchanged
The Water Footprint Network invites stakeholders with an interest in the WF concept to become partner to jointly execute research and WF projects, to share practical knowledge and get involved in open debates on critical issues related to WF and sustainable water management. The approach shows expected effects based on opinions in the filed of ecology, economy, and society on order to propose new projects and plans.

Lesson learnt through the practice
Such a project used in relation with water scarcity and drought issues can be developed to lead towards innovative solutions and collaboration between stakeholders.

Applicability in the Regional/Local context
The use of such instrument will allow a detailed analysis of interactions between crops, climate and management that will be taken into account in the WF assessment. For this reason, the project can be used as decision support for adaptation strategies, environmental awareness and innovative solutions to reduce the severe consequences of global pressure on freshwater resources.

	Yes, totally	**Yes, partially**
To be Transferred		
Applicable in the future		**X**

D-15 - Proposal for elaboration of a Guide for promotion of alternative resources: rain water and water, waste water, raw water, swimming pool water. (Herault)

Short description of the practices exchanged
The guide aims to enlighten the decision makers (from public administration, city halls, economic units etc.) on the advantages of various alternative water resources and about water recovery options to the operational phases. It will describe the general conditions of the ecological, technical and economic measures. One of the main issues will be dedicated to the rain water recovery policy for different users.
The success factor consists in realizing a survey office to conceive the handbook, sum up the knowledge on this topic, and carry on a communication file addressed to the local authorities.

Lesson learnt through the practice
The experience of General Council of Herault with the guide and their communication process with the local authorities demonstrated us about the efficiency this tool in relation with local administration and general public.

Applicability in the Regional/Local context

Information spread throughout the guide will be used by the representatives of Water Administrations at water basin level in the licensing process for water management, and in local training sessions with different water operators. Information from the guide will take into account the experience feedback and will be updated with technical evolution.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		X

D-16 – Awareness campaign in schools for the promotion of water saving and distribution of small water saving kits (Herault)

Short description of the practices exchanged
The pedagogic project has been set to encourage pupils toward a better understanding of impacts about water shortage and establish a diagnostic either in the school or at home. The program included also the correct use of water saver devices and developing behaviours in water savings. The aim of this initiative was also to test the implementation of water saving equipments

Lesson learnt through the practice
Children and their families are opened for new information regarding advices for water saving and good practices in water consumption policies. The most adaptive and cunning are the children and what better way of promoting water saving techniques can be thought of than using them as a means to change their parents way of thinking on this matter.

Applicability in the Regional/Local context
The project can be very easily transferred to Covasna region, since the taught materials are applicable for most regions. The School Inspectorate has been informed about the project, since they are the acting authority in the Covasna County. Teachers welcome the new ways of thinking, the pupils are opened for the information so hopefully the good practice can be transferred with success sometime in the future. The project can be transferred in cooperation with Water Management Systems.

	Yes, totally	Yes, partially
To be Transferred		
Applicable in the future		x

5. Regional Transfer Strategy

As transfer strategy EPA Covasna (P12) together with Romanian Ministry of Environment and Forest (P10) and National Meteorological Administration (P11) considered two different levels of experiences transfer:

1 - regional political level, based on the political approval (by the President of Covasna County Council)
2 - technical level, based on a technical transfer only (by technicians)

All the three Romanian partners analyzed together the study visits held as elements of interest which could have been transferred with or without a political approval.

This evaluation underlined that some of good practices presented by project's partner regions can be transferred in Covasna Region and the necessary actions which aim at adaptation to climate changes were included in the Environmental Action Plan (EAP) of Covasna County, during the updating process that have been put in place in 2011.
EAP is a planning and steering instrument for environmental policy, a document reflecting/expressing the whole community opinion regarding to environmental problems. The EAP for Covasna county is in implementation since 2004. The updating process from the year 2011 was an opportunity to improve the county environmental strategy with issues of water scarcity, droughts and climate change and integrate the lessons learnt from Water CoRe Project partners transferring some of their strategies.
The updated version of the Environmental Action Plan have been submitted to Covasna County Council (the regional political authority) in charge to adopt the strategy and a Council Decision have been issued to approve the measures of the action plan (Decision no. 47/2012).

The first step in the updating of EAP was the identification of environmental issues at the County level. The procedure of updating the EAP was realized in working groups, constituted of specialist from the diverse institutions of the County (environmental authorities, water authorities, forest authorities, agricultural authorities, health care, and fire department local and county administrations). Specialist have used reports and specific studies elaborated by their institutions as well as the results of the group meeting which was organized in the frame of WATER CoRe project, as a workshop in June 2011. As a follow up of the discussions and technical analyses it was decided that issues regarding climate changes have to be considered as a problem for the region and therefore it is necessary to establish new actions and measures for adaptation to climate changes for prevention of droughts and water scarcity.

The main environmental problems identified and included in the updated version of EAP for Covasna County are:

1. Pollution of surface waters
2. Soil and groundwater pollution
3. Waste management
4. Quantity and quality of drinking water
5. Management of urban areas
6. Tourism and recreation
7. Nature protection and conservation of biodiversity
8. Ecological education
9. Pollution of the atmosphere

10. Threats caused by major accidents or by natural or anthropogenic
11. Health of the population
12. Strengthening local authorities capacity to manage climate change

In the working groups sessions EPA Covasna has presented the best practices of the WATER CoRe project partners which can be adapted and transferred in order to solve the identified problems. A strong emphasis was made for those practices that deal with ecological education and for the ones strengthening local authorities' capacity to manage climate change. These good practices can be found in the Good Practices Handbook as follows:

- B-5 – Local Action Program to cope with drought and desertification (Emilia Romagna)
- C-1 – KLIMZUG - Regional Network for climate change adaptation - Northern Hessen;Sub-project: Impacts of climate change and adaptation strategies for the water resources management of the rivers Eder and Fulda (Hessen)
- D-2 - The Green Pack Programme (REC Hungary)
- D-6 - Acqua, risparmio vitale (Water, vital saving) (Emilia Romagna)

With the approval of the Coordinating Committee for EAP these best practices were adapted and introduced as actions into the document (see tables below).

Table 1. – Ecological education

Problem/Objectives	Target	Indicator	Action	Deadline
Ecological education/ awareness raising at the community level **Objectives** General: awareness raising, education and implication of the public in the improvement of the environment Specific: - ecological education of students - awareness raising of the public on water saving techniques in order to prevent desertification .	Insuring educational courses in schools and during camps.	Number of educated students	Introduction into the school curricula of thematic and actions for ecological education (elementary and high school) Taking over the Green Pack by REC Hungary.	2015
	Get the specialists and students involved	Number of trained specialists	Using the e-learning modules created within the WATER CoRE Project for informing and educating the students and other stakeholders	2014
			Organization of informative campaigns based on Aqua, risparmio vitale model (Water, vital saving) from Emilia Romagna Region, Italy.	2014

Table 2. - Strengthening local authorities' capacity to manage climate change

Problem/Objectives	Target	Indicator	Action	Deadline
Lack of institutional capacity to manage climate change issues **Objectives** General: raising the authorities capacities dealing with the aspects of climate change Specific**:** identification and access to financial sources for the development of human resources and for international experience exchange	Increasing knowledge of staff on climate change topics	Number of identified projects	Identification and implementation of projects on the subject of climate change, including research projects	2014
		Number of projects in which implication was achieved	Development of international cooperation and experience exchange in the domain	2014
		Number of trained personnel	Cooperation of institutions, authorities in order to integrate the climate change related problems in the strategy of sectorial development and promotion of such technologies that benefit the environment	2014

The implementation of the EAP is systematically monitored and evaluated by EPA Covasna in order to ensure that the environmental condition changes take place according to the objectives.

The first steps for strategies transfer have already been made by EPA Covasna. Several bilateral contacts with project partners from REC (P9) and Emilia Romagna Region (P5) have been established in order to exchange information regarding the environmental educational programme GREEN PACK (D2 in Good Practices Handbook) and the awareness campaign regarding water saving (D6 in Good Practices Handbook) that had been successfully implemented in that regions. Currently we are in the process of finding the financial sources and funds to put in place these practices in Covasna region.

We took action for identification and implementation of projects on climate changes issues, development of international cooperation and experience exchange in order to integrate climate changes issues in policy and territorial planning. Based on cooperation with WATER CoRe project partners, EPA Covasna together with National Meteorological Administration - NMA (P11) and REC Hungary (P9) has joined a partnership, in July 2012, for a new European project: „ORIENTGATE – A structured network for integration of climate knowledge into policy and territorial planning", financed by the South East Europe transnational cooperation Programme. In the frame of the project NMA and EPA Covasna will develop a pilot study on climate change adaptation measures in agriculture fields. In the development of this pilot study there will be used some of the methodologies described in Good practices Handbook - B5 (P5 Emilia Romagna Region) and C1 (P1 Ministry of Hessen).

The ORIENTGATE project will foster concerted and coordinated climate adaptation actions across the SEE region. The project will explore climate risks faced by coastal, rural and urban communities; contribute to a better understanding of the impact of climate variability and change on water regimes, forests and agro-ecosystems; and analyse specific adaptation needs in the hydroelectricity, agro-alimentary and tourism sectors. The principal scope of the project is to convey the up-to-date climate knowledge to policy makers who may best benefit from it, that is urban planers, nature protection authorities, regional and local development agencies, territorial and public works authorities. The principal project results include six pilot studies of specific climate adaptation exercises, a data platform connected to the EU Clearinghouse on Climate Adaptation, capacity enhancing seminars and workshops, working partnership among the hydro-meteorological offices of the SEE countries.

On the other hand, the Ministry of Environment and Forestry - (P10) was interested in the transfer of the content of two booklets: "The story of a drop of water" and "The adventures of Plitsch and Platsch on the river", as good practice, from German Lead Partner - Hessian Ministry of Environment, Energy, Territorial Planning and Consumers Protection from Hessen. The two partners had decided to discuss and to establish the conditions for the transfer of these booklets in a Romanian version. There was a correspondence between 2 parties about formal conditions, requirements and obligations of publication the booklets in Romania.
P10 had managed the conditions for publication of the booklets: translation and adaptation into Romanian language, page set up of the text and electronic printing of Romanian version of the booklets.

On 30.03.2012 at the meeting in s-Hertogenbosh (Brabant Province -The Netherlands) the transfer of Good Practices (D 1 - Strengthening public participation and awareness raising in Good Practices Handbook) had become palpable. Romanian version of the booklets was handed to German Lead Partner by the Romanian representatives. The P10 – Ministry of Environment and Forests has successfully finalized the transfer of 2 booklets ("The story of a drop of water" and "The adventures of Plitsch and Platsch on the river") from the Hessian Ministry of Environment, Energy, Territorial Planning and Consumers Protection.
Taking into consideration the needs to continue and to improve children education and also the success of the 2 booklets among the children, PP10 proposed to increase the printing edition of these educational materials till the end of project implementation.

National Meteorological Administration (P11) by operational agrometeorological activity monitors daily agrometeorological parameters and changes in the soil moisture content at the plant level, identifies periods and agricultural areas seriously affected by drought conditions, elaborates weekly, monthly and seasonally agrometeorological bulletins, carries out short, medium and long-term agrometeorological forecasts upon plant growth and development. These data are extremely useful in assisting the agricultural producers to choose the appropriate agro-technical solutions. Modeling and GIS techniques are used to monitor the spatial extent of drought phenomenon, and to assess most vulnerable areas.
Therefore it is important to update continuously specialized applications managed by the agrometeorological experts. In support of to above, the WATER Core project can help the development of some operational modules, especially SOIL-MOISTURE and PHENOLOGY modules, in accordance with three good practices presented in the Good Practices Handbook. They refer to:

1. A1-4 – EMR software - Irrigation Environmental Evaluation (AIW) (Aragon)
2. A1-17 – IRRINET (Emilia Romagna)

3. B-7 – Drought observatory and web site (Emilia Romagna)

First two good practices can be used in order to compare the limits and opportunities offered by EMR software and IRRINET system with the National Meteorological Administration's system. The first stage require a SWOT analyses followed by a test of the applications, and finally a case study for a pilot agricultural area in order to observe possible difference or similar aspects if the results can be calibrated in climatic conditions of Romania. Also, the development of a specialized web-page for users completes range of applications. The structure and content of Agrometeorological Bulletin can be used as a model in order to compare with a similar product produced by the NMA team. Thus improve access to diversified products but have a common goal, namely improving the access of information and predictions products trough Internet Web sites. The deadline for applying of two applications is 2 years, and for the case study, at least 1 year.

An enlarged utilization of the results from operational activity is the best valorisation of the costs of the activity it self. The direct contact between final users (technicians-farmers) and researchers is still considered more or less profitable. The complexity of the transfer of modelling applications, sometime complex and characterized by many interactions (water/plant/soil/atmosphere), is still high. So far, the most reliable opportunity is a service able to calculate and transfer on line technical, personalized, indications. Therefore opportunity to exchange best prcatices in the WATER Core project is a complete succes, with practically applicability between partners with similar activities and common development objectives.

One of the main objective developed by research agrometeorological activity refers to assessing of the potential impact of climate change upon crops growth, development and formation, using dynamic simulation models and decision-making support systems for

agriculture (DSSAT v3.5), combined with different climatic scenarios forecast by the global climatic models (RCMs and GCMs). For this reason, the C-2 (Integrated Climate Protection Programme of Hessen/INKLIM 2012 provided by Hessen) and C 26 (Knowledge for Climate – Dry Rural Areas provide by North Brabant) case studies can be used as scientific support for Romania's climate adaptation policy in order to investigate the economic analyses regarding the costs of Climate Changes for some priority sectors like agriculture, forestry and water. The comprehensive analyses can set up a regional Climate Changes database and developed up-to-date climate scenarios to improve the results obtained in regional climate change scenarios over 2020-2050 regarding crop systems and yields on droughty areas.

National Meteorological Administration participate in the COST Action ES1106 named "Assessment of EUROpean AGRIculture WATer use and trade under climate change (EURO-AGRIWAT)" developed under the intergovernmental framework for European Project for Cooperation in Science and Technology – COST (2012-2016). The COST Action EURO-AGRIWAT is focused on the assessment of water footprint (WF) and virtual water trade (VWT) of key food and no-food agricultural products, including their uncertainties, as well as scenarios concerning WF and VWT under future climatic conditions. The use of advanced tools and data such as remote sensing, updated climatic databases, climatic projections/scenarios and agrometeorological models represents the base of the activity. The use of such instruments will allow a detailed analysis of interactions between crops, climate and management that will be taken into account in the WF assessment. An important component of the Action will be the preparation and dissemination of recommendations and guidelines for enabling a more efficient water resource management in relation with agricultural activities under climate change and variability. The results obtained by North Brabant in case study D-14 (The Water footprint – WFP) can be used as scientific support and example of good practice within COST Action ES1106. The use of such instrument will allow a detailed analysis of interactions between crops, climate and management that will be taken into account in the WF assessment. For this reason, the project can be used as decision support for adaptation strategies, environmental awareness and innovative solutions to reduce the severe consequences of global pressure on freshwater resources

6. Funds

Description of the funds to be activated to implement the strategy (Objective 1 and 2 funds and more)

1. National Strategic Reference Framework (NSRF) 2007-2013

a. **General introduction on the main findings of the National Strategic Reference Framework**

The NSRF is a strategic document that sets the intervention priorities for the Structural and Cohesion Funds during the reference period. The NSRF creates the links between the national development priorities, as set out in the National Development Plan 2007-2013 and the priorities at European level – the Community Strategic Guidelines (CSG) on Cohesion 2007-2013 and the Integrated Guidelines for Growth and Jobs 2005-2008.

The NSRF represents the global strategy for using the Structural and Cohesion Funds, while the various Operational Programs are the instruments for implementing the NSRF priorities.

In general terms, according to what stated in the current NSRF, there remain serious deficiencies to overcome in order to boost Romania's economy. Major and long-term structural interventions are required in the following areas: basic infrastructure, economic competitiveness, human capital, administrative capacity, territorial dimension. Following industrial restructuring, regional disparities rapidly appeared and they have continued to grow. Disparities between urban and rural are significant and increasing; Both areas are confronted with problems related to infrastructure (caused by under investment), local economic development and social environment. There is a need of a more structured approach at territorial level of various sectoral and inter-sectoral development policies and derived measures. As far as water sector is concerned, the NSRF focuses on poor quality and inadequate coverage in the supply of drinking water and sewerage systems coupled with low levels of environmental awareness, an under managed natural environment. Therefore efforts will focus on improved management of the natural environment and more sustainable use of natural resources.

b. Description of the NSRF's structure

The Romanian NSRF 2007-2013 has a global objective: To reduce the economic and social development disparities between Romania and the EU Member States, by generating a 15-20% additional growth of the GDP by 2015.

The Strategic Vision addresses the socio-economic development needs, tackles the Regional disparities that Romania faces and supports the EU development strategies. The following four thematic priorities have been identified:

1. Development of basic infrastructure to European standards;
2. Increasing the long term competitiveness of the Romanian economy;
3. Development and more efficient use of Romania's human capital;
4. Building an effective administrative capacity.

Integrated planning and the coordinated implementation of these priorities through the sectorial and regional operational programmes aim to achieve the highest impact of the Structural and Cohesion Funds and will promote a balanced territorial development, as a territorial Priority. Accelerating the process of real convergence with the European Union through realization and enhancement of the endogenous potential will depend on the efficiency of applying the structural instruments coherently by the institutions with responsibilities in promoting and managing a sustainable socio-economic development. The global objective can be achieved only through the co-ordination of all the factors - educational, technical, financial, government and non-government and the Country's human capital.

The NSRF Strategy targets territorial cohesion and aims to stop and potentially reverse the trend of widening regional disparities.

The NSRF is implemented through Operational Programmes under Objectives: "Convergence" and "European Territorial Cooperation".

The general principles of the strategy for the European Territorial Cooperation programmes are to ensure effective social and economic integration in the border areas and increased activity and accessibility to the Romanian regions within Europe.

The strategy focuses the resources on the following:

- Cross-border Cooperation - Romania participate, jointly with its neighbours, to 6 operational Programmes, 2 on the internal borders and 4 on the external borders
- Transnational Cooperation - Romania is participating to the South East European Space (SEES) Transnational Cooperation OP
- Interregional Cooperation

The South East European Space (SEES) Transnational Cooperation Operational Programme has two specific objectives:

1. strengthening competitiveness based on the endogenous potentials by promoting accessibility and the development of innovative networks;
2. strengthening sustainable cooperation actions and partnerships in favour of the integrated promotion of natural and environmental assets and cultural heritage.

In line with the objective nr.2 of the SEES OP, set out in the NSRF, the Covasna Region together with National meteorological Administration has foreseen actions in order to obtain an integrated promotion of natural and environmental assets.

South East European Operational Programme - Operational Programme under Objective "European Territorial Cooperation"

The Transnational Co-operation Programme South East Europe (SEE) is part of the new European Territorial Co-operation Objective for the programming period 2007 – 2013. In the framework of Cohesion Policy the Objective "European Territorial Co-operation" becomes now an objective of its own on an equal footing with the Objective "Convergence" and the Objective "Regional Competitiveness and Employment" and will replace the Community Initiative INTERREG III.

According to the General Regulation (Art. 3, 1083/2006) the overall objective of transnational cooperation is to strengthen integrated territorial development (= territorial cohesion) linked to Community priorities. Romania is participating to the South East European Space (SEES) Transnational Cooperation OP, next to other seven Member States (Austria, Bulgaria, Greece, Italy, Slovenia, Slovakia and Hungary) and eight non-Member States (Albania, Bosnia&Hertegovina, Croatia, Moldova, Montenegro, Serbia, Ukraine).

The European Regional Development Fund (ERDF) is the main funding source of the programme. It has a total available ERDF budget of Euro 206,7 million for the 2007 – 2013 period. These amount is supplemented by national public funds finally amounting to Euro 245,1 million.

The strategy for this type of co-operation will focus on the following actions:

1. to ensure effective water management integrated cooperation (protection and administration of the Danube basin, coastal areas, maritime resources);
2. to develop the SMEs, R&D and innovation networks;
3. to develop transnational activities in order to prevent natural and technological risks.

South-East Europe has to face the consequences of settlement dispersal and urban sprawl. Future accessibility patterns are expected to influence urban development and landscape. Large shares of the population still live in rural or semi-urban areas, posing an additional challenge on urban-rural relationships.

Due to ongoing climate change, a future increase of natural risks like droughts and floods and forest fires, landslides etc. has to be assumed for the programme region. In the programme area environmental risks seem to be highly differentiated. Regions in the southern part of the area face greater risks from droughts, earthquakes and fires, while regions in the northern part of the area face greater risks from floods in the plains and landslides in the mountainous regions. Especially the great floods and forest fires of recent years have shown that risk management structures on a transnational level are missing.

Concerning current policies regarding extreme events monitoring and management in the past few decades it has become evident that in all of them there is a clear need to improve national and regional policies with the goal of improving preparedness measures and reducing negative impacts. Better coordination of the management policies is also needed due to the transboundary or regional/local character of floods/drought events. Key objective of the SEE Program is to support stakeholders at all levels by providing them with policy and management guidance through regionally coordinated generation of scientific information and sharing best practices and knowledge for integrated adaptation measures and management of policies.

The SEES OP has 5 priority axes from which Axis nr. 2 Protection and improvement of the environment shall contribute to the improvement of the environmental conditions and to a better management of protected and other natural/semi natural areas.

This priority axis seeks in particular to achieve five operational objectives and will support transnational partnerships and action that contribute to:

1. Improve integrated water management and floods/droughts risk prevention
2. Improve prevention of environmental and technological risks
3. Promote co-operation in the management of natural assets and protected areas
4. Promote energy and resource efficiency.
5. Raise awareness about extreme conditions through efficient dissemination mechanisms, such as learning platform, training and workshops/seminars.

In the programme area environmental risks take a variety of forms ranging from droughts, earthquakes and fires in the Southern part to chemical spills and landslides in the Northern part. Risks are expected to increase due to intensification of human activities and due to accelerated global climate change.

Examples of (multilevel) activities within transnational partnerships that can be supported under this area of intervention:

- Developing integrated policies for co-ordinated risk prevention and reaction to environmental Risks;
- Developing plans, measures and systems, including spatial and land use planning to prevent and cope with natural risks (especially fires, floods, desertification, droughts, earthquakes) and technological risks;
- Developing monitoring systems (e.g. emission control, dataset about potential sources of pollution, emission monitoring systems for air quality, pollutants etc.) and

alert mechanisms on potential natural and industrial hazards, forest fires as well as chemical and biological contamination of water, soil and air;
- Applying alert mechanisms on potential hazards (floods, coastal hazards, forest fires; chemical and biological contamination of water, soil and air; industrial accidents, safety control of nuclear power plants etc.);
- Developing information systems concerning the transport of dangerous goods and identification of relevant actions to inform the relevant groups;
- Developing regional "risks foresights" including future risk potentials, e.g. along transport corridors, economic activity zones etc.;
- Identifying and managing risk sources (information policies, exchange of data and reports etc.);
- Promoting transnational actions on environmental objectives like reducing air emissions, protection of soil etc.;
- Implementing awareness raising and emergency planning for the population located in very
sensitive areas;
- Implementing strategies for rehabilitation of brownfields;
- Facilitating common procurement and/or operation of risk prevention infrastructure.

European Cooperation in Science and Technology

Earth System Science and Environmental Management (ESSEM)

COST is an intergovernmental framework for European Cooperation in Science and Technology, allowing the coordination of nationally-funded research on a European level.
Cost plays a very important role in building a European Research Area (ERA) including 9 thematic areas. One of the issues relates to the ESSEM domain includes researches on better understanding, observing, modeling and predicting of the Earth system and thereby improved management of environmental conditions. A key aspect is to analyze and predict the trends, and to assess the impacts of natural processes and human activities on the Earth system functioning and natural resources.

Romania's National Climate Change Strategy

In April 2009 the European Commission adopted the White Paper on adaptation to climate change entitled "Adapting to climate change: Towards a European framework for action". The implementation phase of the White Paper (2009-2012) led to significant achievements.
In particular:
- the vast majority of the 33 actions announced in the White Paper have now been implemented or are about to be;
- the European Climate Adaptation Platform (http://climate-adapt.eea.europa.eu/) was launched in March 2012. More and more research findings are being made available on the costs of inaction and action on climate risks;
- mainstreaming climate change adaptation considerations into key EU policies has been an important element of the work in the area of adaptation.

Building on this existing work, the EU Adaptation Strategy aims to enhancing the preparedness and capacity to respond to the impacts of climate change in the EU, its Member States and regions, down to the local level.

Currently, Romania is finalizing the National Climate Change Strategy with time horizon on medium and long term (2012-2020) in which adaptation will be an important part from this document, actually half from this strategy is divided in adaptation and another half is mitigation. At national level, once was launched the Adaptation component from the National Climate Change Strategy (2012-2020) the interministerial working group developed a large consultative process with central and local stakeholders in order to draw up an efficient adaptation component and to reduce the adverse inevitable effects of climate change and to meet the EU objective on adaptation.

In this context, the integration of the adaptation in the sectorial strategies will help to have o comprehensive approach and select appropriate measures for the direct and indirect effects of climate change. To develop a realistic adaptation strategy we have to adjust the existing sectorial strategies on climate change basis. In this sense we have to formalize the existing studies on scenarios making them official documents and assess the physical impact on different sectors and evaluate later the economic costs of this impact.

We have to assess also the autonomous adaptation capacity and evaluate the direct and indirect effects of climate change and the intersectorial links between the most important sectors of the economy and to amend the risk assessment approach taking into account the frequency and magnitude of the future effects of climate change on different economic, social and environmental systems.

To draw up an efficient and realistic national strategy, central authorities will work closely with local administration, business and public sector to select adequate measures and find the required financing resources to bring into effect the adaptation strategy on local level.

Public awareness campaign will support the public behaviour change required to change the existing production and consumption pattern necessary to adapt to the challenge of climate change.

7. Conclusion

Drought is one of the most damaging natural hazards through its effects on agricultural, hydrological, ecological and socio-economic systems. In this context, a distinction can be made between meteorological drought (low rainfall), hydrological drought (low river flow and abnormal low groundwater levels), and agricultural drought (low soil moisture content). The primary cause of the occurrence of drought in a region is determined by the failure or absence of rainfall. High air temperatures and evapotranspiration rates may increase the intensity and duration of droughts. Droughts can occur anywhere in Europe. During the 20th century has been a clear trend towards drier conditions, with decreases in rainfall especially in Southern and Eastern European countries. The total area affected by water scarcity and droughts doubled - from 6 to 13 % - during the last 30 years. Future projections show how the precipitation deficit is projected to change in the future especially in the summer and winter time. In this context, CC is projected to lead to major changes in water availability across Europe with increasing water scarcity and droughts mainly in Southern Europe. Adapting to climate change through a better crop system management will benefit mainly from the knowledge given by our responses to severe climate events, when plans to adapt to and mitigate predictable climate change risks are implemented.

In Romania, from a total surface of 237.500 km^2, 62% are agricultural lands – approximately 14.7 mill. ha – categorized according to usage in arable land, pastures, vineyards and orchards. Frequent and prolonged droughts affect 7.1 million ha, which represent 48% from the total agricultural land (2006). Average yields of various crops in droughty years are only 35-60% of the yields which could be obtained under complete provision of crop water requirements by irrigation. In the South, South-Eastern and Eastern area of Romania, the complex agricultural drought is a climatic hazard phenomenon inducing the worst consequences ever occurred in agriculture.

Concerning current policies regarding drought monitoring and management in the past few decades it has become evident that in all countries affected by drought and water scarcity is a clear need to improve national and regional policies with the goal of improving preparedness measures and reducing negative impacts. Better coordination of the management policies is also needed due to the transboundary or regional/local character of drought events. Adaptation is the ability of natural and anthropogenic systems to react to climate change effects (actual or expected), including climate variability and drought conditions, in order to reduce potential damages, to benefit from opportunities and to adequately respond to climate change consequences. In this context, adaptation requires actions at all levels – local, regional, national and international – and in all affected sectors like agriculture, water management, biodiversity, etc. Also, the need for policy coordination at regional, national and local level as an urgent issue is important to develop and implement specific adaptation measures, especially in the case of areas vulnerable to climate change and drought. The development and implementation of regional training, education and public awareness programs focused on adaptation to climate change and drought impact on agricultural crops, having as focus groups the regional and local authorities, relevant stakeholders and scientific communities, quantifying the effects at regional and local levels by encouraging contributions and personal action in addressing climate change will conduct to appropriate technologies, climate-friendly attitudes and behavioral changes.

Research projects can determine which sectors are impacted most severely by climate change and drought and where measures are needed most urgently to prevent severe effects, even if their extent is not yet known. Therefore, the Romanian WATER CoRe project partners, EPA Covasna, National Meteorological Administration of Romania and Ministry of Environment and Forest through the 24 study visits that have been carried out have learnt from the foreign partners and gained valuable insights to water management and adaptation to climate changes.
Studying the best practices of the WATER CoRe partners some of its features were selected to be transferred after adapting it to the local needs.
The Children's books on travelling water drops from Hessen region have been transferred as a good practice and distributed in Romanian schools from Covasna region and Bucharest.
The Environmental Action Plan of Covasna County as a strategic and political tool has been updated with issues on adaptation to climate changes using the examples from Emilia Romagna, Italy, REC – Hungary and Hessen – Germany.
The good collaboration between EPA Covasna and National Meteorological Administration that started in WATER CoRe project was carried on to ORIENTGATE project which will help in the development of the pilot study on climate change adaptation measures in agriculture fields.

WATER SAVING SHOULD BECAME THE PRIORITY.
Drought Management Plans must be the first set of policy options for future action

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