

PROLINE-CE WORKPACKAGE T4

OUTPUT O.T4.2

DRIFLU CHARTA

SIGNING DOCUMENT

**WP T4 - ADVANCEMENT: STRATEGIC POSITIONING AND
COMMITMENT**

May, 2019

Lead Institution	LP - BMNT
Contributor/s	
Lead Author/s	Elisabeth Gerhardt
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Contributors, name and surname	Institution
Elisabeth Gerhardt	Federal Research and Training Centre for Forests, Natural Hazards and Landscape, Austria
Hubert Siegel	Austrian Federal Ministry of Sustainability and Tourism, Austria
Roland Koeck	University of Natural Resources and Life Sciences, Department of Forest- and Soil Sciences, Institute of Silviculture; Austria
Barbara Čenčur Curk	University of Ljubljana, NTF
Primož Banovec	University of Ljubljana, FGG



DriFLU (Drinking/Water/Floods/Land use) Charta

Among

Institutions within the participating countries in the project

PROLINE-CE

**“Efficient Practices of Land Use Management Integrating
Water Resources Protection and Non-structural Flood
Mitigation”**

**Co-funded by ERDF in the frame of
CENTRAL EUROPE Programme 2014 -2020**

Vienna, 04.06.2019



DriFLU (Drinking/Water/Floods/Land use) Charta

The United Nations General Assembly declared safe and clean drinking water as a human right. However, recent studies have revealed that water resources are under increasing pressure, mainly due to changes in land use and climate. The vulnerability of water resources is therefore constantly rising.

Within the Central Europe Region, there are several challenges which ask for an intensified cooperation between its countries. The need for adapted and target-oriented land-use activities concerning the protection of drinking water resources and balancing conflicts of land-use pressure on water is evident. It was the main task of the project PROLINE-CE to develop respective best practices.

Partly, drinking water protection is already an integrated part of some land-use management practices, but its implementation and realisation lags behind. The main objective of PROLINE-CE was therefore the creation of guidelines and recommendations for the implementation of sustainable land use and flood/drought management, leading to an improved protection of drinking water resources. Based on the experiences gained during pilot actions in various geographic and thematic fields and thanks to a strong stakeholder involvement, optimized best management practices were commonly developed. They mainly aim on local (e.g. municipalities) / regional respectively operational (e.g. farmers, foresters, water supplier) levels and were structured according to different categories of land use and vegetation covers (Forestry, Agriculture, Urban areas / Transport/Industrial units / Energy production, Grassland, Wetland). Additionally, issues related to general water management were taken into consideration. While most of these proposed practices and recommendations call for relevant adaptation processes of existing strategies or policies in each country, some of them were already accepted and could partially be implemented by municipalities or water suppliers during project lifetime.

Call for Action

To determine the most important tasks towards an optimized and effective land use and flood / drought management with efficient organizational structures regarding drinking water protection and considering also climate change issues despite uncertainties currently affecting projections the signatories of this document recommend the following actions:



- **Develop stricter rules** (especially concerning fertilizer and pesticide applications in agriculture), considering actual guidelines (e.g. Nitrate Directive) and measures according to the demands of sustainable water quality and quantity and foster respective **control and monitoring**
- Support **efficient education systems for land users and public water management administrations** in cooperation with all affected stakeholders
- Foster a **better cooperation among different water and land use related sectors and national/regional/local levels** as well as **the involvement of relevant stakeholders** already at the beginning of planning processes as promoted by the Agenda 2030
- Provide the **main results of PROLINE-CE** (content of the DriFLU Charta) to the actual development of the new regulations concerning subsidies of the Common Agricultural Policy, to the Drinking Water Directive, the Water Framework Directive, the Groundwater Directive and the Floods Directive as well as to macro-regional EU strategies (EUSDR, EUSALP, EUSAIR, EUSBSR)
- Encourage the **adoption of PES** (Payments for the provision of Ecosystem Services) **schemes** for land users, if the implemented measures (e.g. Best Management Practices of PROLINE-CE) go beyond the level of national/regional legal frame. These payments always should be transparent for all stakeholders to raise the awareness
- Foster **integrated river basin or catchment-oriented planning** of measures and **integrative flood risk management**, such as synchronized drinking water protection and flood risk management measures
- Foster and spread **target-oriented solutions and non-structural measures for drinking water protection and flood/drought mitigation** (developed within PROLINE-CE) to affected stakeholders. For example: organic farming (without application of fertilisers, manure and pesticides in the narrowest drinking water protection zone), vegetated buffer strips along agricultural fields and water bodies, mixed forest stands according to the natural forest community, retention ponds on farms and urban areas, rain gardens in cities, river restoration, wetland and floodplain restoration /conservation supported by integrated spatial planning
- Provide **economic or legal incentives to increase awareness** and initiatives **about the potential impacts of climate change**
- Promote **interdisciplinary and cross-sectoral research** activities in order to meet the transboundary water policy and water management needs on catchment level (e.g. monitoring and model simulation activities) considering also climate change aspects



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- Foster **strategic and integral concepts for source water protection and planning for drinking water protection** (e.g. Water Safety Plans) to ensure a sustainable water supply, considering climate change issues
 - **Monitor the implementation of recommended actions**

The DriFLU Charta is a joint declaration act and not legally binding, but a statement of intent to provide recommendations for common policies and actions in the field of drinking water protection and related flood/drought mitigation in the CENTRAL EUROPE programme area according to the main outcomes of PROLINE-CE.

Signed in Vienna, on 4th June 2019, in 15 original copies in English language, all being equally identical. In case of any divergence of interpretation, the English text shall prevail.

PROLINE-CE

WORKPACKAGE T4

OUTPUT O.T4.2

TRANSNATIONAL COURSE OF ACTION FOR BEST MANAGEMENT PRACTICES IMPLEMENTATION

WP T4 - ADVANCEMENT: STRATEGIC POSITIONING AND COMMITMENT

June, 2019

Lead Institution	LP - BMNT
Contributor/s	
Lead Author/s	Elisabeth Gerhardt
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Contributors, name and surname	Institution
Elisabeth Gerhardt	Federal Research and Training Centre for Forests, Natural Hazards and Landscape, Austria
Hubert Siegel	Austrian Federal Ministry of Sustainability and Tourism, Austria
Roland Koeck	University of Natural Resources and Life Sciences, Department of Forest- and Soil Sciences, Institute of Silviculture; Austria
Barbara Čenčur Curk	University of Ljubljana, NTF
Primož Banovec	University of Ljubljana, FG
Urša Vilhar	Slovenian Forestry
Ágnes Tahy	General Directorate of Water Management, Hungary
Guido Rianna	CMCC Foundation, Italy
Monia Santini	CMCC Foundation, Italy
Anna Sperotto	CMCC Foundation, Italy
Giuseppe Ricciardi	ARPAE, Italy
Waltner Istvan	Herman Ottó Institute Nonprofit Ltd., Hungary
Matko Patekar	Croatian Geological Survey, Department of Hydrogeology and Engineering Geology
Daniel Bittner	Technical University of Munich; Chair of Hydrology and River Basin Management, Germany



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1. Introduction

One of the main outputs of PROLINE-CE is the so-called **DriFLU Charta**. The abbreviation “DriFLU” stands for “**Drinking water/Floods/Land use**” combining the most important thematic issues within this project.

This joint declaration act will contain transnational guidelines regarding an efficient protection of drinking water resources. This objective should be achieved through the development of sustainable and appropriate land use and management measures aiming at the protection of drinking water resources and additionally at the mitigation as well as reduction of droughts and floods influencing these resources, under the challenges of climate change.

Based on the main outcomes of the previous working steps within PROLINE-CE a common agreed paper between all participating project partners was prepared and will be signed at the end of the project - during the Final Conference in Vienna (04.06.2019) - by notable representatives of each country to determine the most important tasks towards an optimized and effective land use and flood / drought management with efficient organizational structures regarding drinking water protection.

To ensure the usability of this Charta on national/regional/local level as well as on transnational level an adequate intensive stakeholder involvement (2nd series of national stakeholder operationalisation workshops, 2 Round Tables) was conducted resulting in additional courses of action for the implementation of Best Management Practices in accordance with the DriFLU Charta on the level of each participating country to have the possibility to focus more on specific national characteristics and problems.

As the Declaration Act will be signed by all participating countries the targets have to be defined and formulated in a more general way to guarantee the applicability to addressees and areas also outside the programme area.

DriFLU Charta provides also important inputs for different EU guidelines and strategies (EUSDR, EUSALP, EU 2020 Strategy, 2030 Agenda for Sustainable Development, EU Water Framework Directive & RBMP, EU Floods Directive, EU Strategy on Adaptation to Climate Change) and unifies purposes and intentions for the Central Europe Programme area.



2. Definition of targets

DriFLU Charta will pursue following targets:

- Recommendations for optimized, effective and integrated land use and flood/drought management derived from the main project results with efficient organizational structures regarding drinking water protection based on a common commitment of the whole project consortium
- Safeguarding of drinking water resources for the future through effective steering of land-use for drinking water protection
- Development of “Courses of Action” in accordance with the DriFLU Charta in each participating country to consider also national specific issues and problems as well as fostering a network beyond the borders of disciplines, regions and countries
- Political agreement of all participating countries through signing by notable representatives during the Final Conference
- Provision of important inputs for different EU guidelines and strategies (especially EU Water Framework Directive, Drinking Water Directive, Groundwater Directive, Floods Directive)
- Monitoring of the implementation of the recommended actions after the project end by partner representatives in each participating country

3. Sphere of action

The formulated main targets / necessary measures concerning the different land uses within the DriFLU Charta will be held in a quite general, non-specific way as this common agreement has to be applicable not only for the whole Central Europe region but also for areas outside the programme space.

Furthermore the DriFLU Charta recommendations will provide important inputs to following macro-regional strategies, especially:

EU Strategy for the Danube Region (EUSDR):

Priority Area 4:

Action 2 - fostering of transnational cooperation and survey on sub-basin level

Action 5 - recommendations derived from experiences within Pilot Areas

Action 6 - recommendations based on intensive, active stakeholder involvement

Priority Area 5:

Action 2 - recommendations for reduction of flood risks, measures will be reviewed and monitored (especially) within the Pilot Areas



EU Strategy for the Alpine Region (EUSALP):

3rd thematic policy area of the EUSALP action plan, which focus on the most important challenges and opportunities concerning the environment

Action 6 - developing a vision and guidance for the protection of water resources

Action 7 - focusing on landscape development in the frame of land use management

Action 8 - elaborating a transnational adaptation plan as a non-structural basis of flood and drought reduction

EU Strategy for the Adriatic and Ionian Region (EUSAIR):

Priority Area 3:

Recommendations concerning the reduction of degradation of ecosystem services due to extreme events (floods, droughts) and restoring them through appropriate climate hazard damage prevention and mitigation, and climate change adaptation measures

Some of the recommendations also contribute to the **EU Strategy for the Baltic Sea Region (EUSBSR)**.

4. Level of commitment

The DriFLU Charta is a joint declaration act and not legally binding, but a kind of statement of intent to support the preparation of common policies and actions in the field of drinking water protection and related flood/drought mitigation in the Central Europe programme area according to the main outcomes of PROLINE-CE.

5. Content

FORESTS			
Actual management practices / Driving forces (GAPs)	Proposed BMPs	Adaptation of strategies / policies	Countries, which mentioned this issue
Application of the clear-cut technique	Avoidance of the clear-cut technique and illegal logging, application of continuous cover forest systems	Prohibition of clear-cut applications within drinking water protection zones	AT, HU, HR, IT, PL, DE



	Zoning of land to preserve special habitat areas, increased conservation areas	(DWPZ) Enforcement of strict controlling <i>KTM 13, 17, 22, 23</i>	
Planting of coniferous monocultures	Creation of mixed forest stands according to the natural forest community; Identification of the spatial distribution of natural forest communities (forest hydrotope types) within the DWPZ; Plantation of autochthonous tree species; Natural regeneration dynamics	The guidelines for DWPZ should define the creation of natural and stable forest stands with native tree species as necessary management practice <i>KTM 2, 13, 23, 24</i>	AT, PL, DE
Harvesting with heavy machinery (e.g. tractor-skidder method)	Avoidance of the tractor-skidder method Application of soil-friendly exploitation systems (e.g. skyline-cranes) to diminish or mitigate surface run-off Limitation of Forest Roads within DWPZ	Clear guidelines for forest management within DWPZ <i>KTM 13, 17, 22, 23</i>	AT, DE
Forest fires	Fire fighting Forest restoration (e.g. reforestation on steep slopes) Improved preventive measures (e.g. fire breaks, water supply points, communication equipment, adequate forest management measures) ¹	Improved forest and risk management (e.g. forest management plans, automatic observation and alerting forest fire systems) <i>KTM 17, 22, 23</i>	HR, IT

¹ CAMARO-D: D.T2.2.2 - Transnational Cluster Manual for Practitioners, Cluster 2, p. 70



AGRICULTURE			
Actual management practices / Driving forces (GAPs)	Proposed BMPs	Adaptation of strategies / policies	Countries, which mentioned this issue
Use of fertilisers	<p>Optimisation of the Nitrate Directive, evaluation and amendment of the Nitrate Action Plan every 4 years;</p> <p>Acceleration and evaluation of the effectiveness of Agro-Environmental Programmes (e.g. ÖPUL in Austria);</p> <p>Optimization of the application of fertilisers (fertilisation plans according to time and amount due to soil samples);</p> <p>Waiver/prohibition of fertilisers, especially within sensitive areas (DWPZ)</p> <p>Strengthening of consultancy and research programmes on sustainable soil management issues;</p> <p>Acceleration of organic farming² and/or precision agriculture³</p>	<p>Implementation and evaluation/monitoring of the Nitrate Directive</p> <p>Improvement of the effectiveness of Common Agricultural Policy (Pillar 1) towards sustainability and water resources protection</p> <p>Implementation /Improvement of Agro-environmental programmes (providing adequate subsidies and grants)</p> <p>Education programmes for farmers (e.g. through Agricultural Advisory Service)</p>	AT, SI, HU, HR, IT, PL, DE

² **Organic farming and manure (considering drinking water protection):**

Organic farming in many cases involves the application of manure as fertilizer.

On grassland or agricultural areas within drinking water protection zones (DWPZ) it should be forbidden to spray liquid manure. Also solid manure spreading should be obviated within DWPZ. Fact is – spreading of liquid and solid manure endangers the related groundwater resources. The risk of liquid and solid manure for groundwater quality is given through bacteria, viruses, mould fungus and parasites which can be found in livestock faeces. These organisms are serious threats for groundwater quality and human health. Due to this situation it should be avoided to carry out these fertilizing practices within DWPZ.

Any alternative organic fertilizing techniques can be applied instead.



		Control of fertiliser usage <i>KTM 2, 12</i>	
Use of pesticides	<p>Reduction of risk of improper use of pesticides</p> <p>Minimizing and regulation of the application (e.g. application in spring preferred to autumn)</p> <p>Organic farming in DWPZ (with biological pest control)</p> <p>Precision agriculture</p> <p>Vegetated buffer zones/strips along agricultural field or hedges along inner DWPZ</p>	<p>Implementation /Improvement of Agro-environmental programmes (providing adequate subsidies and grants)</p> <p>Prohibition of pesticide application in DWPZ</p> <p>Education programmes for farmers (Funding, consultancy and awareness raising)</p> <p>Measures due to National Action Plans (e.g. in Croatia) to achieve sustainable use of pesticides</p> <p>Continuous monitoring and control of pesticide usage</p> <p>Restricted licensing</p> <p><i>KTM 3, 12</i></p>	AT, HR, IT, PL
Inappropriate use of manure	<p>Avoidance of solid / liquid manure within DWPZ;</p> <p>Ecological agriculture with</p>	Implementation and evaluation/monitoring of the Nitrate	SI, HU, HR, IT

³ **Precision agriculture:** is a farming management concept based on observing, measuring and responding to inter and intra-field variability in crops. The goal of precision agriculture research is to define a decision support system for optimizing returns on inputs while preserving resources using different information technologies (satellite data, remote sensing data etc.). Predictive analytics software uses the data to provide farmers with guidance about crop rotation, optimal planting times, harvesting times and soil management [CAMARO-D, D.T1.2.3 - BMP catalogue Arable Agriculture, 2018]



	<p>alternative organic fertilizing techniques (e.g. compost, green manure, mulch);</p> <p>Investments in appropriate storage facilities for manure.</p>	<p>Directive;</p> <p>Training of farmers, enforcing manure spreading calendars;</p> <p>Agro-environmental programmes (providing adequate subsidies and grants).</p> <p><i>KTM 2, 12</i></p>	
<p>Water abstraction for irrigation</p>	<p>Investments for improving the state of irrigation infrastructures or irrigation techniques;</p> <p>Additional water sources (e.g. rainwater harvesting, using uncaptured springs)</p> <p>Farming practice regulation (irrigation efficiency to achieve optimum yields)</p> <p>Adopting less water demanding crops</p> <p>Creation of buffer/sink zones or vegetated water courses (wet buffer strips along streams / wet zones) leading to filtered runoff of sediments, nutrients, managed aquifer recharge (MAR) of rainwater and/or flood/excess water</p>	<p>Groundwater monitoring network to reduce uncertainty and enabling better responses and management action in case of floods and droughts</p> <p>Revisions of payments, (agro-environmental) schemes and quotas, funding sources</p> <p>Metering of consumption and improved water pricing policies;</p> <p>Education programmes for farmers (e.g. through Agricultural Advisory Service)</p> <p><i>KTM 7, 8, 12, 15, 24, 25</i></p>	<p>HR, IT</p>



URBAN AREAS			
Actual management practices / Driving forces (GAPs)	Proposed BMPs	Adaptation of strategies / policies	Countries, which mentioned this issue
Insufficient dimensioning of sewage systems / areas without sewage system	<p>Implementation/ Improvement of appropriate sewage systems and facilities for wastewater treatment;</p> <p>Inspection/Reassessment and remediation of the sewer system;</p> <p>Optimization of urban waste water management systems to cope with the increase in population and in seasonal increases due to tourism;</p> <p>Fostering the implementation of separated sewers: separate system for meteoric waters and waste waters (discharged to wastewater treatment plants);</p> <p>Studies on effects of extreme rainfall events in sewage flows and efficiency of sewage systems</p>	<p>Investment and (re)construction efforts towards better/additional sewage systems</p> <p>Fostering legal implementation of public controls and renovation activities (e.g. of private sewers);</p> <p>Encourage and promote innovative solutions of sustainable waste management and awareness raising activities for unsanitary and illegal waste disposal.</p> <p><i>KTM 1, 4, 15, 16, 21, 24</i></p>	SI, HU, HR, IT, PL, DE
Expansion of artificial and sealed surfaces	<p>Creation/Increase of green and blue infrastructures in urban areas (i.e. green roofs, parks, urban ponds and wetlands)</p> <p>Implementation of decentralized rainwater infiltration (e.g. rain gardens)</p>	<p>Designation of Nature Based Solutions within spatial plans</p> <p>Implementation of land-saving development measures (zoning building land, commercial areas and</p>	SI, HU, HR, IT, PL, DE



		<p>infrastructure as land saving as possible)⁴</p> <p><i>KTM 6, 7, 17, 21, 23, 24</i></p> <p><i>APM 2, 5</i></p>	
<p>River Flooding and urban development in flood prone areas</p>	<p>Development of improved retention capacity and acceleration of non-structural and natural water retention measures;</p> <p>Integrated strategies for pluvial flood events;</p> <p>Provision and protection of flooding and retention areas;</p> <p>Improvement of ecological functions of water bodies;</p>	<p>Integrative flood risk management (risk management plan, early warning system and information);</p> <p>River basin or catchment-oriented planning of measures (with participatory planning processes);⁵</p> <p>Limitation and prohibition of building area zoning in flood prone areas;</p> <p>Mandatory consideration of hazard maps within spatial planning (area zoning);</p> <p>Improvement of monitoring of flood-induced groundwater pollution (included in RBMPs).</p> <p><i>KTM 6, 7, 12, 13, 14, 15, 23, 24</i></p> <p><i>APM 2, 3, 5</i></p>	<p>AT, SI, HR</p>
<p>The potential effects of Climate Changes are not properly taken</p>	<p>Use of future climate scenarios to assess climate change effects on population, infrastructures and water</p>	<p>Providing incentives (economic or legal) to increase awareness about the effects of</p>	<p>IT, HR</p>

⁴ CAMARO-D (Seher W., Schinkinger K., 2018): Practical Guide to Spatial Planning in Catchments and River Stretches

⁵ CAMARO-D (Seher W., Schinkinger K., 2018): Practical Guide to Spatial Planning in Catchments and River Stretches



into account in action planning	resources (e.g. water availability and extremes as floods and droughts)	climate changes <i>KTM 24</i>	
TRANSPORT UNITS			
Actual management practices / Driving forces (GAPs)	Proposed BMPs	Adaptation of strategies / policies	Countries, which mentioned this issue
Accidental road spills	Low reaction time and fast intervention and reaction of responsible services Construction of separate collectors for hazardous substances (e.g. oil)	Effective action plan in case of spills (especially in DWPZ) <i>KTM 21</i>	SI, HU, HR
Not adequate rainwater management in road traffic infrastructures	Development of adequate water retention capacity Implementation of appropriate sewage system and devices (e.g. road rainwater should not run through public sewage system)	Strict implementation of decrees on the emission of substances in the discharge of meteoric water from public roads Permanent control and maintenance of road rainwater discharge Adaptation of road management policy for road rainwater to run through separate system (and not through public sewage system) <i>KTM 13, 15, 21</i> <i>APM 1, 2, 5</i>	SI, HR
Inadequate management of	Optimized use of herbicides	Regulations concerning herbicides application along	SI



railway infrastructures		railways <i>KTM 2, 21</i>	
INDUSTRIAL UNITS			
Actual management practices / Driving forces (GAPs)	Proposed BMPs	Adaptation of strategies / policies	Countries, which mentioned this issue
Not adequate management of industrial waste waters	<p>Reassessment of sewage systems and construction of appropriate sewage systems and devices for wastewater treatment;</p> <p>Construction of separate systems for meteoric water and industrial wastewaters;</p> <p>Prevention of wastewater discharge without previous treatment (e.g. into rivers);</p> <p>Further efforts towards improved purification systems;</p> <p>Optimization of waste management systems and storage.</p>	<p>Strict implementation of legislation regarding water monitoring for determining impact of the activity or operation of the plant, better inspections and monitoring (e.g. of hazardous substances)</p> <p><i>KTM 1, 15, 16, 21</i> APM 1</p>	SI, HU, HR, IT, DE
Contaminated sites	<p>Implementation of appropriate measures for remediation of contaminated sites;</p> <p>More stringent persecution of contaminated site remediation.</p>	<p>Action plans concerning remediation of contaminated sites according to their hazard level</p> <p><i>KTM 4</i></p>	SI, HU, DE
Sealed artificial surfaces and water pollution	<p>Increase the amount of green surfaces;</p> <p>Implementation of decentralized rainwater</p>	<p>Designation of green retention and infiltration zones within spatial plans</p>	IT, DE



	infiltration.	Implementation of land-saving development measures (zoning building land, commercial areas and infrastructure as land saving as possible) ⁶ <i>KTM 6, 7, 21, 23, 24</i> <i>APM 2, 5</i>	
Contaminants released during the demolition (tearing down) of old structural buildings, which may enter the aquatic environment	Implementation of adapted demolition and restructuring strategies	Implementation of strict policies regarding the safe demolition of old facilities and a controlled storage and removal of overburden <i>KTM 4, APM1</i>	DE
Exhaustive water consumption	Differentiation of water supply sources (i.e. freshwater / groundwater)	Promoting recycling/reuse of effluents <i>KTM 13</i>	IT

ENERGY PRODUCTION			
Actual management practices / Driving forces (GAPs)	Proposed BMPs	Adaptation of strategies / policies	Countries, which mentioned this issue
Hydropower production inducing water availability	Adequate monitoring of hydrological properties (water	Monitoring and research about hydropower plants and	HR

⁶ CAMARO-D (Seher W., Schinkinger K., 2018): Practical Guide to Spatial Planning in Catchments and River Stretches



issues and soil erosion	level and minimum flow rates); Downstream erosion control	their consequences <i>KTM 17, 23</i> <i>APM 4</i>	
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GRASSLAND / PASTURES			
Actual management practices / Driving forces (GAPs)	Proposed BMPs	Adaptation of strategies / policies	Countries, which mentioned this issue
Intensive manuring	<p>Limitation of the application of liquid / solid manure: prohibition or reduction in quantity and limitation to days when plants can provide a high nitrate uptake rate</p> <p>Control of manure management</p> <p>Implementation of appropriate measures, e.g. ecological agriculture, proper manure storage, establishment of buffer strips along water courses</p>	<p>Implementation and evaluation/monitoring of the Nitrate Directive</p> <p>Support for investments and guidelines for farmers in storage of manure</p> <p>Prohibition of liquid / solid manure application in DWPZ</p> <p>Training of farmers</p> <p><i>KTM 2, 12, 17</i></p>	AT, HU, PL
Intensive grazing (e.g. livestock grazing close to dolines, swallow holes and streams)	<p>Prevent livestock from grazing close to dolines, swallow holes or streams</p> <p>Construction of dams, fences etc. to prevent precipitation water from direct and fast entrance into dolines and swallow holes</p> <p>Control of grazing and reduced stocking density</p> <p>Implementation of adapted grazing strategies</p>	<p>Clear guidelines for grazing management (e.g. fences around DWPZ, paddock management, strategic planning)</p> <p>Prohibition of grazing in DWPZ</p> <p>Information meetings and workshops for involved stakeholders (farmers, water suppliers, local /</p>	AT, HU, DE



		regional / national authorities) <i>KTM 2, 23</i>	
Conversion of grassland (e.g. ploughing up)	Implementation of measures for advisory and financial support to avoid conversion of grassland	Clear guidelines for grassland management (no ploughing in DWPZ) Information meetings and workshops for involved stakeholders (farmers, water suppliers, local / regional / national authorities) <i>KTM 2, 12, 23</i>	PL, DE
Intensive use of heavy machinery on grasslands	Extensification of land use activities on grasslands (e.g. manual mowing, harvesting only twice a year)	Implementation / Improvement of Agro-environmental programmes (providing adequate subsidies and grants) Information meetings and workshops for involved stakeholders (farmers, water suppliers, local/regional/national authorities) <i>KTM 2, 23</i>	DE
Pollution of watercourses	Supporting guidance for creation of low-input grassland by converting arable land at risk of erosion or flooding / establishment of riparian buffer strips	Implementation / Improvement of Agro-environmental programmes (providing adequate subsidies and grants) <i>KTM 2, 17, 23</i>	PL



WETLAND		
Actual management practices / Driving forces (GAPs)	Proposed BMPs	Adaptation of strategies / policies
Pollution of water courses / water bodies	<p>Wetland restoration and creation (re-establishment of the hydrology, plants and soils of former or degraded wetlands, installation of new wetlands)</p> <p>Development of water and environmental monitoring and assessment (site specific) for wetlands</p> <p>Preservation and revitalization of buffer streams zones between agricultural-urban areas and water bodies supported by participatory processes</p> <p>Establishment of constructed wetlands for water treatment supported by cost-benefit assessment</p>	<p>Enlargement of nature protection zones (e.g. due to Ramsar Convention, Natura2000 network)</p> <p>Implementation of EU Biodiversity Strategy 2020; EU Strategies for species conservation, ecosystem services and natural capital, balancing social, economic and environment needs.</p> <p>Measures of RBMPs concerning water scarcity and drought, ground water recharge, salt intrusion, flood risk, nature based solutions</p> <p>Implementation of nature-based water purification treatments</p> <p><i>KTM 1, 2, 3, 6, 7, 8, 12, 13, 14, 16, 17, 21, 23, 24, 25</i></p> <p><i>APM1</i></p>
Flood risk, erosion	<p>Preservation and revitalization of wetlands on floodplains supported by integrated spatial and emergency planning</p> <p>Creation and maintenance of riparian wetlands in the framework of water bodies requalification</p>	<p>Enlargement of nature protection zones (e.g. due to Ramsar Convention, Natura2000 network)</p> <p>Implementation of measures deriving from the Landscape Convention</p> <p>Actions/measures to combat soil degradation and desertification</p> <p><i>KTM 2, 6, 7, 13, 17, 23, 24, 25</i></p> <p><i>APM 1, 2, 4, 6</i></p>



GENERAL RECOMMENDATIONS

- **Stricter rules** (especially concerning fertilizer and pesticide applications) including actual programmes and measures should be developed according to the demands of sustainable water quality and quantity and respective **control/monitoring** should be fostered
- **Better communication and dissemination of knowledge and experience** between decision-makers / legislators, experts and other stakeholders and improvement of the transfer of results (transnational and interdisciplinary experiences) to decision makers and authorities responsible for the implementation of European directives
- Development of **efficient education systems for farmers** (at eye level! - calling attention also to economic benefits) and **public water management administrations** in cooperation with decision-makers, legislators, NGOs and research institutions (all affected stakeholders have to be involved and informed)
- **Awareness raising** - drinking water protection provides not only benefits for water suppliers, but also for foresters, nature conservation, the economy and the general public. Including relevant stakeholders in planning already at the beginning of the process and keeping them continuously involved is very important. Agenda 2030 gives us a chance for better cooperation among different sectors and levels.
- **Use of EU funds** (particularly agricultural, structural and cohesion funds) for co-financing projects to manage groundwater and surface water resources and for the compensation of additional expenses due to adjusted land use management measures for drinking water protection; **Provision of target-oriented inputs according to the main results of PROLINE-CE** (considering drinking water protection) to the actual development of the new regulations concerning subsidies of the Common Agricultural Policy
- **PES** (payments for the provision of ecosystem services) **schemes** for stakeholders (e.g. farmers) can be provided, if the implemented measures (e.g. Best Management Practices of PROLINE-CE) go beyond the level of national/regional legal frame. These payments should be made transparent for all stakeholders to raise the awareness.
- **River basin or catchment-oriented planning** of measures and **integrative flood risk management** (e.g. synchronized water protection and flood risk management measures)
- Application of **nature based solutions and non-structural measures for flood mitigation** (e.g. prevention of land use change, conservation tillage, green infiltration zones in cities, buffer strips along water courses, retention ponds on farms, river restoration, wetland and floodplain restoration/conservation), water-quality-improvement-oriented fishery management
- Ensuring minimum ecological flow in drought-endangered river basins
- **Interdisciplinary research** topics with significant stakeholders in the region in order to meet the transboundary water policy and water management needs;



- Use of hydrological/hydrogeological **model** (on catchment level) to estimate impact of catchment land use, provide reliable risk analysis, find efficient site-specific solutions and determine DWPZ in spatial planning.
- Use of ecological models integrated with catchment models to predict water quality and possible impact of climate change on water resources
- Put more emphasis on the value of **monitoring** in the policy guidelines and incentives for water suppliers and water authorities for better hydro-geo-chemical data collection (more frequently and with a better spatial resolution, covering all aspects of water cycle)
- Protection and usage of land and water resources should use **ecosystem services** as indicators what affects human wellbeing and what the ecosystems can provide us.
- **Strategic and Integral Source Water Protection Concepts and Planning for DWPZ** (e.g. Water Safety Plans) to guarantee a sustainable water supply. This also, in dry areas, and under consideration of climate change issues
- Implementation of measures defined in the **Water Framework Directive** (compliance with environmental objectives, monitoring of surface water and groundwater)
- **Importance of water governance and the integration within water and land use related policies:** Different plans addressed to several topics related to water highlight potential priorities, externalities, **synergies** (e.g. drinking water protection and flood mitigation) and conflicts, which have to be carefully considered in further implementation steps.
- **Best practice examples** should be spread around to other regions and affected stakeholders (e.g. water suppliers) and implemented through a network of stakeholders
- **Change human consciousness** of decision makers and all other stakeholders. Decision makers must directly stimulate good practices, and vice-versa, the other stakeholders should adapt and generally change their attitude towards changes in actual management practices.
- **Improvement of shared models for climate and hydrology** as well as the understanding and use of the outputs of those models and the cooperation at local level to adopt the results and to keep them up to date.

Remark: green highlighted sentences are results of discussion processes during different stakeholder involvements (national stakeholder workshops, Round Tables)



6. Literature

WWAP (United Nations World Water Assessment Programme)/UN-Water (2018): The United Nations World Water Development Report 2018: Nature-Based Solutions for Water. Paris, UNESCO

NWRM (Natural Water Retention Measures): 53 NWRM illustrated, NWRM-project (<http://www.nwrn.eu>)

The SuDS (Sustainable drainage systems) Manual (2015). London, CIRIA

CAMARO-D: D.T1.2.3 (2018) - Best Management Practice catalogue Arable Agriculture

CAMARO-D: D.T2.2.2 (2019) - Transnational Cluster Manual for Practitioners, Cluster 2

CAMARO-D (Seher W., Schinking K., 2018): Practical Guide to Spatial Planning in Catchments and River Stretches



7. Annex

25 defined Key Type Measures (KTM) within WFD

Selection regarding drinking water and floods (for PROLINE-CE project):

red-relevant, **orange-partly relevant**, **black-not relevant**

KTM1. Construction or upgrades of wastewater treatment plants

KTM2. Reduce nutrient pollution from agriculture

KTM3. Reduce pesticides pollution from agriculture

KTM4. Remediation of contaminated sites (historical pollution including sediments, groundwater, soil)

KTM5. Improving longitudinal continuity (e.g. establishing fish passes, demolishing old dams)

KTM6. Improving hydromorphological conditions of water bodies other than longitudinal continuity

KTM7. Improvements in flow regime and/or establishment of ecological flows

KTM8. Water efficiency technical measures for irrigation, industry, energy and households

KTM9. Water pricing policy measures for the implementation of the recovery of cost of water services from households

KTM10. Water pricing policy measures for the implementation of the recovery of cost of water services from industry

KTM11. Water pricing policy measures for the implementation of the recovery of cost of water services from agriculture

KTM12. Advisory services for agriculture

KTM13. Drinking water protection measures (e.g. establishment of safeguard zones, buffer zones etc)

KTM14. Research, improvement of knowledge base reducing uncertainty

KTM15. Measures for the phasing-out of emissions, discharges and losses of priority hazardous substances or for the reduction of emissions, discharges and losses of priority substances

KTM16. Upgrades or improvements of industrial wastewater treatment plants (including farms)

KTM17. Measures to reduce sediment from soil erosion and surface run-off



KTM18. Measures to prevent or control the adverse impacts of invasive alien species and introduced diseases

KTM19. Measures to prevent or control the adverse impacts of recreation including angling

KTM20. Measures to prevent or control the adverse impacts of fishing and other exploitation/removal of animal and plants

KTM21. Measures to prevent or control the input of pollution from urban areas, transport and built infrastructure

KTM22. Measures to prevent or control the input of pollution from forestry

KTM23. Natural water retention measures

KTM24. Adaptation to climate change

KTM25. Measures to counteract acidification

Additional Project Measures (APM)

Additional project measures are related to those recognized measures that reach beyond the KTM measures and contribute to the specific objectives of the PROLINE-CE project. Additional project specific measures (APM) are identified in the field of non-constructive measures. Several identified responses (measures) are related to improved governance and similar non-constructive measures. As the project is addressing interaction between floods and drinking water protection, they are also encompassing some measures, which are related to the implementation of EU Floods directive (2007/60).

APM1 Improved permitting, control and supervision procedures including regulatory supervision process, approvals, technical standards and their implementation.

Permitting procedures in the field of water management usually address the process related to granting of emissions, abstractions, and construction on potentially flood prone zones. The permitting procedures should follow the advances in technology that enable more efficient, long term status supervision, enabling also close interaction with the modelling process as validation tool.

APM2 Regulatory processes regarding flood risk management - spatial planning procedures, protection and restoration floodplains, integrated with the development of River Basin Management Plans (RBMPs) and water conflict resolution procedures.

Improved regulatory mechanisms could prevent floods-drinking water conflict as a non-constructive measure. The gap between the river basin management plans and municipal spatial planning was identified in different countries with recognized necessity for improvements with special position of spatial planning process as conflict resolution tool.

APM3 Improved financing mechanisms for all water services



While KTM9 to KTM11 are addressing water pricing policy measures for the implementation of the recovery of cost of water services for different water users - abstractions, this concept should be extended to other components of water management. Providing a flood protection service by the cost of zero for the end consumers challenges the free-rider problem and thus aggregated under provision of the service.

APM4 **Landslide and erosion control measures**

While the PROLINE-CE project is focused on floods - drinking water interaction, other weather-induced hazards like landslides and erosion processes, should be addressed and managed as well. With water abstraction locations often in the upper, mountainous parts of the catchments, these measures could be essential for the safety of the water resources and water supply.

APM5 **Improved understanding of the impacts of different man-made structures and infrastructure potentially affecting flood flows**

Understanding how built environment could worsen the impacts of floods is still a challenge, and actual flood dynamics too often differ from those taking only in account natural environment on the same area. Typical examples are bridges and culverts being clogged by debris or deposits, but other man-made structures and infrastructure have related uncertainties as well.

PROLINE-CE WORKPACKAGE T4

OUTPUT O.T4.2

NATIONAL COURSES OF ACTION FOR BEST MANAGEMENT PRACTICES IMPLEMENTATION

WP T4 - ADVANCEMENT: STRATEGIC POSITIONING AND COMMITMENT

June, 2019

Lead Institution	LP - BMNT
Contributor/s	
Lead Author/s	Elisabeth Gerhardt
Date last release	06/19





Contributors, name and Institution surname

<p>Austria</p> <p>Elisabeth Gerhardt</p> <p>Hubert Siegel</p> <p>Roland Koeck</p> <p>Markus Hochleitner</p> <p>Gerhard Kuschnig</p> <p>Harald Kromp</p> <p>Markus Werderitsch</p>	<p>Federal Research and Training Centre for Forests, Natural Hazards and Landscape</p> <p>Austrian Federal Ministry of Sustainability and Tourism</p> <p>University of Natural Resources and Life Sciences, Department of Forest- and Soil Sciences, Institute of Silviculture</p> <p>Municipality of Waidhofen/Ybbs</p> <p>Municipality of the City of Vienna, MA31 - Vienna Water</p> <p>Municipality of the City of Vienna, MA31 - Vienna Water</p> <p>Municipality of the City of Vienna, MA31 - Vienna Water</p>
<p>Croatia</p> <p>Josip Terzić</p> <p>Jasmina Lukač Reberski</p> <p>Ivana Boljat</p> <p>Daria Čupić</p> <p>Matko Patekar</p> <p>Ivona Baniček</p>	<p>Croatian Geological Survey, Department of Hydrogeology and Engineering Geology</p> <p>Croatian Geological Survey, Department of Hydrogeology and Engineering Geology</p> <p>Croatian Geological Survey, Department of Hydrogeology and Engineering Geology</p> <p>Croatian Waters</p> <p>Croatian Geological Survey, Department of Hydrogeology and Engineering Geology</p> <p>Croatian Geological Survey, Department of Hydrogeology and Engineering Geology</p>
<p>Germany</p> <p>Daniel Bittner</p> <p>Prof. Dr. Gabriele Chiogna</p> <p>Prof. Dr.-Ing. Markus Disse</p>	<p>Technical University of Munich; Chair of Hydrology and River Basin Management</p> <p>Technical University of Munich; Chair of Hydrology and River Basin Management</p> <p>Technical University of Munich; Chair of Hydrology and River Basin Management</p>
<p>Hungary</p> <p>Robert Hegyi</p>	<p>General Directorate of Water Management</p>



Contributors, name and Institution surname

Magdolna Ambrus	General Directorate of Water Management
Peter Molnar	General Directorate of Water Management
Tamas Belovai	General Directorate of Water Management
Barbara Bezegh	Herman Otto Institute Non-profit Ltd.
Matyas Prommer	Herman Otto Institute Non-profit Ltd.
István Waltner	Herman Otto Institute Non-profit Ltd.
Italy	
Cinzia Alessandrini	Arpae
Silvano Pecora	Arpae
Daniele Cristofori	Arpae
Paolo Leoni	Arpae
Francesco Puma	EU WATERCENTER
Guido Rianna	CMCC Foundation
Giuseppe Ricciardi	Arpae
Paolo Leoni	Arpae
Monia Santini	CMCC Foundation
Anna Sperotto	CMCC Foundation
Silvia Torresan	CMCC Foundation
Poland	
Przemysław Gruszecki	Krajowy Zarząd Gospodarki Wodnej
Norbert Jaźwiński	Krajowy Zarząd Gospodarki Wodnej
Marcin Walczak	Krajowy Zarząd Gospodarki Wodnej
Piotr Zimmermann	Krajowy Zarząd Gospodarki Wodnej
Joanna Troińska	Krajowy Zarząd Gospodarki Wodnej
Andrzej Kaczorek	Krajowy Zarząd Gospodarki Wodnej
Edyta Jurkiewicz-Gruszecka	Krajowy Zarząd Gospodarki Wodnej
Grzegorz Żero	Krajowy Zarząd Gospodarki Wodnej
Olga Sadowska	Krajowy Zarząd Gospodarki Wodnej
Anna Goszczyńska-Zajac	Krajowy Zarząd Gospodarki Wodnej
Michał Falandysz	Krajowy Zarząd Gospodarki Wodnej
Joanna Czekaj	Górnośląskie Przedsiębiorstwo Wodociągów S.A.



Contributors, name and Institution surname

Sabina Jakóbczyk - Karpierz	University of Silesia
Sławomir Sitek	University of Silesia
Andrzej Witkowski	University of Silesia
Jacek Różkowski	University of Silesia
Bartosz Łozowski	University of Silesia
Andrzej Woźnica	University of Silesia
Slovenia	
Barbara Čenčur Curk	University of Ljubljana, NTF
Anja Torkar	University of Ljubljana, NTF
Urška Valenčič	University of Ljubljana, NTF
Ajda Cilenšek	University of Ljubljana, FGG
Špela Železnikar	University of Ljubljana, BF
Branka Bračič Železnik	Public Water Utility JP VO-KA



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Dictionary of abbreviations

BMP	Best Management Practice
CC	Climate Change
CSR	Corporate Social Responsibility
DEWS	Drought Early Warning System
DPSIR	driver, pressure, state, impact, response
DriFLU	Drinking Water/Floods/Land use
DWPZ	Drinking Water Protection Zone
FEWS	Flood Early Warning System
FoHyM	Forest Hydrotope Model
GAP	Gap in Land use Management or Water Management practice
GWP	Guideline for securing the Water Protection functionality of the forest ecosystems within the DWPZ
ÖPUL	Austrian Agri-Environmental Programme
PA	Pilot Action
PAC	Pilot Action Cluster
PES	Payments for Ecosystem Services
RBMP	River Basin Management Plan
SWOT	Strengths, weaknesses, opportunities, threats
WP	Work package



1. Introduction

One of the main outputs of PROLINE-CE is the so-called **DriFLU Charta**. The abbreviation “DriFLU” stands for “**Drinking water/Floods/Land use**” combining the most important thematic issues within this project.

This joint declaration act will contain transnational guidelines regarding an efficient protection of drinking water resources. This objective should be achieved through the development of sustainable and appropriate land use and management measures aiming at the protection of drinking water resources and additionally at the mitigation as well as reduction of droughts and floods influencing these resources, under the challenges of climate change.

Furthermore as the DriFLU Charta should not only be a paper, which will be signed, but also a document which should indicate necessary steps in the future in each participating country it is important to develop “**Courses of Action**” not only on transnational, but also on national level to focus more on specific characteristics and problems, which can differ more or less between the PROLINE-CE countries. To guarantee a quite target-oriented document embedding relevant topics in national/regional strategies and policies, comprehensive participatory processes with relevant stakeholders were conducted: besides two series of national stakeholder workshops in each partner country (according to the Application Form) several internal meetings with the affected stakeholders were conducted to gain also the opinions and experiences from different target groups.

During the whole project duration the main purpose of the project consortium was the development of target-oriented best management practices (BMPs) in each land use / vegetation category (forestry, agriculture, grassland, urban areas / transport and industrial units / energy production, wetland) and general recommendations for water management. The most important and relevant BMPs in each pilot area were identified and tested, supplemented by continuous intensive stakeholder involvements. Thus the acceptance of future necessary steps could be improved respectively increased in the relevant sphere of action of the involved target groups.



2. Methodology - Basis for Courses of Action

Within WPT1 by means of a SWOT-analysis strengths, weaknesses, opportunities and threats in each partner country were analysed and through DPSIR (driver, pressure, state, impact, response)-frameworks the most important gaps and potentials for improvement in current management practices were derived (D.T 1.1.1). For the development of DriFLU Charta respectively “Courses of Action” each partner country had to choose up to five of the most relevant GAPs/Driving forces per land use respectively vegetation cover category in their respective country, whereas the general objectives/recommendations are derived from the SWOT-Analysis focused on the “Opportunities”. For each GAP/Driving force the relevant country-specific best management practices (BMPs) were selected from the “Country-specific best management practice reports” (D.T 1.2.1).

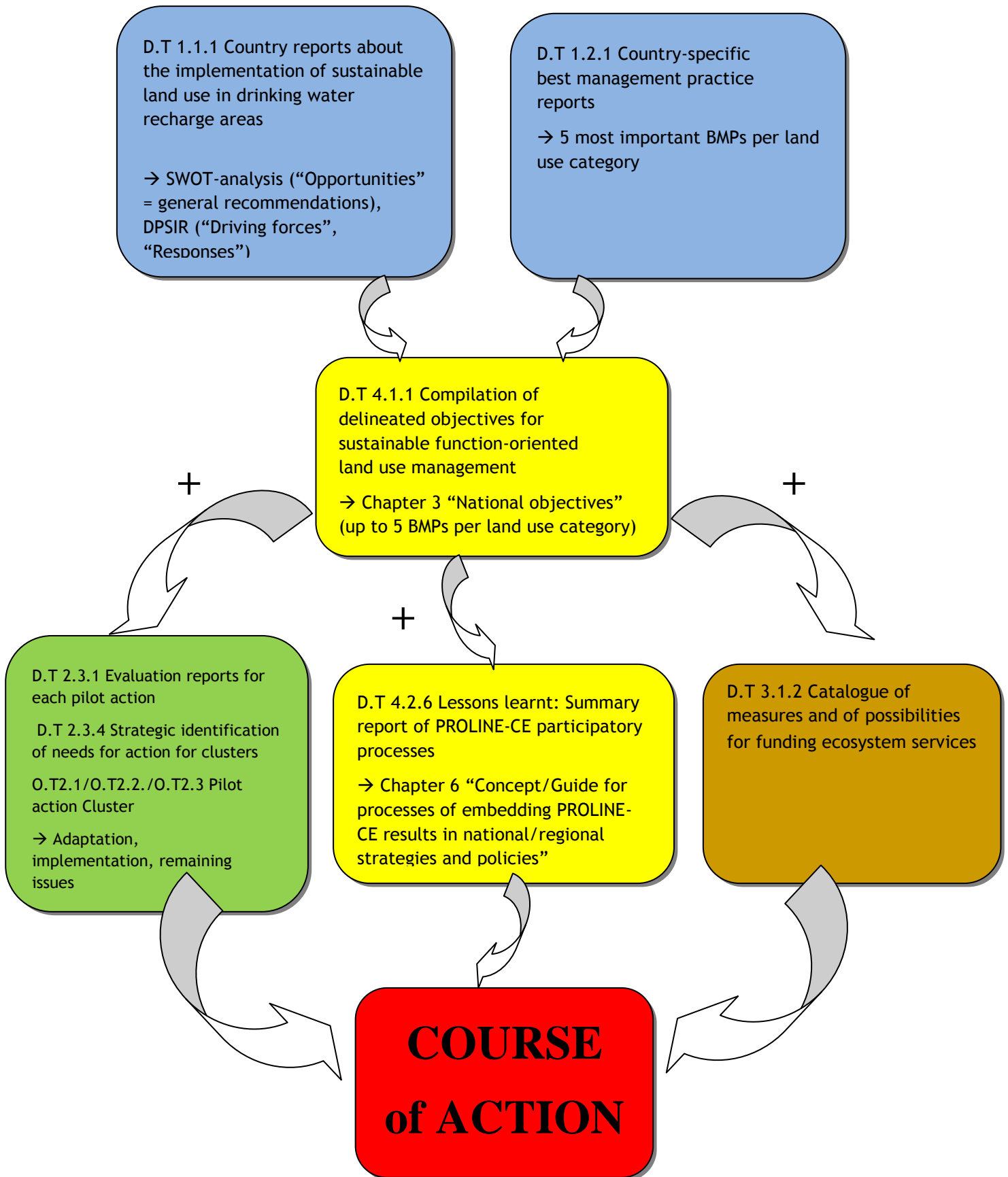
These inputs were merged within D.T.4.1.1 Compilation of delineated objectives for sustainable function-oriented land use management, Chapter 3 (“National objectives”).

As some of these BMPs and their operationalisation possibilities were tested and assessed within the pilot areas in WPT2 necessary steps towards adaptation, implementation and acceptance of each BMP were delineated in the evaluation reports for each pilot action (D.T 2.3.1) respectively on cluster level within D.T2.3.4 (Strategic identification of need for action for clusters) containing also remaining issues to be solved.

In this context the main results and findings of the 2nd national stakeholder workshops, especially recommendations made by the participants, were taken into consideration and supplemented within the relevant issues (D.T.4.2.6 - Lessons learnt: Summary report of PROLINE-CE participatory processes, Chapter 6).

Within WPT3 potential measures and possibilities of funding ecosystem services compliant with the protection of drinking water resources and related flood/drought management were analysed, which provide also a very important contribution to the development of “Courses of Action”.

According to this procedure each partner country prepared its own “Course of Action”.





Transnational Course of Action for BMP implementation
Forestry
Agriculture
Urban areas, Transport/Industrial units, Energy production
Grassland
Wetland
General water management

National Course of Action	National Course of Action	National Course of Action	National Course of Action(for each partner country)
Forestry	Forestry	Forestry	Forestry	Forestry
Agriculture	Agriculture	Agriculture	Agriculture	Agriculture
Urban	Urban	Urban	Urban	Urban
Grassland	Grassland	Grassland	Grassland	Grassland
Wetland	Wetland	Wetland	Wetland	Wetland
General	General	General	General	General

Contrary to the transnational DriFLU Charta only the most relevant land use /vegetation categories and the general water management related issues, which were discussed mainly during the second stakeholder workshop series, were selected by each partner country for the development of their respective national “Course of Action”.



3. National Courses of Action

Within the following tables each partner country was asked to provide their national specific contributions with **following procedure**:

Based on the tables of D.T4.2.6 “Lessons learnt” (Chapter 6 - “Concept/Guide for processes of embedding PROLINE-CE results in national/regional strategies and policies”) two additional columns have to be supplemented:

- **“Further Steps”** → derived from D.T4.2.6, Chapter 6 and the tables of D.T2.3.4 “Strategic identification of needs for action for clusters” (“Remaining issues to be solved”) and the relevant tables of O.T2.1/O.T2.2./O.T2.3 “Pilot action clusters” (“Implementation possibilities”, “Acceptance of BMPs”)
- **“Funding possibilities”** → derived from D.T3.1.2 “Catalogue of measures and of possibilities for funding ecosystem services”

3.1. Austria

Category	Actual management practices /Driving forces (GAPs)	Proposed BMP	Adaptation of strategies/policies	Further Steps	Funding possibilities (short description, responsibility, source)
FORESTS	Continued application of the clear-cut technique	Avoidance of the clear-cut technique	Prohibition of clear-cut applications within DWPZ	<p>The avoidance of the clear-cut technique has to be applied within all DWPZ in Austria, what will be a challenge in many cases.</p> <p>Setting up of contracts with forest owners according to facilitated</p>	<p>➤ PES (Payments for Ecosystem Services)² according to the developed Best Practices (e.g. in the pilot area Waidhofen/Ybbs defined in a Directive of the municipality, signing of contracts</p>



				BMP application (e.g. Directive GWP ¹ in Waidhofen/Ybbs)	with the forest owners, information strategies)
	Extensive construction of forest roads	Limitation of forest roads	Clear guidelines for forest management within DWPZ	Limitation of forest road constructions within DWPZ will cause resistance of some forest owners → Setting up of contracts with forest owners according to facilitated BMP application (e.g. Directive GWP in Waidhofen/Ybbs) with further information, that the application of technical alternatives will result in higher PES.	<u>Responsibility:</u> Municipality, water works <u>Source:</u> Municipal funding (water prize)
	Creation of conifer plantations, even within deciduous forest communities	Tree Species Diversity According to the Natural Forest Community	The guidelines for DWPZ should define the creation of natural and stable forest stands with native tree species as necessary management practice	Setting up of contracts with forest owners according to facilitated BMP application (e.g. Directive GWP in Waidhofen/Ybbs: the fitting tree species were spatially explicitly defined through the Forest Hydrotope Model FoHyM) For DWPZ outside the PROLINE-CE project space it will be a challenge to establish the optimal native tree species set for each forest site → The	➤ “Land acquisition” by municipalities/water works (e.g. City of Vienna/Vienna Water), BMPs are defined between Vienna Water (MA31) and Forest Department of the city (MA49) <u>Responsibility:</u> Municipality, water works <u>Source:</u> Municipal funding (water prize)

² **REMARK:** If land-owners provide land-use management according to the national legislative framework, they are not obliged to receive PES. PES schemes can only be implemented, if the land-users (farmers, foresters, etc.) provide a state-of-the-art land management with the overall purpose of drinking water protection within drinking water protection zones (DWPZ, e.g. for better pesticide and fertilizer use management or for preservation of the forest cover). Hence only the implementation of Best Management Practices (BMPs) which reach beyond the legally defined land use management regime provide the possibility to apply PES schemes. This is a basic rule which has to be followed. Only if BMPs like defined e.g. in the PROLINE-CE project go beyond the level of the national/regional legal frame, the application of PES schemes can be considered.

¹ “Guideline for securing the Water Protection functionality of the forest ecosystems within the Drinking Water Protection Zone” defining all relevant BMPs for the watershed, resolved by the city council of Waidhofen/Ybbs in May 2018



				<p>implementation of tree species diversity based on native tree species still will need persuasive efforts, as Austrian foresters cling to the primacy of Norway spruce and recently also of Douglas fir.</p>	<p>➤ Austrian Rural Development Programme 2014-20 (Nr. 26) - Investments to strengthen resistance and ecological value of forests (public value and protection against natural hazards)³</p> <p><u>Responsibility:</u></p> <p>Federal Ministry of Sustainability and Tourism (Forest department), Forest departments of Federal States</p> <p><u>Source:</u></p> <p>EU, national/regional</p>
Cutting of old, huge and vital tree individuals	Foster old, huge and vital tree individuals	Forest Policy in Austria should develop more awareness towards the need to protect old growth forests and tree individuals	<p>Setting up of contracts with forest owners according to facilitated BMP application (e.g. Directive GWP in Waidhofen/Ybbs)</p> <p>The protection of old growth trees and forests in Austria is in general lacking, it has to be improved → persuasive efforts (awareness training) with regard to all forest owners and stakeholders</p>		
Unnaturally elevated wild ungulate densities as result of trophy-hunting activities and resulting browsing and bark-stripping damages	Forest Ecologically Sustainable Wild Ungulate Densities	<p>Clear compliance to the regional Hunting Acts (provincial legislation) in all Austrian forest areas</p> <p>Hunting Acts of the Federal States should enforce mandatory enhanced hunting rates.</p>	<p>Hunting Acts of the Federal States should enforce mandatory enhanced hunting rates.</p> <p>If hunters are simultaneously beneficiaries of the relevant drinking water resources, they should be convinced to regulate game stock according to a forest ecologically sustainable level</p> <p>The regional and local forest authorities have to be forced to act</p>		

³ Sonderrichtlinie für die ländliche Entwicklung 2014 bis 2020

https://www.bmnt.gv.at/land/laendl_entwicklung/foerderinfo/sonderrichtlinien_auswahlkriterien/srl_le_2014-2020.html



				<p>according to the Provincial Hunting Acts.</p> <p>Some forest owners (e.g. the Austrian Federal Forests, ÖBF) could act as best practice example for all other stakeholders, as they act accordingly.</p> <p>Utilisation of interdependencies between forest owners: The application of BMPs through one forest owner can motivate others to follow also this task.</p> <p>Persuasive efforts with regard to the implementation of ecological hunting practices.</p> <p>In severe cases persecution of a trial in the specific court.</p> <p>Information campaigns in local media for the general public in order to create a sphere of awareness for this issue (newspapers, radio or TV)</p>	
(ALPINE) PASTURES	<p>Erosion dynamics (open soils without vegetation cover) around water troughs for cattle</p>	<p>Placing of water troughs for cattle more frequently, avoiding concentrations of cattle / Concrete basements for the troughs and their surroundings</p>	<p>Stakeholder involvement (concerning water trough spacing and construction of concrete basements)</p>	<p>Water trough spacing and construction of concrete basements could be difficult on some alpine pastures (especially in karstic areas due to lack of water) → After information campaigns for the alpine pasture staff, the set-up of specific contracts can be carried out (to overcome lacking monetary resources for respective</p>	<p>➤ PES and contracts with the farmers (e.g. Vienna Water) according to BMPs receiving consultations and supports for the construction of structures supporting drinking source water protection</p> <p><u>Responsibility:</u></p>



				construction works).	Municipality, water works
	Grazing of cattle in or close to dolines and sinkholes	Fencing of dolines and sinkholes in order to keep cattle in distance from those karstic features	Stakeholder involvement and information Fences around dolines and sinkholes have to be maintained continuously for providing sustained functionality	Fences around dolines and sinkholes have to be maintained continuously for providing sustained functionality (precondition: accurate maps with dolines and sinkholes on the pasture area) After information campaigns for the alpine pasture staff, the set-up of specific contracts can be carried out.	<p>Source:</p> <p>Municipal funding (water prize)</p> <p>➤ Austrian Agri-Environmental Programme (ÖPUL) - part of "Rural Development"⁴</p> <p>Responsibility:</p> <p>Federal Ministry of Sustainability and Tourism, Chamber of Agriculture of Federal States</p>
	Unwanted grazing patterns of cattle	Grazing management for cattle on alpine pastures	Stakeholder involvement and information Strategic planning process based on detailed knowledge about the pasture quality and strategic placing / spacing of fences	The challenge of this BMP is the necessity of a strategic planning process, which requires detailed knowledge about the pasture quality on the alpine pasture and the consequent implementation through the strategic placing and spacing of fences. To achieve this, training of the alpine staff and persuasive efforts will be necessary. The alpine pasture staff has to be convinced that both overgrazing and under-grazing is bad for the economic output of the alpine pasture and for source water protection and that grazing management is the adequate	<p>Source:</p> <p>EU, national/regional</p>

⁴ https://www.bmnt.gv.at/land/laendl_entwicklung/foerderinfo/sonderrichtlinien_auswahlkriterien/srl_oeapul.html

<https://www.bmnt.gv.at/english/agriculture/Rural-development/-pul2015until2020.html>



				solution for this situation. Also, the positive side-effects on water protection and flood prevention should become aware. Set-up of specific contracts	
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General recommendations:

- Best practice examples are the pilot areas: These Best Practice examples and measures within the pilot areas should be disseminated on national level and periodically evaluated.
- Individual conversations are in some cases more successful than group discussions
- Recommendations / Explanations for farmers, foresters etc. how to manage the relevant land use in the future have to be as simple and understandable as possible
- Intensive conversations with the affected farmers: they have to be asked what they want; then the preconditions under which they may continue to manage their pastures, have to be set out. General framework conditions should be determined, which the farmer has to comply with. Communication (at eye level considering that economic arguments are more successful than ecological ones), awareness-raising of problems on site (very important is that landowners and all stakeholders are present on site, so that nobody feels passed over and complains afterwards)
- Strategic and integral catchment-oriented source water protection concepts and planning for DWPZ - Fostering of cross-sectoral coordination and thinking; Drinking water protection measures/management provides not only benefits for water suppliers, but also for foresters, nature conservation, economy and general public
- Development of water management plans and water efficiency programmes - considering climate change issues; vulnerability and risk assessment mapping



3.2. Slovenia

Category	Actual management practices /Driving forces (GAPs)	Proposed BMP	Adaptation of strategies/policies	Further Steps	Funding possibilities (short description, responsibility, source)
GENERAL WATER MANAGEMENT	Individualistic (Non-Sectoral) approach to common problematics regarding protection of drinking water resources	Joined and integrated management of drinking water resources (horizontal and vertical co-operation)	Ministries, experts and public independently approach to common problematics, such as drinking water resources protection, instead of combining their knowledge and experiences to find unified and optimal solutions. Therefore, more communication and cooperation is needed horizontally (inside ministries, among ministries, among experts, etc.) and vertically.	<p>(1) Ministry competent for water has to take initiative for establishing cross-sectoral cooperation in the field of water on the governmental level.</p> <p>(2) Local level: restore of the Water Conference in order to facilitate the influence of local communities, holders of water rights and non-governmental organizations on water management (this was planned in the first Water Law of Slovenia, but was later cancelled); widened extent has to be discussed (e.g. adding water authorities)</p> <p>(3) Expert level: cooperation of experts of different disciplines concerning water has already begun with organising the second Slovenian water congress, where all Associations dealing with water participated. After that a new group “Water link” was established</p>	<p>(1) Funding: Governance framework (<u>responsibility</u>): Ministry of Environment and Spatial Planning (Water Directorate)</p> <p>(2) <u>Source</u>: The operating costs of the conference shall be financed from the budget of the Republic of Slovenia.</p> <p>Governance framework (<u>responsibility</u>): Ministry of Environment and Spatial Planning (Water Directorate)</p> <p>(3) Funding: Governance framework (<u>responsibility</u>): expert associations</p>



DRINKING WATER MANAGEMENT	Drinking water protection zones (DWPZs) for the potential water source do not exist	Determination (e.g. hydrogeological modelling) and establishment of DWPZs	Adaptation of Spatial plan of the Municipality of Ljubljana with DWPZ determination and adoption of Decree on the water protection area for this aquifer.	Water suppliers have to establish reserve drinking water sources, but almost none exist. For Ljubljana, there is a reserved area for planned Water well field without surrounding protected areas with restrictions in the current spatial plan. The restrictions should already be applied, in order to avoid future conflicts, such as: no construction of buildings, no waste disposal, no storages of dangerous substances, prohibition of use of pesticides and fertilizers, salting undrained surfaces like yards and gravel roads, etc.	
	Lack and not effective control over implementation restrictions for existing DWPZ	Strict implementation and inspection of DWPZ restrictions	Implementation should be supervised by inspectors of the Ministry of the Environment and Spatial Planning and the Ministry of Agriculture, Forestry and Food.	<p>Compliance of DWPZ restrictions has to be strictly supervised/inspected (more inspectors in the field needed and more effective control).</p> <p>Revision of the procedure for issuing water consents for intervention in to DWPZ (Slovenian Water Agency).</p> <p>Revision of spatial planning process, (municipalities)</p> <p>Raising awareness of land owners, farmers...</p>	<p>Type of funding mechanisms:</p> <p>Some costs related to the implementation of the DWPZ status (e.g. compensation payments for farmers due to the farming limitations) are covered by the water supply companies - part of the pricing mechanism to the end-users.</p> <p><u>Financial source</u>: water pricing</p> <p>Governance framework (<u>responsibility</u>): water supply companies</p>
FLOOD MANAGEMENT	Pollution sources in flood prone areas are not known / identified	Register of potential point pollution sources on flood areas identified in PA	Potential pollution sources are exceeding current requirements of national legislation (Slovenia: Environmental	Establishing responsibilities and competence for setting up the register of point and diffuse sources of potential pollution on flood areas.	Type of funding mechanisms: Implementation of measures from the River Basin Management Plan state budget



		<p>protection act O.G. 39/2006) and EU requirements SEVESO Directive, IED Directive 2010, E-PRTR Register.</p> <p>Proposed amendment to existing Decree on conditions and limitations for constructions and activities on flood risk areas 89/08 - activities of storage activity on flood prone zones.</p>		<p><u>Financial source</u>: state budget</p> <p>Governance framework (<u>responsibility</u>): Ministry of the Environment and Spatial Planning and Ministry of Defence</p>
Surface water intrusion in the well	Sealed wells heads on flood areas evaluated according to Hydrological / Hydraulical model	Amendment to the technical specification relative to standards of construction on flood prone zones (proposed amendment to existing Decree on conditions and limitations for constructions and activities on flood risk areas 89/08).	Establishment of control within issuing of water permit for wells and before issuing operating licence.	
Water balance status and effective mitigation measures are not known (identified)	Water balance status will be determined with Hydrological / Hydraulical modelling	Flood risk map as an adaptation of evaluation of parcels included in Municipal spatial planning.	Flood risk map as an adaptation of evaluation of parcels has to be included in Municipal spatial planning.	<p>Type of funding mechanisms:</p> <p>According to the Decree on conditions and limitations for constructions and activities on flood risk areas (Off. G. 89/08) the financing of modelling of flood risk zones is mainly provided by local communities, where flood hazard maps are a part of municipal spatial</p>



					<p>plans development. For the national defined flood priority zones financing is sometimes provided by the state budget (through Water Agency).</p> <p><u>Financial source:</u> state and municipal budget</p> <p>Governance framework (<u>responsibility</u>): municipalities, Slovenian Water Agency</p>
	Legalization of illegal construction on flood areas	To prevent legalization of construction on flood areas	Improvement of ineffective control or higher penalties from state authority on illegal construction (legislation implementation problem).	Establishment of more effective control/inspection; ban on legalization of constructions/buildings on flood areas must be incorporated into existing legislation.	
	River banks vegetation is not maintained	Management of river banks vegetation	<p>Similar Decree as on Ambrosia (Ambrosia should be Decree on measures to suppress harmful plants of genus Ambrosia (Official Gazette No. 63/10) should be accepted also on Japanese Knotweed.</p> <p>Maintenance of the vegetation along watercourses and on inundation plains should be better defined and implemented.</p>	Maintenance of the vegetation along watercourses and on inundation plains should be better defined and implemented.	<p>Type of funding mechanisms:</p> <p>Funding state level: state budget as part of annual river maintenance programme.</p> <p>Municipal budget as part of management of urban streams/urban runoff.</p> <p><u>Financial source:</u> state and municipal budget</p> <p>Governance framework (<u>responsibility</u>): Slovenian Water Agency (water consent)</p>



AGRICULTURE	Inflexible time ban of fertilizers and manure application	Redefinition of time ban of fertilizers and manure application	<p>The Slovenian Environment Agency yearly produces the agrometeorological prediction according to the weather forecast but is more as a recommendation and not as an obligation with determined exact date of fertilizing period.</p>	<p>Enforcing cooperation among competent institutions (governmental, local), agricultural chamber, agricultural advisory services experts and farmers. Determination of rules concerning time ban on fertilizers and manure application.</p> <p>Existing agrometeorological prediction according to the weather forecast has to be obligatory for the determination of exact date of fertilizing period. For this, agrometeorological prediction has to be updated with recommendations about fertiliser and manure application (allowed, allowed with limitations, not allowed). Education of farmers for using this portal is essential.</p>	<p>Type of funding mechanisms:</p> <p>Legislation change - changing the decrees and implementation framework (supervision, control, inspection) and empowerment/implementation. Funding mechanisms for the legislative controlling measures is ensured at the state level.</p> <p><u>Financial source</u>: state budget</p> <p>Governance framework (<u>responsibility</u>): Chamber of Agriculture and Forestry of Slovenia, Ministry of the Environment and Spatial Planning (inspectorate), farmers</p>
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">URBAN AREAS</p>	<p>Torrential water flooding - excessive surface runoff, lack of water for animals and watering the plants</p>	<p>Collecting torrential water in wider channels, small retention pond (e.g. transient marsh Mali Rožnik) managed according to Hydrological / Hydraulical model</p>	<p>Existing policy and regulation measures do not address necessity for gradual multi-use improvements of existing drainage systems.</p> <p>Strategic development of new policy framework addressing complex climate change adaptation process is necessary.</p>	<p>Strategic development of new policy framework addressing complex climate change adaptation process is necessary.</p>	<p>Type of funding mechanisms::</p> <p>Funding state level: state budget as part of annual river maintenance programme</p> <p>Municipal budget as part of management of urban streams/urban runoff</p> <p>Financial source: state budget, municipal budget</p> <p>Governance framework (<u>responsibility</u>): Slovenian Water Agency (water consent), local community, utilities responsible management of infrastructure and urban areas, land owners/managers, farmers</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">TRANSPORT UNITS</p>	<p>Unarranged road rainwater discharge</p>	<p>Collection and treatment of road rainwater discharge, particularly within drinking water protection areas</p>	<p>Adaptation of road management policy for road rainwater to run through separate system and not through public sewage system.</p>	<p>Road rainwater discharge (and main roads rainwater drainage and retention ponds with treatment) must be controlled and regularly maintained for all roads and motorways.</p> <p>Furthermore, road rainwater should not run through public sewage system.</p> <p>Enforcing more strict regulation for collection and treatment of road rainwater discharge, within drinking water protection areas</p>	<p>Type of funding mechanisms:</p> <p>Polluter pay principle - organizations managing and maintaining traffic infrastructure (usually public companies, concessionaires) have to implement and maintain the measures.</p> <p><u>Financial source</u>: From the road toll, or general taxes if they are financing the operation and maintenance of road infrastructure.</p> <p>Governance framework (<u>responsibility</u>): Municipality, Utility for municipal public road maintenance, Highway management</p>



	<p>No limitation of road runoff water salinity</p>	<p>Define limitation of salinity of road water run-off</p>	<p>Upgrade on the Decree on the emission of substances in the discharge of meteoric water from public roads.</p>	<p>Salting of roads and motorway cannot be prohibited, but the salinity of road water discharge should be limited.</p>	<p>Type of funding mechanisms: Polluter pay principle - organizations managing and maintaining traffic infrastructure (usually public companies, concessionaires) have to implement and maintain the measures.</p> <p><u>Financial source</u>: From the road toll, or general taxes if they are financing the operation and maintenance of road infrastructure.</p> <p>Governance framework (<u>responsibility</u>): Municipality, Utility for municipal public road maintenance, Highway management</p>
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FORESTS	Abandonment of forest areas	Forestry subsidies and encouraging foresters to facilitate regeneration dynamics within their forests	<p>Most of the forest in the PA locates in two nature parks: Nature park Tivoli, Rožnik and Šišenski hill and also the natural park Polhograjski Dolomiti. In these parks activities are limited according to the Ordinance for each Nature park in order to protect nature but there are no directives for maintaining the safety of their visitors, even sanitary cutting needs authority's agreement. Despite that it has to be taken into account that natural forest ecosystems in general show the highest level of stability.</p>	<p>Measures have to be taken for preventing aging of Slovenian forests (regular maintenance).</p> <p>Close to streams (brooks or rivers) logging residues should not be left in order to reduce the danger of driftwood formation during floods.</p>	<p>Type of funding mechanisms: subsidies for forest owners</p> <p><u>Financial sources</u>: state budget</p> <p>Governance framework (<u>responsibility</u>): Ministry of Agriculture, Forestry and Food, Slovenia Forest Service</p>
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3.3. Hungary

Category	Actual management practices /Driving forces (GAPs)	Proposed BMP	Adaptation of strategies/policies	Further Steps	Funding possibilities (short description, responsibility, source)
GRASSLAND / PASTURE	The impact of livestock and manure on surface water resources	Frequently monitoring livestock farms (authorities), providing information to the farmers about the environmental disadvantages of improper manure storage and about climate change	Guidelines for farmers about manure storage	<p>During stakeholder discussions we learned that most of the time the actual monitoring on livestock farms are more or less just formality; accurate data is often not available. Solving the problem of frequent and efficient monitoring of livestock farms has to be the first step - with or without involving the authorities. Therefore, authorities should be informed about GAP, as well as the imminence of climate change, so they can make the first step towards a regular monitoring/ inspection.</p> <p>Experts from water sector agreed that the raised problems are very complex, and that although the situation might seem to be under control at the moment, climate change could be a serious threat. It is also a common opinion that monitoring the water quality of River Tisza is enough, there is no need to monitor its tributaries.</p>	<p>➤ National Agro-environmental Program - Integrated land use management program The program focuses primarily on the environmental elements (water, soil, air, wildlife). As a result of good agricultural practices, the nitrate load from agricultural production could be reduced. The direct beneficiaries are private land owners.</p> <p>Responsibility: Ministry of Rural Development</p> <p>Source: state budget</p>



AGRICULTURE	<p>Improper or excessive use of pesticides and manure on plant production fields</p>	<p>Involving farmers to the Agrarian Environmental Program, emphasizing the importance of green products, providing information to the farmers about climate change.</p>	<p>Stakeholder involvement (adequate plant production considering climate change, ploughing parallel to the watercourse)</p>	<p>While many farmers are aware of the danger of improper application of pesticides, fertilizers and manure, the experience is that in most cases they can only be motivated through financial incentives. Therefore, informative meetings for farmers about the National Agro-Environmental Program would be important. Also forecasting how plant production will change as climate changes could be advantageous.</p> <p>Experts from the water sector agreed that the raised problems are very complex, and that although the situation might seem to be under control at the moment, the climate change could be a serious threat. It is also a common opinion that monitoring the water quality of River Tisza is enough, there is no need to monitor its tributaries.</p>	<p>➤ National Agro-environmental Program - Regional Programs: The System of Sensitive Natural Areas</p> <p>The objectives of The System of Sensitive Natural Areas Program in the framework of the National Agro-environmental Program, is to support farmers whose farms are located on a sensitive area, in compliance with the regulatory packages that meet the ecological conditions and the protection needs of the region. These programs are introduced on those areas where specific measures are needed to overcome existing environmental problems and preserve natural values. This program was realized on Szentendre island. Convincing farmers is the basic task, because the participation is voluntary. The commitment period is 5-year. Direct beneficiaries are land owners.</p> <p>Responsibility: Ministry of Rural development Sources: state budget</p> <p>➤ National Agro-environmental Program - Integrated land use management program</p> <p>The program focuses primarily on the environmental elements (water, soil, air, wildlife). As a result of good agricultural practices, the nitrate load from agricultural production could be reduced. The direct beneficiaries are private land owners.</p> <p>Responsibility: Ministry of Rural Development Source: state budget</p>
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	<p>Agricultural groundwater pollution</p>	<p>Participation in Agro Environment Program</p>	<p>The availability of subsidies acts as a main driver for the implementation of such practices. Guidelines can be adapted to not only prohibit certain practices in sensitive areas but also to better encourage sound practices beyond the required minimum.</p>	<p>There is no access to entire data on how many farmers have joined the National Agro-Environmental Program already. Better cooperation between experts and authorities is necessary. An education program for farmers about the available methods would be advantageous, however, financial aspects significantly limit the widespread implementation of those methods, so available subsidies and grants should be improved.</p>	<p>➤ National Agro-environmental Program - Regional Programs: The System of Sensitive Natural Areas The objectives of The System of Sensitive Natural Areas Program in the framework of the National Agro-environmental Program, is to support farmers whose farms are located on a sensitive area, in compliance with the regulatory packages that meet the ecological conditions and the protection needs of the region. These programs are introduced on those areas where specific measures are needed to overcome existing environmental problems and preserve natural values. This program was realized on Szentendre island. Convincing farmers is the basic task, because the participation is voluntary. The commitment period is 5-year. Direct beneficiaries are land owners.</p> <p>Responsibility: Ministry of Rural development</p> <p>Source: state budget</p>
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	<p>Increased contamination of surface drinking water resources during flood events</p>	<p>Reducing flood effects on surface drinking water resources</p>	<p>Guidelines for agricultural practices in riparian areas</p>	<p>Farmers and the water management sector should prepare for climate change to be prepared for extreme flood events caused by climate change.</p> <p>The Szolnok Surface Waterworks operates well during flood events, purification technology is suitable for the treatment of changing water quality - the operating system and the purification technologies must be reviewed in the context of climate change.</p>	<p>➤ KEOP-2.1.1/2F-2008-0002 Hanyi-Tiszasüly flood-level reducing reservoir project</p> <p>The Hanyi-Tiszasüly flood-level reservoir project is part of the Vásárhelyi Plan Improvement Program, which fits into the development plans of the flood protection system of the Tisza Valley. The aim of the project is to develop flood protection in the Tisza Valley to protect residents and properties against flood by integrating the ecological development of the Tisza, tributaries and floodplains.</p> <p>Responsibility: National Development Agency, Ministry of Environment and Water, Central Directorate for Water and Environment</p> <p>Source: State budget, EU budget - KEOP - Environment and Energy Operational Program</p>
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GENERAL WATER MANAGEMENT	<p>Flood protection protocol on bank-filtered wells operations during high water and flood events</p>	<p>Ensure the drinking water supply during high water or flood</p>	<p>Current flood management practices are good, but preparation for extreme flood events caused by climate change seems to be necessary</p>	<p>Assessing risks for individual wells and potential measures for their protection during high water/flood events to ensure drinking water supply.</p>	<p>➤ KEOP-2.1.1/2F/09-2009-0003 Danube project The aim of the project is the development of a flood mitigation system while keeping in mind the importance of nature conservation. Measures are levee-reinforcement, levee-heightening, levee side slope protection, flood protection works reconstruction, building of new flood protection works, improving access of flood protection works. As beneficiaries 15 micro-regions, 510,000 inhabitants, 152 settlements in six counties are affected.</p> <p>Responsibility: National Development Agency, Ministry of Environment and Water, Central Directorate for Water and Environment</p> <p>Source: EU budget - KEOP - Environment and Energy Operational Program</p>
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3.4. Croatia:

Category	Actual management practices /Driving forces (GAPs)	Proposed BMP	Adaptation of strategies/policies	Further Steps	Funding possibilities (short description, responsibility, source)
GENERAL WATER MANAGEMENT	Increased water demand	Establishment of groundwater level monitoring network in Imotsko polje and South Dalmatia	Relevant for water market: if necessary, revisions of payments, schemes and quotas	<p>The issue needs to be brought before stakeholders via consultations.</p> <p>Decision makers and financiers (e.g. county, community) must be addressed adequately in order to realise the long term importance of establishing a monitoring network.</p> <p>Include monitoring into the existing Imotsko-bekijsko polje bilateral project between Croatia and Bosnia and Herzegovina which aims to prevent field flooding, reconstruct the existing irrigation infrastructure and produce environmental impact studies.</p>	<p>Irrigation project: Imotsko-bekijsko polje, IPA cross-border project between Croatia and Bosnia and Herzegovina, RBMP programme</p> <p><u>Responsibility:</u> Split-Dalmatia County, Grude Municipality, Development Agency of the County of West Herzegovina; Croatian Ministry of Environment and Energy, Croatian Waters</p> <p><u>Source:</u> EU, national/regional</p>



	<p>Periodic field flooding</p>	<p>Infrastructure maintenance and reconstruction / Non-structural flood mitigation measures</p>	<p>Prevention of land use change should be included in designated sensitive areas (e.g. prevention of agricultural land spread on the account of Proložko Blato wetland areas)</p>	<p>The next step should be stakeholder involvement actions through educative brochures, workshops and lectures. The following actions should ensue: regulate and expand the infrastructure coupled with cleaning and maintenance, encourage cultivation of annual plants or vineyards (and prevent land use changes), establishment of protective forests on a small scale where possible.</p>	<p>Various EU projects or loans, state budget <u>Responsibility:</u> Ministry of Environment and Energy, Ministry of Agriculture, Croatian Waters, Local service providers <u>Source:</u> EU projects, national/regional</p>
	<p>Insufficient number of proclaimed drinking water protection zones on valuable springs in South Dalmatia</p>	<p>Defining and establishing sanitary protection zones in South Dalmatia</p>	<p>Policy guidelines are well developed concerning DWPZ, but implementation is lacking, inspections are inadequate and penalties are rarely given.</p>	<p>Establish and implement more strict penalties, since the Ordinance on determination of sanitary protection zones is not legally binding. Educational activities in the local communities are essential.</p>	<p>State budget <u>Responsibility:</u> Ministry of Environment and Energy, Ministry of Construction and Spatial Planning, Croatian Waters <u>Source:</u> national, EU budget</p>
	<p>Pressure on water resources quantity</p>	<p>Climate change adaptation and resilience / Reconstruction of public water supply network</p>	<p>CC Adaptation Strategy 2040-2070 and Action Plan 2019-2023 provide good guidelines for adaptation and resilience for CC. Local authorities should incorporate it in local plans and strategies.</p>	<p>Awareness raising activities should be the focal point. Further actions include: rationalization of water consumption and water re-use wherever possible, promoting alternative sources of water, spatial planning measures for mitigation of flood effects in flood prone areas, monitoring and modelling projections, improvements in legal regulations, construction and revitalization of accumulation structures, green retention and green roofs</p>	<p>Various EU projects, subsidies for adaptation, several loan options from banks and programmes <u>Responsibility:</u> Ministry of Environment and Energy <u>Source:</u> national/regional/local, EU budget</p>



URBAN AREAS	Unsanitary and illegal waste disposal	Educative brochure and awareness raising activities	Policy guidelines are good, penalties are prescribed for illegal waste dumping but inspections are poor and misdemeanour is not punished	Engagement in recycling, reusing and reducing waste activities should be encouraged on a consumer level.	State budget, various EU projects <u>Responsibility:</u> Ministry of Environment and Energy <u>Source:</u> national/regional/local, EU funds
		Encourage and promote innovative solutions of sustainable waste management	Innovative solutions for waste management are not mandatory, but rather an option. However, positive management examples can serve as a catalyst to improve waste management guidelines	Stakeholder involvement actions are a prerequisite for successful implementation. For instance, applications for smartphones which educate and help citizens with separate waste disposal and recycling or allow them to report illegally disposed waste, damaged waste infrastructure etc. could be created, as well as online databases with all relevant info on waste management activities (active or closed landfills, landfills in remediation process, dump sites etc.).	State budget, various EU projects <u>Responsibility:</u> Ministry of Environment and Energy <u>Source:</u> national/regional/local, EU funds
	Insufficiently effective waste water treatment system that needs to be reconstructed and expanded	Natural waste water treatment system	Plans for the extension of sewage and purification network must shift towards green and innovative methods	Educate and promote natural waste water treatment systems to public water suppliers and service providers through workshops and lectures, visit successful natural waste water treatment sites (e.g. Cres and Vrlika plants).	State budget, various EU projects <u>Responsibility:</u> Ministry of Environment and Energy, Ministry of Construction and Spatial Planning <u>Source:</u> national/regional/local, EU funds



3.5. Italy:

Category	Actual management practices /Driving forces (GAPs)	Proposed BMP	Adaptation of strategies/policies	Further Steps	Funding possibilities (short description, responsibility, source)
GENERAL WATER MANAGEMENT	Pressures on water resources management	The Drought Observatory/ Steering Committee and Drought Early Warning System (DEWS)	Improvement of potential synergies among stakeholders on water demand and land use. Give more decisional power to the Permanent Observatory on Water Uses. Support to the implementation and put in place of the Water Management Plan.	<p>Guarantee continuous resource allocation for maintenance and improvement of the existing platform for harmonized water and territorial planning and management.</p> <p>Increase awareness on drinking water as a not renewable resource.</p> <p>Assure incentives and investments for water scarcity prevention.</p> <p>Improvement of operational procedures, interoperability, organization and coordination among local structures and the Observatory.</p> <p>Identification of common and easier drought indicators and indices.</p>	<p><u>Public funding (current source):</u></p> <ul style="list-style-type: none"> - Drought Management Framework Agreement among national, river district and regional institutions; the Observatory Regulation also includes the main stakeholders and experts. - Responsibility: Regional authorities (e.g. Veneto region), regional environmental agencies (e.g. Arpae), Po River Basin District Authority, National Civil Protection.
				<p>Development of better, easier, higher resolution and more accessible information through interactive web services.</p> <p>Extension of the number of stakeholders and experts from different fields.</p>	<p><u>Further potential public funding sources:</u></p> <ul style="list-style-type: none"> - national, river basin district, regional and local/territorial public financial resources; - sectoral and territorial plans/programs; - emergency management funds



				<p>Coupling of water quality and water quantity (flood/droughts) monitoring and simulation.</p> <p>Fixing drought early warning thresholds and related specific action.</p> <p>Drought impact assessment accounting for economic, meteorological, environmental, supply system and organizational aspects together.</p>	<ul style="list-style-type: none"> - EU Funds (LIFE, INTERREG, H2020). - Responsibility: depending on the specific funding case <p><u>Further potential mixed private/public funding sources:</u></p> <ul style="list-style-type: none"> - fees/taxes for abstraction of surface and ground water (drinking water, agriculture, industry..). - Responsibility: depending on the specific funding case
	<p>Climate change impacts on drinking water resources</p>	<p>Analysis of the impacts of climate changes on drinking water resources</p>	<p>Test the implementation of proposed solution by relevant stakeholder's communication in actual decision-making processes (mainstreaming). Improving the process increasing the awareness of all the stakeholders about the future challenges for effectively preserving drinking water resources.</p>	<p>Performing Regional and Urban Adaptation Plans that, following EU Directive, explicitly accounting for CC issue.</p> <p>Providing more quantitative evaluations to better driving decisions of Administrators.</p> <p>Integrating the activities about adaptation in Observatories, Technical panels and other decision-making bodies in which experts and communities are already involved.</p> <p>Promoting the development of participative processes and stakeholders engagement to support bottom-up approaches.</p> <p>Making the modelling results easier</p>	<p><u>Public funding sources including:</u></p> <ul style="list-style-type: none"> - EU Funds (LIFE, INTERREG, H2020), Rural Development Plans (measures bridging the gap between research and agriculture); - National Operative Program 2017-2023 "Mettiamoci in riga", "Piattaforma della conoscenza" (Platform for exchanging knowledge). - Responsibility: Regional authorities (e.g. Veneto region), Po River Basin District Authority, other specific beneficiaries (of European/



				<p>interpretable for all potential stakeholders and promoting the transfer from research to actual planning activities.</p> <p>Communicating in proper way the sources of modelling uncertainties, their magnitude and evolution on different time horizons.</p> <p>Replicating the experiences carried out on different contexts favouring the dissemination of the results.</p>	<p>national/regional funds).</p> <p><u>Further potential mixed private/public funding sources:</u></p> <ul style="list-style-type: none"> - Fees/taxes for abstraction of surface and groundwater (drinking water, agriculture, industry). - Responsibility: depending on the specific funding case
Flood impact not fully implemented and considered	The Flood Forecast Centre and Flood Early Warning System (FEWS)	Integration in policy guidelines of predictability, uncertainty and communication of extreme events, and related losses including those for drinking water supply systems.	<p>Guarantee continuous resource allocation for maintenance and improvement of the existing platform for harmonized water and territorial planning and management including multi risk emergency plans.</p> <p>Increase awareness of flood damage on drinking water supply systems.</p> <p>Shifting economic resources from emergency to prevention actions.</p> <p>Coupling water and sediment cycle modelling.</p> <p>Development of better, easier, higher resolution and more accessible flood information through interactive web services and citizen dissemination.</p> <p>Extension of the number of stakeholders and involved experts.</p> <p>Assure incentives and investments for</p>	<p><u>Public funding (current source):</u></p> <ul style="list-style-type: none"> - Flood Management Framework Institutional (national and regional) Agreement among national, river district and regional institutions (current) - Responsibility: Regional authorities (e.g. Veneto region), regional environmental agencies (e.g. Arpae), Po River Basin District Authority, Interregional Agency for the Po River, National Civil Protection. <p><u>Further potential public funding sources:</u></p> <ul style="list-style-type: none"> - national, river basin district, regional and local/territorial financial resources; 	



				<p>flood prevention.</p> <p>Fixing site-specific flood warning indicators, thresholds and specific action, also considering environmental aspects of flood impacts.</p> <p>Promoting empowered synergies between central warning offices and local actions.</p> <p>Further development of operability and organizational architecture, including procedure refinement and training.</p>	<ul style="list-style-type: none"> - sectoral and territorial plans/programs; - emergency management funds; - EU Funds (LIFE, INTERREG, H2020, ECHO). - Responsibility: depending on the specific funding case <p><u>Further potential mixed private/public funding sources:</u></p> <p>Fees/taxes for land reclamation and for abstraction of surface and ground water (drinking water, agriculture, industry)</p> <ul style="list-style-type: none"> - Responsibility: depending on the specific funding case
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3.6. Poland:

Category	Actual management practices /Driving forces (GAPs)	Proposed BMP	Adaptation of strategies/policies	Further Steps	Funding possibilities (short description, responsibility, source)
GENERAL WATER MANAGEMENT	No DWPZ established	Proposal of DWPZ establishment	Implementation of DWPZ according to the new Water Law Act	The proposal should be implemented based on administration procedure defined within Water Law Act. Establishing of the DWPZ includes implementation of prohibitions and injunction of land use and water management. Establishment requires carrying out risk assessment taken into account possible impact of hazard on water quality and quantity.	Establishing of DWPZ requires investment of private funds due to Water Law Act regulations. Responsibility: water supplier (user of the water intake)



	<p>No complex evaluation of water hazards</p>	<p>Complex catchment modelling</p>	<p>Catchment modelling should be included in policy guidelines as important tool for water management.</p> <p>Within the preparation of local land use management plan procedures results of the catchment modelling should be taken into account</p>	<p>There is a strong need of implementation of a complex catchment modelling in daily operation of water management activities. Catchment modelling give a possibility to simulate impact of land use and potential pollution sources on water which could be used in risk analysis of drinking water source, thus being a basis for establishing DWPZ. Moreover, modelling is a complex tool possibly being used for finding solutions to improve water management and can be treated as an early warning system and for better understanding of water environment.</p>	<p>Activities require investment based on private funds and also possibility of public funds such as National Fund of Environmental Protection and Water Management.</p> <p>Responsibility: water supplier, local / regional water management authority</p>
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	<p>No information about ecology of water reservoir</p>	<p>Establishment of an ecology model of water reservoir</p>	<p>Ecological modelling, integrated with catchment models, should be included in policy guidelines as important tool for water management.</p> <p>Within the preparation of local land use management plan procedures results of the ecological modelling, integrated with catchment models, should be taken into account</p>	<p>Using ecological modelling give the users the opportunity to predict possible changes of water biology under pressures. One of the advantages is using ecological model to predict water quality under CC.</p> <p>Establishment of ecology model of water reservoir gives complex information on reservoir's ecosystem (including flora and fauna) and factors possibly have an influence on water quality and water quantity. The model simulation provides complex information on water ecosystem and can be used as one element of risk assessment.</p> <p>There is a high interest of stakeholders of using it but in the same time this need an implementation into practise with policy guidelines as obligation.</p>	<p>Practise requires investment based on private funds and also possibility of public funds such as National Fund of Environmental Protection and Water Management.</p> <p>Responsibility: water supplier, local / regional water management authority</p>
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	<p>Small scope of water monitoring</p>	<p>Establishment of constant, multi-aspect water monitoring in catchment scale</p>	<p>Establishing multi-aspect monitoring network of water environment provides full information about water quality and quantity. Conducting at least seasonal monitoring campaign gives an opportunity for following trends of changes.</p> <p>The importance of conducting multi-aspect of water monitoring should be included in policies.</p>	<p>The need of implementation of multi-aspect monitoring is well known since the approach can provide full information of water environment and possible changes.</p> <p>Conducting water monitoring based on policy requirements should be implemented with operation experiences and adjusted to needs and experiences taken from screening monitoring.</p> <p>Good quality data can be used as input data to modelling simulation, thus constituting a base for risk assessment and establishing DWPZ. Also carrying out multi-aspect monitoring provides information possibly used in daily operation of water suppliers and in Early Warning Systems for drinking water management.</p>	<p>Practise requires investment based on private funds and also possibility of public funds such as National Fund of Environmental Protection and Water Management or other support i.e. EU funds.</p> <p>Responsibility: water supplier</p>
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	<p>Low level of society awareness</p>	<p>Raising awareness and increasing knowledge</p>	<p>Set of society meeting was organised to get participants familiar with water environment and management problems.</p> <p>Society was introduced in current water policy, guidelines and BMPs established for improvement of water protection.</p>	<p>Lack in environmental awareness and low level of water protection knowledge require taking actions to increase level of awareness of society.</p> <p>There is a strong need for organising meetings with society for increasing their knowledge of water protection and possible impact of human inappropriate activities on water environment. It is highly recommended to start on early education level.</p>	<p>Private funds, also under CSR (Corporate Social Responsibility) actions.</p> <p>Possibly public funds, national programs concerns public consultation, Life+ funds, National Fund of Environmental Protection and Water Management, educational funding.</p>
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3.7. Germany:

Category	Actual management practices /Driving forces (GAPs)	Proposed BMP	Adaptation of strategies/policies	Further Steps	Funding possibilities (short description, responsibility, source)
GRASSLAND	Continuous conversion of (permanent) grasslands	Continuous monitoring program in both, surface water and groundwater	The value of monitoring should be more emphasized in the policy guidelines. Water suppliers as well as water authorities should receive incentives to better manage available data and to collect relevant data (incl. hydrogeochemical, water level and discharge data) more frequently and with a better spatial resolution.	Discussions with farmers can be a challenge. This was not only stated by stakeholders coming from the water part, but also from farmers themselves. Thus, we learned that communication with all stakeholders involved in water resources protection needs to be tailored also to get data monitored by farmers.	<p>The <u>responsibility</u> of implementing a monitoring network and gathering the data is related to the water authorities and the environmental agency.</p> <p>No funding opportunities are available to extend existing monitoring networks. However, data obtained from private companies (e.g. from construction sites) should be better exchanged with authorities, thus improving monitoring networks without further costs.</p> <p><u>Funding possibilities</u> should be elaborated for water suppliers to support them increasing their monitoring network.</p>



GENERAL WATER MANAGEMENT	Public engagement in development of action plans	Finding site-specific solutions	The value of an available hydrological model is not adequately reported in the current guidelines. This tool is of fundamental importance to find efficient site-specific solutions, to test the implementations of solutions proposed by the various relevant stakeholders and to communicate the decision-making process.	Proposing Hydrological Modelling as a BMP cannot be considered solely related to modelling hydrological processes and related effects of land use operations. Different modelling approaches need to be considered for different sites with respectively varying modelling requirements, e.g. in some parts the interest is more on simulating trends of nitrification processes while somewhere else the focus should lie on long-term predictions of the effects of floods and droughts on a considered water reservoir.	<p>The <u>responsibility</u> of finding site-specific solutions should be taken over by the water authorities and in close cooperation with the water suppliers.</p> <p>The final implementation of model derived measures can be linked to the KULAP program (https://www.stmelf.bayern.de/mam/cms01/agrapolitik/dateien/massnahmenuebersicht_kulap.pdf).</p> <p>However, <u>further funding sources</u> need to be found to support the identification of site-specific solutions</p>
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