Interreg

EUROPEAN UNION

Danube Transnational Programme

CAMARO-D

WP T3 VISIONARY DANUBE

GUIDR - GUIDANCE FOR THE DANUBE REGION FOR SUSTAINABLE LAND USE PLANNING

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Date last release	Juni 30, 2019

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MAIN FINDINGS

INTRODUCTION

This section presents the main findings that the T3 Work Package Team has come up with on the basis of outputs and deliberations within other CAMARO-D Workpackages as well as on the basis of the review of extensive literature and reports from different sources (See Bibliography on the end of this document)

Water is fundamental to the health of the biosphere, strong economic growth and human social well-being. Despite its relative scarcity and absolute importance to life on earth, fresh water resources are often used inefficiently, polluted unnecessarily and unprotected adequatelly.

In Europe there is an abundance of water in absolute terms. Total rainfall is over 10 times the volume of water withdrawn for human activities [European Environment Agency (EEA) 2005].

However, much of this water falls in northern Europe which is generally sparsely populated, whereas the more densely populated south often suffers from water shortages particularly during the summer months.

Indeed, as nearly half of the population of Europe lives in water stressed countries, it is apparent that the continent's relative water abundance is more theoretical than real (EEA 2005). (Figure 1)

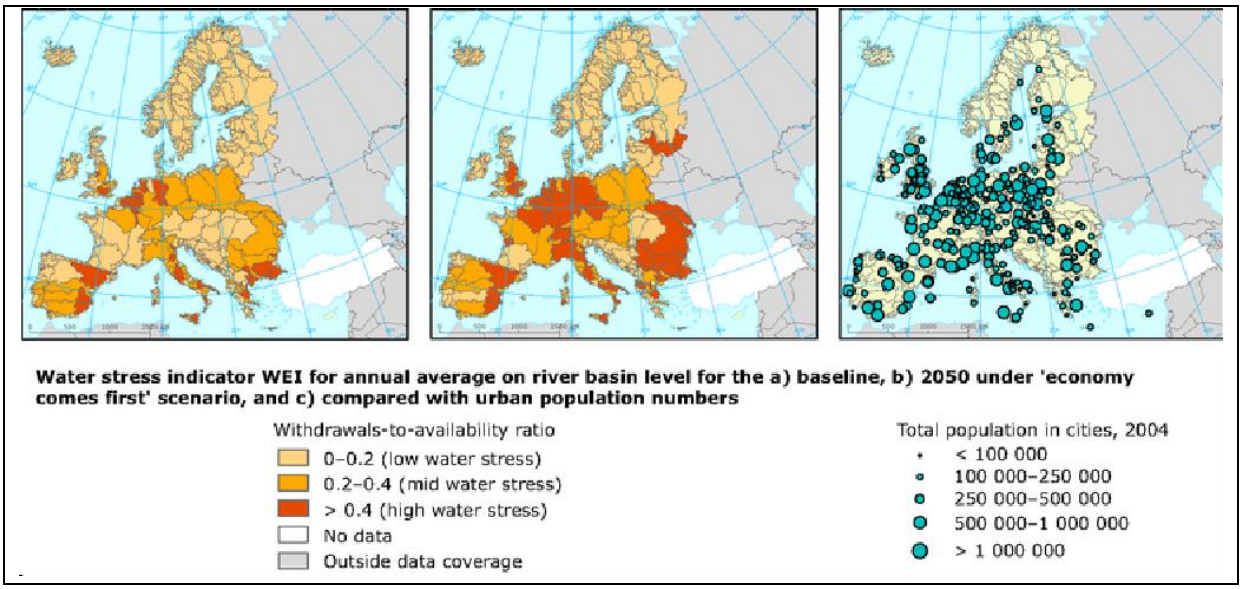

Figure 1. Water Stress in EU and Candidate Countries

water is essentially a finite resource over large parts of Europe, there are limits to which it can provide for the crucial functions that societies rely upon for their current prosperity and long-term sustainability.

Available water resources are under threat from human activities in the form of diffuse agricultural and urban pollution and over abstraction of groundwater.

CAMARO-D Project is focused on land use planning and its potential contribution to water management and more specificly its role in acheiving the EU Water Policy objectives as articulated through Water Framework Directive and thus in the role of land use planning in ensuring water security in the Danube basin.

The European Water Framework Directive, which aims to encourage the sustainable management and protection of freshwater resources, brings into sharp focus the link that exists between land use change and environmental quality and the fact that the nature and location of development can significantly influence both the generation and resolution of environmental problems.

Land use planning, which provides a framework for regulating the development and use of land, is seen an important tool supporting the achievement of the Directive's goals. In particular, land use planning has an important function in integrating the use and management of land and water more closely than is presently the case.

As part of the preparation of the GUIDR documment the CAMARO-D Project team has carried out an extensive review of the litterature on linking land use/land use planning and water management. In doing this it was recognised that land use planning essentially involves the development and implementation of strategies and procedures to regulate land use and development in an attempt to manage and balance the numerous pressures placed upon land and in fact can be equated with the term land use planning in the context of the objectives of CAMARO-D project. It should threfore be recognised that the two terms (land use planning and spatial planning) essentially have the same meaning in the context of CAMARO-D Project. The literature review ha salso led to a set of important findings that set the framework for the development of the GUIDR.

Spatial/Land use and planning essentially involves the development and implementation of strategies and procedures to regulate land use and development in an attempt to manage and balance the numerous pressures placed upon land.

It is noted that every land-use planning project is different. Objectives and local circumstances vary, but the content and aims are more or less similar. Furthermore the development of joint standards on transnational level is a challenging and slow process, but is essential for the development of the reliable LUDP at a basin level..

Making recommendations on the basis of the national practice and experience for the improved coordination of water management and spatial planning is essential for the elaboration of the planning for sustainable land management on transnational level.

The CAMARO D Project has identified the following main problems and weaknesses regarding land use planning in the participating countries:

- Stakeholders are aware of the insufficient monitoring and data to quantify the environmental impacts of their activities.
- Qualified human resources are limited. In most cases the current employees involved in land use planning are fully occupied with their daily obligations.
- Many stakeholders feel that they need to improve the dissemination of their positive environmental actions among the general public. Most of the positive actions are not properly communicated. Most of the stakeholders miss public relation know-how.
- Several countries of middle and lower Danube mention lack of involvement in EU and transboundary environmental projects.
- The most important barrier of the organization development towards better environmental conservation is the need for increased administration(additional administrative and other procedures)

FINDINGS MADE IN CAMARO-D WORK PACKAGE T3

1. Spatial planning regulates the development and use of land and provides a means of maintaining a degree of balance between the numerous and varied demands placed on land resources.
2. In essence land use planning is a regulatory instrument influencing the allocation of land uses to designated territorial units and thus it is a part of spatial planning (*a tool or an instrument of implementation of spatial and other type of plans*).

***Land use** planning regulates the development and use of land and provides a means of maintaining a degree of balance between the numerous and varied demands placed on land resources.*

3. The current planning system in Europe is a mechanism for managing the supply of land to meet a range of demands. The linkages between land use planning and the environment are well documented [Owens and Cowell 2002; Royal Commission on Environmental Pollution (RCEP) 2002; Selman 2000] Jacobs (1993, 23).
4. Changes in land use are linked to environmental change through a multiplicity of direct, indirect, sometimes cumulative and often uncertain effects'. Owens and Cowell (2002, 5). Consequently, as Blowers (2000) noted, land use planning lies at the heart of addressing environmental problems.
5. Environmental problems and their resolution often must be considered over long time periods and at wide land use scales. Land use planning has a long-term and strategic focus with plans covering large areas, sometimes for durations of 10–15 years. (Blowers 1993 1997 2000; Healey and Shaw 1993; Kivell et al . 1998; Wood 1999)

Land use planning lies at the heart of addressing environmental problems.

Land use planning has a long-term and strategic focus with plans covering large areas, sometimes for durations of 10–15 or more years.

6. Land use planning procedures are required, amongst a range of other environmental planning and management strategies and techniques (e.g. economic instruments, demand management and pollution prevention and control), to help to address challenges associated with water.

7. Planning authorities have a responsibility to ensure that the implications for water of new developments and proposed changes in land use are considered during land use plan preparation.
8. Environmental goals can be integrated within land use planning policies encouraging the development and use of land to proceed in a manner that is sensitive to these issues.

Planning authorities have a responsibility to ensure that the implications for water of new developments are considered during land use plan preparation.

9. Land use plans exert an influence over the type and location of development, and are therefore a key influence over the generation of pollutants (to air, water and land) and their subsequent distribution.
10. Land use planning policies can offer protection to sensitive environmental areas such as wetlands or ancient forests.
11. Preparation of land use plans often involves a range of stakeholders, the process provides an arena within which the conflicting environmental, economic and social land use demands can be discussed and where possible resolved.
12. Planning systems are usually organised around a land use hierarchy of plans, often operating at national, regional and local levels. This enables environmental problems, many of which will cross administrative boundaries, to be addressed at an appropriate land use scale.

Land use planning policies can offer protection to sensitive environmental areas.

Planning systems are usually organised around a land use hierarchy of plans, often operating at national, regional and local levels.

13. Land use planning relates to both the natural environment and human societies. This is significant as many environmental problems are caused by the way that humans relate to the natural environment, a relationship that land use planning can influence.
14. Land use planning provides a framework for holistic cross-sectoral thinking and policy making, which is ultimately necessary to both

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understand and address contemporary environmental problems.

15. Ecological services that water provides, economic development and social welfare rely upon supplies of fresh water.
16. Planning has a particularly important role to play where available water supplies are stretched, or where development is proposed in areas at risk of flooding.
17. Plans are often prepared according to a land use hierarchy, with plans at the national and regional level setting a general guiding framework for plans at the local level.
18. Planning policies provide a guide for planners when taking decisions concerning development within their area of jurisdiction.

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19. Development control is the process through which local planning authorities grant or refuse permission for proposals for new development or land use modifications.
20. Development control reveals the local influence that land use planning can have on water issues, as the form and location of individual developments can be directly affected.
21. In order to be effective, development control at the local level requires an appropriate supportive guiding framework at higher tiers in the planning system.
22. Development control procedures often offer planning authorities the opportunity to attach planning obligations relating to the proposed development or change in land use when granting planning permission.
23. Planning obligations and development briefs include conditions that developers must adhere to when proceeding with a building.
24. The development control process (including preapplication discussions and the attachment of planning conditions) can clearly help to address water resource challenges where necessary.
25. The WFD calls for the integration of land and water management.

WFD calls for the integration of land and water management

26. The multiple uses of and demands on a water resources mean that *an integrated approach to managing water is required*. Reconciling and coordinating competing demands relies on appropriate planning mechanisms, and planning can now be seen as the starting point

of sustainable management of water resources and the associated social and economic systems.

27. Land use planning has an important role to play in addressing water issues such as flooding and aquatic pollution which are strongly influenced by the nature and location of development.
28. Land use planning is an established mechanism through which the water management challenges raised within the WFD can be addressed.
29. If implemented in a complete and timely manner, the WFD has the potential to be the EU's first "sustainable development" Directive. (World Wildlife Fund (2001)

WFD has the potential to be the EU's first "sustainable development" Directive

30. The preparation of river basin management plans (RBMPs) (by competent authorities nominated by the member states) covering river basin districts is the key procedural requirement of the Directive.
31. A RBMP is a strategic planning document and an operational guide to implement programmes of measures that will form the basis for integrated, technically, environmentally and economically sound and sustainable water management within a River Basin District for a period of six years. It will be developed in consultation with the public
32. The process, content and extent of RBMP is is set by the requirements of the WFD and water related land use plans would fit into this through integration into different stages of the RBMP development and especially within the context of the program of measures which every RBMP must contain.This will effectively make water related land use planning an integral part of the RBDP.
33. The scope of the WFD is clearly far-reaching and its implementation will impact on many sectors from agriculture and forestry to water services and land use planning.
34. The successful achievement of the WFD's goals will ultimately depend on the effective integration of land and water management processes.

The successful achievement of the WFD's goals will ultimately depend on the effective integration of land and water management processes.

35. Planning authorities have a key role to play in implementing the WFD through ensuring that the development and use of land is undertaken in a manner that is sensitive to the requirements of the Directive (White and Howe 2003).

Land use planning can make an important contribution to the achievement of the legislative requirements of the WFD

36. Land use planning can make an important contribution to the achievement of the legislative requirements of the WFD.
37. Article 11 of the WFD concerns the preparation of programmes of measures (POMs). These measures must be developed by WFD competent authorities and included within RBMPs in an effort to meet the Directive's environmental objectives within individual river basin districts.
38. Land use planning procedures can contribute directly to some of the 'basic measures' outlined in Article 11, which are minimum requirements for inclusion within RBMPs. They include measures to (EC 2000):

Land use planning procedures can contribute directly to some of the 'basic measures' which are minimum requirements for inclusion within RBMPs

    a. Promote an efficient and sustainable water use.
    b. Safeguard water quality in order to reduce the level of purification treatment required for the production of drinking water.
    c. Control of point source discharges liable to cause pollution.
    d. Control of diffuse pollution sources.
    e. Prohibit direct discharges of pollutants into groundwater.
    f. Eliminate pollution of surface waters.
    g. Prevent and/or reduce the impact of accidental pollution incidents, for example as a result of floods.
39. If planning systems are not able to be proactive in terms of encouraging the sustainable use of water, water resource problems and their associated environmental, economic and social impacts will be likely to restrict development activities and opportunities in the future.

40. Land use planning policies can significantly affect the demand for water, water use and water quality and need to be recognised more strongly in policy-making' (DEFRA 2002, 17)

Land use planning policies can significantly affect the demand for water, water use and water quality and need to be recognised more strongly in policy-making'

41. The negative impacts of precipitation [flooding, diffuse pollution etc.] should be regulated by the land use planning system' (Howe and White 2004, 262)

The negative impacts of precipitation [flooding, diffuse pollution etc.] should be regulated by the land use planning system'

42. It is important that good links are made between the land use planning system and water planning' (Environment Agency 2005, 12)
43. There needs to be a much stronger emphasis on using land use planning to integrate decisions on land use and built development with policies for water resources (Council for the Protection of Rural England)
44. There is wide recognition that the water environment is increasingly challenged by the effects of development, and since the management of development is the role of the land use planning system, it is important that sufficient connection is made between the water environment and the planning system' (Baker Associates 2005)
45. Policies within regional land use plans can usefully set out a broad strategic framework for considering water at the local planning level.
46. At the strategic level, land use plans (both regional and local) can influence development activities with the potential to pollute water bodies or to pressure water supplies of and wastewater treatment facilities.

There are several specific elements of land use planning that can aid the implementation of the WFD, including its long-term approach and that the planning process provides a forum for stakeholder involvement

47. Planning policies can both lessen and worsen flood risk. They can act to protect natural floodplains and permeable surfaces such as urban green spaces that help to absorb storm water (limiting the scale and intensity of floods) and reduce diffuse pollution created by runoff.

48. There are several specific elements of land use planning that can aid the implementation of the WFD, including its long-term approach and that the planning process provides a forum for stakeholder involvement.

49. National governments and other stakeholders responsible for the WFD are increasingly recognising that land use planning provides an established mechanism that can help them to meet this requirement.

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50. The UK government department with responsibility over the planning system has stated that planning should be utilised to ensure new developments consider the needs of the water environment as identified within RBMPs (Office of the Deputy Prime Minister 2004).

51. Land use planning is already making an important contribution to meeting the WFD's key goal of achieving good water status, yet it is not the WFD itself that is driving this activity. Instead, planners in countries such as England and Germany are carrying forward a long tradition of addressing environmental issues through the planning system.

52. Established planning approaches and techniques such as stakeholder involvement (an important determinant of the success of several of the ENMaR case studies including the water development plan for the Leine river(ENMaR is a short name of the EU funded Project on Environment and marine systems) and SEA(Strategic Environmental Assessment) are likely to prove valuable in taking this framework forwards.

53. Emerging approaches and techniques such as flood risk assessment and geographic information systems can be added to the list of tools available to planners.

54. Many case studies demonstrate that land use planning is often a low-cost option for safeguarding and enhancing the water environment, particularly in comparison to the provision of infrastructure such as water treatment plants or structural flood defences for example.

Case studies demonstrate that land use planning is often a low-cost option for safeguarding and enhancing the water environment, particularly in comparison to the provision of infrastructure as an option

55. Planners and relevant stakeholders should also be encouraged by the multifunctional benefits generated by the land use planning initiatives explored during the case studies.
56. Ultimately, the 'spirit' of the WFD goes beyond the achievement of good water status and requires an evolution in the relationship between human societies and the water environment, and land use planning processes have the potential to help stimulate.

Ultimately, the 'spirit' of the WFD goes beyond the achievement of good water status and requires an evolution in the relationship between human societies and the water environment.

57. There are considerable challenges faced by planning systems in reconciling conflicts between economic development, social progress and the sustainable use and management of water environments.
58. Land use planning influences the nature and extent of the use of land, the process is intensely political. The contents of land use plans, therefore, tend to reflect political, social and economic priorities (Carter 2001; Cullingworth and Nadin 2002).
59. Ultimately, for the requirements of the WFD to be implemented successfully and effectively, political commitment to achieving the goals of the Directive is crucial.
60. Raising awareness of the multifunctional benefits of improving the water environment amongst stakeholders and decision makers would be a first step towards encouraging this change in mindset.
61. Planning has been found to be lacking in tackling the complex environmental problems characterising today's society, and planning's effort to balance the needs of economic development and environmental protection has failed (Bennett (1995).

Planning has been found to be lacking in tackling the complex environmental problems characterising today's society.

62. Meeting the requirements of the WFD via land use planning would undoubtedly provide a major boost to achievement of policy objectives. At present, however, planning lack of success in addressing complex

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environmental problems may hinder its potential role in the context of the WFD.

63. Particular features of the WFD present challenges to land use planning systems.
    a. The Directive effectively recognises that water bodies cannot be valued and managed as economically productive goods, and must instead be regarded as natural ecosystems.
    b. A move away from water resource management based around administrative and political boundaries towards an appreciation of the geophysical context within which water exists.
    c. Principally, there is a need to acknowledge that administrative boundaries may hinder the development of a holistic ecologically focussed approach to water resource management based around natural river catchments as promoted by the WFD.
    d. However, it is of concern that there is often a lack of coordination between municipalities (and higher level planning authorities at the regional level) in terms of the management of water issues.
    e. Planning authorities sometimes act in isolation in shared river basins, which is not conducive to effectively dealing with challenges concerning the water environment which do not fall neatly within administrative boundaries.

Planning authorities sometimes act in isolation in shared river basins, which is not conducive to effectively dealing with challenges concerning the water environment

    f. Another procedural barrier is that the process of preparing the key delivery agent of the WFD, the RBMP, is not taking place in tandem with land use plan preparation.

64. New working practices and stakeholder relationships will be needed to avoid problems associated with the current land use and temporal mismatch between the planning of land and water existing in some European countries.

65. International and national management of water resources have been conducted in a fragmented way, based on immediate needs and interests, without adequate regard to the finite nature and interdependence of the elements of the natural water cycle, Abu-Zeid (1998)

International and national management of water resources have been conducted in a fragmented way, based on immediate needs and interests, without adequate regard to the finite nature and interdependence of the elements of the natural water cycle.

66. One of the biggest hurdles for effective implementation of the WFD is the integration of water within other sectors, including land use planning activities (European Environment Bureau 2001).

One of the biggest hurdles for effective implementation of the WFD is the integration of water within other sectors, including land use planning activities.

67. A barrier therefore exists in promoting a holistic approach to land and water management as major polluters of the water environment are managed separately from the land use planning system.

Direct links between the WFD and municipal level land use planning approaches are rare, and the challenges faced by planners when attempting to take genuine steps towards promoting sustainable water management are great

68. Several other barriers exist that limit the potential contribution of land use planning to water management, and hence the WFD.
    a. National legislative frameworks linking land use planning and the WFD are not adequately developed and need to be strengthened.
    b. At present, municipalities and organizations that support them are lacking a solid framework to build upon and to act as an incentive to stimulate activity in this area.
    c. There is also a lack of knowledge and experience amongst planners concerning the water environment and of measures to address challenges such as flooding and groundwater protection. This problem is exacerbated by a lack of data.

69. Tools such as SEA can be usefully applied to raise awareness of the impacts of land use plans on water.
70. Competent authorities should be encouraged to support municipalities by acting as a focal point for data on the water environment.
71. There is a lack of resources (including time, money and staff) available to some municipalities to undertake their land use planning duties. Faced with limited resources, concern for the water environment may sometimes be marginalized in favour of issues such as economic development and housing.
72. Direct links between the WFD and municipal level land use planning approaches are rare, and the challenges faced by planners when attempting to take genuine steps towards promoting sustainable water management are great.
73. According to Carter (2007) ongoing changes across Europe to incorporate the WFD within land use planning legislation and guidance indicate that it is only a matter of time until land use planning approaches targeted at meeting the Directive's goals begin to emerge more regularly.
74. Suggestion that WFD should be incooperated within land use planning legislation will be beneficial only if land use planning becomes a constituent part of the RBMP for any

Recommendation

Land use planning should be an integral part of ***RBDP Program of meassures****, esspecially so for protected areas as per WFD Article 6. This suggest that land use plans for protected areas in article xxx of the WFD should be a constituent of the RBMP for any given basin and especially so for transboundary river basins* considering that EU has no jurisdiction over land use planning at national level.

Protected areas under WFD are:

1. Areas designated for the abstraction of water intended for human consumption under Article 7;
2. Areas designated for the protection of economically significant aquatic species;
3. Bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC;
4. Nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC and
5. Areas designated as sensitive areas under Directive 91/271/EEC; and
6. Areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 92/43/EEC and Directive 79/409/EEC.
7. Areas at risk of floods under Floods Directive (art 5)

given basin and especially so for transboundary river basins considering that EU has no jurisdiction over land use planning at national and lower levels.

75. While EU has no direct mandate on spatial and land use planning at a national and lower levels it does exert direct and indirect influence on spatial and land use planning through other policies which have spatial and land use ramifications (Water Framework Directive, Floods DIrective, Nitrate Directive etc.).
76. All land use planning efforts and measures at transnational scale should occur within the scope of water related Directives and primarelly and probabley most effectivelly within the transnational planning framework established within WFD and FD.
77. The most effective way to introduce water related land use management and planning would therefore be through the plannig DPSIR Planning framework establihed and allready obligatory for all Member states (within RBMP Planning system)
78. Planners should trust the planning process. A clearly scoped and designed process with a specified timeframe and outcome should facilitate, contain and make sense of the chaos, complexity and iteration required to converge on an implementable plan. This does not imply an inflexible and static process, but rather one that adapts to emerging issues and information.
79. ***The Water Framework Directive (WFD) defines a framework for the protection of inland surface waters***, transitional waters, coastal waters and groundwater [European Commission (EC) 2000].
80. ***The WFD also provides for the long-term protection of water resources*** through promoting sustainable water use and the reduction of groundwater pollution, and aims to mitigate the effects of floods and droughts.
81. Planning decisions on water related issues (quality and quantity) are to be taken on a river basin level. Any land use planning intended to modify in any way or manner water quantity and quality fals under this legal reqirement!
82. European commission is the only body that can make new policy proposals. Any change in transnational policy and regulations has therefore to come via EC.
83. Basin planning is a process of: Assessing and prioritizing issues of concern; Deciding on the way in which these priorities should be

RECOMMENDATION

1. The main spatial unit for water related land use planning is river basin district/catchment.
2. Use DPSIR framework in your planning efforts.
3. Use ecosystem based thinking when analyzing causal paths within the DPSIR framework.

managed to achieve social objectives; Specifying the way in which different competing may develop or use the basin water resources

84. The primary purpose of planning is to provide a Plan as an instrument for making decisions in order to influence the future. Planning is a systematic, integrative and iterative process that is comprised of a number of steps executed over a specified time schedule.
85. This basin planning process can be represented in four key stages:
    a. Conducting the situation assessment to gain an understanding of the current and future conditions in the basin, as well as identify and prioritize the key issues.
    b. Formulating the vision and goals to provide the long term aspirational desired state for the basin together with goals (preliminary objectives) and principles to achieve this over time.
    c. Developing the basin strategies to specify a coherent suite of strategic objectives, outcomes and actions related to protection, use, disaster and institutions in the basin, designed to achieve the vision.
    d. Detailing the implementation to define actions that give effect to the basin strategies and ultimately achieve the vision and objectives.
86. Planning has the capacity to increase the legitimacy of decisions to be taken by enabling open and wide dialogue between the public, interest groups and authorities. It's crucial for the legitimacy of a planning process to start dialogue as early as the phases of problem defining and setting the agenda. Better understanding of the interests of those involved arising during the planning process and so the chance to influence planning will increase their willingness to co-operate in problem solving.
87. Some issues can create conflicts in water resources planning that are not necessarily the result of wrong or illicit approaches. As different people have different goals, perspectives, and values, water resources planning should take into account multiple users, multiple purposes, and multiple objectives. Planning for maximum net economic benefits is not sufficient. Issues of equity, risk, redistribution of national wealth, environmental quality, and social welfare can be as important as economic efficiency. It is clearly impossible to develop a single objective that satisfies all interests and all political and social viewpoints.
88. The planning process should develop a number of reasonable alternatives to consider; evaluating from each one its economic, environmental, political, and social impacts. However, achieving environmental, social and economic goals simultaneously can be

impossible. Therefore, it will be necessary to develop a balance between environmental functioning and users with conflicting aims.

89. Planning can help practitioners to approach complex problems, to organise thinking, and to form the understanding necessary to strike that appropriate balance. Only in that way, crucial issues can be identified and sometimes difficult choices made on the basis of adequate information and a full review of the options.
90. The WF and Flod Directives explicitly require Member and Accession States to produce a management plan for each RBD. The River Basin Management Plan (RBMP) is intended to record the current status of water bodies within the RBD, set out, in summary, what measures are planned to meet the objectives, and act as the main reporting mechanism to the Commission and the public.
91. There are a number of outputs of this process, in the form of reports, that Memberand Accession States are required to submit to the Commission by prescribed deadlines in order to confirm progress. The river basin planning process is followed by the implementation of the management plan.
92. Uncertainty is always an element in the planning process. It arises because the complexity of the many factors involved. In fact, meteorological, demographic, social, technical, and political conditions which will determine the planning process have behaviour patterns not always known with sufficient accuracy.

93. EU regulations requires that spatial context for integrated and co-ordinated water management has to be the river basin district level. As a matter of "good practice", river basin planners and managers need to build some cross-cutting principles into all components of their work, to ensure that co-ordination and coherence required for effective results is actually achieved.
94. Traditional water and land use management assumes that the development future is independent of the water and land use future. The WFD approach differs in that it assumes that the future is to a large extent a function water and land use future and that basin VISION drives the final outcome.
95. Purpose-specific thematic analysis techniques and models tend to be developed around the priority issues. The aim of basin planning is to ensure that the assumptions and principles underlying these different techniques are consistent and that the interactions between them are considered.

The process of developing a basin vision tends to be a combination of centralized political positioning, institutionalized bureaucratic negotiation and decentralized stakeholder consultation, with the balance between these forces being dependent on both the planning context and the specific situation in the basin.

In practice, this is inherently a political process that needs to be managed carefully by the facilitator of the basin planning process.

Technical and economic analyses are largely used to support the development of objectives and the evaluation of management options to achieve this vision.

96. There is a natural progression from 'good knowledge' and 'good tools' to a 'good plan'. However, planning is far more complicated, and often a scientific approach alone is not adequate to make sound decisions. There is no scientific way to choose between a solution with moderate costs and benefits and an alternative with higher costs and benefits, although many tools are available for illustrating the implications of the choice, or even to simulate choice on the basis of various criteria. Deciding on basin priorities is **inherently a political decision**, and is typically the outcome of an iterative and even chaotic process involving some **degree of negotiation between political leaders, bureaucrats and/or stakeholders**.
97. The basin objectives will only the achieved through coordinated, coherent and appropriate management actions. Thus the achievability of an objective must first be

assessed against the possible actions (alternative measures) that might be implemented to jointly contribute to its attainment, and second, the viability and sustainability of these actions need to be evaluated from technical, financial, social, environmental and institutional perspectives.

98. In international RBDs the implementation of the programmes of measures should be co-ordinated for the whole of the river basin district for the significant water management issues identified. For river basins extending beyond the boundaries of the Community, Member States should endeavour to ensure the appropriate coordination with the relevant non-member states.
99. If a particular land use is shown to cause pollution of an important water resource the application of "polluter pays principle" would suggest that the owner of the land with a particular land use category would be responsible for damages and meassures to control such pollution. This is of particular importance for the agriculture sector and agriculture land uses as is reflected in the Nitrates Directive and obligatory measures under it.The opposite situation may apply to certain land uses such as forestry where such a land use can be documented to reduce pollution of a particular water resource. If this is the case the question arises whose pollution is such a land use removing and should the owners of forestry lands be compensated for the services provided by their land and who should pay such a compensation or should some other economic incentives be provided to owners of land under forest.
100. Catalogue of measures and best practices based on experience is a valuble component of a toolbox available to water and land use planners and is seen as significant resource for the RBDP process and deffinition of program of meassures.
101. Water related land use planning should focus on ecosystem services provided by different land uses in the context of WFD requirements. It is therefore imperative that evaluation of the role of ecosystem servicies in water management be considered as a part of land use planning within the RBDP process.
102. ***Basin/Catchment planning is not for the faint of heart*** – it is difficult and chaotic, requiring the balancing of competing interests and critical decision-making often without adequate information. Basin planning is only likely to become a more challenging area of engagement for the allocation of resources to meet social, economic and ecological imperatives in an increasingly water-stressed world.

OTHER FINDINGS (FINDINGS FROM CAMARO-D WORK PACKAGES T1 AND T2)

1. Different countries of the Danube region do not have the same problems and they do not find the impacts of stakeholder behavior in the target areas as similar
2. The water quality is a major issue in every CAMARO-D country,
3. Few practices were identified as significant for flood risk. It does not mean that flood risk is not an issue in the Danube region countries, but the countries are aware that flood risk is least influenced by land management and more by natural conditions (climate). Minimum of only 20% of practices were connected to the flood risk in Croatia, maximum 57% in Austria, followed by Bulgaria (56%) and Czech (55%).
4. Looking at the variability of vulnerability interconnections in different countries, again we can see, that water quality is a major issue in all Danube regions, but the flood risk and soil functioning are differently valued as a land management problem in different countries .
5. In Czech Republic, Austria and Hungary the flood risk is considered to be influenced by more bad practices than the soil functioning.
6. In Croatia, Slovenia, Germany, Bulgaria, Romania, Serbia it is the opposite and soil retention capacity is considered to be more affected. Especially in Croatia there are 3.5 times more practices assigned to be risky for soil functioning than for flood risk (71% to 20%). In Germany and Hungary flood risk and soil functioning are rated almost as equally endangered.
7. If we search more in detail in the three vulnerability areas, we can see the differences between countries and the six land management segments presented in the introduction.
8. The Danube region is not homogenous and considering the mix of factors, the development of blueprint methodology for integrated land use planning should adhere to local and regional differences.
9. The Danube region has a great diversity of landscapes that are the result of both natural processes and the long history of human land use.
10. Many problems of land use are specific to particular areas, not only because of their differing physical environments but also because of local and cultural social conditions.
11. Watershed management is a dynamic and continually readjusting process. Watershed management is continuous and needs a multi disciplinary and flexible approach.

FINDINGS ON LAND USE TYPES AND INTERDEPENDENCES WITH WATER MANAGEMENT

AGRICULTURE

1. Erosion can occur due to unsustainable agricultural practices such as inadequate tillage methods, improper drainage, ploughing on steep slopes and use of heavy machinery on arable lands resulting in soil degradation.
2. Soil compaction is often caused by the use of heavy machinery in agricultural practices, which creates disturbance on soil morphological structure resulting in increased surface water runoff.
3. The uncontrolled use of pesticides is present causing decrease of soil and ground water quality along with the minimal or no crop rotation. Furthermore, buffer zones are not always present between rivers and arable land, which disrupts the structure of river banks.

FORESTRY

1. Forest management practices affect drinking water status through clear cut practices that result in nitrate loss exported by seepage water.
2. Monocultures accelerate soil acidification and nitrogen saturation. Such high nitrogen emissions lead to increase nitrogen saturation in forest soils.
3. Tree dieback causes reduced nutrient uptake from soils and increased soil mineralization, hence nitrate export to groundwater resources is increased.
4. Increasing concentrations of dissolved organic carbon is a serious issue for drinking water management.
5. Concerning the management of water quantity, use of heavy machinery in forest management practices leads to soil compaction, decreased soil morphological structure and increased surface runoff.
6. The increased surface runoff leads to high risk of soil loss, respectively erosion and greater risk of flash floods.

GRASSLANDS AND ALPINE PASTURES

1. Intensively managed alpine pastures and grasslands due to livestock grazing are causing change in biodiversity, landslides, erosion and surface run off, soil degradation and eutrophication.
2. These conditions are favorable for the increasing population of invasive species as there is often lack of policies or appropriate management practices concerning the elimination of non-native species.

FINDINGS ON STANDARDS FOR CATCHMENT BASED, FUNCTION ORIENTED LAND USE MANAGEMENT AND SPATIAL PLANNING

1. The planning processes, based on Existing strategies and regulations need to be improved according to current watershed management state and requirements.
2. Land use planning is a contribution to sustainable land management (SLM), which encompasses the ecological, economic and socio-cultural dimensions of sustainable development. /Metternicht, G./. The process, comprises land use planning, land use design and land development.
3. The land use planning policy is crucial for supporting Sustainable Land Management.
4. Crucial element of land use management on watershed level is to guarantee the environmental, social and economic functions of every land use type. This is a very hard process, which requires good planning and effective partnership between all stakeholders and decision makers.
5. The catchment land use management should include several important processes and features that SLM will be guaranteed:
    - Land use planning
    - Public and private partners collaboration
    - Guaranteeing the sustainability of the land type functions - problem
    - Appropriate use of land throughout the watershed - problems
    - Relevant institutions meet multiple objectives - problems
    - Innovative and cost-effective solutions through partnerships and leveraging
    - Effective Decision Making process and active participation of all stakeholders

FINDINGS ON EFFECTIVE DECISION MAKING PROCESS AND ACTIVE PARTICIPATION OF ALL STAKEHOLDERS

1. Standards for function oriented land-use management and spatial planning within the Danube River Basin should consider the different national legislations in the partner countries (e.g. regional and transnational development plans), as the LUDP will be developed in accordance with already existing management plans and strategies, focused on the Danube River Basin Management Plan, Joint Danube Survey (JDS), EUSDR and various monitoring programs.

FINDINGS ON CATCHMENT BASED POLITICAL ORIENTED, TRANS-SECTOR AND TRANSNATIONAL COOPERATION

FINDINGS ON TRANS-SECTOR AND TRANSNATIONAL COOPERATION

1. Land-use planning is non-sectoral by definition but, unless a special planning authority is set up, which is very rare, a plan must be implemented by sectoral agencies - in agriculture, forestry, irrigation, etc.
2. On the other hand the planning is a process on different levels – local, regional, national and transnational level.
3. Other challenge is to integrate bottom-up aspects with top-down aspects, which is “vertical integration” and to carry out the inter-sectoral cooperation, which is “horizontal integration”.
4. For the preparation and implementation of comprehensive planning strategies and plans the main aim is to ensure commitment and cross-agency government support (vertical and horizontal integration). The cooperation and planning process should be also future-oriented or “visionary”.
5. Sustainable land management should facilitate the development appropriate to the suitability of the land and the socio-economic context.
6. Partnerships between the authorities on national level and local authorities (councils, municipalities) for the identification of problem, priorities and best solutions is a key to the integration of sustainable land management into comprehensive Land use Development Plan /LUDP/.
7. For the development of successful LUDP a good governance for the effective coordination of policies between different sectors and policy levels is required. Horizontal coordination of sector administrations and policies, vertical coordination of different levels of responsibilities and the active involvement of all relevant stakeholders is essential for the development of LUDP.
8. Once developed, to guarantee the implementation of planning instruments for sustainable land management, mechanisms of enforcement and strength capacity-building are essential.

FINDINGS ON RECOMMENDATIONS FOR IMPLEMENTATION OF BEST PRACTICES IN EXISTING STRATEGIES, POLICIES ETC.

1. Best practices carried out in WPT2 pilot areas need to be analyzed and used for the development of recommendations on national and transnational levels.

CHAPTER 1: ROLE OF LAND USE PLANNING IN WATER MANAGEMENT

CHAPTER 1:
SETTING THE SCENE: ROLE OF LAND USE PLANNING IN WATER MANAGEMENT

INTRODUCTION (BACKGROUND)

Water resources provide the lifeblood of natural systems, societies and economies. People have lived near and on rivers, lakes, wetlands and deltas for many centuries. Most early civilizations emerged on the banks of some of the world's iconic rivers. Rivers and groundwater provide a multitude of services such as water supply for farms and cities, waste disposal for factories and households, fisheries to provide food for communities, energy to drive economies, flood attenuation for downstream developments, cultural and recreational enjoyment for people, spiritual upliftment for believers and a habitat for many animals.

It is precisely because water resources provide so many functions that planning for their use is so complex. Unfortunately, the demands on water resources increasingly exceed their natural capabilities, resulting in over-abstraction, pollution, alien vegetation infestation, floodplain alteration and habitat destruction. ***These failures are usually the consequence of poor decision-making, inadequate management and inappropriate planning.***

MESSAGE: The multiple uses of and demands on a water resources mean that ***an integrated approach to managing water is required***. Reconciling and coordinating competing demands relies on appropriate planning mechanisms, and planning can now be seen as the starting point of sustainable management of water resources and the associated social and economic systems.

Water related land use planning in **transnational** context is one of the focus areas of CAMARO D Project. As such it is of primary interests of this document. Transnational in this case refers to the Danube River Basin which is mostly on the territory of EU Member states or EU candidate countries. This being the case EU Policy and regulations are the most important determinants of the planning scene in the area covered by the project. Understanding this scene is therefore of crucial importance.

IMPACTS OF EU POLICIES

EU policies can have a pervasive influence on land in Europe; their impacts need to be considered in terms of Europe's complex, multi-level governance system, from EU to national, regional and local

levels. *The specific contexts, including the policies and institutions within each Member State, play a key role in shaping the impacts of EU policies*.

Figure 2 presents this framework, which incorporates the following elements:

- policy **objectives**, which are the strategic goals and targets that an intervention is seeking to achieve — and which seek to address one or more economic, social or environmental needs;
- policy **inputs**, including instruments such as EU funding, legislative requirements and strategic documents, including their reference (or lack thereof) to land use and assessments;
- policy **outputs** comprising implementation of the policy instruments in the Member States, for example national strategies and programmes and the actual spending;
- sectoral policy **results** in the form of the completed investments; these results are related to a varying degree both to EU sectoral policy objectives and to the objectives on land;
- **impacts**, including intended and unintended impacts, and direct and indirect impacts, of EU policies on land use.

Within this policy framework, and especially at the level of outputs (implementation in the Member States), at least three factors are of crucial importance (4):

- the **context** in which these instruments are put in place — which can include a range of national as well as regional and local factors, including the spatial planning framework, key national policies, institutional structure and capacities of government, as well as the role of key stakeholders;
- **interactions** with other EU policies;
- the role of **assessment tools**, such as strategic environmental assessment (SEA) and Land use plan (LUP) tools.

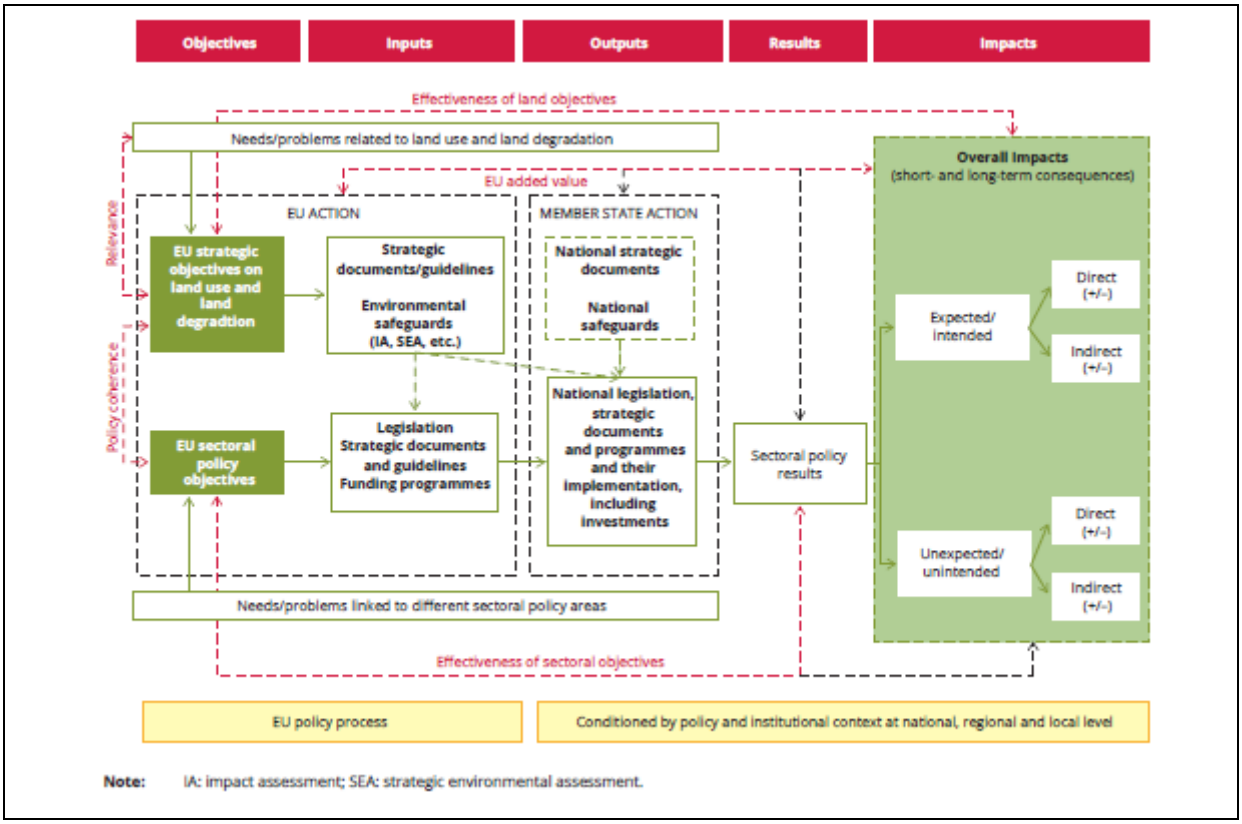


Figure 2. Conceptual framework for the evaluation of an EU policy's impacts on land

This is the spirit of many Territorial Impact Assessment (TIA) methods currently under development (Evers, 2011). The terms influence, impact and effects are usually used more-or-less interchangeably. In general, 'influence' denotes the existence of some kind of causality, while 'impact' is used analytically to highlight a specific relationship.

TYPES OF INFLUENCE

In the introduction to their book *Grenzeloze Ruimte* (Borderless space), Janssen-Jansen and Waterhout (2006) state that the EU influences spatial planning in four distinct ways. This distinction is used to categorise the *origins* (see Figure 3) of the European influence.

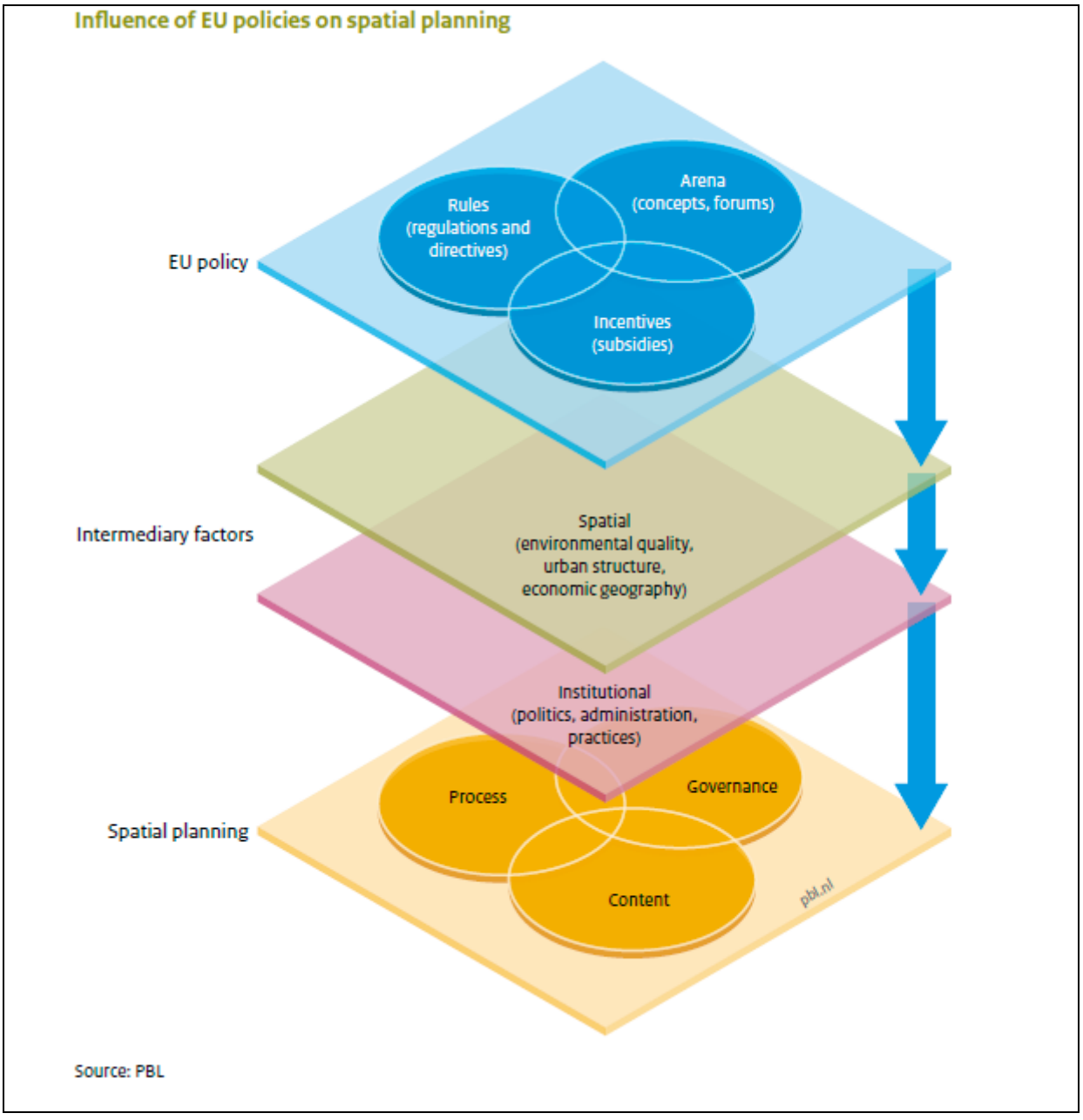


Figure 3 Influences of EU policies on spatial planning

Firstly, according to those authors, the EU can act as a 'stimulator' by providing subsidies; in this case it makes something new possible. The more general term 'incentives' is often used as some incentives can reinforce the existing situation; for example, in the case of income subsidies for farmers. Secondly, Europe can, according to Janssen-Jansen and Waterhout (2006), be a 'hindrance' through regulations (rules) that restrict planning initiatives (e.g. by forbidding state aid). Although many rules can be considered a hindrance, they can also provide structure, and even act as a

stimulator by reducing uncertainty. Thirdly, the EU is an 'arena' where actors involved in spatial planning can interact.

It is important to describe how EU policy can impact planning (bottom layer). First of all, EU policy can affect spatial development; for example, if certain areas are zoned in a particular way (e.g. Water Framework Directive (Protected Areas articles), Floods Directive(Flood Risk zoning), (Nitrates Directive(Nitrate sensitive yones), the Habitats Directive etc). Secondly, EU policy can affect the spatial planning process by, for example, mandating research (e.g. environmental impact assessments) or setting public procurement rules. Lastly, EU policy can affect governance relationships, primarily as a result of the institutional sensitivities discussed above.

The influence of EU policy is notoriously difficult to quantify. There are some distinct differences between EU and national policies. One concerns inflexibility of the former. EU law takes precedence over national law and an EU rule cannot simply be changed by national governments if implementation problems are encountered in practice. The notion of 'tolerance' (pragmatic non-enforcement) is an unknown concept in Brussels (Van Ravesteyn and Evers, 2004). Because of this, EU policies (e.g. Natura 2000) generally take precedence over national policy (e.g. National Ecological Network) in spatial planning practice. This can also be seen in the spatial planning decision-making process; individuals can lodge a complaint against the government should it fail to act in accordance with EU legislation.

A second difference is that EU policy often creates international dependencies and therefore alters governance relationships. **Because of the Water Framework Directive and the Floods Directive, for example, planning decisions on water quality and quantity are now taken at the river basin level**. Even without enforcement by the European Commission, a unilateral decision could incur resistance from the international partners. In each case, and as shown above, EU policy can hamper, limit, encourage, complement or facilitate national policy. This effect, and its desirability, depends very much on the positions of the parties involved.

PLANNING DECISIONS ON WATER RELATED ISSUES (QUALITY AND QUANTITY) ARE TO BE TAKEN ON A RIVER BASIN LEVEL

Any land use planning intended to modify in any way or manner water quantity and quality fals under this legal reqirement!

The **arrival of a 'fourth layer of governance' (EU Level)** has altered governance relationships in the member states, including those relevant to spatial and land use planning. As there is no specific EU spatial planning policy, the EU's influence is fragmented and differs from one policy area to the next. This influence changes as EU institutions change and policies evolve. The activities of national actors (e.g. National Parlaments, Euro MPs and national representatives) in Brussels may also affect planning governance. Moreover, changes in governance within a country (e.g. decentralisation of spatial policy, reforms, budgetary cuts, administrative restructuring and the transfer of risk) also determine the influence of EU policy.

Although the popular media is rife with cries about a loss of sovereignty to the 'Brussels super state', the development of an EU layer of governance through an ongoing process of political, economic and legal integration is a given in all member states. For municipalities and provinces, Europe signifies a new governance reality, the importance of which cannot be overestimated because whether you see Europe as the solution or the problem, one thing is certain: Europe is a fact of life' (Rob, 2013: 3).

Description of the EU bodies that have the most influence on spatial and land use planning is given next, followed by a brief introduction of a few policy areas that have, or will have, an impact on the spatial domain. Each EU policy area has its own policy development pathway, its own governance system and, therefore, its own influence on planning.

The executive body of the EU, the **European Commission (EC)**, is arguably the most 'European' of EU institutions. **The EC is the only body that may make new policy proposals**, and is also responsible for ensuring that policy is implemented properly.

Since the EU Treaty does not provide a clear mandate for EU intervention in spatial planning, it is not surprising that no spatial planning DG exists, or will exist in the foreseeable future. The most relevant DGs that propose new legislation that can affect spatial planning in the Member States and that can enforce existing policy are:

EUROPEAN COMMISSION IS THE ONLY BODY THAT CAN MAKE NEW POLICY PROPOSALS

Any change in transnational policy and regulations has therefore to come via EC.

Regional and Urban Policy (REGIO). This DG is historically the most involved in spatial policy development at the EU level. It played an active role in developing the European Spatial Development Perspective (ESDP) in 1999 and the ESPON programme. Even so, the policy focus of this DG is territorial rather than spatial.

Environment (ENV). This DG is ***responsible for policy proposals that are highly relevant to spatial planning, both in terms of content and process***. It also monitors the implementation of nature and environment legislation in the Member States and takes legal steps in cases of non-compliance.

Agriculture and Rural Development (AGRI). Although the Common Agricultural Policy (CAP) has had a tremendous impact on land use, it has almost no influence on spatial planning. The first pillar of the CAP (income support to farmers) is spatially blind. The effects of the CAP on spatial planning are indirect and weak but still considerable in terms of the CAP's physical footprint. The second pillar (rural development) is more modest in terms of funding but much more relevant to spatial planning, as it is place-based and engages sub-national authorities (provinces) for implementation.

Competition (COMP). The aim of this DG is to create a level playing field and ensure equal market access. Theoretically speaking, this has little to do with spatial planning, so when it does affect spatial development, this usually comes as a surprise. Planners are 'caught unaware' by questions from the EC on, for example, state aid to housing corporations, out-of-town retail policy, land

transactions or public procurement procedures. DG Comp often works with regulations (which are applied directly in all Member States), or directives.

Mobility and Transport (MOVE). Most EU transport policy is not highly spatial in nature, focusing instead on traffic and transport regulations. The Trans-European Networks (TENs) policy is an exception, as it designates priority infrastructure projects. DG Move policy takes the form of subsidies – either through the Structural Funds or a modest TENs budget (incentives) – and by conferring symbolic value by identifying EU priority projects (arena).

Maritime Affairs and Fisheries (MARE). Although the physical territory of DG Mare falls outside that of traditional spatial planning, there is some interesting overlap. The Maritime Spatial Planning directive (CEC, 2013d) took effect in September 2016 and serves as an example for spatial planning on land (arena).

The **Council of the European Union** (also called **Council of Ministers or EU Council**) should not be confused with the Council of Europe (which includes 47 Member States, is not an EU institution and has only advisory capacity) or the European Council (which is composed of the heads of state of the Member States). Together, the **EU Council and the European Parliament (EP) hold the legislative power within the European Union**. Like the Commission, the ***EU Council has no configuration for spatial policy***, and not even one for regional policy. There is, however, an informal gathering of ministers for spatial planning and territorial cohesion which draws up non-binding agreements and discusses territorial issues.

Before the Maastricht Treaty, the **European Parliament (EP)**, which consists of directly elected members, had only an advisory role. Now it **holds real legislative power** alongside the EU Council and is amassing power in more and more policy areas. The Lisbon Treaty (2009) granted the EP control of the CAP, which had long been outside its reach. Very few (and increasingly fewer) legislative proposals now take place without involvement of the EP (Møller Sousa, 2008).

The EU's influence on national spatial planning governance is, to a large extent, determined by existing and evolving governance relationships within the any given nation. To reduce the administrative burden, several governance principles are commonly in use. The first relates to **the 'self-interest'**: authorities must not interfere in matters where they have no defined interest. Despite its clarity, it is very difficult to apply this principle to broad policy areas such as spatial planning, which often try to coordinate multiple policy areas. The second principle, based on the same philosophy, is more specific: no more than two layers of government may work on any given matter at the same time. As with the first principle, this is also difficult to apply to the three-tiered system of spatial planning. If one were to count the EU as a fourth layer, this rule becomes even less practical.

In most countries central governments tend to bring spatial planning decision-making closer to the stakeholders (individuals and companies), delegating more to local and provincial authorities (decentralisation as the first option), and focusing more on users. The philosophy is summarised

using the concept of 'system responsibility': the national government should ensure that the planning system functions well, but not necessarily what the planning system does in terms of content. Changing spatial and land use planning traditions in Europe are summarized in figure 4.

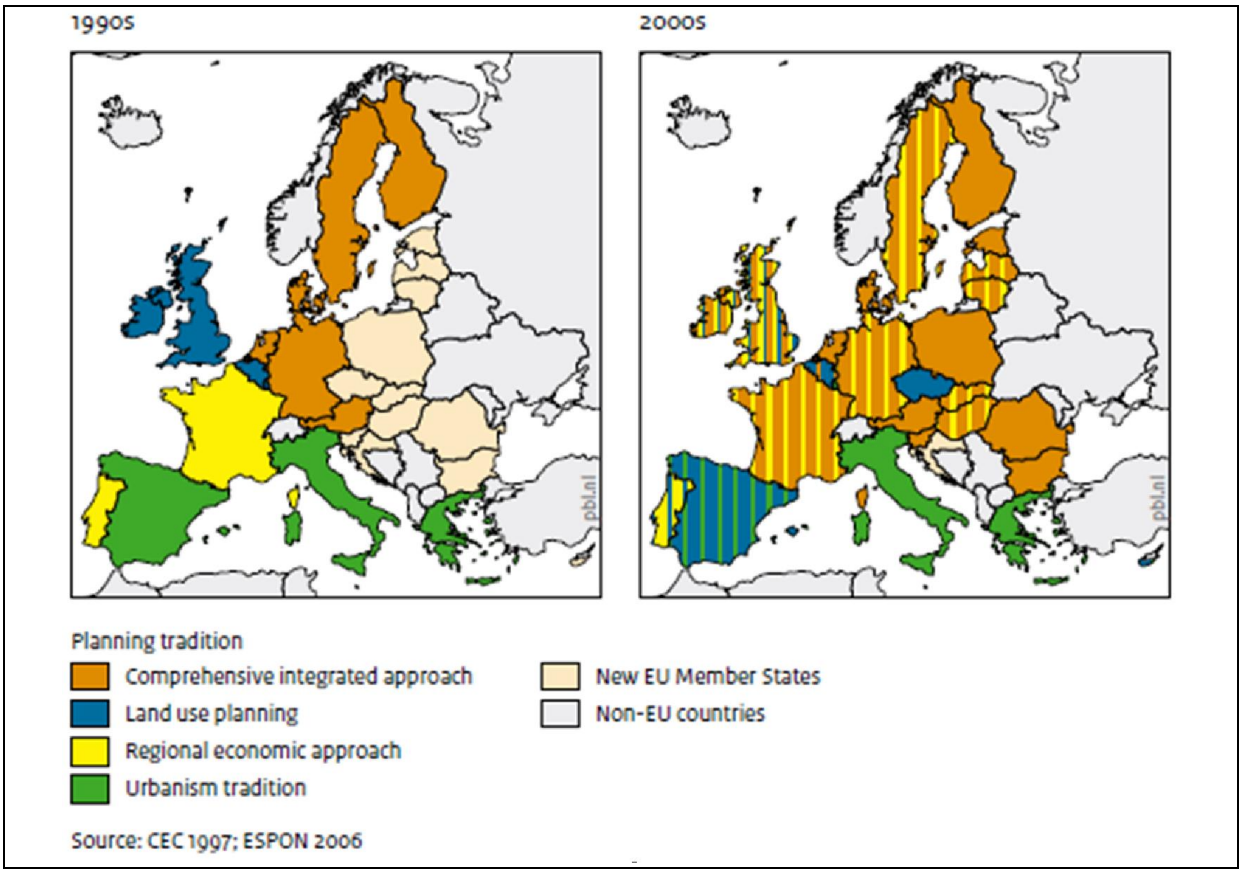


Figure 4 Changing spatial and land use planning traditions in Europe

In the absence of official EU spatial planning policy, various EU policies can and do affect spatial developments and spatial planning processes (Van Ravesteyn and Evers, 2004). Figure 5 depicts a hypothetical area being influenced by various EU policies. It is noted that EU policies can be mutually reinforcing, but this is not always the case. Policies can run in parallel, which means that opportunities for synergy may be missed (Robert et al., 2001). More adversely, objectives may conflict and this is especially problematic when they converge on a certain area.

EU policy affects spatial planning in three ways:

- First, this influence may be on *content*; for example, by **placing legal restrictions on the use or development of certain areas**, or by stimulating such uses through subsidies. (e.g. Nitrates Directive and nitrate sensitive areas)
- Second, EU policy may affect the planning *process*; for example, by affecting the length and speed of the development process, the order of tasks to be executed or the parties involved.

- Third, EU policies may affect the relationship between the various parties involved in spatial planning, in other words, *governance*.

European Union does not have an official spatial policy and will never claim to have 'an interest' in one of its Member States, as these are sovereign states. In practice, however, one can define European interests analytically as any expression of EU policy. Using this definition, it becomes possible to create a cartographic representation of EU policy. For completeness, the notion of EU interest is used in a broad sense. In the first place, it includes all policy that originates from the EU, regardless of whether any given nation pursues the same policy. In short, an EU interest does not mean that something is 'imposed by Brussels', but only indicates that policy frameworks of the European Union apply.

MESSAGE:

While EU has no direct mandate on spatial and land use planning at a national and lower levels it does exert directand indirect influence on spatial and land use planning through other policies which have spatial and land use ramifications (Water Framework Directive, Floods DIrective, Nitrate Directive etc.).

As a result all land use planning efforts and measures at transnational scale should occur within the scope of such Directives and primarelly and probabley most effectivelly within the transnational planning framework established within WFD and FD.

The most effective way to introduce water related land use management and planning would therefore be through the plannig DPSIR Planning framework establihed and allready obligatory for all Member states (within RBMP Planning system)

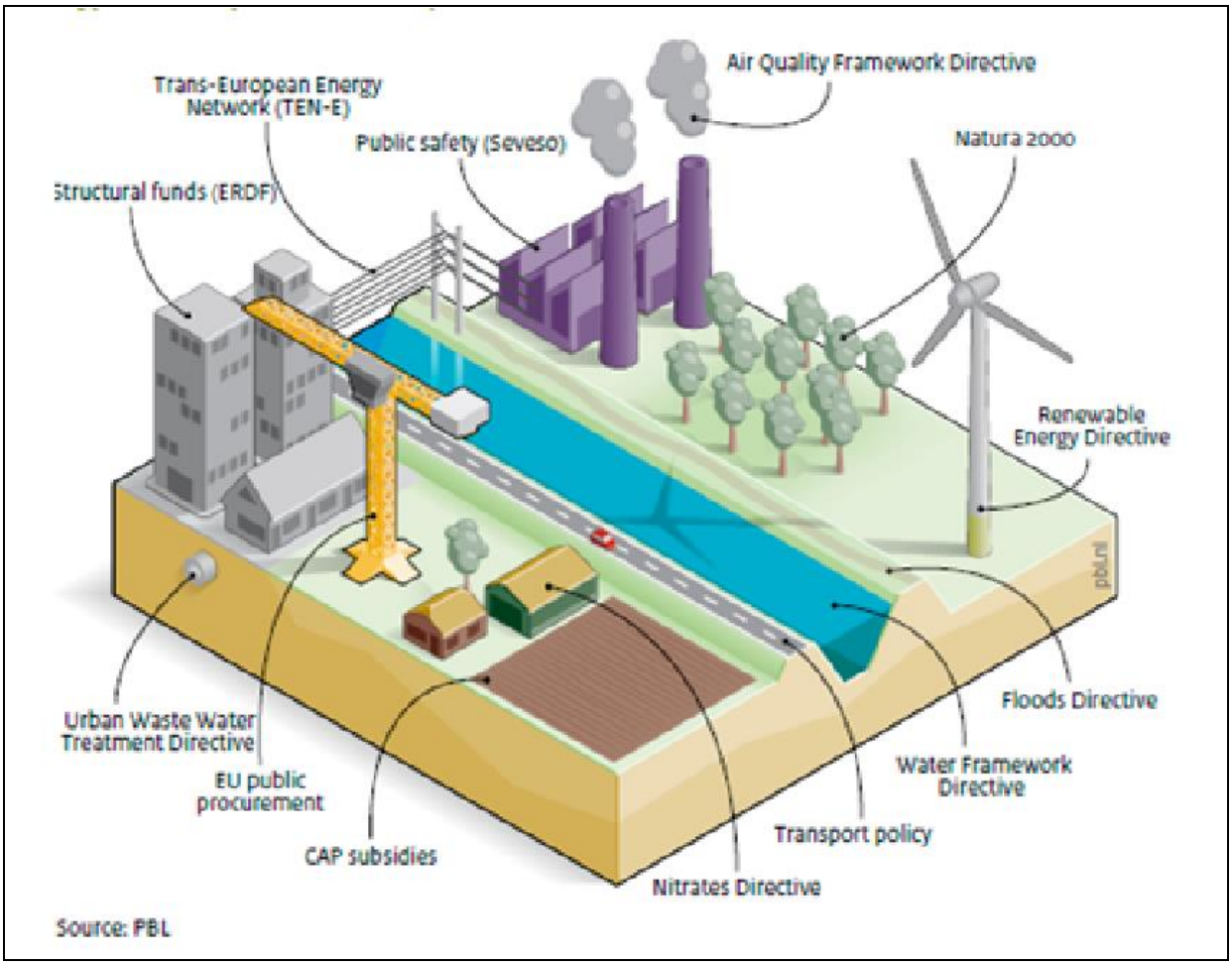


Figure 5 Influence of EU Policies on spatial and land use planning through different Directives

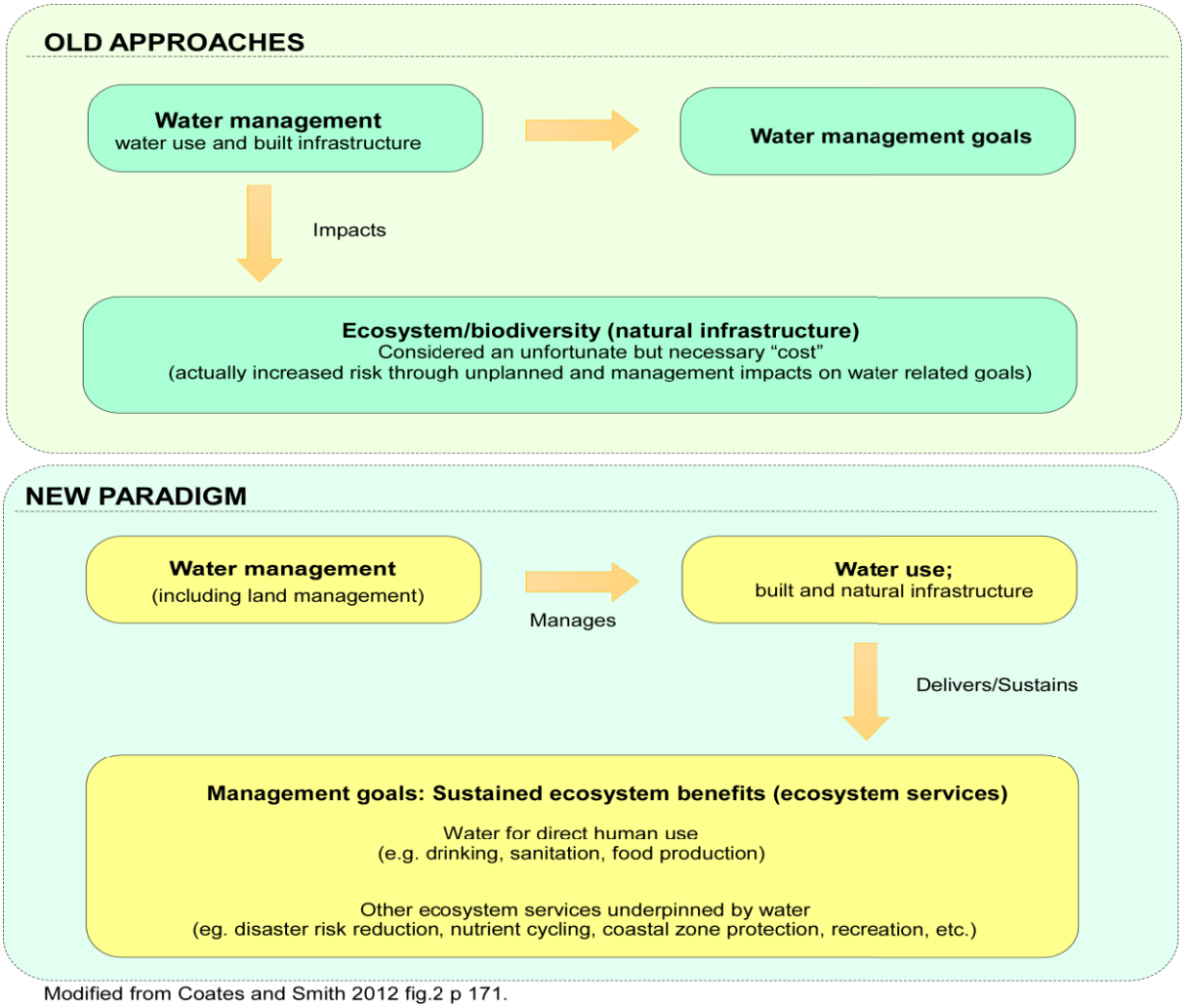
RIVER BASIN PLANNING, SPATIAL PLANNING AND LAND USE PLANNING

RIVER BASIN PLANNING

Traditionally water resources management was based on river basin planning which is the process of identifying the way in which river and its limited natural resources and groundwater may be used to meet competing water demands, while maintaining natural systems health. It includes the allocation of scarce water resources between different users and purposes, choosing between environmental objectives and competing human needs, and choosing between competing flood and drought risk management requirements (Figure 6). More recently integrated water resources management has become a norm and the emphasis of management has changed (New paradigm in Figure 7). This new approach results in a process leading to a River Basin Management Plan whose main

component is a program of measures aimed at meeting a desired policy objective (for example good status of water bodies as per WFD)

Examples of single-purpose water allocation, flood control and navigation rules go back centuries. However, with increasing development and population pressures, the complexity of many of the world's river basins has increased and many have experienced serious crises related to floods, deteriorating water quality, acute water shortage or degraded ecological health. This has often led to the political requirement to manage rivers more effectively, in order to pre-empt crises and resolve conflicts.



Modified from Coates and Smith 2012 fig.2 p 171.

Figure 6 Old and New ways of water management

While approaches to basin planning have evolved over time and are adapted to the local circumstances within a basin, basin planning is ultimately the process of:

- assessing and prioritizing issues of concern to be managed within a basin
- deciding on the way in which these priorities should be managed to achieve social objectives over time
- specifying the way in which different competing purposes (such as abstraction, hydropower, flood control and navigation) may develop or use the basin water resources.

Basin planning is a process of:

- Assessing and prioritizing issues of concern
- Deciding on the way in which these priorities should be managed to achieve social objectives
- Specifying the way in which different competing may develop or use the basin water resources

Basin planning has historically has been prompted by the need to manage the challenges associated with one or more of the fundamental basin-scale water-related issues:

- Water allocation, reconciliation and utilization planning has tended to be the focus in more arid or seasonally variable basins where population and development has driven water demands.
- Water quality planning has been the focus in highly developed urban, industrial or mining dominated basins, as well as those with intensive irrigation.
- Flood risk management has tended to be the focus in higher rainfall basins, particularly where there is significant downstream development (people and property).

In some large and diverse basins all of these issues require significant consideration. However, in most basins, not all of these issues will be of equal concern.

SPATIAL PLANNING

According to United Nations, Economic Commission for Europe (2008) spatial planning is concerned with "*the problem of coordination or integration of the spatial dimension of sectoral policies through a territorially-based strategy*" (Cullingworth and Nadin, 2006: 91). More complex than simple land-use regulation, it addresses the tensions and contradictions among sectoral policies, for example for conflicts between economic development, environmental and social cohesion policies. *The key role of spatial planning is to promote a more rational arrangement of activities and to reconcile competing policy goals*. The scope of spatial planning differs greatly from one country to another, but most share a number of similarities. In almost all countries, spatial planning is concerned with identifying long- or medium-term objectives and strategies for territories, dealing with land use and physical development as a distinct sector of government activity, and coordinating sectoral policies such as transport, agriculture and environment (Koresawa and Konvitz, 2001).

Spatial planning:

The Compendium of European Spatial Planning defines spatial planning as methods used largely by the public sector to influence the future distribution of activities in space (European Commission, 1997).

Spatial planning is undertaken with the aims of creating a more rational territorial organization of land uses and the linkages between them, to balance demands for development with the need to protect the environment and to achieve social and economic development objectives

LAND USE PLANNING

In contrast to spatial planning, **land use planning** refers to the process by which a society, through its institutions, decides where, within its territory, different socioeconomic activities such as agriculture, housing, industry, recreation, and commerce should take place while taking cognizance of the main determinants of the spatial plans in place. This includes protecting well-defined areas (spatial plans) from development due to environmental, cultural, historical, or similar reasons, and establishing provisions that control the nature of development activities.

Land use planning

Is a process by which a society, through its institutions, decides where, within its territory, different socioeconomic activities such as agriculture, housing, industry, recreation, and commerce should take place while taking cognizance of the main determinants of the spatial plans in place

Figure 7. Land use and aspects affecting it

These controls determine features such as plot areas, their land consumption or surface ratio, their intensity or floor-area ratio, their density or units of that activity (or people) per hectare, the

technical standards of the infrastructure and buildings that will serve them, and related parking allowances. In relation to pollution prevention, land use provisions should include, where applicable, levels of gas emissions, light radiation, noise, water, solid waste discharges, and onsite or pre-disposal treatment of pollutants. All of these provisions should be included in the jurisdiction's land use or zoning code. This code becomes the legal guide for landowners, developers, citizens, and authorities. A good system of protected areas, together with strong land use provisions, should result in a less-polluted jurisdiction.

While spatial plans tend to be development oriented (pro development) land use plans are more often than not restrictive in nature and protective in character (constraining development). Spatial plans are typically done at a larger scale(national, regional, areas of special interest such as nature protection areas, source water protection areas etc.) than land use plans (urban and peri urban areas and similar).

In essence **land use planning** is a regulatory instrument influencing the allocation of land uses to designated territorial units and thus it is a **part of spatial planning** (***a tool or an instrument of implementation of spatial and other type of plans***).

CURRENT PLANNING SCENE IN THE EU

The territory of the EU Member States is experiencing important land-use changes characterised by a number of trends including increased urbanization, intensification of agriculture and land abandonment. These trends are taking place at a time when the effects of climate change are becoming increasingly evident and in the context of dwindling natural resources and important societal and economic changes. All of these changes in essence change the land use across EU and member states and exert different influences on spatial characteristics, structure and function of ecosystems and societies at large over a given territory. For this reason, appropriate and "fit for purpose" spatial planning or in some countries better recognized as land use planning is emerging as a required activity for a focused and appropriate intervention to prevent and mitigate the negative effects of these changes and manage the European space in a manner that meets the needs of its population. At the core of these activities is the emergence of ecosystem function focused set of requirements so characteristic of the newest generation of EU Policies, Directives, Regulations, Decision and projects.

In contrast to the importance of spatial and land use planning assigned to it in the EU acual practice leaves a lot to be desired. The recent ESPOM COMPASS Project „ Comparative Analysis of Territorial Governance and Spatial Planning Systems in Europe" concluded that ***after two decades of encouragement of stronger interrelationships between domestic spatial planning systems and EU cohesion (and also sectoral) policies and much reform on both sides, progress on effective coordination across EU is rather disappointing***.

Irrespective of the level at which it is carried out, spatial planning provides important opportunities for ensuring better implementation of EU legislation and resolution of conflicts between different sectors, and may enhance stakeholder involvement in decision-making about territorial developments. This in turn provides the preconditions for establishing better synergy between different sectoral policies and spatial planning.

Spatial planning is also a key instrument for ensuring that land-use developments comply with EU sectoral and environmental legislation, particularly in relation to deciding about the design, location and management of infrastructure and built-up areas and other land uses.

It is well recognized that spatial and land use planning has a strong coordinating role across sectors and can strategically support various initiatives for the protection, restoration and management of ***water availability, quality and flood and drought extremes*** in the Member States.

ESPOM COMPAS PROJECT KEY FINDINGS

Overall, Systems of spatial planning and territorial governance in Europe are well established and there is a high amount of energy dedicated to spatial planning, as demonstrated by the multiple types of plans at all levels.

However, the project also reports a highly differential landscape for territorial governance and spatial planning in Europe, in terms of terminology, concepts, tools and practices.

Ideally, spatial planning can regulate and strategically manage the overall quality of a territory and identify the mutual benefits that can be achieved for sectors and the environment and the trade-offs needed. The ultimate goal is to provide optimal quality of life and conservation of natural resources of the territories while ensuring that developments have as little impact on nature as possible and that and destruction or degradation of nature areas is offset.

Integrated spatial planning, which reconciles the needs of different sectors and stakeholders at each stage of the planning process, has a particularly important role. Experience has shown that land-use planning which only acknowledges the environmental needs at the final stages of a planning process often results in delays and additional costs to projects or plans and occasionally can even result in the total failure of planned investments or the loss of valuable nature.

Presently, integrated spatial-planning practices have been developed and applied in some countries. Some spatial-planning systems in the Member States have been recast as mechanisms to improve coordination and integration between sectors and the use of integrated spatial planning has become one of the main objectives of spatial-planning policy.

For example, such an approach to spatial planning can be found in the planning systems in Austria, Denmark, Germany, Netherlands and the Nordic countries (CEC, 1997).

Other Member States have already succeeded in developing comprehensive plans for establishing National Ecological Networks (NENs), including Natura 2000, which have subsequently been

embedded in the spatial planning process at all levels of government (e.g. France, the Netherlands, Germany, Estonia and more recently Spain and Portugal). The NENs serve as basis for developing a coherent spatial structure of protected areas of nature at national level, including Natura 2000. NENs do not always have a legal status. For this reason planners may not be obliged to modify the spatial plans or projects due to presence of the NENs, but in some cases may at least be obliged to take the NENs measures into account in the assessment and planning process.

In contrast to the Western European countries, in the Eastern European countries progress in reshaping the spatial planning systems is even more challenging due to the rapid socio-economic and legal reforms that have taken place in these countries during the last two decades, these being the transition to a market economy and accession to the EU.

A number of factors affect the implementation of the integrated spatial planning across Europe (CEC, 2004; Stead and Meijers, 2009; Simeonova & van der Valk, 2016). One of these factors is the fact that ***currently there is no unified approach across the Member States for integration of needs of implementation of different EU Policies into spatial planning and into different sectoral developments***.

The key challenge for all Member States is to initiate, implement and maintain this integration process in a way that resources, competences and responsibilities are shared across various spatial scales and governmental levels (Stead & Meijer, 2009; Simeonova & van der Valk, 2009; Vigar, 2009).

SPATIAL PLANNING IS NOT AN EU COMPETENCE;

IT FALLS WITHIN THE REMIT OF THE MEMBER STATES

While in most of the countries the integration of environmental objectives such as nature conservation have been addressed in the strategic spatial plans (e.g. national territorial development plans or regional territorial development strategies), the actual integration process often lags behind at the local level of planning. This is despite the fact that in many cases the local level of spatial lanning is the operational level. This is the level at which the biggest difference can be made. Although the European Union has no specific competency in spatial planning, its policy and legislation have influenced the planning systems of the Member States. While at the European level strong support is provided to sustainable territorial development, spatial planning is not an EU competence; it falls within the remit of the Member States. It is a competence of the national, regional or local authorities (Country specific situations).

Water Framework Directive(Including its doughter directives) and Floods DIrective along with the Nature Directives, the SEA and EIA Directives and the Marine Strategy Framework Directive, has exerted the biggest impact on the spatial planning policies and practices.

In the transnational context of the CAMARO D Project it is clear Water framework and Flood Directives are the main sceen setting EU Polciy components within which water related land use

planning has to occur. ***These two directives in fact directly call (requier) for transnational level planning including spatial and land use planning***.

Figures 8 and 9 show the current policy scene in relation to water related spatial and land use planning and the key role of the WFD in the transnational context of this process.

PROTECTED AREAS UNDER WFD (Art 4):

1. Areas designated for the abstraction of water intended for human consumption under Article 7;
2. Areas designated for the protection of economically significant aquatic species;
3. Bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC;
4. Nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC and
5. Areas designated as sensitive areas under Directive 91/271/EEC; and
6. Areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 92/43/EEC (1) and Directive 79/409/EEC (2)

AREAS AT RISK OF FLOODS UNDER FLOODS DIRECTIVE (Art 5):

On the basis of a preliminary flood risk assessment as referred to in Article 4, Member States shall, for each river basin district, or unit of management referred to in Article 3(2)(b), or portion of an international river basin district lying within their territory, identify those areas for which they conclude that potential significant flood risks exist or might be considered likely to occur.

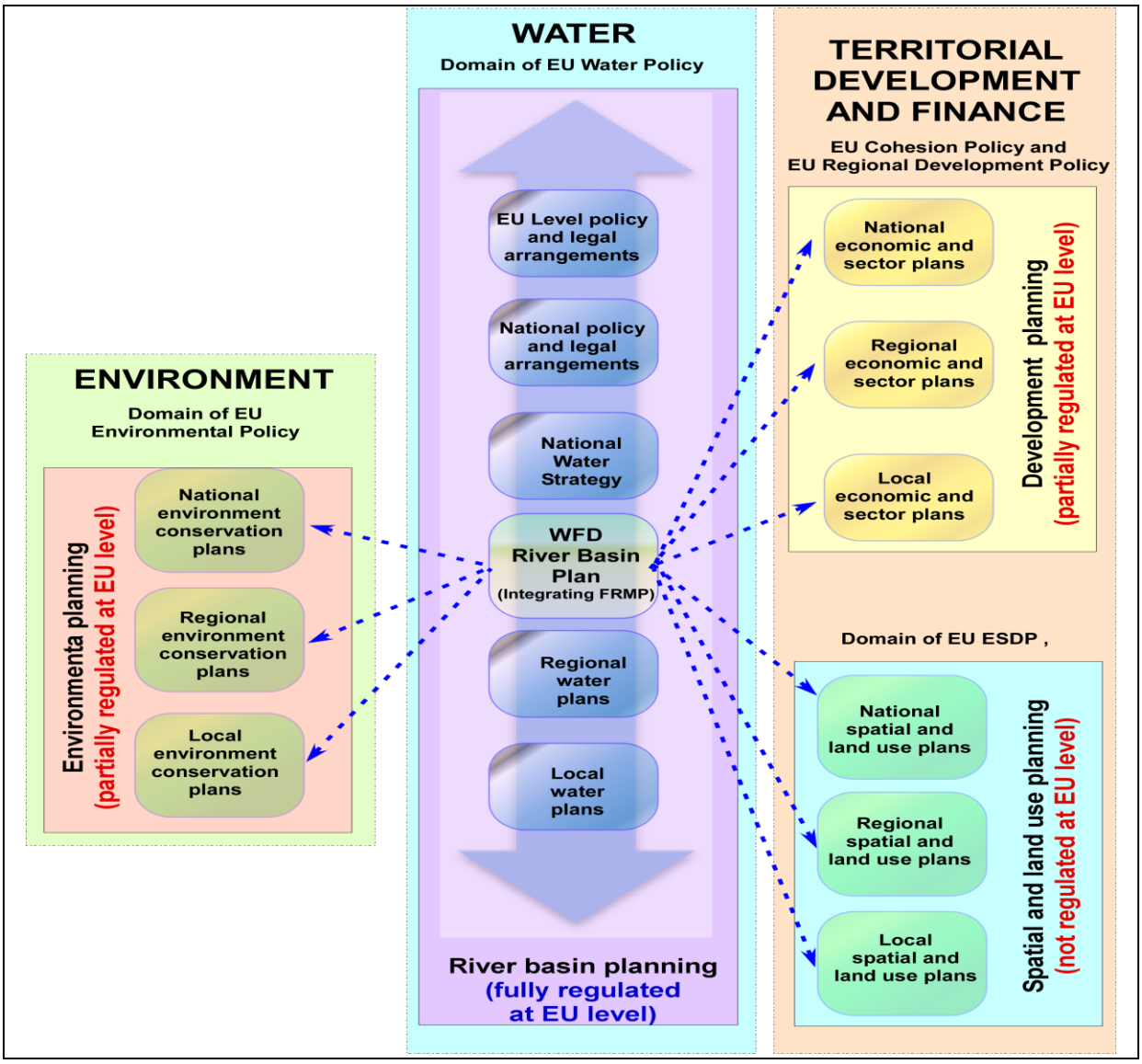


Figure 8. Current policy scene in relation to water related spatial and land use planning and the key role of the WFD in the transnational context

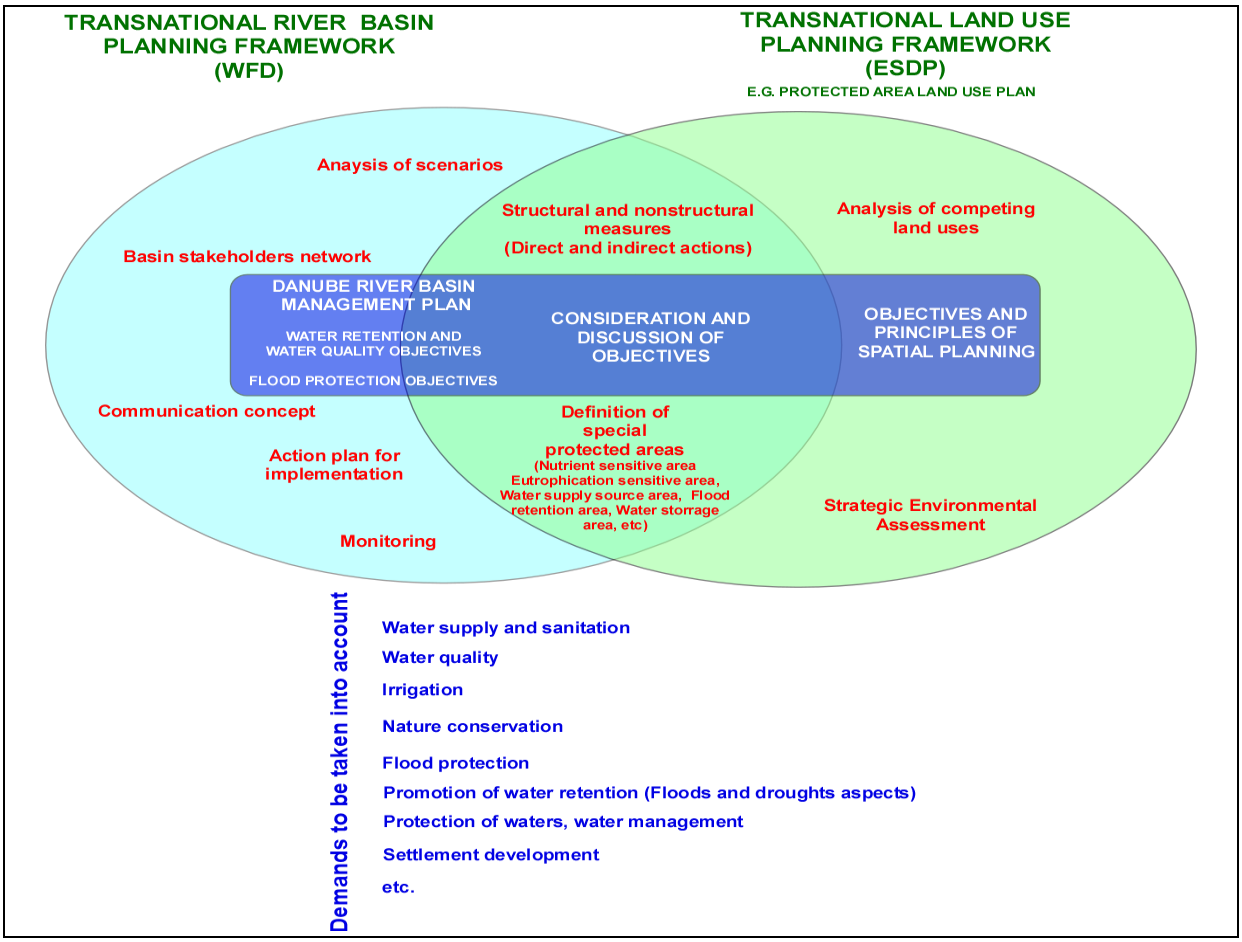


Figure 9. Example relationship of the transnational planning framework resulting from the implementation of the Water Framework Directive and the transnational spatial planning framework which although overlapping with the previous is not a subject of any of the EU Directives.

The European Commission and the Member States have nevertheless undertaken several initiatives which can serve as the basis for developing a more unified spatial-planning approach across Europe. One of these is the European Commission's recently adopted Strategy on Green Infrastructure (GI) (CEC, 2013), which relates more to settlement areas and main infrastructure corridors and serves as an example of a more comprehensive and integrated spatial-planning approach.

As ESPOM COMPASS Project concluded Spatial planning is essence a crucial tool/instrument for the implementation of many of the EU Policies, Directives and Regulations. While potentials for more effective governance arrangements between territorially relevant EU policy making and spatial planning activities on national/subnational levels do exist there is a need for valorizing the role of the national territorial governance and spatial planning systems with respect to EU Cohesion Policy and vice versa. To this end, the EU Cohesion Policy itself, the coming Territorial Agenda, and especially the potential synergies between the two, can play a crucial role.

RECOMMENDATION NO 1.

The main spatial unit for water related land use planning is river basin district/catchment.

or

Use natural boundaries to deliniate planning area unit.

It is especially interesting to note that current Policy at the EU level recognises the need for integration in the context of planning accross all levels but at the same time creates complexities in terms of nonaligement of planning unit „boundaries" making integration accross the board very difficult. EU Water Poicy and instruments thereoff (WFD, FD etc.) recognise the River Basin District as main planning unit (Catchment and basin boundaries-which natural features of the territory and landscape) where as other EU Policies retain political and administrative boundaries as main planning units (Countries, regions, municipality/city – which are man made boundaries). In the context of the CAMARO D project and its main objective which is *de facto* beter water management the Water Policy approach to planning is better suited and more appropriate.

Basin/Catchment planning is not for the faint of heart – it is difficult and chaotic, requiring the balancing of competing interests and critical decision-making often without adequate information. Basin planning is only likely to become a more challenging area of engagement for the allocation of resources to meet social, economic and ecological imperatives in an increasingly water-stressed world.

Planners need to act with mindfulness and humility. Planning is inherently a social process involving various actors (whether they are formally recognized or not), so the chances are that unexpected issues or perspectives will arise during the planning process, regardless of the technical rigour that supports the analysis. A workable plan needs to engage and possibly reflect the diversity of relevant issues and perspectives of those that will be required to act in its implementation, even where these may not coincide with the scientific opinions of the experts.

MESSAGE: Planners should trust the planning process. A clearly scoped and designed process with a specified timeframe and outcome should facilitate, contain and make sense of the chaos, complexity and iteration required to converge on an implementable plan. This does not imply an inflexible and static process, but rather one that adapts to emerging issues and information.

Table 1. gives a list of EU water related Polices/Directives with explicit or implicit links to spatial/land use planning. Each of these should be considered early in the process of developing water related land se plans.

Table 1. EU Policies with explicit and implicit links to water related land use planning

EU policy/Directive	Overall policy objective(s)	Explicit and implicit links to land use planning
Water Framework Directive	To achieve good status for all waters in Europe	Annex IV of the WFD identifies **5 different categories of protected areas** and each requiers deliniation. Annex VI of the WFD provides a list of measures that can be considered in the programmes of measures. These **include inter alia the recreation and restoration of wetland areas**.
Floods Directive	To reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity	Article 7 of the Floods Directive specifies that Flood risk management plans may also include the promotion of **sustainable land use** practices, improvement of **water retention** as well as the controlled flooding of certain areas in the case of a flood event.
Climate Change Adaptation Strategy	To make Europe more climate-resilient and enhance the preparedness and capacity of all governance levels to respond to the impacts of climate change	The EU Adaptation Strategy calls for a strong emphasis on incorporating win-win, low-cost and no-regret adaptation options. These include sustainable water management and early warning systems. **Ecosystem-based approaches** are usually cost-effective under different scenarios. They are easily accessible and provide multiple benefits, such as reduced flood risk, less soil erosion, improved water and air quality and reduced heat island effect
Green infrastructure	To promote the development of Green Infrastructure (GI) by creating an enabling framework to encourage and facilitate GI projects within existing legal, policy and financial instruments to exploit their benefits for sustainable development.	**Green infrastructure solutions** that boost **disaster resilience** are also an integral part of EU policy on disaster risk management. […] The impacts of such events on human society and the environment can often be reduced using GI solutions such as **functional flood plains, riparian woodland, protection forests** in mountainous areas, barrier beaches and coastal wetlands that can be made in combination with infrastructure for disaster reduction, such as river protection works.

EU policy/Directive	Overall policy objective(s)	Explicit and implicit links to land use planning
EU Water Blueprint	To ensure that a sufficient quantity of good quality water is available for people's needs, the economy and the environment throughout the EU.	Blueprint promotes **alternative land use practices for contributing to the achievement of WFD good status**. It states the following: Among the measures that can greatly contribute to limiting the negative effects of floods and droughts is green infrastructure, **particularly natural water retention measures**. (restoring floodplains and wetlands). Green infrastructure can help ensure the provision of ecosystem services in line with the EU Biodiversity Strategy. Reducing soil sealing is another measure that can diminish flood risks. These measures should be included in both RBMPs and FRMPs and, as mentioned, should become a priority for financing under the CAP, Cohesion and Structural Funds.
Common Agricultural Policy (CAP)	Enhancement of environmental performance through a mandatory 'greening' component of direct payments which will support agricultural practices beneficial for the climate and the environment.	CAP 'greening' measures including crop diversification, Note: **Maintaining permanent grassland and ecological focus areas** will account for 30% of single farm payments.

EU policy/Directive	Overall policy objective(s)	Explicit and implicit links to land use planning
Rural Development Regulation (RDR)	Restoring, preserving and enhancing ecosystems related to agriculture and forestry,	**Water retention** is an implicit objective in the EU's priorities for rural development. Article 5 of Regulation 1305/2013 refers to **restoring, preserving and enhancing ecosystems related to agriculture and forestry**, with a focus on the following areas: • **restoring, preserving and enhancing biodiversity**, including in **Natura 2000 areas**, and in areas facing natural or other specific constraints, and high nature value farming, as well as the state of European landscapes; • **improving water management**, including fertiliser and pesticide management; • c) **preventing soil erosion** and improving soil management.

The two key Directives both requiring significant planning efforts are the Water Framework Directive and the Floods Directive. The water Framework Directive requires the Development of the River Basin Management Plans where as the Floods Directive requires the development of Flood Risk Management Plans. Both of these two plans have a lot to do with land use and therefore Land Use Plans are key input documents into the planning process.

It is clear that coordination between the WFD and the FD is prerequisite for success and that it offers the opportunity to adopt a new approach to optimize the mutual synergies and minimize conflicts between them. The Flood Risk Management Planning Framework is shown in Figure 10.

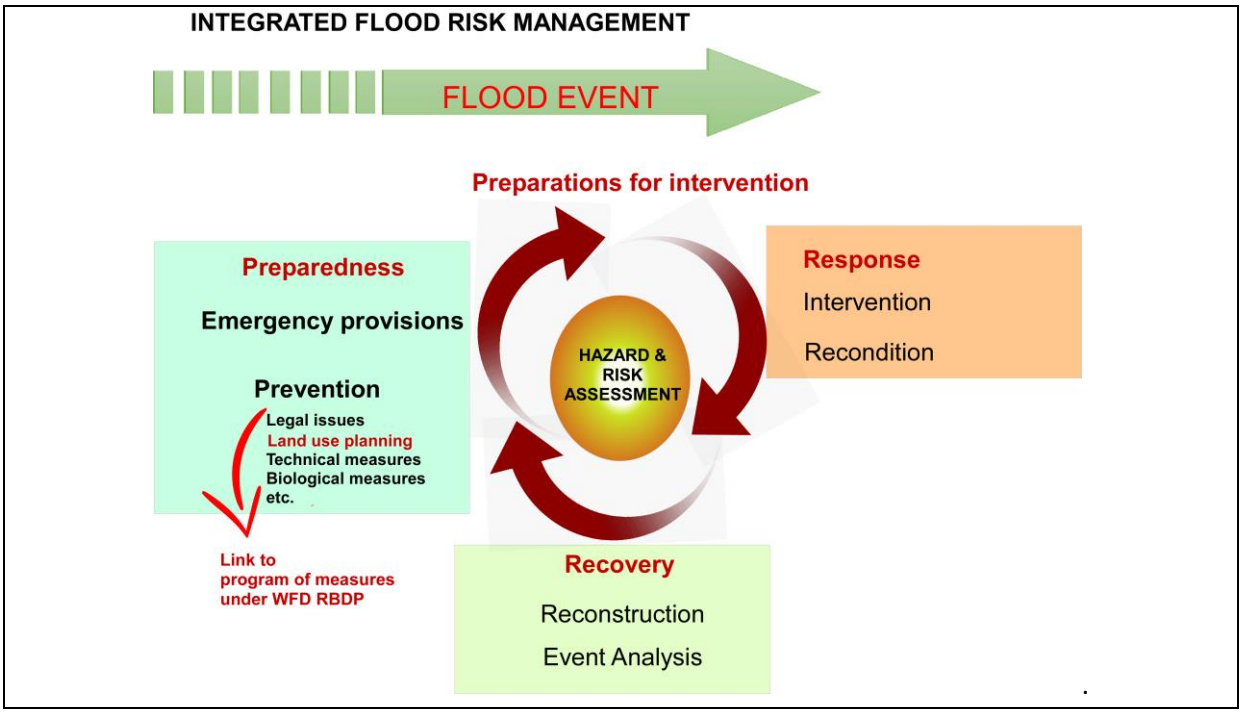


Figure 10. Flood Risk Management Planning Framework.

There are a number of reasons why better coordination is required. These include:

- The overlap of legal and planning instruments in many Member States
- Planning and management under both Directives generally use the same geographical unit i.e. the **river basin which acts as natural "reference area"** for both water quality and flood risk management
- Aiding the efficiency of the implementation of measures and increasing the efficient use of resources. Measures taken under one Directive may have an influence the objectives under the other. Coordination provides an opportunity to maximise synergies by identifying cost-effective measures which serve multiple purposes and can result in "win-win" measures being implemented
- An expectation from many stakeholders that an integrated approach will be taken.

There are also series of references to the WFD set out by the FD to support coordination and possible integration between the two Directives, as part of a holistic approach to water management. Article 9 of the FD explicitly states that Member States shall take appropriate steps to coordinate the application of the FD and WFD, focusing on opportunities for improving efficiency, information exchange and for achieving common synergies and benefits with respect to the environmental objectives in Article 4 of the WFD in particular such that:

- • Flood hazard and risk maps contain information that is consistent with relevant information in the WFD (in particular from WFD Article 5 analysis)

- • Development of FRMPs should be carried out in coordination with and may be integrated into reviews of RBMPs • The active involvement of all interested parties should be coordinated as with those of the WFD The main benefits of coordinating the FD with the WFD are summarised below and examples of these benefits are given throughout this document.
- Improving efficiency via:
    - Presenting information to the public in one place
    - Cross referencing of objectives to ensure mutual benefits realized
    - Coordinating consultations on FRMPs and RBMPs increases the opportunities for synergies to be recognized
- Information exchange via:
    - Collecting data once and using it many times.
    - Integration of data, which allows for easier identification of pressures on the water environment
    - Sharing data assists better understanding of the issues and potential solutions to identify reductions in flood risk and improving the environment
- Achieving common synergies and benefits having regard to the environmental objectives laid down in Article 4 of the WFD including:
    - Improved integrated river basin management
    - Identify areas where measures can meet both FD and WFD aims e.g. river and floodplain restoration, use of Sustainable Drainage Systems (SuDS), changes in land management and creation of multifunctional wetlands

There are also many benefits that can be gained from the coordination of the participation of stakeholders for the two Directives.

Dimensions of sustainable development such as environmental, economic and social aspects are covered to different degrees in the two Directives. The environmental aspect is the main one covered by the WFD, whereas for the FD all these aspects are relevant (Table 2, after Evers and Nyberg, 2013). .

Table 2.

Dimension of the Directive	**Floods Directive**	**Water Framework Directive**
Political objective	To establish a framework for the assessment and management of flood risk to reduce adverse consequences for human health, the environment, cultural heritage and economic activity	To establish a framework for the protection of water bodies that: • Prevents further deterioration and protects and enhances the status of aquatic ecosystems • Promotes sustainable water use • Aims at the enhanced protection and improvement of the aquatic environment • Ensures the progressive reduction of the

Dimension of the Directive	Floods Directive	Water Framework Directive
		pollution of groundwater • Contributes to mitigating the adverse effects of floods and droughts
Legal dimensions		
Monitoring	No monitoring of the water environment is explicitly required	Monitoring of chemical, biological, hydromormophological and physico-chemical elements to establish overall water status. Three types of monitoring: surveillance, operational and investigative
Specification of the objectives to be met	The FRMP should include defined flood risk management objectives and a description of the prioritisation of measures aimed at achieving those objectives, and the way in which the implementation of the plan will be monitored	General objective is good status and prevent deterioration. Exemptions to these general objectives are possible if the conditions set in the Directive are fulfilled.
Implementation and control of measures	FRMPs shall include a summary of the measures for achieving the objectives, and a description of the prioritisation and the way in which the implementation of the plan will be monitored. Updates of FRMPs should include a description and explanation of any measures that have not been taken forward and a description of any additional measures since the publication of the previous FRMP No penalties described	Control of effectiveness of measures is done through operational monitoring. Member States to determine the penalties applicable to breaches that are effective, proportionate and dissuasive
Management dimensions		
Time scale (schedule and milestones)	2007 to 2015, 2021, 2027 (revision after six years) 2007 Directive was adopted 2009 Transposition 2010 Administrative arrangements in place 2011 PFRAs 2013 Publish flood hazard and flood risk maps 2015 Publish Flood Risk Management Plans 2021 Second management cycle ends	2000 to 2015, 2021, 2027 (revision after six years) 2000 Directive was adopted 2003 Transposition and administrative arrangements 2004 Characterisation of river basins 2006 Establish monitoring programme 2009 Finalise River Basin Management Plans and programme of measures 2015 Meet environmental objectives and update River Basin Management Plans 2021 Second management cycle ends

Dimension of the Directive	Floods Directive	Water Framework Directive
Participation/Stakeholder involvement	Member States shall encourage active involvement of interested parties in the production, review and updating of FRMPs	Active involvement of interested parties in the implementation of the Directive has to be encouraged, Information is required.

ROLE OF LAND USE PLANNING IN WATER MANAGEMENT

Typical framework within which WFD based planning occurs is shown in Figure xxx (The so called DPSIR Framework). The interventions to manage the impacts of human action or to induce the required system changes (**main purpose behind any plan**, e.g. improve the environment, mitigate the effects of climate change, increase water retention, protect people and property from floods etc.) can:

1. Eliminate, reduce or prevent pressures from occurring
2. Compensate and/or mitigate the impacts
3. Restore the previous state or influence the transformation to a new state, and
4. Modify, substitute or remove the drivers.

Within the DPSIR Framework these interventions are shown as orange arrows (Response paths) in Figure 11. It is those reponse paths that should be the focus of planning efforts.

It follows that **water related land use planning**

RECOMMENDATION NO 2.

Use DPSIR framework in your planning efforts.

should be focused on the very same response paths within DPSIR Framework.

RECOMMENDATION NO 3.

Use ecosystem based thinking when analyzing causal paths within the DPSIR framework.

The effectiveness of water related land use plans will be a function of social value systems and social processes in any give society and territory (Figure 12) but can also, in the long run induce change in both social value systems and social processes if applied with diligence and expertise.

Interestingly when put in context of ecosystem based causal paths within the DPSIR Framework (Figure 13) the feedback mechanism tends to be positive in nature and can generate restoration of ecosystem functions and increase the value of benefits delivered to society as a result of the implementation of the plan.

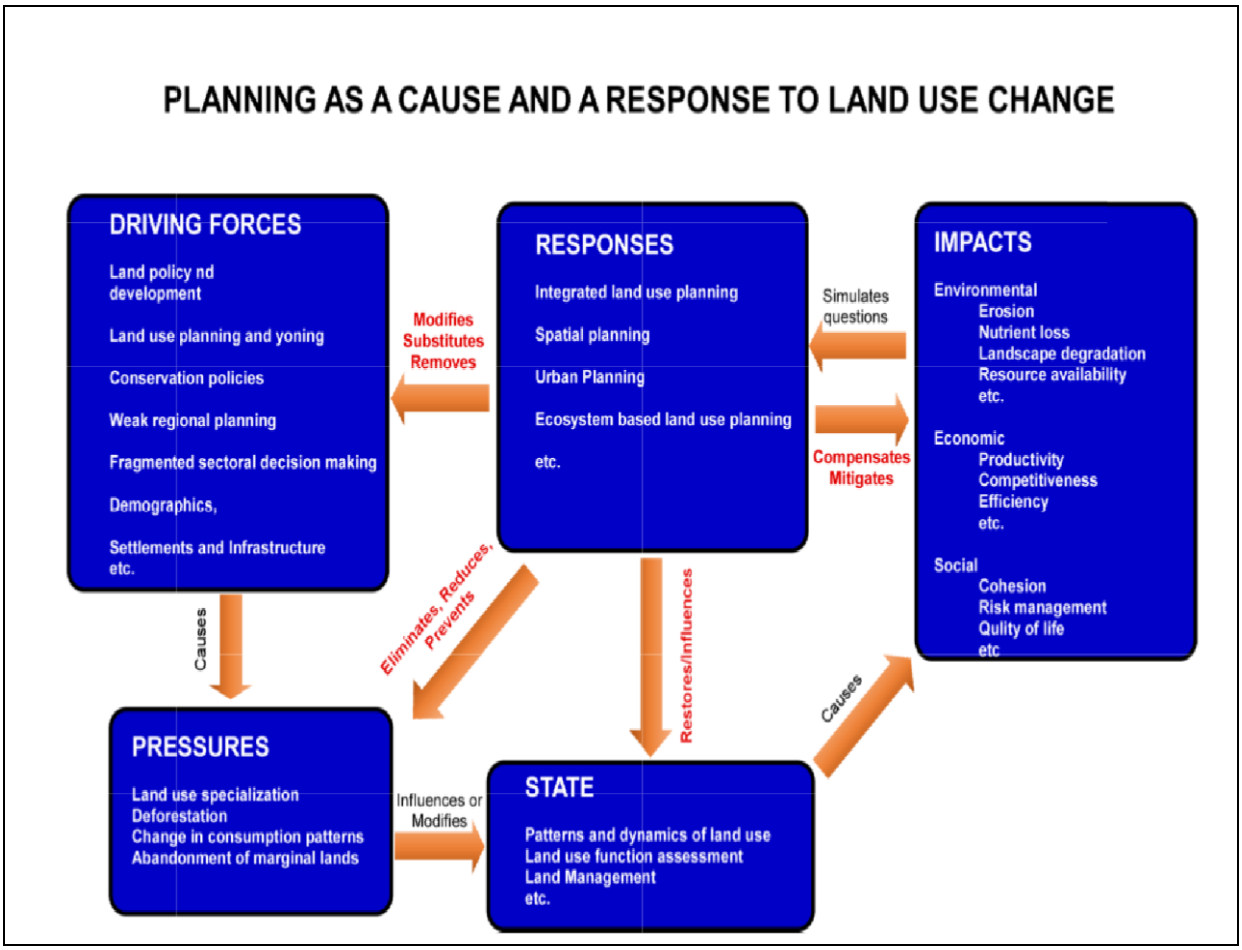


Figure 11. DPSIR Framework applied to water related land use planning.

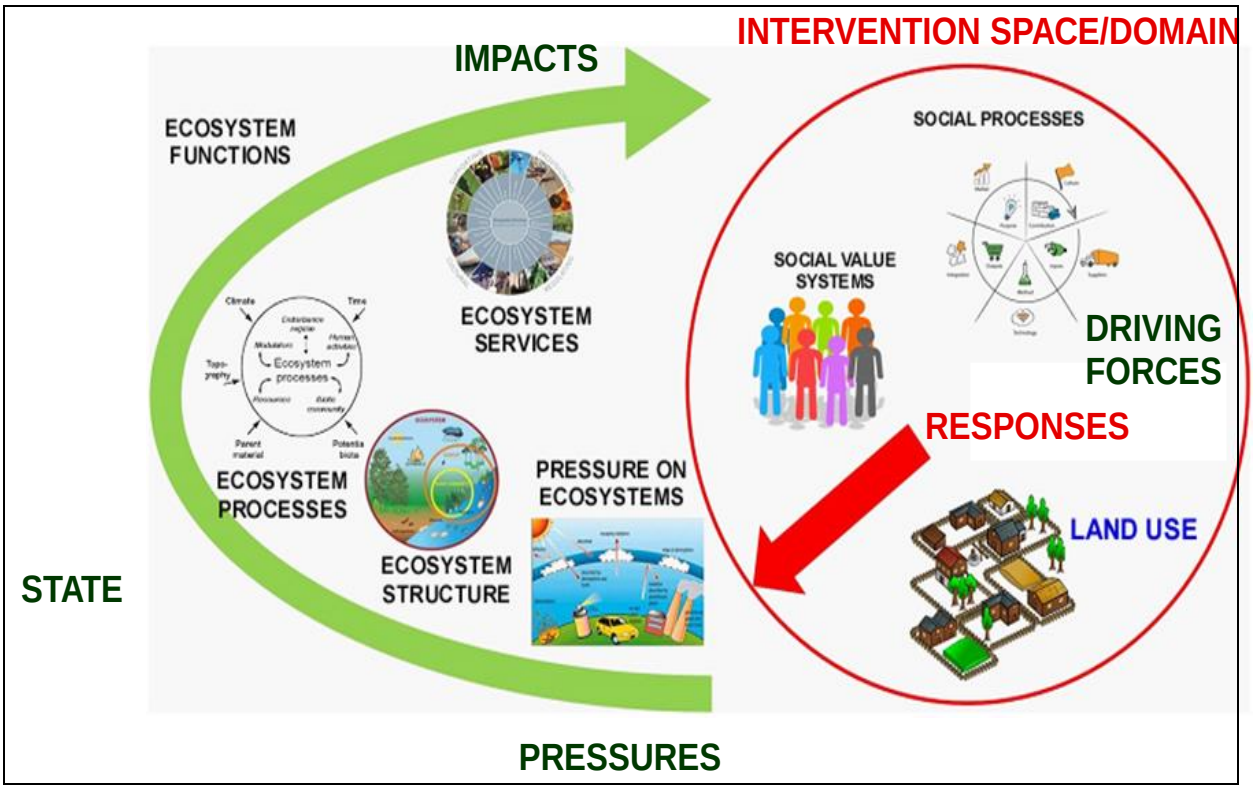


Figure 12. DPSIR Framework in the context of ecosystem based land use planning framework

KEY STEPS IN THE PLANNING PROCESS

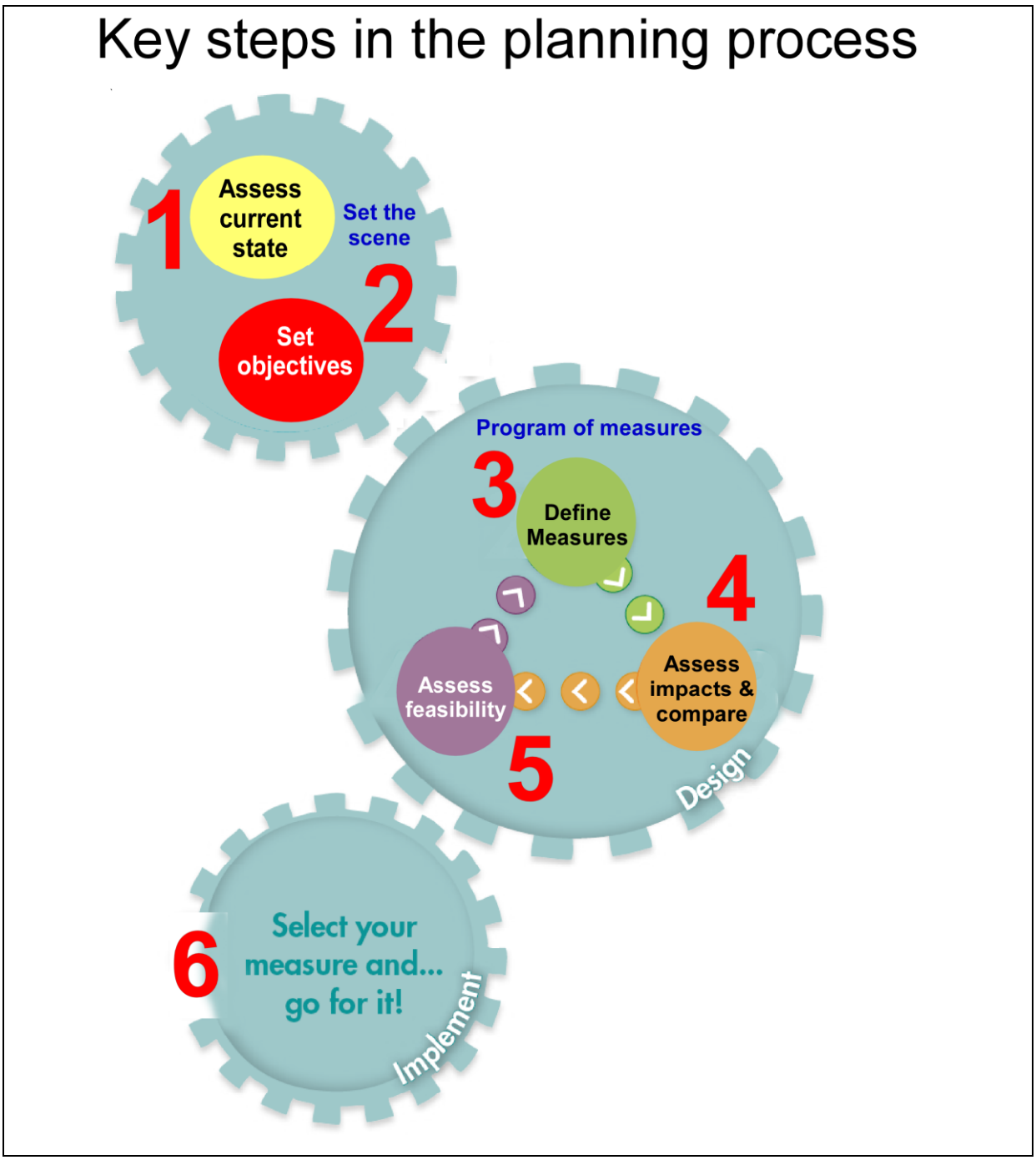


Figure 13. Key steps in the planning process

CONCLUDING REMARKS

It is clear that under current circumstances the transnational water related land use planning can most effectively be initiated and implemented if it is set within existing system wide boundaries and frameworks. Effectively this means that water related transnational land use planning should be integrated into the process of developing River Basin Management Plans (RBMP) as per requirements of the WFD and to a certain extent the Floods Directive.

The process, content and extent of RBMP is is set by the requirements of the WFD and water related land use plans would fit into this through integration into different stages of the RBMP development and especially within the context of the program of measures which every RBMP must contain.

This will effectively make water related land use planning an integral part of the RBMP and will be well integrated into the so called „water box“ of decision making in the water sector (See Figure 14).

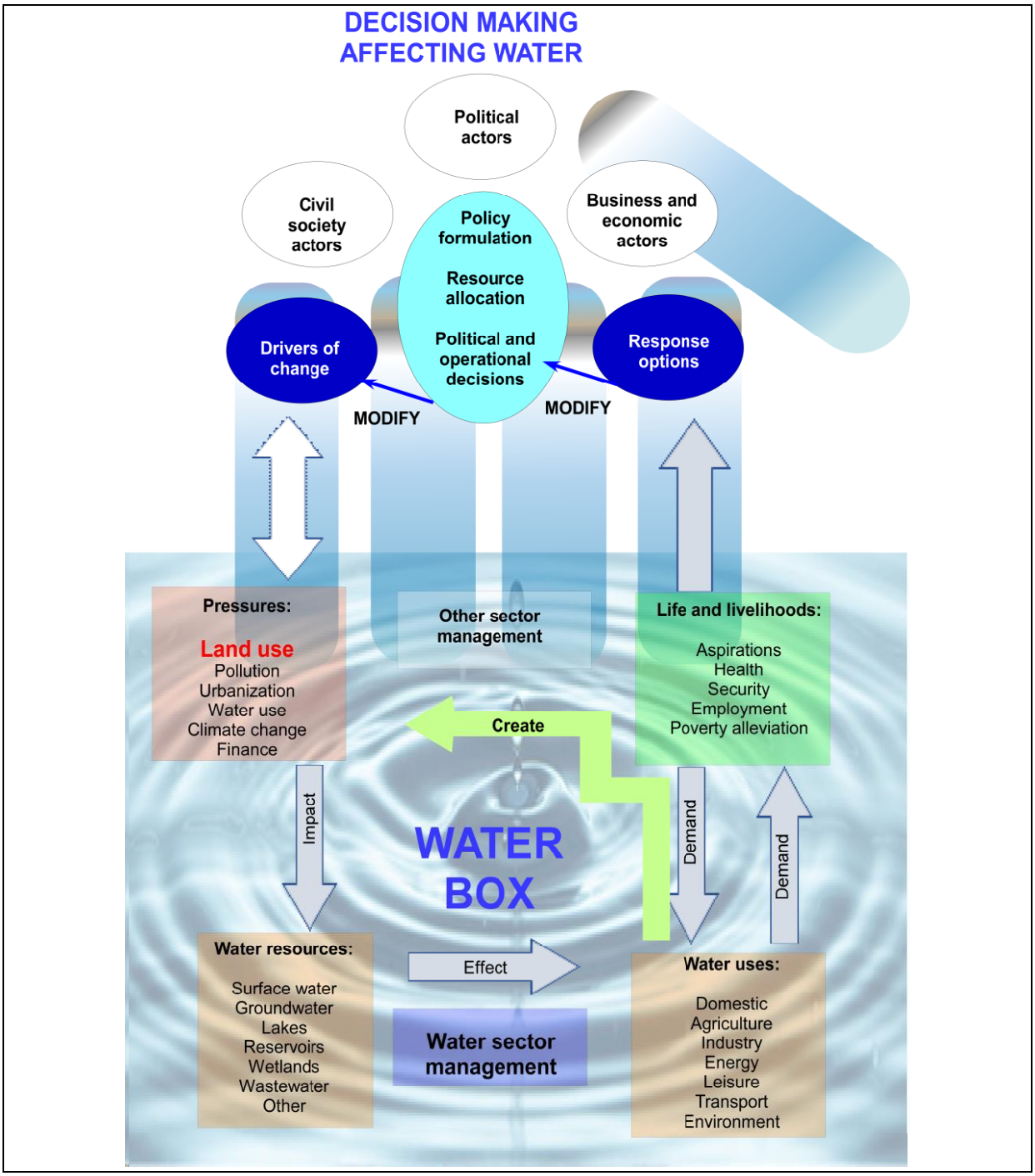


Figure 14. Decision making affecting water (Modified from WWAP 2009). The 'water box', showing issues, decisions, and actions directly within the scope of water managers, and the connection to influencing factors outside the "water box"

CHAPTER 2: PRINCIPLES RELEVANT FOR THE WATER RELATED LAND USE PLANNING AND NEEDS FOR THE DECISION MAKING PROCESS.

CHAPTER 2: PRINCIPLES RELEVANT FOR THE WATER RELATED LAND USE PLANNING AND NEEDS FOR THE DECISION MAKING PROCESS.

INTRODUCTION

The system of planning introduced with the WFD Directive is not the only possible one, yet the deadlines and objectives from the Directive are compulsory.

In planning, decisions are made on who is doing what and when. There is no a single best approach to make this decision. This has led to the development of different types of planning process. A flexible use of different planning styles can be useful for competent authorities in order to achieve the objectives.

The primary purpose of planning is to provide a Plan as an instrument for making decisions in order to influence the future. Planning is a systematic, integrative and iterative process that is comprised of a number of steps executed over a specified time schedule.

Look out! *Planning is a means to improve and support a sound management. In this sense, planning has to be regarded as a process and not as an objective in itself.*

Planning culminates when all the relevant information has been considered and a course of action has been selected. The plan is then produced and implemented in order to achieve the goals and objectives.

The planning process adopted in the WFD is best characterised by the term 'end result planning'; from the start of the process it is clear what the final outcome will be.

There are certain factors that have to be taken into account in the planning process, so they do not prevent the achievement of the objectives:

- In the river basins concerned, not only is the planning process of the Directive ongoing, but also other initiatives exist, e.g. the development of regional industrial zones, the building of houses, extension of infrastructure, restructuring the agriculture, construction of recreational areas, etc., from which conflicts with the objectives of the WFD can arise.;
- The different Member States have their own planning traditions, which means they all have their own long-established manners of adjusting developments in society, with

corresponding division of roles and allocation of tasks between public and private sectors. In order to achieve the objectives in a socially acceptable manner, every Member State should be able to inform, capacitate and promote the active involvement of stakeholders and the public which may mean that the current planning can be improved and revised.

While the relevant Directives provides a a necessary framework; the actual operational implementation must take place at Member State level. Within this framework there are opportunities to act in different scales: per Member State, per (sub-)basin or per water theme, as long as the prospect of 'good status' stays the leading principle, and the different prescribed steps are followed.

SCOPE, FUNCTIONS AND THE PLANNING PROCESSES

The classical approach for planning usually includes three main stages:

- Current state and foreseen scenarios assessment,
- Target setting and
- Development of alternative programmes of measures including action taking.

These stages are part of a cyclical and iterative process in which it is possible to define three additional elements (public participation, monitoring and evaluation of the process) that will be developed in a continuous way in parallel, serving as a link between the others. The process is shown in the Figure 15.

Planning is an inherently chaotic, iterative and adaptive process. This is largely because of the complexity, changing conditions, limited understanding and uneven management that are typical in most cases, especially those at transnational scale. While this means that the entire process cannot be mapped out in the beginning, a coherent procedure and method for iteratively screening information and focusing planning attention is required to guide the process. There is no single template or blueprint for planning, but rather some common procedural principles and lessons that have been learned over the past half-century.

Effective management requires knowledge of the system to be managed and actions to be taken to achieve desirable outcomes. Planning represents the process of deciding on goals to be achieved and actions to be taken in getting there.

The planning process typically poses four fundamental questions:

- Where are we now?
- Where do we want to be?
- How will we get there?
- How will we know that we are getting there?

There are a number of models outlining the planning process, but all have the same basic elements of planning (plan), implementing (do), monitoring (check) and reviewing (act).While this cycle was originally developed for business process quality improvement, the basic approach is just as applicable to water related land use planning planning.(Figure 16,)

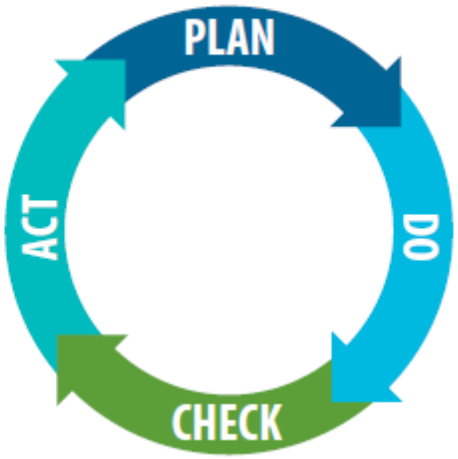


Figure 16. Basin planning as an iterative process

The final stage involves assessment of what to do next, based on what has been achieved. This may lead to a revision of the understanding of the problem, a modification of the activities to address the problem, or moving onto a new problem as the previous one has been addressed. This is the basis of the adaptive management process, in which planning is a continuous and ongoing part of the management cycle.

Traditional planning focuses on hydrological, water quality and/or system analysis, followed by engineering feasibility studies. The planning process is well understood and can be captured in a project plan (for instance, a Gantt chart) detailing the activities and deliverables of the planning process.

Strategic basin planning however requires a process that is more flexible, in order to enable the process to reflect and adapt to the changes in understanding and priorities of the basin's environmental, water resources, land use, socio-economic and institutional systems. The planning process tends to be iterative, explorative and outcome oriented, but is less well suited to traditional project planning approaches.

This is important to reduce the risk that detailed analysis of all issues drains resources, obscures understanding and paralyzes decision-making. Effective planning processes are similar in nature to large complex information technology development processes, where the requirements of the final product are defined, but the process of getting to this is not necessarily well defined at the outset (in other words, 'what we want' is clear, but not 'how

to do it'). The immediate activities may be defined, but the details of future activities are only clarified as the process unfolds, understanding improves and priorities are agreed.

The iterative nature of the planning process within a single iteration or edition of the basin plan is highlighted above. However, the longer iterative planning–implementation cycle from one basin plan edition to the next must also be recognized, as this allows priorities to shift as conditions change and issues are addressed.

This demonstrates how planning matures as understanding is gained and institutional relationships are established. The early editions of the planning process may not be basin plans, but rather thematic plans that are incorporated into the basin planning process (Land use plan is such thematic plan for example). The planning cycle expands from narrow sector master plans (for irrigation, flood protection or land use) to broader basin planning over the course of time.

STAGES AND MILESTONES IN PLANNING

Planning balances a number of competing imperatives. A process is therefore required that allows for the analysis of scenarios across a range of social, economic and environmental issues. However, these complex issues need to be narrowed down into a series of key priorities for the basin, against which high-level strategy can be developed. This strategy consists of coherent objectives and actions, which are ultimately detailed in series of implementation plans and activities. (Figure 17)

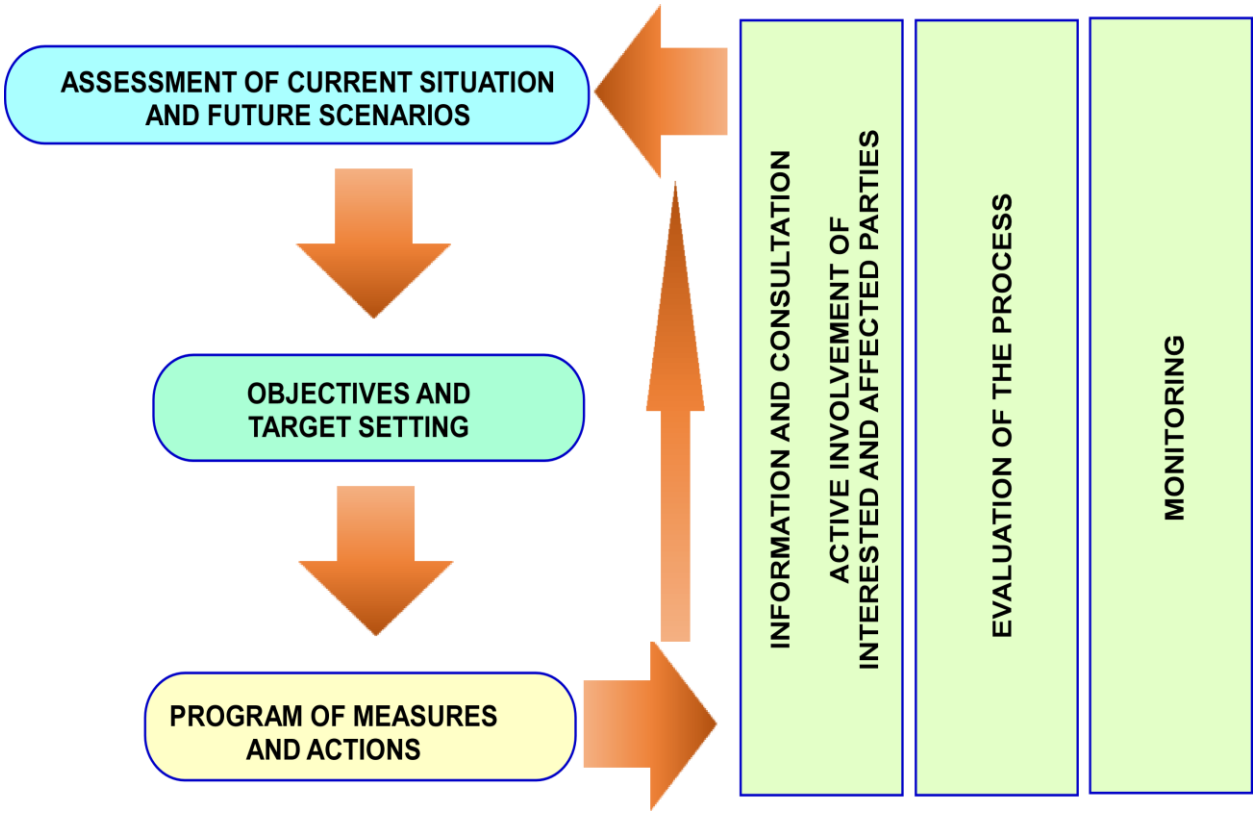


Figure 17. Stages of the planning process

The process initially narrows from broad screening, through comprehensive analysis, to prioritization and objective-setting, and then broadens again through strategic action down to detailed implementation planning. (Figure 18)

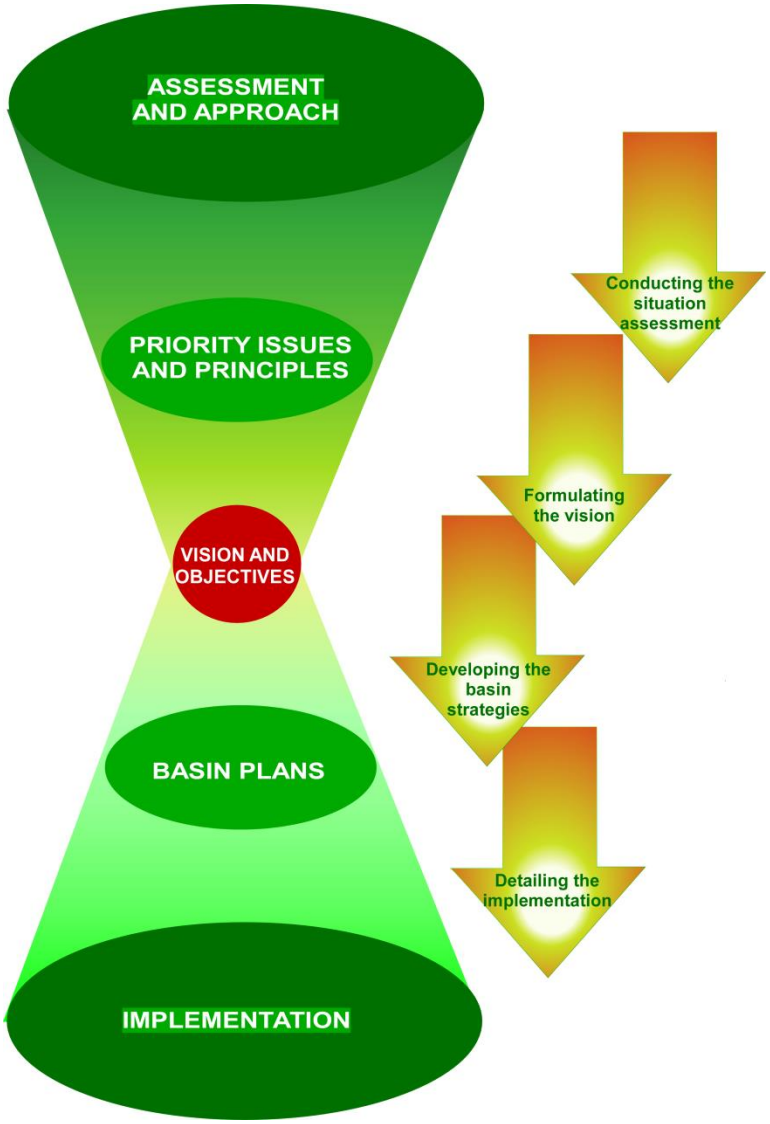


Figure 18. Key milestones in strategic planning process (Modified from Marjanovic et.al. 1999 and Pegram et.al. 2013)

This planning process can be represented in four key stages:

- **Conducting the situation assessment** to gain an understanding of the current and future conditions in the basin, as well as identify and prioritize the key issues.
- **Formulating the vision and goals** to provide the long term aspirational desired state for the basin together with goals (preliminary objectives) and principles to achieve this over time.
- **Developing the basin strategies** to specify a coherent suite of strategic objectives, outcomes and actions related to protection, use, disaster and institutions in the basin, designed to achieve the vision.

- **Detailing the implementation** to define actions that give effect to the basin strategies and ultimately achieve the vision and objectives.

Central to the process is the identification of priorities and trade-offs. These priorities are determined by social preferences about the economy, society and the environment, so these choices are the fulcrum on which the planning process rests. This process is supported by the identification, analysis and selection of feasible options to achieve defined goals.

Figure 19 shows these stages in the development of the basin plan, together with the key milestones (outcomes) during the process. The hourglass shape illustrates the way in which the process moves from the consideration of a wide range of detailed issues, into a narrow focus on a limited number of key high-level objectives, and then broadens out again into detailed implementation planning.

It is also important to recognize that the highly iterative nature of the planning process implies that these stages tend to overlap. Therefore, the outcomes that are nominally linked to a particular stage may be revisited during the entire process as further information and understandings is gained.

Each of the four stages has a different purpose, and consequently has distinct approaches, methods and assumptions.

PROCESS ROADMAP FOR BASIN PLANNING

The four stages may be unpacked into the more detailed roadmap of the basin planning process outlined in Figure xxx While this represents a comprehensive process, not all of these steps and associated outcomes are followed in all basin plans.

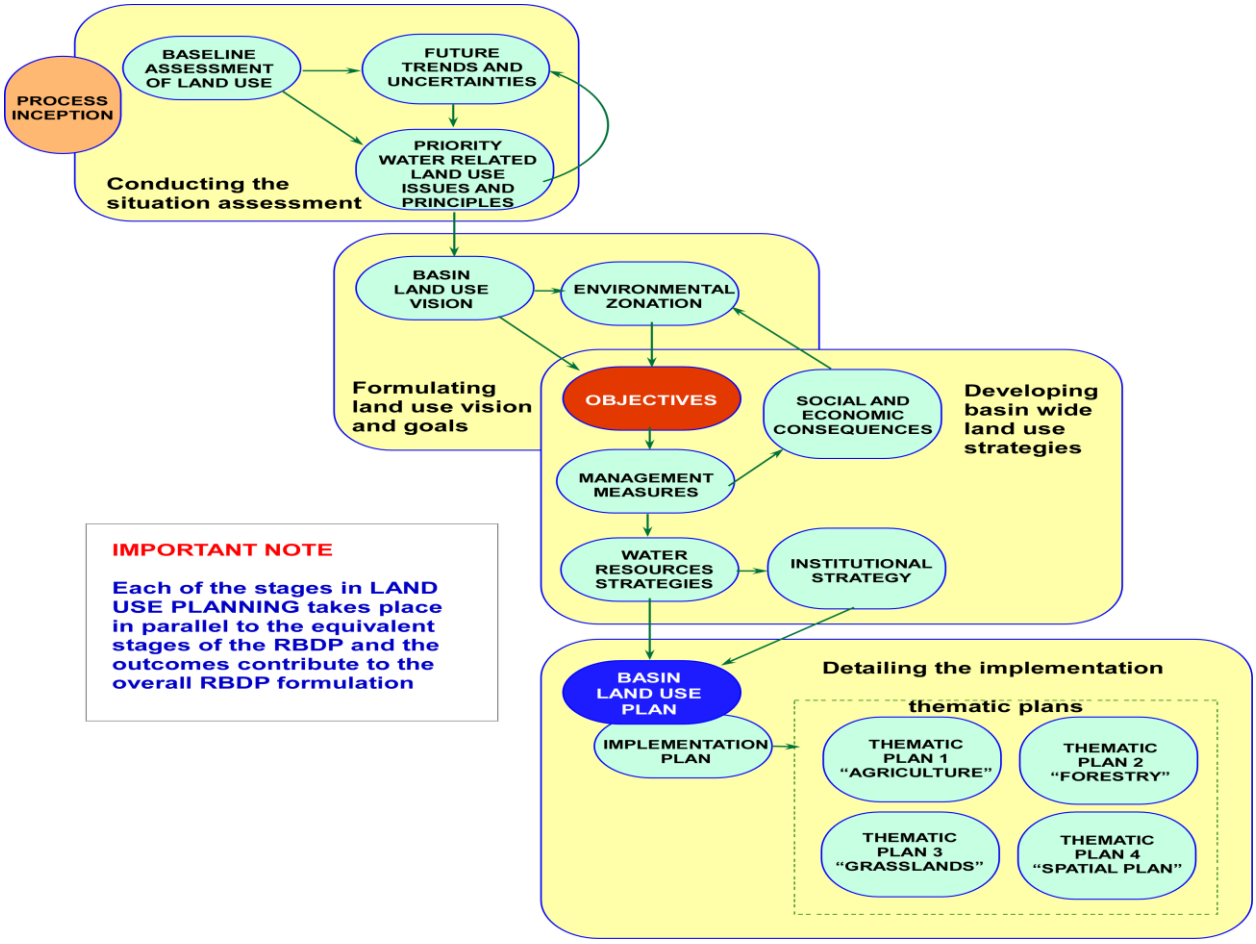


Figure 19. Road map for basin planning process

CONDUCTING THE SITUATION ASSESSMENT

Understanding the current land use situation and its cause-effect pathways in relation to the important water related issues (quantity, quality, extremes, ecosystem services, etc) is crucial for successful planning exercise. This requires a well structured effort and often needs significant resources in additional data collection and focussed studies. Land use planning process inception starts with this activity and should be able to document historical trends in land use within the delineated basin boundaries and the associated water related consequences of these. In addition it is advisable that future scenarios of land use are considered so that priority issues and principles can be identified. The following are components of the assessment:

- Process inception and design.
- Baseline assessment of the current situation and historical evolution.
- Future development and trends and forecasts or scenarios of development pathways.

- Priority issues and principles indicating the key challenges and concerns for land use planning.

Vision statements for the Danube River Basin Plan

The organic pollution goal is zero emission of untreated wastewaters into the waters of the Danube River Basin District

The nutrient pollution goal is the balanced management of nutrient emissions viewpoint and diffuse sources so that neither the waters of the DRBD nor the Black Sea are threatened or impacted by eutrophication.

The hazardous substances pollution goal is no risk or threat to human health and the aquatic ecosystem of the waters in the DRBD and Black Sea waters impacted by the Danube River discharge.

The hydro morphological alterations goal is the balanced management of past, ongoing and future structural changes of the riverine environment, so that the aquatic ecosystem in the entire DRBD functions in a holistic way.

Floodplains/wetlands in the entire DRBD are reconnected and restored.

Hydrological alterations are managed in such a way that the aquatic ecosystem is not influenced in its natural development and distribution.

Future infrastructure projects are conducted in a transparent way using best environmental practices and best available

Emissions of polluting substances do not cause any deterioration of groundwater

Water use is appropriately balanced and does not exceed the available groundwater resource climate change. Source: ICPDR (2009*a*).

FORMULATING THE VISION AND GOALS

Formulating vision and goals for water related land use in the basin is in many ways driven by respective vision and goals which are envisioned for the RBMP and should be aligned with it. This is important in that it feeds into setting of the objectives which drive the actions to be taken in the implementation of the land use plan.

Formulating the vision and the goals requires a broad consultation with stakeholders and extensive participation of all concerned, both those benefitting from the results of the implementation of the plan and those affected by the plan be it directly or indirectly. As a result sufficient time and resources should be allowed for this activity to ensure that the resulting vision and goals are clear,

alligned with the corresponding vision and goal for the RBMP and have extensive support of most if not all affected groups. Consultation and participation in this phase is mandated bz the WFD.

It is noted that there exists a hierrarchy within the process as shown in Figure: 20. The activities include consideration of:

- Basin land use vision for the long-term desired state of land use in the basin.
- Environmental zonation providing the desired state of land use in catchment that reflects a balance between social, economic and ecological imperatives.
- Land use objectives as time-based targets associated with the state of land use that leads towards the achievement of the vision over time.
- Social and economic consequences indicating the implications of achieving the objectives
-

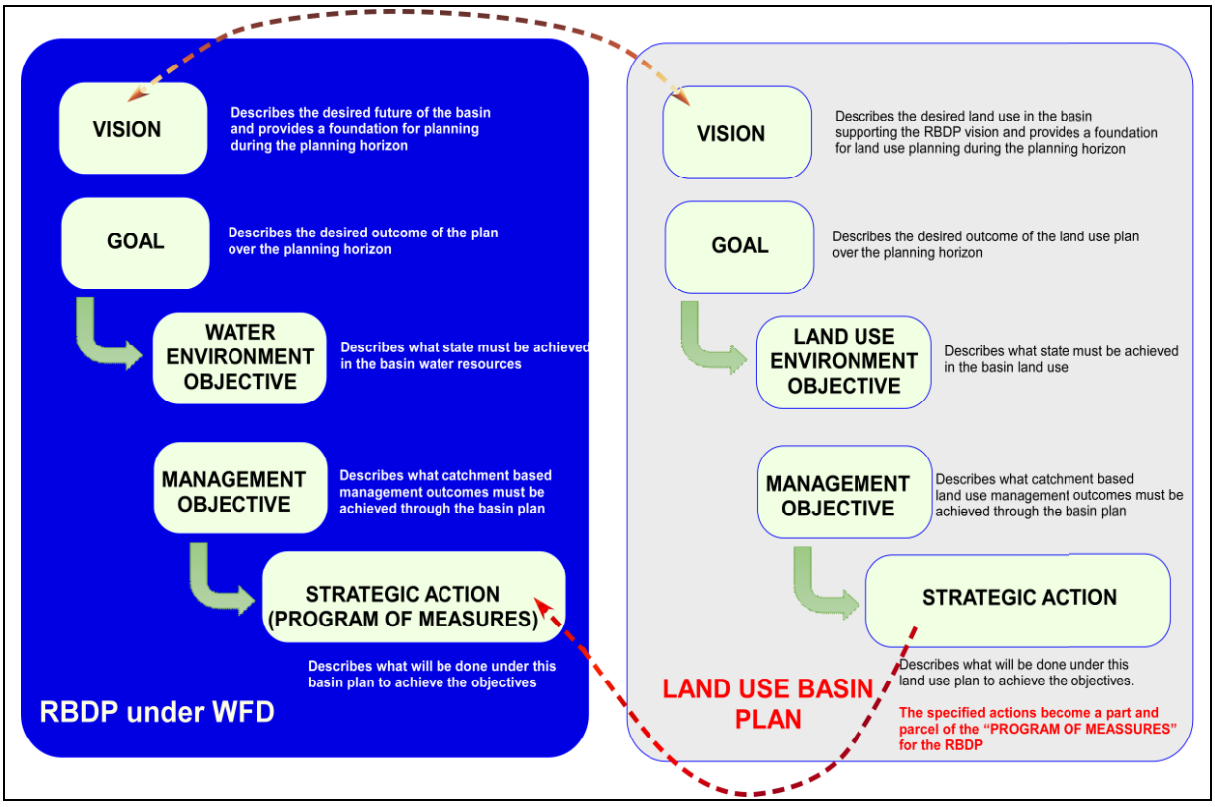


Figure 20. Hierarchy of vision, goals and objectives

DEVELOPING THE BASIN STRATEGIES

Basing land use strategy starts with clear statement of water related land use envirnmental objectives which determines land use management objective and this in turn leads to a strategic action program or or using the terminology of the RBMP to water related land use Program of

measures. Management objectives should be formulated as time-based targets to achieve the vision and land use objectives for the basin. Here different options and trade offs need to be considered since there is always more than one way to achieve a desired state. In practice catalogues of best practice measures are often consulted and used in this phase. This is particulary useful for land use planning purposes since best practice catalogues are available and sometimes also mandated as compulsory measures to be taken within legally specified focus areas (e.g. compulsory measures required by the Nitrate Directive within nutrient sensitive zones established as a part of its implementation)

DETAILING THE IMPLEMENTATION

The planning process culminates with the detailed implementation plan (often called ACTION PLAN) which outlines all the necessary activities, sets milestomnes and assigns responsibilities and resources needed for the implementation of the plan. In the case of land use basin plan which should be a significant input into the RBMP development it is advisable to split this into four distinct thematic programs of measures for agriculture, forestry, grasslands and spatial planning sectors due to different structures of decision making processes in the for sectors and associated administrative procedures, (Revisit figure 20). Doing this will allow for regional and/or local land use plans within the basin to be integrated into overall basin wide decision making.

Increasing the legitimacy and transparency for water management

Planning has the capacity to increase the legitimacy of decisions to be taken by enabling open and wide dialogue between the public, interest groups and authorities.
It's crucial for the legitimacy of a planning process to start dialogue as early as the phases of problem defining and setting the agenda. Better understanding of the interests of those involved arising during the planning process and so the chance to influence planning will increase their willingness to co-operate in problem solving.

It is noted that stakeholder consultation and participation is also required as it aids in the implementation efforts and makes land use planning more effective. Developing thematic land use plans as suggested contributes to the effective stakeholder consultation and participation through focusing relevant deliberations and consensus building and decision making processes.

COOPERATION AND ENGAGEMENT AS PART OF water related land use PLANNING

Despite the requirement that RBMP and its implementation be assigned to a responsible authority (e.g. Basin Authority at a national or regional level, ICPDR in the case of Danube basin at transnational level) no department or authority is likely to be able to implement basin wide water related land use plan alone or impose its will on other institutions or independent bodies. Cooperation is therefore the most appropriate approach, and should be institutionally built through the basin planning process.

As already noted, strategic basin planning requires alignment with other planning processes. To do so effectively, basin planning requires close cooperation between a range of organizations, institutions and groups. This achieves four main purposes:

- **Obtaining a diversity of perspectives** on the nature and causes of problems, as well as the possibilities and opportunities for solutions. Many groups have important information, and engaging external stakeholders(outside the water and land use sectors) provides an important way of incorporating diversity into the process and thus making it more robust.
- **Fostering alignment** with the planning activities and objectives of other institutions. This assists in the understanding and incorporation of these imperatives into the basin planning process and the ongoing cooperation of these institutions in basin management.

To facilitate the interaction and discussion among managers and stakeholders providing tools for conflicts resolution

Some issues can create conflicts in water resources planning that are not necessarily the result of wrong or illicit approaches. As different people have different goals, perspectives, and values, water resources planning should take into account multiple users, multiple purposes, and multiple objectives. Planning for maximum net economic benefits is not sufficient. Issues of equity, risk, redistribution of national wealth, environmental quality, and social welfare can be as important as economic efficiency. It is clearly impossible to develop a single objective that satisfies all interests and all political and social viewpoints.

In consequence, the water planning process should develop a number of reasonable alternatives to consider; evaluating from each one its economic, environmental, political, and social impacts.

However, achieving environmental, social and economic goals simultaneously can be impossible. Therefore, it will be necessary to develop a balance between environmental functioning and users with conflicting aims.

Planning can help practitioners to approach complex problems, to organise thinking, and to form the understanding necessary to strike that appropriate balance. Only in that way, crucial issues can be identified and sometimes difficult choices made on the basis of adequate information and a full review of the options.

- **Generating ownership and understanding** amongst a wide range of stakeholders of the concerns and solutions that are addressed by the plan. This in turn can greatly improve the effectiveness of implementation.
- **Disseminating knowledge** that has been developed through the basin planning process to other sectors 'decision-makers, particularly where the sector is not being generally monitored or evaluated.

Achieving this requires cooperation with partner institutions and engagement of broader stakeholder groups.

INSTITUTIONAL COOPERATION

It is critical to build on existing institutions wherever possible, and avoid unnecessary transfers of authority from one body to another. Requirements for shifts of institutional mandates and responsibilities can take a long time, and eventually cause the failure of well-intended reforms.

A variety of different approaches to engagement with other government institutions is possible. It is important to clarify the type of engagement that is most appropriate at different stages, distinguishing between:

- **Review (incorporation):** where the basin land use planning process needs to incorporate aspects of another sector's plan, that is either already completed or requires relatively little input from basin water resources planning; this is appropriate where the inter-relationship between the planning processes must be considered but are relatively independent.
- **Consultation (alignment):** where planners recognize there is a need to exchange views and information before acting, while accepting that the two processes remain independent; this is appropriate where planning decisions have an impact on each other and should be aligned as fares possible, but do not require harmonization as mandates are distinct.
- **Coordination (harmonization):** where the basin plan (and its implementation) requires harmonization between two planning process; this is appropriate where there are close interfaces or overlapping mandates which require coherence and consistency in application.
- **Cooperation (integration):** where the basin plan must be integrated in content and process with another process, leading to some degree of joint decision making; this is appropriate where effective and/or efficient implementation requires common action and/or response.

These represent increasing levels of engagement, with the appropriate level being related to how important it is that the partner acts in a manner that supports the basin plan. Clarification of roles and responsibilities is critical to an effective planning process that is integrated with other sectors. In this it is important that the 'lead voice' in the basin planning process acts as facilitator and coordinator, rather than dictating actions. The "lead voice" in the case of water related land use planning should be assigned to the Authority responsible for the development of a RBMP. The institutional and bureaucratic mechanisms that are necessary to support this role need to be understood and developed.

Report to EC on water management policy

The WF and Flod Directives explicitly require Member and Accession States to produce a management plan for each RBD. The River Basin Management Plan (RBMP) is intended to record the current status of water bodies within the RBD, set out, in summary, what measures are planned to meet the objectives, and act as the main reporting mechanism to the Commission and the public.

There are a number of outputs of this process, in the form of reports, that Member and Accession States are required to submit to the Commission by prescribed deadlines in order to confirm progress. The river basin planning process is followed by the implementation of the management plan.

In thinking about mechanisms to promote alignment, harmonization or integration, it is important to reiterate that planning is cyclical and requires bureaucratic mechanisms to being place during both planning and implementation. Institutional bureaucratic mechanisms that have proved useful in fostering some degree of alignment and/or cooperation include:

- **Enabling framework:** legislation and policy requirements may assist cooperation or alignment between organizations, but are not generally sufficient to achieve this except where penalties are incurred.
- **Governance and representation:** representation of political or bureaucratic leadership on governance structures.
- **Institutional structures:** regular joint meetings at a formal or informal level between officials of each institution.
- **Organizational design:** internal organizational structuring and systems to foster engagement with other institutions, including assessable job titles and functions.
- **Delegation and contracting:** inter-agency delegation of functions promotes cooperation, potentially beyond the contracted function.
- **Financial arrangements:** inter-agency financing promotes interaction and accountability.
- **Capacity building and support**: of another institution.
- **Engagement in planning processes:** representative attendance of each other's planning processes and meetings.
- **Consultation and comment:** on planning documentation ensures areas of potential nonalignment are raised.

- **Information sharing and exchange:** providing relevant information builds trust and potentially ensures action by another agency if the information is presented to help identify possible issues.

It is important to recognize that cooperation is built on experience and trust, that this typically begins with personal interactions and that the critical dimension is to institutionalize and operationalize these fledgling opportunities into long-term engagement(particularly where cooperation or coordination is required).

NON GOVERNMENTAL STAKEHOLDER ENGAGEMENT

Complex highly developed basins such as the Danube basin tend to have diverse water and land users and interest groups at a range of spatial scales and focused on various basin issues. Increasingly, major business, private sector and civil society organizations are becoming involved in land and water planning exercises. Typically these organizations are in addition to the governmental institutions that need to cooperate, and they may all have some level of influence on the implementation of the water related land use plan. Properly designed, this stakeholder engagement can complement the institutional cooperation discussed above.

Particular complementarities may be found between the public and the private sector, with the potential benefits of an active collaboration and capacity-sharing, although it is important to be mindful of the possible negative consequences related to perceptions of other stakeholders around institutional capture.

With the focus still being on obtaining diversity, generating ownership and fostering cooperation, in stakeholder engagement it can be useful to distinguish between:

- **informing stakeholders,** through the provision of information to assist them in understanding the problems, opportunities and response
- **consulting stakeholders** to consider perspectives and feedback around issues, priorities, objectives and solutions before decisions are made
- **involving stakeholders** in making decisions throughout the process in order to ensure that their concerns and interests are incorporated

Planning is not 100% accurate

Uncertainty can be defined as the occurrence of events that are beyond our control.

Uncertainty is always an element in the planning process. It arises because the complexity of the many factors involved. In fact, meteorological, demographic, social, technical, and political conditions which will determine the planning process have behaviour patterns not always known with sufficient accuracy.

Uncertainty arises mainly due to the stochastic nature of some key elements affecting these processes.
The programme of measures can be a tool to deal with this uncertainty since it can be revised according to the circumstances

- **collaborating with stakeholders** for joint decision making leading to joint action, including the development of objectives and the identification of preferred solutions.

Stakeholder engagement must recognize the differences between these levels, acknowledging that each has a role in the basin planning process for different stakeholder groups. A balance needs to be maintained between informing many groups and people, and involving only those that are most relevant. When done effectively, stakeholder engagement becomes the basis for strengthening the institutional and bureaucratic arrangements on which implementation will depend, because stakeholder resources and cooperation may be mobilized through the development of local stakeholder structures (such as committees and forums).

Look out!

EU regulations requires that spatial context for integrated and co-ordinated water management has to be the river basin district level.

Special considerations for a sound planning process

Planning is a tool or working methodology for preparing decision making with the objective of improving the use of resources available to achieve certain goals. It requires knowledge of the reality on which it operates and capacity to evaluate both the expected outcome and the process through which it can be attained.

Look out! Think globally, act locally.

As a matter of "good practice", river basin planners and managers need to build some cross-cutting principles into all components of their work, to ensure that co-ordination and coherence required for effective results is actually achieved.

The following preconditions for a sound planning process according to the relevant aspects of the WFD can be underlined:

- **Long-term vision for the RBD;**
- **Knowledge and information management.**
- **The need of building capacity;**
- **Integration on the operational level.**
- **Links with other planning policies;**
- **The right timing;**
- **Appropriate toolbox**

Knowledge and information management, capacity building and integration on the operational level needs appropriate tools. Tools are needed for e.g

- collecting appropriate data (data bases, GIS);
- picking up relevant data and information on data bases;
- analyzing and describing the content and planning process (flowcharts and GIS-based maps directed to the authorities and the public);
- facilitating administrative requirements;
- public participation (actor analysis, workshops, logical framework etc.);
- decision support tools able to make right priorities concerning the program of measures.

Look out! Under the Common Implementation Strategy a specific Guidance Document (WFD CIS Guidance Document No. 9) has been developed on the GIS elements of the WFD (WG 3.1)

SPECIFIC REQUIREMENTS IN THE WATER FRAMEWORK DIRECTIVE WITH REGARDS TO THE PLANNING PROCESS

The publishing of the Water Framework Directive forms a legal obligation for the competent authorities to organise the management of water within River Basin Districts.

The planning process is aimed to improve the establishment of river basin management plans and the programmes of measures and hence contribute to the establishment of the overall environmental goals of the Directive: that of achieving "good water status"(recital 25), prevent "further deterioration", "promote sustainable water use" and enhance protection and improvement of the aquatic environment through measures "for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances"(Article 1). The required steps and timing is shown in Figure 21.

Common understanding

There are a number of different planning concepts related to the WFD that are often used interchangeably and require some clarification – these relate to river basin planning, river basin management, river basin management plan, programme of measures and the appraisal process.

The River Basin Management Plan

The WFD requires MS to produce a management plan for each river basin district. This requirement is described in Article 13 and 15. The RBMP will act as the central focal point for the outcome of river basin planning. It will record the current status of water bodies within the River Basin District, set out, in summary, what measures are planned to meet the objectives, and act as the main reporting mechanism to the Commission and the public. The full contents of the plan are specified in Annex VII.

River basin planning and river basin management

River basin planning is the process of collecting and analysing river basin data and evaluating management measures in order to achieve the objectives of the WFD within prescribed timescales.

The river basin planning process is followed by implementation of the programme of measures. The planning process together with the implementation of the programme of measures is often referred to as river basin management.

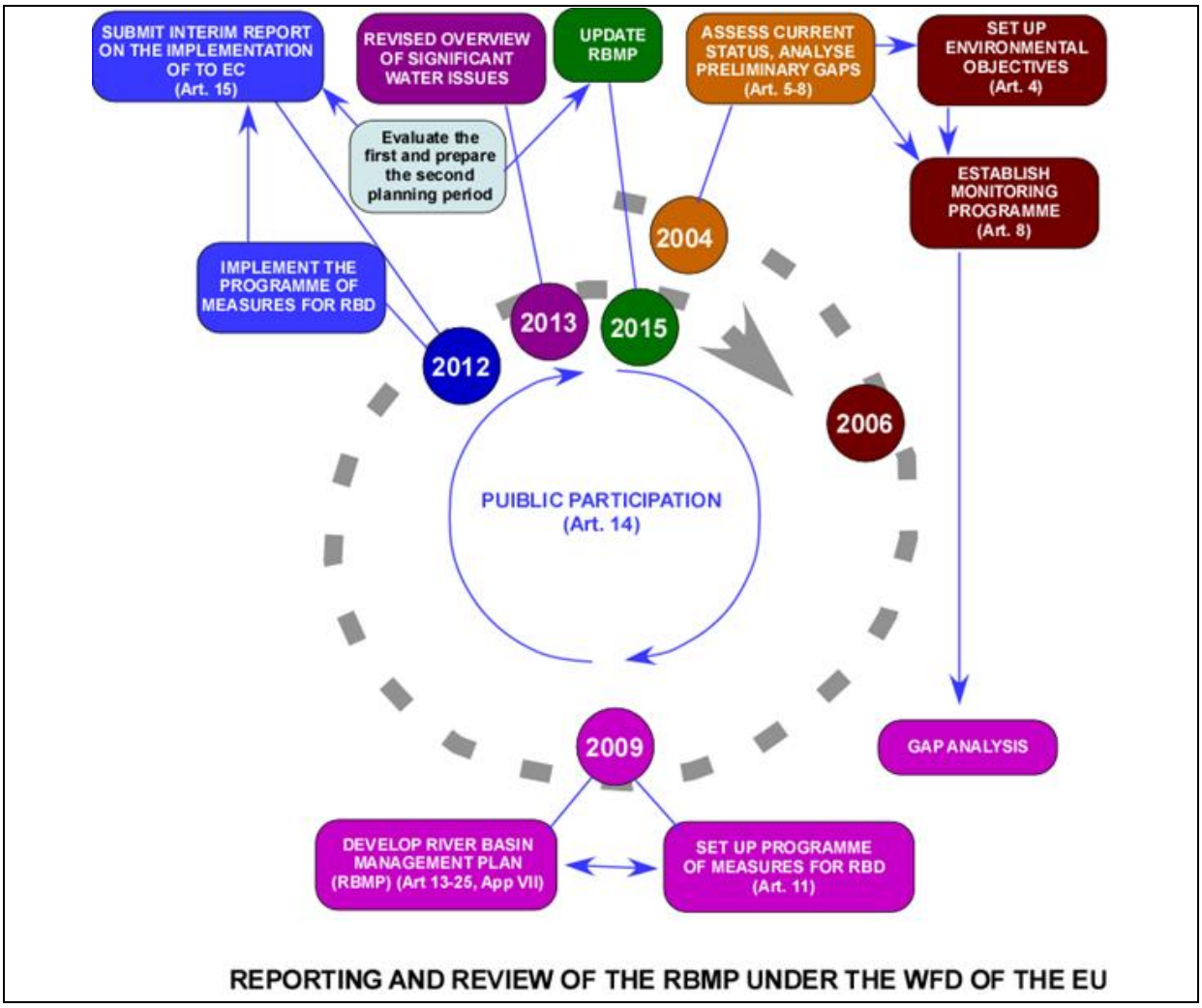


Figure 21. WFD requirements

Look out! Risk assessment is one of the main tools of the basin planning process.

If every pressure could be reliably identified and its effects accurately predicted, monitoring would be redundant. However, risk assessments can never be perfect. They always need to be tested. The monitoring programmes must provide the information needed to supplement and validate these assessments.

CHAPTER 3: BASELINE SITUATION ASSESSMENT.

CHAPTER 3: TECHNIQUES FOR BASIN PLANNING

INTRODUCTION

The principles, approach and process that are adopted in the planning of a basin need to reflect the nature of the basin, its historical evolution and the motivation for the current planning initiative Where this is not done, considerable time and effort maybe wasted.

The situation assessment provides the opportunity to narrow the focus of the strategy and develop an understanding of the **key management concerns**. It should begin with a comprehensive screening of issues, followed by a synthesis of understanding, and conclude with a prioritization of concerns to be addressed by the basin plan. During this process, both the historical evolution of the basin to its current state and the future development trends need to be considered. (Figure 22)

Detailed analysis and understanding should continue throughout the planning process, in response to emerging priorities. This implies that *the information in the situation assessment is continually being updated and is only complete at the end of the planning process*, not when the visioning starts. Alternatively, the situation assessment may be viewed as continuing in parallel to the other stages in the strategic basin planning process.

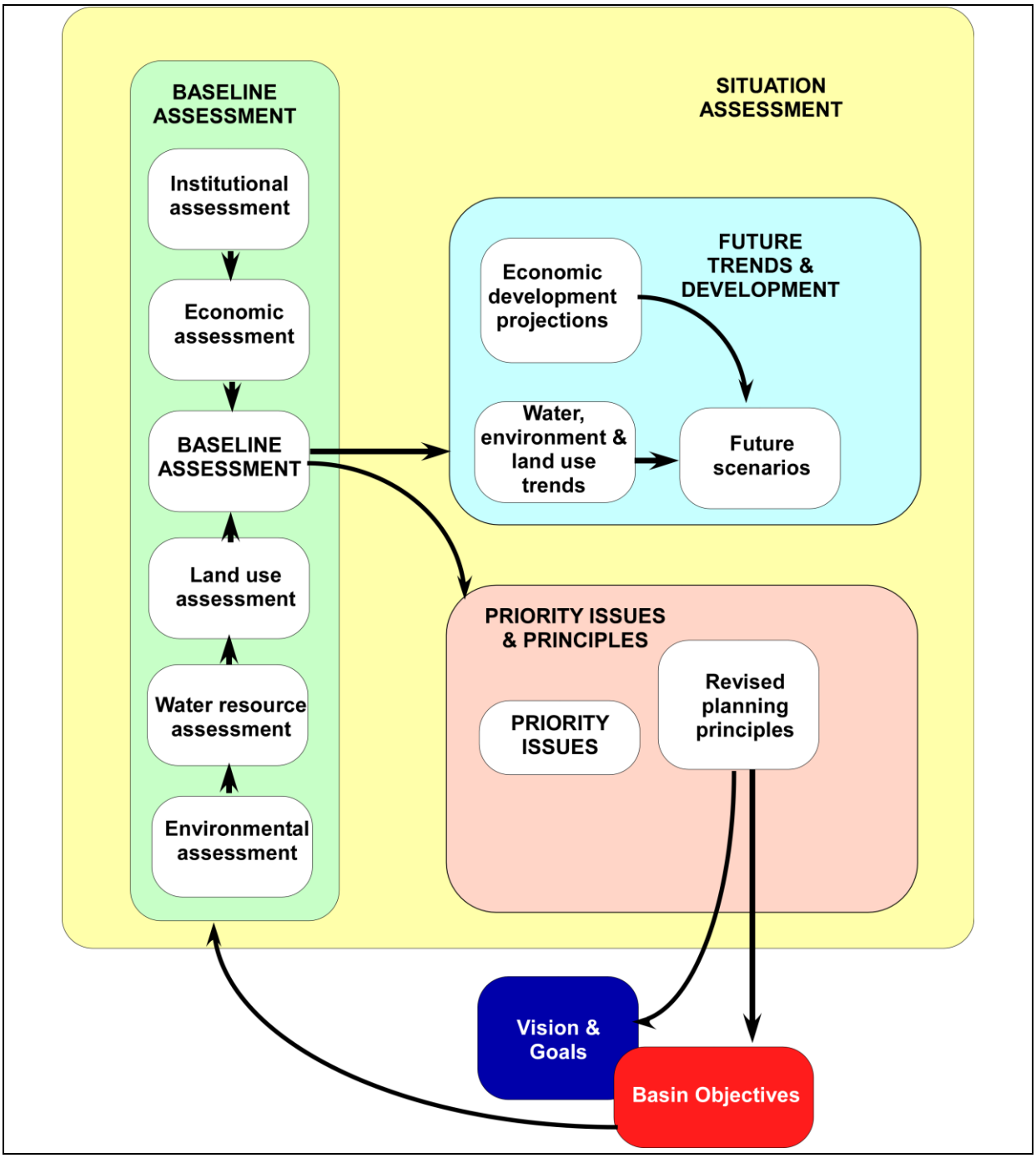


Figure 22. Situation assessment in water based basin level land use. For simplicity of presentation, a linear process is indicated, with the implication that all information from previous activities is carried through subsequent activities. In practice there is significant iteration between the baseline assessment, future development and issue prioritization.

PLANNING PRINCIPLES

There are two distinct types of planning principles relevant for the basin plan, namely:

- **Procedural principles,** guiding the way in which the basin planning process should be conducted, which need to reflect the institutional, political and historical management context in the basin.
- **Substantive principles,** guiding the strategic development of the basin plan itself, which need to reflect planning priorities and development imperatives of the core stakeholders.

Procedural principles (Source: Bloxham et al., 2005)

These are adapted from the Global Environment Facility's (Gaff's) transboundary diagnostic analysis (TDA)/strategic action programme (SAP) guidelines:

- Full stakeholder participation
- Transparency in information sharing and decision-making,
- Joint fact-finding between the basin organization, other institutions and stakeholders
- Integrated management recognizes the interrelated nature of hydrological, ecological, social and economic systems, in line with the national water policy and legislation.
- Adaptive management
- Causal understanding of the underlying economic and social drivers, and the balance between equity, sustainability and efficiency
- Subsidiarity to implement management at the lowest appropriate level, particularly through other institutions, where these have appropriate mandate and capacity.
- Intersectoral (and intersectoral) focus, recognizing the relationships (in terms of impact and influence) of other sectors
- Stepwise consensus building to reach a broad consensus, beginning with small wins and areas of agreement at each step in the process.
- Pragmatism in selecting implementable options, considering capacity and resource availability in the short and medium term.
- Clear accountability by the basin organization, government and stakeholders for implementing.
- Joint commitment to the strategy and its elements.
- Institutionalizing the process by linking to existing structures.

LAND USE PRIORITIZATION AND PLANNING TECHNIQUES

The situation assessment phase of basin planning needs not only to establish existing land use conditions in the river basin, but in addition to identify the priority issues for future water related land use planning in the basin. These priorities play an important role in informing the assessment of trade-offs with other basin planning goals and identifying the vision, objectives, and strategic actions for the basin plan.

Basin-scale water related land use planning exercises typically seek to meet two overall objectives (Nel et al. 2009):

- **Representation,** which seeks to adequately conserve the full variety of land use features in the river basin. This requires the protection or restoration of a representative sample of main habitat types and species within a river basin, as well as protection of sites of particular importance.
- **Persistence,** which requires maintenance of the natural processes in the river basin that underpin key functions of the river basin, and maintain ecosystems and biodiversity in the river basin.

The water related land use basin planning techniques identified below each contribute to these overall objectives. The appropriate planning techniques will depend on the particular context and challenges in the river basin. One technique which is appropriate is **land use zonation and prioritization**,. In complex basins facing multiple pressures it is likely that there will be a role for some other techniques also.

LAND USE PRIORITY ZONATION

The purpose of land use priority zonation techniques is to identify the areas of the basin that are of particular importance for sustainable water management and which should be afforded particular recognition or protection in the development of the river basin land use plan. Criteria for the selection of priority zones varies from catchment to catchment but as minimum is that WFD Protected areas and FD flood risk zones should all be included. In addition the following criteria should be considere:

- Protection of an intact example of each of the main habitat types found within the basin.
- Presence of globally, nationally or regionally significant concentrations of species (particularly endemic or endangered species)
- Globally, nationally or regionally significant areas where most naturally occurring species exist in natural patterns of distribution and abundance.
- Formally protected areas (such as Nitrate Directive sensitive areas, RAMSAR sites and national parks)
- Rare, threatened or endangered ecosystems that are not formally protected.
- Areas fundamental to meeting the needs of local communities (for example, for food, health, drinking water)
- Areas fundamental to the regional or national economy (such as fisheries)
- ***Areas that provide ecosystem services in critical situations*** (such as flood attenuation, nursery areas, maintenance of dry-season base flows, etc.)

These assessments seek to identify the most important areas, processes and functions in the basin in which particular attention should be devoted to land use management or areas that need to be conserved and protected in the river basin plan. They provide, among other things, maps of the distribution of water important terrestrial ecosystems that should be conserved to meet agreed water resources management targets and/or protect critical ecosystem services, such as flood attenuation, water retention or pollutant assimilation. Land use priority zonation exercises therefore build on the environmental zonation exercises undertaken as part of the baseline assessment. Under some basin planning approaches, one of the objectives of basin water related land use plans can be the establishment of a comprehensive system of basin environmental zonation, with different levels of protection afforded to different parts of the basin.

Specific attention should be devoted to protection and enhancement of important waterrelated ecosystem services (Table 23 and Figure 24)

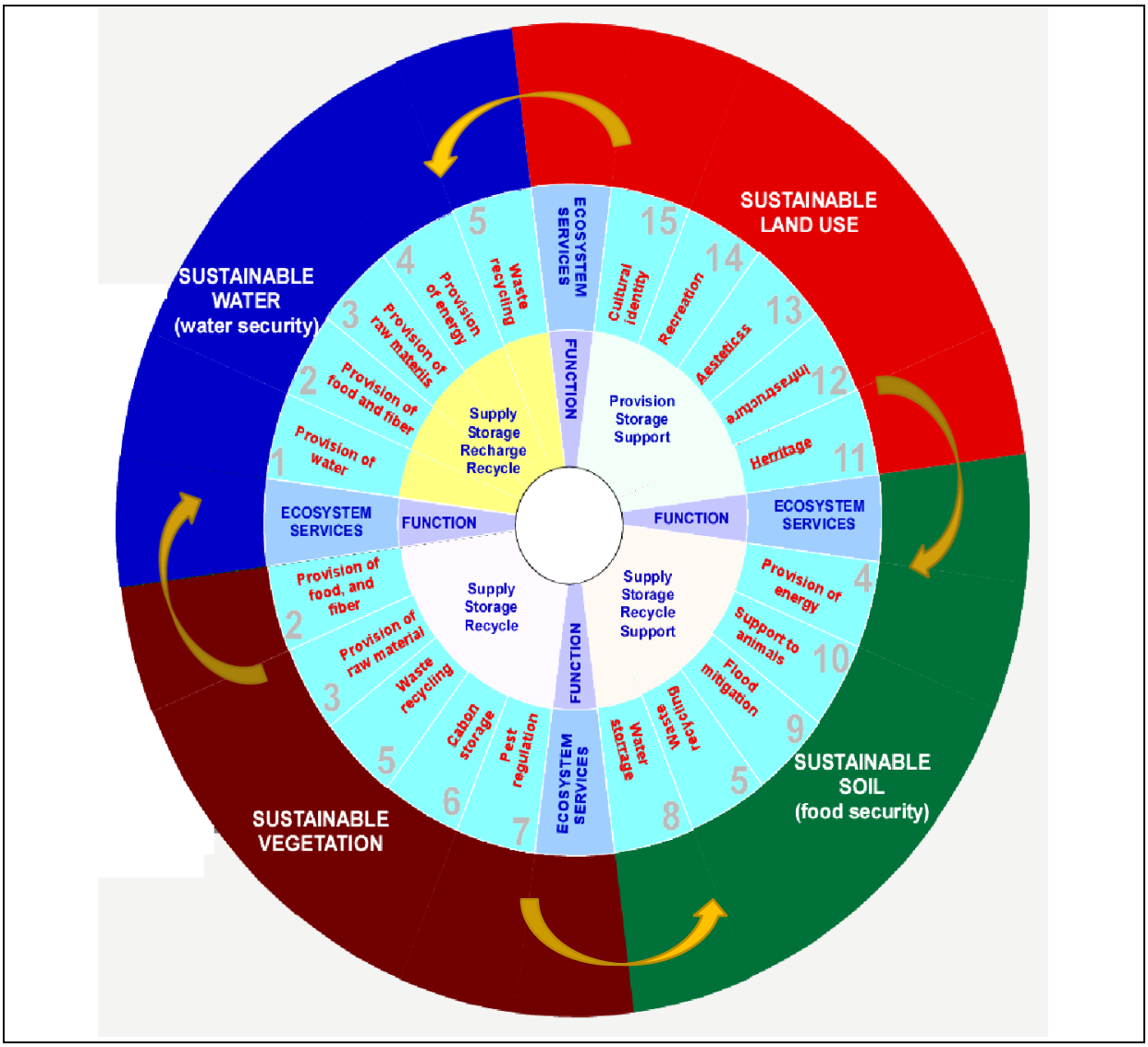


Figure 23. Importan water related ecosystem services

Table 3. Examples Water-related ecosystem services* and some functions they perform

Ecosystem service category	Example ecosystem functions and benefits
Provisioning services – Products obtained from ecosystems	
Freshwater supply	Providing freshwater for human consumption and human needs
Regulating services – Benefits obtained from the regulation of ecosystem processes	
Water regulation	Regulating the presence of water over time and space – surface waters and groundwater discharge/recharge
Erosion regulation	Soil stabilization (links to natural hazard regulation and supports provisioning services)
Sediment regulation	Regulating the water-driven formation and flow of sediments through the system, including deposition to maintain coastal wetlands and built land
Water purification and waste treatment	Nutrient and pollution uptake, processing and retention, particle deposition
Natural hazard regulation Coastal protection Flood protection Drought protection	Water-related disaster risk reduction Attenuates/dissipates waves, buffers winds Stores water or slows water flows to reduce flood peaks Provides sources of water during drought periods
Climate regulation/moisture recycling	Influencing local and regional precipitation and humidity and local/regional cooling effects through evaporation
Pollination	Sustaining animal pollination of plants to support crop production and biodiversity
Supporting services – Services that are necessary for the provision of all other services	
Nutrient cycling	Maintains overall ecosystem functioning
Primary production	Supports all life on earth
Soil formation	Maintains the regular production of soil to support most other terrestrial ecosystem services
Cultural services – Non-material benefits that people can derive from ecosystems	
Spiritual, religious and totemic values	Beliefs held that depend on the existence of ecosystems (nature)
Aesthetic values	Benefits derived through ecosystems being considered beautiful, appealing or visually appreciated etc.
Recreation and eco-tourism	Socio-economic benefits (e.g. livelihoods) based on tourism and recreation, including sport (e.g. recreational fishing)

*Water-related ecosystem services are those that directly influence the quantity and quality of water

INSTITUTIONAL, LEGAL AND GOVERNANCE ASSESSMENT

Water related land use basin plan is likely to have an impact on the institutional environment within and related to the river basin. It is therefore essential to have a full understanding of the historical, current and emerging institutional context. This implies that the institutional assessment needs to identify and understand theme stakeholders in the water sector and other sectors, their mandates and relationships with the mandated basin water management organization, their policy and planning initiatives that need to be considered by the basin plan, their financial arrangements and their relevant capacity. This implies:

IDENTIFY AND UNDERSTAND

Stakeholders in the water sector and other sectors, their mandates and relationships with the mandated basin water management organization, their policy and planning initiatives that need to be considered by the basin plan, their financial arrangements and their relevant capacity.

- assessment of the roles, functions and capacities of the different organizations in the basin
- understanding the plans of other sectors: it is important to be clear how this is different from an assessment of future-economic scenarios.

The institutional assessment considers the critical aspects related to implementation: legal mandates, policy intent, governance arrangements, and financing and organizational capacity. This guides the identification of stakeholders that must be engaged on key emerging issues, and also highlights particular bottlenecks that may be faced in the acceptance of the plan and its eventual adoption.

A critical aspect of this review relates to potential misalignments between the policy and planning intent of different government sectors. This enables the identification of gaps and inconsistencies between policies and plans.

This leads to the institutional mapping of the roles and relationships of government departments, agencies and levels of government, together with their interactions with private sector and nongovernmental organizations around water related and developmental issues. Typical elements of the institutional mapping include:

- **Water management institutions:** Understanding the roles and relationships between institutions and structures (both legally established and informally functioning) that are involved in water management. This ranges from the national department of water and national agencies or authorities, through basin-level organizations and provincial departments, down to entities involved in the local operation of irrigation schemes, urban and domestic water supply systems, and local water resources management.
- **Land use management and other institutions:** A number of other institutions have an influence on the water resource management arena which needs to be captured in this institutional review. Among them are other national departments and their agencies and in some instances programmes. The potential intentions of the

private sector should be considered, particularly linked to agri-business, as should be the engagement and intentions of active nongovernmental and community based organizations

- **Provincial and local government:** Understanding the roles and relationships of the water sector with provincial and local government mandates related to spatial, social and economic development, as well as environmental management and conservation. This should include an assessment of the pragmatism and relevance of plans and initiatives at different levels, because often paper plans are not meaningful or the relevant institutions do not have adequate capacity to implement them. Therefore, this assessment should develop a clear picture of the water related land use requirements, impacts, management challenges and opportunities for the basin plan development, and will usually require direct engagement with provincial and local government.

IDENTIFYING ISSUES AND REFINING PLANNING PRINCIPLES

As highlighted above, basin planning in complex situations cannot address all issues in all places. It is necessary to identify the key land use management issues and carry out some level of prioritization, both for the situation assessment and for the further development of the plan. In the final stage of the situation assessment these issues should be identified. **This stage forms the bridge between situation assessment and the development of a basin strategy**.
Identification and prioritization of issues is typically done through a combination of the following:

- political priorities/negotiation dictated by political leaders emerging in response to events within the basin or country
- expert perspectives of knowledgeable managers and practitioners, gained through a Delphi-type process
- technical/economic analysis and screening of issues by a small project team during the baseline assessment
- the engagement of local stakeholders through consultation sessions and technical review and synthesis of their inputs.

Identification and prioritization of issues

- political priorities/negotiation
- expert perspectives of knowledgeable managers and practitioners
- technical/economic analysis and screening of issues by a small project team
- engagement of local stakeholders through consultation sessions and technical review

The identification and prioritization of land use management-related issues is usually an iterative process, with priorities emerging during the situation assessment baseline and future scenario analyses. During this process, understanding improves around these issues, particularly as they relate to specific problems and zones in the basin. In some cases, causal

relationships are explored to describe the base and intermediate causes of an issue. Important considerations in assessing the priority of an issue include:

- the current social, economic or ecological severity of impact associated with the issue
- the future expected severity of the issue under changing Circumstances
- the uncertainty associated with current understanding or future implications
- the feasibility and degree to which water related basin wide land use planning can address the issue.

These priority issues are used in three distinct ways in the basin strategy process:

- to refine the substantive principles on which the remainder of the process will be based, in order to reflect the specific nature of the basin planning challenges and opportunities
- to guide the focus for the basin visioning and objective setting Process
- to indicate the thematic areas of focus (systems) that must be developed as part of the basin planning process, which will eventually be rolled out into land use plans.

ENGAGING TRENDS AND UNCERTAINTY

Basin planning clearly needs to consider the current land use management issues highlighted by the baseline assessment, but at the same time must identify emerging issues and potential threats. This future assessment is particularly important for strategic basin planning that takes a long-term perspective, within a dynamic and uncertain climate and development environment.

There are two distinct ways of approaching this future assessment, reflecting different views of the future.

- The first assumes that the future can largely be predicted (within bounds)and that the management response can be optimized, possibly even considering different trajectories with their estimated probabilities of occurrence.
- The second recognizes that the future is highly uncertain and that management responses need to be robust to various alternative pathways (with no indication of probability of occurrence) within the domain of possible futures.

Traditional land use planning has been largely based on the former. However, the latter is being increasingly explored in response to the acknowledgement that development and climate changes imply that the **future is fundamentally uncertain**.

Land use planning is therefore evolving to reflect a paradigm of uncertainty about the future, rather than trying to anticipate and plan for one or more probable futures. This need

to develop robust solutions that can accommodate multiple futures is driven by two key uncertainties:

- **Rapid social, demographic and economic change** has been observed in several basins. These unanticipated changes lead to challenges when the land use plan is too rigid in its design.
- **Climate change** may cause variation in rainfall and temperature that affects water resource availability, increases the frequency and severity of floods and droughts, and disrupts the ecosystems that maintain water quality. The degree of change in a specific basin&catchment and the timeframe over which change will occur is difficult to predict, resulting in significant uncertainty.

There are also two distinct ways in which to assess the degree to which land use and its management impact on the broader social and economic development drivers of change.

There is increasing recognition that strategic basin planning requires one to gaze into a future filled with uncertainties, while being aware of the context in the broader political economy.

The way in which water and land resources are used, protected and developed has a profound influence on broader public and private-sector risks and opportunities, and therefore has significant consequences for economic activity, social development and political stability.

Understanding and evaluating these uncertainties and their impacts is a fundamental part of the situation assessment phase of basin planning.

Traditional water and land use management assumes that the development future is independent of the water and land use future, and therefore basin planning needs to respond to these exogenous drivers of water and land use requirements.

Alternatively, as water and land resources become stressed, their availability and management have a greater influence on economic and social development pathways, and their role as a catalyst or constraint to development is being considered through feedback to the understanding of future equirements for strategic basin planning.

Various techniques have been adopted or proposed to assess these changes and uncertainties:

- the impact of future development on water and land resources (and vice versa)
- the impact of climate variability and change on water and land resources and vulnerability
- the impact of development and climate uncertainty on robust decision-making.

The ultimate purpose of understanding the future is to inform decisions as part of the basin planning process. Therefore the approaches that are used to assess the future situation also typically support decision-making that considers or optimizes selected objectives and actions against that future.

It is useful to outline the three basic elements of any basin planning analysis, each of which may be affected in different ways by future changes.

- First, **the catchment land use patterns**, climatic variability and hydrological processes drive the flow, water quality and flood response of rivers, wetlands, lakes and estuaries. Socio-economic development and climate changes affect the quantity and quality of infiltration, runoff and discharge of water to surface and ground water. Assessment of these future impacts may be done through a range of heuristic, deterministic or stochastic methods to produce 'synthetic 'future estimates of hydrology and water quality, against current-day or naturalized conditions.
- Second, the hydraulic characteristics and configuration of the surface water, aquatic environment and reservoir system determine the quantity, quality and timing of water flowing through the basin. **Changing climate, hydrological and water quality inputs and/or instream infrastructure development and habitat modification may change the characteristics and thus the response of the system**. Techniques to assess these responses depend on the issue being addressed, and vary from large system analysis for water allocation and hydropower generation, through water quality modelling to hydraulic routing for flood risk and navigation.
- Third, the system requirements in terms of ecosystem functioning, water supply, water quality or flooding determine the demands on the water resources, as well as providing the link back to the social, economic and ecological imperatives for development. These requirements shift with changing development patterns and climate variability in the basin, from the obvious increases in water demand with increased production, through **increasing flood risk with land use change**, to less obvious changes, such as in crop evapotranspiration as temperature and carbon dioxide levels shift.

It must also be recognized that no one model or technique can answer all of the possible issues. Rather, purpose-specific thematic analysis techniques and models tend to be developed around the priority issues. The aim of basin planning is to ensure that the assumptions and principles underlying these different techniques are consistent and that the interactions between them are considered.

All three of these elements clearly interact, and only by combining them can a complete picture of future changes in the basin be assessed.

SCENARIO PLANNING

Scenario planning is a means of assessing the consequences of multiple equally plausible futures, and thus represents a technique that moves away from exogenous trend analysis and towards planning for uncertainty. It provides a technique to engage potentially complex developmental and climate futures in a basin and their interactions with management

strategies. Scenario planning is built on thorough analysis of future possibilities, combined with the knowledge and insight of individuals who know and understand the basin.

Scenario planning begins with the identification of future uncertainties (at various scales) that will affect the social economic development, environment, water and land resources in the basin. An assessment of the level of uncertainty against the level of impact on water allows the identification of highly uncertain and high-impact issues, around which different futures may be formulated. Typically these futures are captured in there to four plausible scenarios reflecting different futures (with no indication of their different likelihood of occurring), together with narrative on the pathway and key drivers from the current state to that future.

These scenarios provide the landscape against which the planner can identify the key levers that should be the focus of planning interventions, and evaluate the degree to which possible interventions are resilient to future change. Alternatively they may provide a landscape within which water-related development can take place without exceeding agreed boundaries.

CHAPTER 4:
DEVELOPING THE BASIN WATER RELATED LAND USE PLAN

CHAPTER 4: DEVELOPING THE BASIN WATER RELATED LAND USE PLAN

INTRODUCTION

Once the relatively linear process of conducting the situation assessment has provided an adequate understanding and prioritization of the issues and principles, the more iterative and chaotic process of developing a basin plan must begin. The process description below attempts to frame the multitude of ways in which this is done. In practice, basin planning processes have many of these elements, but few involve all aspects.

The primary aim of basin water related land use planning is to provide a coherent strategy to address the priority water concerns in the basin, concerns which typically relate to objectives of conservation and sustainable development. This requires the alignment, harmonization or integration of many management themes and disciplines in order to create a holistic and coherent basin plan. There are two conceptually distinct ways of doing this, each of which reflects a different approach and assumptions for the basin planning process:

- **The development of a strategic vision**, based on the priority issues and future scenarios identified for the basin during the situation assessment process. This may distinguish between different parts of the basin according to local conditions. The strategic objectives and actions are developed against this coherent vision. This allows disciplinary (thematic) differences and local(area) constraints to be considered, but continually comeback to the unifying vision, thereby facilitating proactive harmonization at the basin level. This represents a process of visioning with spatial and thematic disaggregation.
- **The development of thematically based actions and associated objectives** for the priority issues identified during the situation assessment, considering future development scenarios. The development of a coherent set of strategic actions, targets (objectives) and outcomes(goals) for the basin then becomes a project management function (aligning the distinct thematic processes), with more reactive synthesis and agglomeration of the emerging and in some cases prior existing plans into the basin strategic objectives towards the end of the process. **This represents a process of alignment with spatial and thematic aggregation**. In practice, while any given basin planning process may have elements of both approaches, it will be inherently grounded in one or other of the two philosophies outlined above. On the one hand, visioning-based processes typically do not start with a blank slate, but instead must incorporate and align with previous basin or catchment thematic objectives and plans. On the other hand, the process of alignment often requires a

perspective on sub catchment or basin visioning to balance potentially competing needs.

Thesis quite common in more traditional planning environments, where flood planning, navigation planning, hydropower planning, irrigation planning and urban water supply planning are done separately by different ministries. The outcome is that these plans are often in conflict in terms of their understanding, aims and requirements on water management. While all of these approaches may be applicable in some circumstances, proactive strategic visioning and alignment approaches tend to be more effective, and have emerged as the common practice in the planning of basins that have greater complexity, involve trade-offs between competing uses of the basin water resources, and require alignment with broader economic and social development imperatives.

It is important to recognize that most basin planning processes begin with a relatively clear high-level project plan, and end with a relatively coherent structured basin plan, both of which imply a logical planning sequence. However, it should also be acknowledged that the process in between may not look much like either of these, because it is only through meandering, exploring dead-ends and tracking back on previously covered ground that the necessary level of common understanding between key stakeholders and the required alignment of objectives and actions is possible.

The common feature of strategic basin planning processes is an attempt to combine the priority issues (considering their current and future states), with broader social, economic and ecological imperatives. They typically distinguish a longer-term aspirational intent (vision) from short term measurable targets (objectives) that describe the start of a pathway to this aspiration. Each basin planning process tackles this in a different way. Some define a clear unifying vision from which the strategy flows, while others formulate goals or statements of intent, and the remainder develop a coherent suite of objectives.

They all share a commonality in the definition of objectives that reflect the imperatives to manage the basin, and the interpretation of these objectives into actions that consider technical feasibility, financial viability and institutional capacity of implementation. From a conceptual perspective, strategic basin planning may be separated into two interrelated, but distinct phases:

- The first involves determining *what* is to be achieved, or more specifically the setting of strategic objectives that contribute to meeting the basin imperatives in a coherent and time-bound manner. This may involve some of the following steps:
    - development of an aspirational vision according to developmental and environmental imperatives in the basin articulated in basin level social and economic principles/criteria
    - definition of qualitative statements (goals or outcomes),reflecting the priority issues and defined planning principles

  - functional zonation (or classification) of river reaches or catchments (and their inter-connectivity) balancing levels of protection and development
  - translation of these visions, goals or zones into measurable water environmental objectives to be achieved during and/or beyond the timeframe of the basin plan
  - assessment of the broader social and economic(developmental) impacts of setting these water environmental objectives, with possible iterative refinement of the goals or zonation.
- The second relates to *how* this is to be achieved, or more specifically the development of strategic actions that jointly enable the relevant strategic objectives to be attained over the period of the basin plan. This typically involves the following steps:
  - translation of the (vision and) water environmental objectives into tangible management objectives related to catchment development and/or water use
  - identification of technically feasible strategic actions that will jointly contribute to the achievement of the management objectives and water environmental objectives
  - evaluation of the social, institutional and financial viabilities of these strategic actions and the sustainability of their implementation in achieving the specified objectives
  - assessment of the broader social and economic consequences (and trade-offs) of the suite of defined objectives and associated strategic actions.

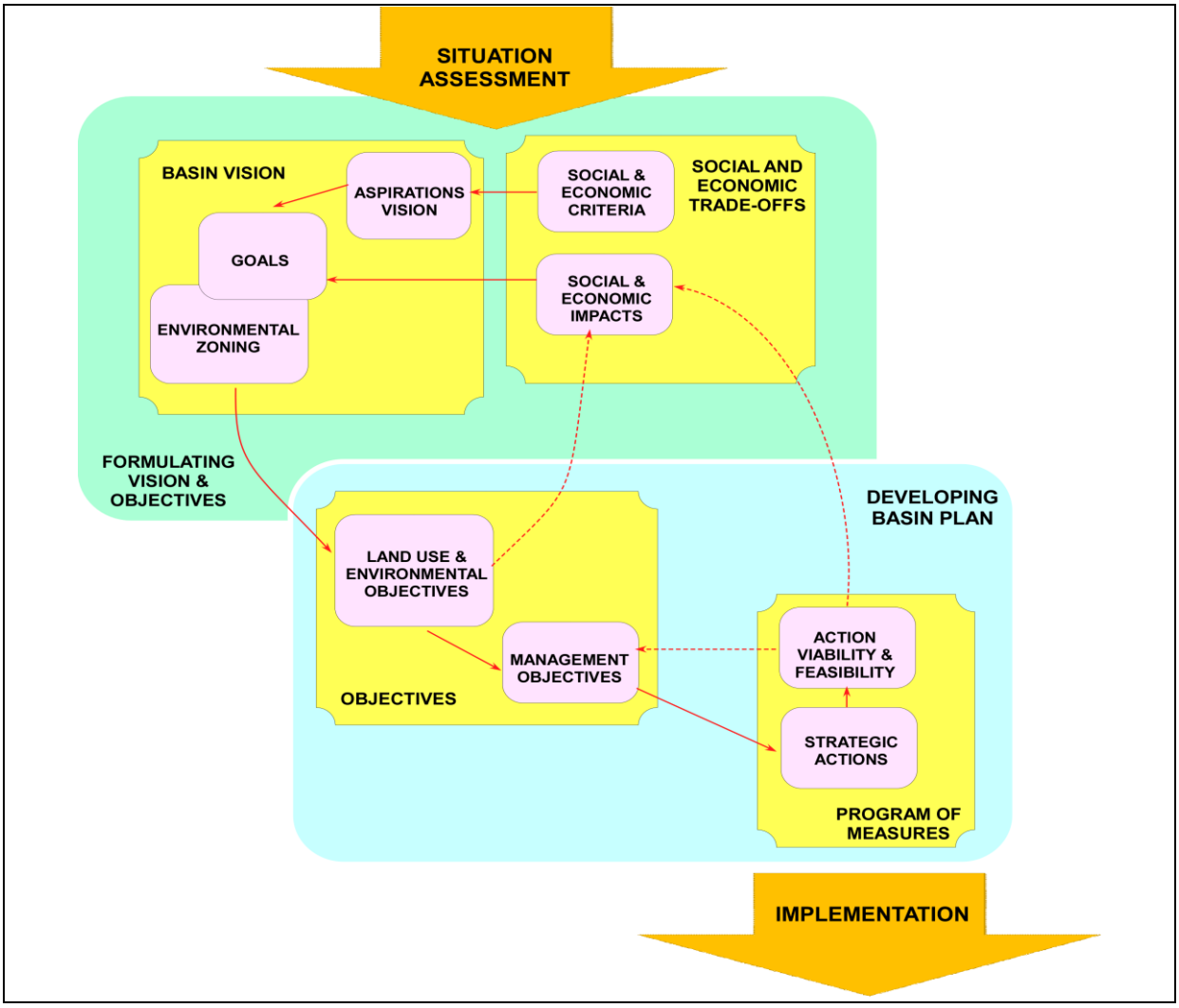


Figure 25. Procedure for formulating the basin vision, objectives and actions

The specific evaluation and broader assessment outlined in the last two steps may lead respectively to modification of the management objectives and strategic actions, or revision of the basin goals and water environmental objectives. This potential iterative refinement of the basin goals, objectives and actions may continue until an acceptable balance is achieved between the desired state defined by the objectives and the implementation requirements of the associated strategic actions. The process is captured in diagrammatic form in Figure 25.

BASIN VISIONING

A basin vision (and principles) typically provides a somewhat generic and qualitative statement of long-term intent, because the aim is to develop something that all stakeholders can support on the level of principles. The advantage of this is that the specific implications

of the vision for individual water users are not initially clarified, so stakeholders focus on a desired state for the basin rather than for themselves. It is in translating this into objectives that the process becomes more quantitative and focused (with the implications on individuals becoming clearer), but in the visioning pathway, this happens within the context of a collective vision and principles.

The vision will be continually interrogated and refined during the basin planning process, and more detailed vision statements, goals and objectives may emerge as improved understanding and greater common ground is found. It is therefore a mistake to interpret the vision presented in a completed basin plan as the vision that was developed at the start of the process, and conversely to judge a vision that is developed early in a basin planning process as being too vague.

> The process of developing a vision tends to be a combination of centralized political positioning, institutionalized bureaucratic negotiation and decentralized stakeholder consultation, with the balance between these forces being dependent on both the planning context and the specific situation in the basin.
>
> In practice, this is inherently a political process that needs to be managed carefully by the facilitator of the basin planning process. Technical and economic analyses are largely used to support the development of objectives and the evaluation of management options to achieve this vision.

The visioning process requires a skilled facilitator who is perceived by all stakeholders to be technically competent(understands the issues), politically astute (sensitive to the process) and independent (not aligned to an interest). This typically implies someone who is external to the basin management organization responsible for the basin plan. Basin visioning is particularly valuable in processes where there is significant complexity in the basin, with potentially difficult trade-offs between different environmental and development perspectives for the basin. It is particularly applicable where a number of diverse stakeholders with limited common understanding of the basin must come together to develop the basin plan..

GOAL ALIGNMENT

A suite of basin management goals or outcomes (qualitative and/or quantitative statements of intent) may be developed, without first formulating a unifying and aspirational basin vision. These are typically thematically based, are derived from basin principles and the key management issues, and entail some degree of alignment and coherence. In some cases these goals are defined as thematic visions for the basin, the distinction being that they do not indicate the balance between different themes. The basin planning process thus revolves

around the iterative setting of goals and objectives, and evaluation of the strategic actions required to achieve these.

Basin goals or outcomes typically provide a clearer set of aims from which to develop basin objectives, but require astound understanding of the basin functioning and issues. Ensuring alignment between the goals may be a challenge, as may the indication of clear priorities between goals in order to guide the process of making trade-offs between competing interests. **Thus it is important that the number of goals be limited to the key priorities (between four and seven goals) and that these reflect the implicit understanding of the desired state for the basin**.

Developing basin goals or outcomes may be more appropriate in a basin that has undergone previous basin planning processes, and in which there is some common understanding of the basin processes, the critical issues and an implicit strategic direction. Thus goals may be developed against this understanding, without first going through the visioning process, particularly where there is limited conflict between different thematic areas.

The main trade-offs may be between the objectives that reflect the goals within a theme (such as land use), or between the strategic actions required to achieve these objectives.

FORMULATING COHERENT AND ALIGNED OBJECTIVES

The setting of basin-level (land use, water, environmental or management) objectives represents a common critical point in the development of a strategic basin plan. However, there are multiple pathways that can lead to this point, each of which is suited to a different context and approach to basin planning. Three distinct pathways are described below, which while not necessarily exhaustive, do reflect the broad range of possible approaches to strategic basin planning.

CAUTION

A word of caution is required at this point, because the description implies that there is a natural progression from 'good knowledge' and 'good tools' to a 'good plan'. However, planning is far more complicated, and often a scientific approach alone is not adequate to make sound decisions. There is no scientific way to choose between a solution with moderate costs and benefits and an alternative with higher costs and benefits, although many tools are available for illustrating the implications of the choice, or even to simulate choice on the basis of various criteria. Deciding on basin priorities is **inherently a political decision**, and is typically the outcome of an iterative and even chaotic process involving some **degree of negotiation between political leaders, bureaucrats and/or stakeholders**.

CATCHMENT ZONATION OR CLASSIFICATION

The newly emerging approach to land use catchment zonation represents a decentralized 'pseudo-visioning 'process within relatively homogeneous land use areas, while considering the interconnections between sub catchments within a basin. The approach is based on defining a desired management objective for each basin zone, which specifies the balance between utilization of the water for social and economic development and water environmental protection for the goods and services it provides (typical zonation would include e agriculture zone, forest zone, grassland zone and specific protected zones (drinking water source area, specific habitat type, nutrient sensitive area etc)). This balance is then translated into land use environmental objectives specified in each zone, which consider the social and economic consequences for the zone, the basin and even wider region.

Catchment zonation inherently mainstreams consideration of the water environment as a key focus of decision making, within the broader context of social and economic development. It recognizes that different parts of the same river basin may have varying protection status, with some sensitive areas requiring high levels of ecological functioning and others being heavily utilized and impacted for social and economic development purposes.

Catchment zonation is particularly useful in diverse and heterogeneous basins in which local catchment areas of the same basin may have different imperatives for environmental protection or socio-economic development, implying distinctly different desired states throughout the basin.

FORMULATING MANAGEMENT OBJECTIVES

Water related land use and environmental objectives need to be translated into management objectives, against which actions can be identified.

This process requires technical basin or catchment hydrological system, water quality or flood routing analysis (modelling) to establish the relationships between the buffer strips and flood wave propagation for example.

The basin objectives will only the achieved through coordinated, coherent and appropriate management actions. Thus the achievability of an objective must first be assessed against the possible actions (alternative measures) that might be implemented to jointly contribute to its attainment, and second, the viability and sustainability of these actions need to be evaluated from technical, financial, social, environmental and institutional perspectives.

The process of formulating the objectives and strategic actions must balance the resource requirements of the actions with the desirability of the objectives. This iterative process is reflected in the following steps, through which there is convergence to an appropriate and workable solution:

1. First, drawing on an expert group to identify the possible management options, supported by input from various informed stakeholders.
2. Assessing the contribution of each option to achieving the agreed preliminary objectives, and proposing refinement of the objectives, if necessary.
3. Evaluating and ranking the options against clear technical, financial, social, ecological, economic and institutional criteria.
4. Evaluating the level of robustness to alternative futures reflected by the uncertainty-based scenarios, including refinement of the options where necessary.
5. Consulting relevant stakeholders to solicit diverse perspectives and preferences.
6. Selecting the suite of most viable (and sustainable) options, with proposed refinement of the objectives, if necessary.
7. Assessing the economic, social and ecological implications of the refined objectives, and refining the suite of actions where these outweigh the additional resources required to implement the necessary actions.

A wide range of analysis techniques and tools may be used to support this process. Some of these are specific to technical disciplines, others are more broadly social and economic in nature, and the remainder are derived from decision-making management theory.

DEVELOPING PROGRAM OF MEASURES

Setting up of the programme of measures is a legally required component in the implementation of the river basin planning under WFD. Water related land use planning is input into thie WFD planning process and as such falls under same legal requirement by default.

WFD requires river basin plans to integrate the management of water quantity and quality (largerly under influence of land use) and water resources and surface and groundwater management in order to meet the environmental objectives of the WFD. This in essence can be translated to mean that land use management should also be integrated into water management since the two are conected.

The programme of measures should consist of defining, for each river basin district, the regulatory provisions or *basic measures* to be implemented in order to achieve the objectives defined by the river basin management plan in accordance with Community and/or national laws (e.g. extension of sensitive or vulnerable areas, reporting and authorisation system, definition of resource protection areas, discharge control etc.). These measures also include economic incentive measures taken to provide users with incentives to manage water and land use more efficiently. The measures may be decided on the national level. In transnational basins program of meassures should also be transnational.

If the aforementioned provisions do not suffice to achieve the set objectives, *supplementary measures* shall be taken.

In international RBDs the implementation of the programmes of measures should be co-ordinated for the whole of the river basin district for the significant water management issues identified. For river basins extending beyond the boundaries of the Community, Member States should endeavour to ensure the appropriate coordination with the relevant non-member states.

Look out! Co-ordination must be ensured from the very beginning of the planning process.

It is not possible to co-ordinate programmes of measures of river basin management plans without a co-ordinated analysis and review of the status, co-ordinated monitoring programmes, co-ordinated assessment and coordinated approaches for the involvement of the public. Therefore, co-ordination must be ensured from the very beginning of the planning process. One possible approach that competent authorities could take is to develop a co-ordination network, work plan and a timetable indicating the various co-ordination steps within the planning process.

Basic measures include the measures to control the pollution at source through the setting of emission limit values and of environmental quality standards. For example for diffuse sources liable

to cause pollution(typically land use determined), basic measures are to prevent or control the input of pollutants or prior regulation, authorisation or registration in a similar way to point source discharges. Prohibition of direct discharges of pollutants into groundwater is a basic measure subject to some provisions – use for geothermal purposes, injection for mining activities, construction, civil engineering and so on – that are listed in Article 11 (j).

WFD Article 10(1) (combined approach for point and diffuse sources) refer to a range of directives such as Integrated Pollution Prevention and Control (IPPC) (96/61/EC), Cadmium Discharges (85/513/EEC), Mercury Discharges (82/176/EEC) and nitrates, and any future relevant directives. Controls required by these directives must be established

Article 10(3) specifies that where different quality objectives or quality standards have been established according to the different directives referred to in article 10, and they require stricter conditions than those which result from the application or article 10, the emission controls must be tightened. Therefore, if the application of the environmental quality standard approach required tighter controls on emissions than would otherwise be the case, those controls would need to be tightened.

The use of economic instruments is part of the basic measures. As it is mentioned in preamble 38 of the WFD, the principle of recovery of the costs of water services, including environmental and resource costs associated with damage or negative impact on the aquatic environment should be taken into account in accordance with, in particular, the polluter-pays principle.

WFD requires the “principle of recovery of the costs of water services” to be taken into account. It also requires that an adequate contribution of the different water uses be made to the recovery of the costs of water services.

The obligation in the Directive requires the adoption of a programme of measures to meet the requirements of article 7 and **additionally to safeguard water quality in order to reduce the**

If a particular land use is shown to cause pollution of an important water resource the application of “polluter pays principle“ would suggest that the owner of the land with a particular land use category would be responsible for damages and meassures to control such pollution. This is of particular importance for the agriculture sector and agriculture land uses as is reflected in the Nitrates Directive and obligatorz measures under it.

The opposite situation may apply to certain land uses such as forestry where such a land use can be documented to reduce pollution of a particular water resource. If this is the case the question arises whose pollution is such a land use removing and should the owners of forestry lands be compensated for the services provided by their land and who should pay such a compensation or should some other economic incentives be provided to owners of land under forest.

Implications of the above examples should be examined as a part of the process of defining the program of measures for water related land uses.

level of water treatment required for the production of drinking water.

The general requirement of article 7 is the identification, within the river basin districts proposed, of water bodies that are used or are intended to be used for human consumption.

The final provision of article 7 is the requirement to ensure that the necessary protection for the water bodies identified is provided, with the aim of avoiding deterioration in their water quality, in order to reduce the level of water treatment required. Article 11 requires that the measures to be taken for the protection of each river basin district are specified within a programme.

> ***Look out! The programme of measures can be phased in order to spread the costs of implementation.***
>
> The Directive includes a number of provisions that allow for derogation from the environmental objectives for legitimate economic and technical reasons. This will help Member States to strike a balance between environmental, economic and social goals. Justification for the use the derogation must, in all cases, be included with the RBMP.

PRECONDITIONS

Effective program of meassures calls for a set of preconditions that should be met. The team developing the program of meassures must be such that multidimensional knowledge base and expertise is assured. In addition meassure selection process must ensure that the hydrological cycle and its components are understood and addressed. No program of meassures can be implemented sucesfully unless full stakeholder participation is assured and multiple benefits and costs of the set of measures are articulated. Implementation of the measures will be as sucessful as the incentives provided for implementation, especially so if meassures are to be based on volentary actions such as are many of the meassures for nutrient management for example.

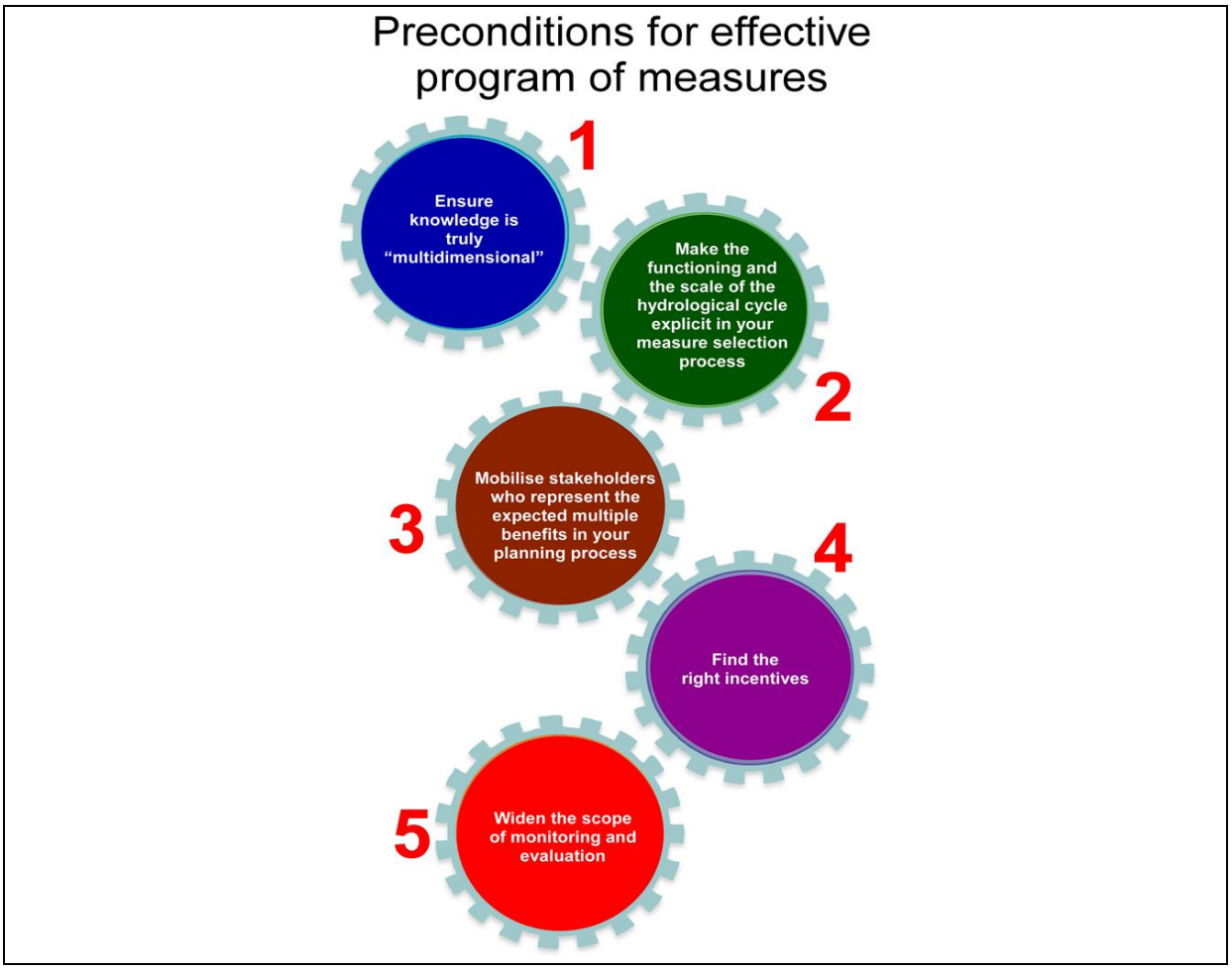


Figure 26. Preconditions for effective program of meassures

IMPLEMENTATION OF THE PROGRAMMES OF MEASURES AND EVALUATION

The implementation of the programmes of measures has to be linked with a continuous process of evaluation. This evaluation has quite often been seen as a last - more or less additional - box in a planning process. However, evaluation has usually been done after the planning process to get feedback about what has actually been planned or even carried through already. This means that evaluation has not been used as a tool of continuous development and making choices or in other words as an ordinary part of a planning process.

Look out!

After implementing the programme of measures, the evaluation of the first planning ***is the key element for the preparation of the second period.***

CHAPTER 5: DEFINING PROGRAM OF MEASURES RELATED TO LAND USE

INTRODUCTION

Land use related measures for addressing the objectives set out by the WFD (good status) are many and varied. Many of the available measures achieve multiple objectives (water retention, pollution control etc) and can be applied in all situations. On the other hand many measures are specific to a particular situation in the field and address a particular water related problem only. As a part of CAMARO D Project potential measures have been identified through capturing the experiences of participating countries in terms of best land use practices used in their countries. The identified measures have been categorized into particular segments of land use, naimly:

- Best land use management practices used in areas where agriculture dominates
- Best land use management practices used in areas where grasslands and pasture lands dominate
- Best land use management practices used in areas where forests dominate

Initially all project partners participated in identification of existing BMP and their frequency of use. The information was collected at national level, concerning BMPs for drinking water protection and flood prevention, to control water pollution (and generally water regime of the landscape) from non-point pollution sources from agriculture, forestry and grassland management and the corresponding spatial planning measures in CAMARO-D countries.

Twelve areas of BMP implementation were mapped (Table 4). Altogether 202 Best Management Practices were identified within 12 segments of land management. The numbers within the segments and relative share of total 202 BMPs are presented in Figure 27.

Table 4: Numbers of identified BMPs in activity segments.

BMP activity segments	Number of BMPs within segment
A - Arable Agriculture (cropping systems)	36
B - Grass Agriculture (all permanent cultures)	20
C – Forestry	43
D - Water Management	24
E - Spatial Planning	8
F – Technical Measures (TM) in Agriculture	12
G - Technical Measures (TM) in Forestry	5
H - Technical Measures (TM) in Water Management	10
I - Technical Measures (TM) in Spatial Planning	18
J - Land Consolidation Projects (strategies)	7
K – Surface Water (SW) Protection Zones	10
L – Ground Water (GW) Protection Zones	9

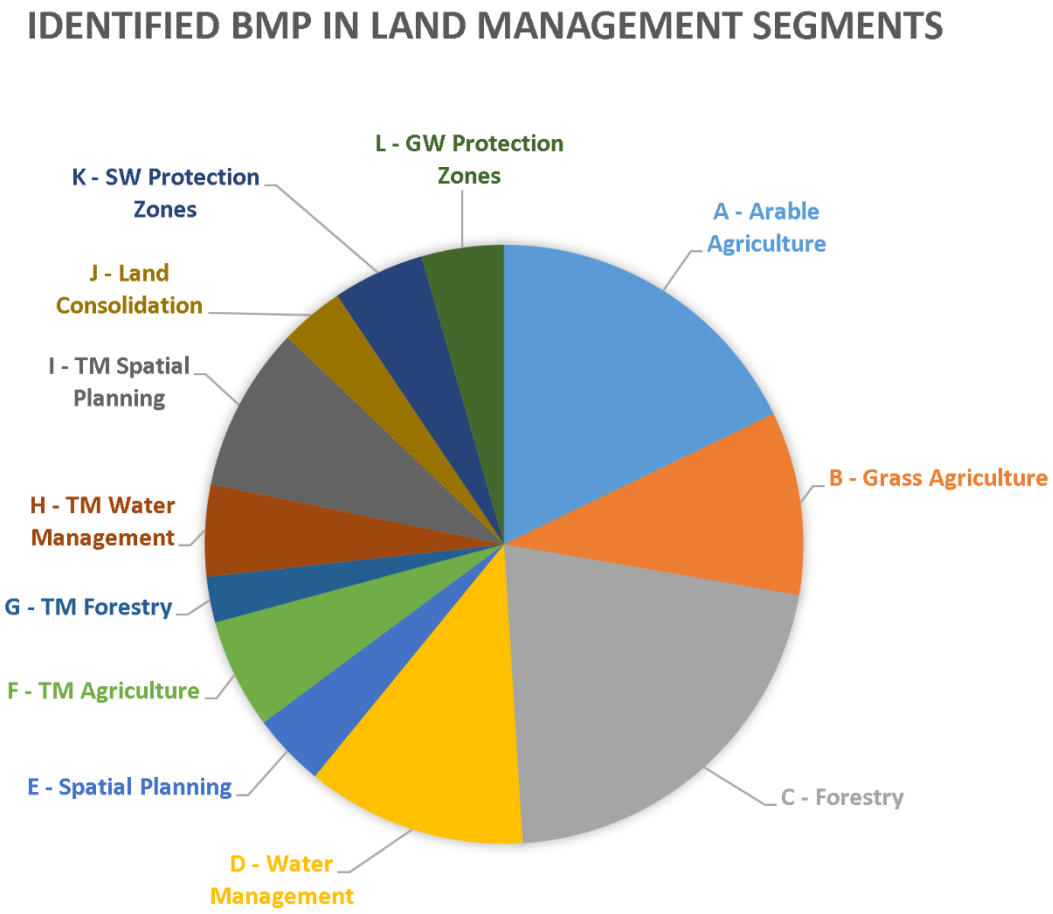


Figure 27: Number of BMPs identified within land management segments.

Each of the 202 identified Best Management Practices was classified by each of the participating countries based on occurrence as follows::

L (Low) – rare frequency of use

N (Normal) – occasional use, under suitable conditions

H (High) – frequent use, typical management strategy or measure

From the total number of 202 identified BMPs in Danube region, on average 45 practices (23 %) occur frequently. 87 practices (42 %) on average occur normally and 66 practices (34 %) occur rarely. In different countries, the frequencies of use are variable due to national, economical, legislative, and environmental specifics (Figure 28).

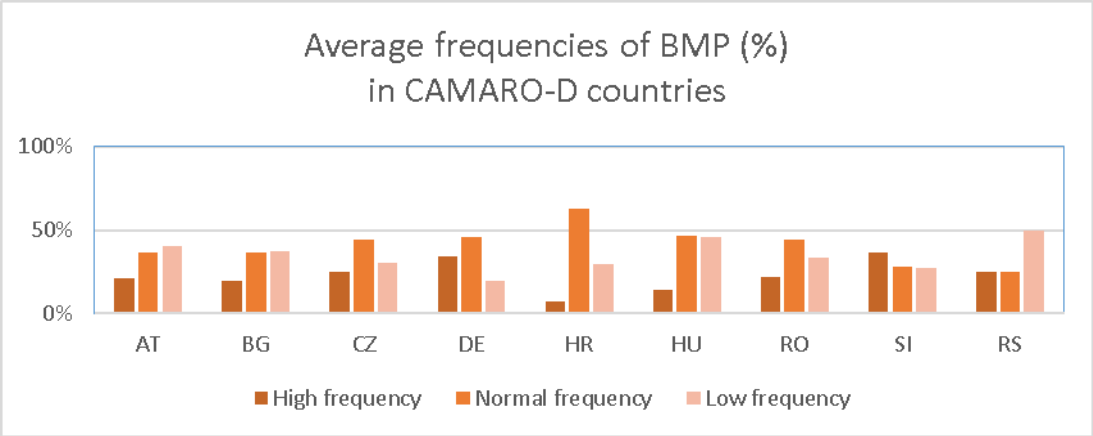


Figure 28: Average frequencies of practices (%) in CAMARO-D countries

Off the identified 202 BMB 46 practices were defined and described in 4 BMPs catalogues for Danube region (ranging from 6 to 16 of BMP per segment). These BMPs were selected not as the most used current practices, but as favourable BMPs for wider use and for potential implementation within an innovative transnational catchment-based "Land Use Development Plan" for the Danube River Basin.

In the final list of practices wide variety of approaches are combined: From single technical measures (ditch) up to the general management plan (coordination of flood risk management at catchment scale). Therefore, the implementation of the listed BMP can vary in complexity. Current use, policy support, and frequency of application of these BMPs are approximated for every CAMARO-D country.

The list will never be complete, but the list tries to collect the most effective and most often implemented practices to share knowledge and experiences within Danube countries. Hopefully our target group consists of decision makers, land managers, stakeholders, and local authorities interested in Danube region landscape improvement.

BEST LAND USE MANAGEMENT PRACTICES USED IN AREAS WHERE AGRICULTURE DOMINATES

The list of most relevant BMP identified in arable agriculture:

1. Conservation tillage
2. Strip tillage
3. No tillage
4. Grass buffer strips along water courses
5. Mulching

6. Fertilization with manure and compost
7. Conservation crop rotation
8. Precision agriculture
9. Control of Nutrients application
10. Control of pesticides application
11. Retention ditches
12. Grassed waterways
13. Sediment traps
14. Hedges
15. Infiltrating pools
16. Stabilized dung pits with retention tank

Conservation tillage

Conservation tillage is an agricultural practice applied on arable land. Basic principle consists in replacement of conventional tillage based on regular plough (turning of top soil layer of ca 15 – 30 cm) by soil surface loosening by cultivator. Top soil layer of ca 5 - 10 cm is loosened by various technologies but is not turned upside down.

Positive effects include mainly following: soil is only disturbed by cultivator, but not turned by plough. It allows to soil organisms continuous activity, not interrupted by ploughing and following period. Soil structure is not that much affected by mechanical processing of soil. This technology allows to leave mulch (crop residues) within topsoil, what provides good protection against soil erosion. Finally yet importantly – the operation is less energy and time demanding than conventional tillage, based on ploughing.

The movement of machinery is easier (less energy needed) and faster than conventional ploughing. The measure (technology) enhances soil properties – mainly soil structure, organic carbon content, hydraulic conductivity and provides good soil protection.

Strip tillage

Strip-tillage is defined as less than full-width tillage of varying intensity that is conducted parallel to the row direction. Generally, no more than one-fourth of the plow layer is disturbed by this practice. The goal of strip-tillage is to create a seedbed condition in the row that is similar to that achieved by moldboard plowing, while leaving a relatively high amount of crop residue on the inter-row soil surface to reduce erosion.

The main advantages include soil processing by deep loosening in a strip up to the depth of 35 cm with the option to apply fertilizer into the root zone. Plant residues are placed in the inter-row which not only eliminates erosion processes, but also unproductive evaporating.

Strip-tillage, which creates a soil environment that enhances seed germination, is an alternative to no-till in areas where poorly drained soils are dominant. Where soil moisture conditions are suitable, strip-tillage — traditionally in the fall — creates narrow-width tilled strips to increase early spring soil evaporation and soil temperature in the top 5 cm.

No tillage

In agricultural crop production one term – no-till – is leading to increased polemic and polarization of the parties. No-till or no-tillage describes a form of cropping which does not use any mechanical tillage of the soil for crop establishment. The aim is to move as little soil as possible in order not to bring weed seeds to the surface and not stimulating them to germinate. No other soil tillage operation is done. The residues from the previous crops will remain largely undisturbed at the soil surface as mulch.

In no till farming, the soil is more resistant to erosion caused by wind and water. Ground that is not tilled is less compacted than soil that is tilled. Tillage busts up the natural soil structure. Loss of structure makes the soil less able to support heavy loads, such as the wheel traffic from tillage operations. Fewer passes across the field in no till farming will dramatically reduce fuel costs. No till seeding leaves plant residues on the ground, which can help keep the soil moist and protect against evaporation caused by sun and wind. The measure is suitable for any types of field, soil and crop, when respecting specific conditions of complex agricultural approach.

Grass buffer strips along water courses

Buffers and filter strips are areas of permanent vegetation located within and between agricultural fields and the water courses to which they drain to interrupt sediment fluxes and allow infiltration and sedimentation of eroded material. The strips must be designed with proper dimensions (width) according the field topography and have to be maintained (mowed).

Simpler variant is formed by strips of protective crops on arable land (supported by Cross Compliance in several countries), but this variant is much less effective than permanent filter strips.

If properly designed the strips reduce the surface runoff and sediment connectivity to desired level. Additional benefit is reduction of nutrient fluxes caused by both surface and hypodermic flows. They can provide soil surface protection for steeper slopes, help to stabilize river and stream banks. They can help to provide necessary landscape fragmentation in areas with improper field sizes. They allow easier stream accessibility for machinery used for stream maintenance.

Mulching

Mulching is the process of covering the topsoil with plant material such as leaves, grass, twigs, crop residues, straw etc. Mulching plays a crucial role in preventing soil erosion.

A mulch cover enhances the activity of soil organisms such as earthworms. They help to create a soil structure with plenty of smaller and larger pores through which rainwater can easily infiltrate into the soil, thus reducing surface runoff. As the mulch material decomposes, it increases the content of organic matter in the soil. Soil organic matter helps to create a good soil with stable crumb structure.

Mulching is one way to improve the water use. Research has shown that a 5 cm layer of wheat straw mulch decreased water evaporation by 40 % compared to bare ground control test plots. Doubling the depth of mulch increased the efficiency by another 10 %. In addition to improving water use efficiency, mulching reduces soil temperature. This is especially important when the hot summer temperatures can quickly exceed a plants upper critical temperature. By keeping the soil and plant roots cooler, it can continue to maintain its vigor and growth.

Fertilization with manure and compost

Compost and manure are excellent fertilizers containing nitrogen, phosphorus, potassium and other nutrients. It also adds organic matter to the soil which may improve soil structure, aeration, soil moisture-holding capacity, and water infiltration. Applying compost and manure requires proper period, volumes, and a mixture of the fertilizers to be applied.

The effectiveness of the composting process is dependent upon the environmental conditions present within the composting system i.e. oxygen, temperature, moisture, material disturbance, organic matter and the size and activity of microbial populations. Composting is not a mysterious or complicated process. Natural recycling (composting) occurs on a continuous basis in the natural environment. Organic matter is metabolized by microorganisms and consumed by invertebrates. The resulting nutrients are returned to the soil to support plant growth.

Nitrogen content in manure varies with the type of animal and feed ration, amount of litter, bedding or soil included, and amount of urine concentrated with the manure. To determine how much manure is needed for a specific application, the nutrient content and the rate nitrogen becomes available for plant uptake needs to be estimated.

Conservation crop rotation

Crop rotation is an integral part of a sound soil conservation and crop management program. It involves growing different crops in sequence or at different times in a field. Through the selection of the proper sequence of crops in the rotation program, different goals can be achieved such as:

increase soil organic, matter, improve soil structure, increase or decrease the content of some soil nutrients, and break disease and other pest cycles. Crops grown in the rotation system are chosen based on a number of factors such as: main commodity(ies) produced on the farm, location and climatic conditions, land base and soil type, cost of establishing the rotation crop and its potential return, production practices, and goals to be achieved.

Soil organic matter and clay particles hold large stores of plant nutrients. These reservoirs, however, are not all available to the crop. In an organic crop rotation, the grower manages soil organic matter and nutrient availability by incorporating different crop residues, cycling among crops with different nutrient needs, using cover crops, and adding organic soil amendments.

Precision agriculture

Precision Agriculture (PA) or Site-Specific Crop Management (SSCM) 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 (DSS) for whole farm management with the goal of optimizing returns on inputs while preserving resources. Precision Agriculture (PA) is a whole-farm management approach using information technology, satellite positioning (GNSS) data, remote sensing and proximal data gathering. These technologies have the goal of optimizing returns on inputs whilst potentially reducing environmental impacts.

Agricultural control centers integrate sensor data and imaging input with other data, providing farmers with the ability to identify fields that require treatment and determine the optimum amount of water, fertilizers and pesticides to apply. This helps the farmer avoid wasting resources and prevent run-off, ensuring that the soil has just the right amount of additives for optimum health, while also reducing costs and controlling the farm's environmental impact.

The risk is, that farmers need to be well-educated, or depend on an extensive network of third party providers.

Control of Nutrients application

In modern agriculture, use of essential plant nutrients in adequate amounts and proper balance is one of the key components in increasing crop yields. Further, in developing crop production technologies, research work under field and controlled conditions is necessary to generate basic and applied information. In addition, research is very dynamic and complex due to variation in climatic, soil, and plant factors and their interactions.

Generally, nutrients are essential part of soil fertility and their management is a key to the success of agricultural production of arable lands. Nevertheless, control over nutrient application is very complex task, depending on crop rotation, soil properties, type of fertilizers used (natural versus synthetic), machinery, and technology level of the farm. Control over nutrient application should

reduce the nutrient use and their fluxes to the environment, mainly to water sources to prevent excessive eutrophication.

Control of pesticides application

The term pesticide can refer to insecticides, herbicides, fungicides, rodenticides, and various other substances used to control pests. Pesticides are used in agriculture to control weeds, insect infestation and diseases. A pesticide is any substance or mixture of substances used to: prevent; destroy; repel; reduce pests and the damage caused by pests.

When pests must be controlled over large areas of land, pesticides prove to be very cost effective, including when less human labor is needed to maintain the pesticide process. The general effectiveness of the program and its economic benefits are increased greatly still when pesticides are used in a way that reduces the likelihood of the pests becoming resistant to the chemicals used to fight them. If all the correct precautions are used, including using no more than the recommended level, then chemical control of pests can be used effectively.

Control over pesticide application should reduce the pesticide use and their fluxes to the environment, mainly to water sources.

Farmers maintain unnecessarily high levels of pesticide use because pesticides are weakly regulated, because farmers pay none of the costs to remedy the pollution caused by pesticides, and because pesticides account for a relatively small percentage of overall production costs and per-acre crop value.

Retention ditches

Retention ditches are usually connected to a system of other retention features, including, where appropriate, hedges, ponds, ditches trees in line, and others. Opposite to typical ditch, to achieve retention capacity, they have to be contour oriented, usually constructed as a grassed, shallow profiles accessible with conventional agricultural machinery.

The design of a retention ditches needs to be well fitted to its surroundings. When choosing a suitable site, the main factors to consider are the cost effectiveness of the area as well as its ability to support the retention ditch environment.

The retention ditches should be constructed on mild slopes (up to 6°) and on permeable soils to infiltrate fast enough prior another rainstorm episode. They have to be designed to hold the total flow volume (not only peak discharge) of the design flood. Otherwise, being overflooded, they lose their anti-erosion and flood protection function.

Grassed waterways

Grassed waterways are broad, shallow and typically saucer-shaped channels designed to move surface water across farmland without causing soil erosion. The vegetative cover in the waterway slows the water flow and protects the channel surface from the eroding forces of runoff water. Left alone, runoff and snowmelt water will drain toward a field's natural draws or drainage ways. It is in these areas that grassed waterways are often established.

If properly sized and constructed, grassed waterways safely transport water down natural draws through fields. Waterways also provide outlet channels for constructed terrace systems, contour cropping layouts and diversion channels. Grassed waterways are a good solution to the erosion caused by concentrated water flows when the watershed area generating the runoff water is relatively large.

Outlets must be adequate enough to allow water to drain without ponding or flooding the area being protected, while also preventing erosion of the water into the outlet which can be accomplished through the use of riprap.

A limitation is during large runoff events, when soil is saturated, grassed waterways will have a very concentrated flow of water making them not as effective during high rainfalls.

Sediment traps

A sediment trap is generally a constructed 'basin' or depression or a dam at the field outlet, where sediment settles out and accumulates, allowing for its removal. Regular maintenance of sediment traps (removal of accumulated sediment) is a necessity to ensure their proper function. Sediment traps can be designed as dry ponds at the field or small watershed outlets prior the sediment entrance to ditches or permanent streams. The other variant is digging small sinks with overflow for smaller contributing areas. Finally, impervious, but recyclable dams are being tested worldwide, built from straw piles, bushes or wooden residues.

Sediment traps and bunds can reduce pollution risk by intercepting run-off and allowing the soil carried in the run-off to fall out. They can also be useful in emergency situations to intercept and capture any small slurry or chemical spills on the steading.

They are most appropriate where run-off polluted with sediment is the main concern and are not appropriate for accepting more polluted types of run-off such as slurry. Having a sediment trap upstream of a pond or wetland will help provide the opportunity for heavier particles within the run-off such as soil and sediment to settle out.

Hedges

A hedge is a permanent cover stripe together with a row of bushes or small trees separating two parcels, often accompanied by a path, small road, or a ditch. Hedging agricultural crops can be a very useful risk management tool if used correctly, promoting also other ecosystem functions.

Besides the basic erosion function (permanent obstacle to the surface runoff), there are of great importance in terms of landscape aesthetics and nesting and migration zones for small game, insects, plants and all living organisms, while increasing the permeability of the landscape for living (because of disproportionately large field units created earlier, the agricultural landscape became a human being impenetrable). It can function in the landscape as an indispensable part of local bio-corridors.

Well designed and maintained hedge can be an important tool for maintaining soil quality and productivity, but also rises the overall quality of the landscape.

Infiltrating pools

Infiltration basins are vegetated depressions designed to hold runoff from impervious surfaces, allow the settling of sediments and associated pollutants, and allow water to infiltrate into underlying soils and groundwater. Infiltration basins are dry except in periods of heavy rainfall, and may serve other functions (e.g. recreation). They provide runoff storage and flow control. Storage is provided through landscaped areas that allow temporary ponding on the land surface, with the stored water allowed to infiltrate into the soil. The measure enhances the natural ability of the soil to drain water by providing a large surface area in contact with the surrounding soil, through which water can pass.

Infiltration basins may also act as “bioretention areas” of shallow landscaped depressions, typically under-drained and relying on engineered soils, vegetation and filtration to reduce runoff and remove pollution. They provide water quality benefits through physical filtration to remove solids/trap sediment, adsorption to the surrounding soil or biochemical degradation of pollutants.

Stabilized dung pits with retention tank

The construction of a manure storage facility involves some risks with regards to the negative effects on the environment. Therefore, it is impetuous to establish rules and conditions for setting up and organizing livestock manure storage structures that have a negative impact on the environment.

The farmer must be trained and aware of all considerations regarding the geological, technical and most important aspects of soil, water, and atmosphere protection. In most cases, however, farm advisory services are virtually non-existent, storage facilities for unsuitable livestock are arranged,

which are inconsistent with the soil's capacity to take over the loads from the accumulation of enormous quantities of residual organic materials, which, as is known, contain besides the nutrients necessary for the development of crop plants and organic elements and components with potentially toxic effects on the main environmental resources such as soil, water, atmosphere. This is a general framework for the conditions to be met when a manure storage facility is planned for large-scale agro-zootechnical farms with high yields of animal waste and low-capacity farms, the so-called households. Also, the conditions that need to be met when designing a communal manure storage platform are presented.

BEST LAND USE MANAGEMENT PRACTICES USED IN AREAS WHERE GRASSLANDS AND PASTURE LANDS DOMINATE

The list of most relevant BMP identified in grassland management:

- 4.2.1 Appropriate cattle load at pastures
- 4.2.2 Manual mowing in vulnerable areas
- 4.2.3 Appropriate distribution of pastures versus meadows
- 4.2.4 Extensive meadows/pastures within vulnerable areas
- 4.2.5 Permanent grassing of infiltration areas
- 4.2.6 Proper pastures (grazing) management (feeding lots, drinking lots, weed control)

Table 5: Support of BMP by national policies and their application in every country.

BMP	Required or supported by country specific policy									Application frequency (low - x, normal - xx, high - xxx)								
	AT	BG	HR	CZ	D	HU	RO	RS	SLO	AT	BG	HR	CZ	D	HU	RO	RS	SLO
4.2.01	x	x	x	x	x	x	x			xxx	xx	x	xxx	x	xxx	xx	xx	xx
4.2.02	x	x	x	x		x	x			xx	xx	xx	x	x	x	xxx	xx	
4.2.03	x	x	x			x	x			xx	x	xx	x	xx	xx	xxx	xx	x
4.2.04	x	x	x	x	x	x	x			xx	xx	x	xx	xx	x	xx	x	x
4.2.05	x		x	x	x	x	x			x		x	xx	x	x	xx	x	x
4.2.06	x	x	x	x	x	x	x			xxx	xxx	x	xx	xx	xx	xx	xx	x

Appropriate cattle load at pastures

Grasslands are being replaced by urbanization and more profitable agricultural activities around the world. Producers may be faced with land constraints and need to consider intensification of the remaining grasslands as a means of maintaining overall production on a decreasing land resource. However, intensification of the grazing system is usually associated with greater nutrient inputs, including those from commercial fertilizers and supplement fed to animals. Excessive loading of nutrients in intensive grazing systems via fertilizer and animal wastes can cause nutrient build-up in the soil and subsequent water quality problems.

Management strategies to reduce soil and water contamination include refining the balance of nutrient inputs from feeds and fertilizers as well as accounting for the nutrients recycled through the decomposition of plant litter and animal wastes. The best management practices will supply reliable information for future environmental policies that may be adopted by governmental agencies.

Manual mowing in vulnerable areas

Autumn works applied on pastures are particularly important for preserving and/or improving the productive potential of grassland systems. These works are limited to mowing vegetal remains and spreading animal manure. Extensive meadows with high biodiversity require regular harvesting of biomass (during vegetation season). Manual mowing can be only way of their preserving.

Manual mowing is based on mowing (harvesting) of biomass by manual power or small machinery in conditions of difficult morphological or economic conditions. Manual mowing also means removal of rest of ungrazed biomass from pasture.

Use by mowing requires the knowledge of simpler conditions to be observed, such as: stage of plant development, cutting height and cutting, harvest removal, hay preparation, silage and more. Instead, grazing is much more complicated, as the animal factor by trampling, grass breakage, solid and liquid manure, etc., influences the productivity and floristic composition of the grassy rug of a meadow. Therefore, as much methods of use as the methods of improving the production of a meadow should be given to obtain the expected results.

Appropriate distribution of pastures versus meadows

Management by mowing or grazing is essential to the maintenance of structure, balance and diversity in grassland. Without management grassland becomes coarse and rank, loses both diversity and interest, and will eventually turn into scrub or woodland.

Parcels, accessible for machinery, with fertile soils are more effective to use as meadows, while less fertile land, steep, broken topography or for any other reason not effective for mechanization shall be used as pastures. Intensity of grazing shall correspond to soil and vegetation type – to keep turf in good shape. Meadows can be located at places, dedicated for flood wave spilling, while pastures are not suitable – due to both of risk for animals and potential flood water pollution by feces.

The goal is to provide optimum harvest of biomass/production of meat or milk on one hand and to provide as high soil conservation, water retention and water quality conservation as possible.

Extensive meadows/pastures within vulnerable areas

A classically managed meadow grassland is one that is shut up for hay (grazing stock excluded) during the spring/early summer. In July the stock are returned to 'aftermath' graze, then light grazing continues until the end of the season – about November time. The best haymaking grasslands are normally found on neutral soils, as grass growth on thinner limestone and acidic soils is poorer, with finer swards better suited to pasturing. Particularly in dairy systems, many traditional meadows have been improved by addition of fertilizers to produce rapid grass growth for multiple-cropping and silaging.

A pasture grassland is one that is normally grazed year-round, spring included, and not hay-cropped. The pasture may be 'rested' in winter to allow sward recovery and while stock is housed. Confusion often arises when pastures are referred to colloquially as 'meadows' because they may have been managed as such in the recent or historic past. The goal is to set up only such management, which will lead to sustainable exploitation without damages on turf and soil, changes of vegetation species and risk for water quality. This is especially necessary in locations with high slope, shallow soils, low fertile soils, high ground water level or any other "extreme" conditions.

Permanent grassing of infiltration areas

The goal is to cover important infiltration areas with permanent vegetation cover, providing filtration and retention effect for surface water to transform it into subsurface one. Permanent, well maintained extensive grass (preferably meadow) provides much better qualitative control for infiltrating water than arable land, due to limited, or generally neglected amount of fertilizers and pesticides.

Principle consists in permanent grassing (preferably meadow) of the area, which has been identified as infiltration one. Ideally, grassed area is managed as extensive one. Such management/measure will lead to decreasing of surface runoff and positive effect on infiltrating water quality. Permanent grasslands and farming systems linked to them have a great diversity in Europe and can differ between the main agro-climatic zones. Therefore, the practices to improve efficiency and productivity and/or their influence on biodiversity conservation or carbon footprint may vary according to that diversity.

Proper pastures (grazing) management (feeding lots, drinking lots, weed control)

Pasture management should be thought of as grass farming: "Think of the grasses as your crop, while you use animals to harvest that crop." If pastures show characteristics representative of poor pasture management, there are five steps to improve and better manage pastures: conducting an

inventory, creating a sacrifice area, implementing rotational grazing, mowing and harrowing, and proper fertilizing. Important part of the practice is appropriate load of animals at the parcel.

Good pasture management are represented by following:

- Sacrifice area set up for animals during rainy season
- Several smaller, lush pastures and few, if any, weeds
- Animals fenced away from streams, ditches or other water bodies
- Few, if any, areas of bare soil exposed

Therefore, the goal of this practice is to manage the grazing process the way to avoid intensive contact of animals with water bodies, serious damages of turf, long term (permanent) concentration of feces at one place and massive damages at trees and bushes caused by animals. Expected effect is water quality conservation, soil protection and prevention of accelerated surface runoff of rainwater. Side effect is also nature and landscape preservation and biodiversity control.

BEST LAND USE MANAGEMENT PRACTICES USED IN AREAS WHERE FORESTRY DOMINATES

The list of most relevant BMP identified in forest management:

- 4.3.1 Establishment of stable, site-adapted forest ecosystems
- 4.3.2 Avoiding areas without canopy cover
- 4.3.3 Improving structural diversity and stability parameters of forest ecosystems
- 4.3.4 Small-scale silvicultural regeneration techniques
- 4.3.5 Adequate timber harvesting techniques
- 4.3.6 Identification and protection of virgin forests
- 4.3.7 Manage forest-ecologically sustainable wild ungulate stocks
- 4.3.8 Soil conservation liming
- 4.3.9 Prohibition of chemical fertilizers and pesticides within DWPZ
- 4.3.10 Forest fire prevention
- 4.3.11 Limitation of forest roads
- 4.3.12 Forest roads with proper drainage
- 4.3.13 Construction of retention pools
- 4.3.14 Wetlands restoration, deconstruction of drainages

- 4.3.15 Buffer strips along streams, dolines or sinkholes
- 4.3.16 Establishing of field shrubs

Table 6: Support of BMP by national policies and their application in every country.

BMP	Required or supported by country specific policy									Application frequency (low - x, normal - xx, high - xxx)								
	AT	BG	HR	CZ	D	HU	RO	RS	SLO	AT	BG	HR	CZ	D	HU	RO	RS	SLO
4.3.01	x	x	x	x	x	x	x	x	x	x	x	x	x	xx	xx	x	x	xxx
4.3.02	x	x	x	x	x	x	x	x	x	xx	xxx	x	xxx	xx	x	x	xxx	x
4.3.03	x	x	x	x	x	x	x	x	x	x	x	xx	xx	x	xx	xx	xx	xxx
4.3.04	x	x	x	x	x	x	x	x	x		xxx	xx	xx	x	xx	xx	xx	xxx
4.3.05	x		x		x	x	x		x	x	x	x	x	xx	x	x	x	xx
4.3.06	x		x	x	x	x	x		x	x	x	x	x	x	xx	xx	x	xxx
4.3.07	x		x		x	x	x		x	x	x	x	x	x	x	x		
4.3.08				x	x	x	x				x	x	x	xx	x	x		x
4.3.09	x	x	x		x	x		x	x	xx	xxx	xx	x	xxx	x		xx	xxx
4.3.10	x	x	x	x	x	x	x	x	x	x	xxx	xxx	xx	xx	xx	xx	x	xx
4.3.11		x	x	x		x			x		x	xx	x	x	x		x	x
4.3.12	x	x	x	x	x	x	x			x	x		xx	xx	x	x		x
4.3.13			x	x		x	x			x		xx	xx	x	x	x		x
4.3.14	x	x	x	x	x	x	x		x	x	x	xx	x	x	xx	x		xx
4.3.15		x	x		x	x			x		xx	x	x	xx	x		xx	xxx
4.3.16	x		x	x		x	x		x	x	x	xxx	xx	x	x	x	x	x

Establishment of stable, site-adapted forest ecosystems

Stable forest ecosystems with different layers minimize large-scale risks such as insect calamities and storm damages, and are more robust against climate change. The practice includes the establishment of mixed forests according to the natural forest community (site-adapted) and of high structural diversity which entails permanent ground cover and therefore minimizes runoff. The tree species diversity and mixture has to be adapted to the natural forest community in order to guarantee the highest degree of stability and resilience. On soils with lower permeability, deep rooting species and layered younger stands should be used to increase transpiration and interception.

A forest ecosystem's stability and resilience are crucial for drinking water protection and flood mitigation/prevention. Therefore, a site-adapted tree species mixture in forest stands becomes a central focus of silviculture.

During the process of forest reconstruction, when monotonous forests are changed to become mixed forests, a continuous vegetation cover should be guaranteed. Small scale structures can be created by prearranging the regeneration of shade-tolerant tree species, by initializing natural site-adapted regeneration, and by selective structural thinning.

Avoiding areas without canopy cover

Avoiding areas without canopy cover by avoiding clear-cuts and large-scale forest die-back (e.g. due to wind-throw, bark beetle or forest fires) is the most important facet of this measure. The application of the clear-cut technique may endanger the quality of the water and also creates erosive dynamics. All these effects are contradictory to integral drinking source water protection. The avoidance of clear-cuts prevents the above mentioned negative effects. Huge clear-cuts have to be avoided, as alternative small-scale gap-cuts, single-tree-felling or the group selection system can be applied. In addition the regular shelter wood cut system should be avoided, as it would involve a clear cut phase as a result of its final cut. Without applying the clear-cut technique the continuous cover forest management system can be established.

This practice is characterized by the application of a bundle of individual measures which ensure together the provision of forest canopy cover over space and time.

Improving structural diversity and stability parameters of forest ecosystems

Only stable forest ecosystems can provide the ecosystem services water provision (drinking water protection) and water regulation (flood prevention). Hence it becomes mandatory for forest-spatial-planning as part of general spatial planning concepts to improve the stability and resilience of forest ecosystems, especially within the context of drinking water protection and flood prevention. To achieve this purpose all possibilities to improve forest ecosystem stability and resilience have to be taken into account.

The measure is an integrative application of silvicultural operations and general management approaches which promote stability and resilience of forest ecosystems. It encompasses both silvicultural techniques and conservation strategies for reaching the intended purpose.

The establishment of Continuous Cover Forests (CCF) requires structured forest stands, where the structural diversity is created by tree species diversity, uneven-aged trees and multi-layered stands. This leads to the intended structural diversity. One possibility to achieve this target is the application of structural thinning operations.

Small-scale silvicultural regeneration techniques

Also the application of small-scale regeneration methods (gap-cuts or group selection cuts) supports the creation of structured forest stands. The applied silvicultural regeneration techniques have to be carried out on small-scale areas. This is an essential contrast to the clear-cut technique and supports forest stand stability during the mostly natural regeneration phase. The adequate techniques are e.g. group selection cuts, single tree cuts or small-scale gap cuts. There has to be given the balance between light-provision for the regeneration of the forest trees and the stability of the remaining forest stand.

All three regeneration techniques (the group selection system, the single-tree selection system or the small-gap cut system) follow the principle of natural regeneration of all tree species. This system requires the presence of all necessary tree species within the mature forest stands, where regeneration dynamics have to be induced. If some tree species are missing, afforestation measures have to be included. For an overall success the wild ungulate stocks have to be maintained on a forest ecologically sustainable level.

Adequate timber harvesting techniques

It is impossible to completely avoid soil damage while logging. To minimize erosion and surface runoff, only clearly defined roads and skid trails should be used on forest soils. Soil-conserving techniques should be preferred, such as skyline cranes, manual wood processing, horses, and others. To limit runoff to short stretches, cross drainages should be installed on the skid trails and roads.

In general the timber should be prepared with chainsaws and transported by skyline cranes, and only if necessary, timber should be harvested with tractor-skidders. However, as this is unrealistic, alternatives must be found. One alternative is using defined skid trails and roads that are used over and over again during harvesting periods. That way, the impact is limited to those trails and roads. Harvesting should be carried out extensively with unused stretches in between. The skyline-crane method should be state of the art in DWPZs (Drinking Water Protection Zones).

Runoff is much higher in wheel tracks than on normal forest soil because of soil compaction. Over longer distances, the runoff accumulates and increases the erosion potential. Compaction also leads to a lower rooting density and higher water saturation in the soil which result in reduced infiltration. Therefore, applying soil-conserving harvesting techniques, especially the application of skyline cranes and horses, is very effective regarding flood prevention and drinking water protection.

Identification and protection of virgin forests

Mostly virgin forest ecosystems already fulfil all criteria of an adequate drinking water protection forest. Tree species diversity and distribution, uneven-aged and multi-layered structure of the forests are given and stability, vitality and resilience have to be given on an optimal level. Wild ungulate densities have to be forest-ecologically balanced. If those criteria are fulfilled, the self-regulating force of such forest ecosystems is given on a high level. Hence forest management measures within those virgin forest ecosystems can be suspended and natural succession can take place, until an urgent need for management measures implementation should arise again (e.g. in case of large-scale bark beetle infestations, wind-throw or forest fires). Therefore the protection of virgin forest ecosystems secures a low disturbance regime, which supports important ecosystem services such as water provision (drinking water protection) and water regulation (flood prevention).

Manage forest-ecologically sustainable wild ungulate stocks

Regeneration dynamics are of crucial importance for forest succession. If the stocks of the wild ungulate game species are too high, forest regeneration is seriously hampered or even stopped. Reasons for this dangerous situation for forest ecosystems are the browsing, fraying and bark-stripping damages caused by wild ungulates. In order to guarantee stable forest stands, the wild ungulate stocks have to be kept on a level, which allows vital regeneration dynamics of all necessary tree species, i.e. of all tree species of a natural forest community (forest hydrotope type).

In some European regions especially the regeneration dynamics of Silver fir (Abies alba) and oak species (Quercus sp.) have to be facilitated by the creation of forest-ecologically balanced wild ungulate stocks. The regeneration process of all broadleaved tree species, fir, larch and in some cases spruce can be improved by this measure. The only chance to reach forest-ecologically balanced wild ungulate stocks is the implementation of appropriate hunting activities and by the creation of close to nature forest stands. The focus of the hunting activities has to be on red dear (Cervus elaphus), roe dear (Capreolus capreolus), chamois (Rupicapra rupicapra) and ibex (e.g. Capra ibex). The activities of the hunters can be supported essentially by the presence of wild predators like e.g. wolf (Canis lupus) or lynx (Lynx lynx).

Soil conservation liming

In forest areas with acidified soils (especially on siliceous bedrocks) it may be necessary to carry out liming in order to counteract soil acidification caused by a high input of air contaminants. Acidification of forest soils is still a big problem in some areas despite the fact that depositions (acid rain) have decreased to very low levels since the 1990s in most parts of Europe. Liming regenerates the soil from the effects of air pollution on acidified sites. It prevents nutrients and pollutants such as heavy metals from leaching into the groundwater. It helps the conservation and rebuilding of soil structure and therefore increases infiltration and water retention.

The process of liming starts after a phase of planning and approval. Generally, 2.5 – 4.5 t/ha dolomite is applied every 10 years. This is being done by helicopter or on the ground using a blowing machine. The measures must be documented to register ecological and economic impacts. By random samples of the used material on site, both nutrient compositions and whether or not the measure complies with fertilizer regulations are monitored.

Prohibition of chemical fertilizers and pesticides within DWPZ

The use of chemicals like fertilizers, pesticides or herbicides in forestry practices should be generally avoided (forbidden in DWPZs), as these substances form a threat to water quality. Forestry is not dependent on the use of these substances. It has to be highlighted that forestry in general does not apply chemicals in an extended way, but in some cases of course they are applied. Examples are pesticides used against insect infestations, chemicals against browsing damages, herbicides against

broadleaved tree species during the establishing of conifer plantations, or fertilizers in special plantations. The potential danger of these chemicals entering the source water resources for drinking water supply is a strong argument for the prohibition of their use within DWPZ.

The absence of the application of the mentioned chemicals is a crucial advantage of forested watersheds in contrast to agriculturally used ones.

Forest fire prevention

Forest fire prevention is of vital interest for the integrity of forest ecosystems, especially if they are providing a continuous protection of drinking water supply and are functional for flood prevention or mitigation. Climate change and other challenges threaten forests and their protection and production functionality. According to climate change simulations forest fires could increase in future. For this reason it is necessary that forest management practices address principles that ensure fire prevention. Fire prevention measures require attention from all authorities, especially from those responsible for forest management. Forest fire prevention does not only protect life, environment and natural heritage, but in most cases is the most effective strategy to reduce infrastructural damages. This best management practice is highly relevant both within the context of flood prevention and drinking water protection.

Forest fire prevention measures take into account the probability of fire and include several organizational concepts and measures:

- Educational actions: planning, organizing, implementing and performing control patrol actions.
- Permanent monitoring and early detection measures to end the fire before it grows.
- Measures specific for silvicultural forestry activities in order to reduce the risk of fire.
- Rules and measures for firefighting.

Limitation of forest roads

The overall goal is to have good infiltration in forests which means a large percentage of unsealed surfaces. A network of forest roads is necessary for harvesting. The more efficient it is designed, the fewer roads are needed. The goal is to have as few forest roads as possible to minimize erosion and runoff. Especially in DWPZ, forest roads should be as scarce as possible, and the construction of new ones should be avoided.

Extremely runoff intensive roads should be removed if possible. These are all roads with a slope of >10 % (>3 % for clayey or silty substrates) that do not have cross drainages. Deeply cut in roads should be filled, rarely used ones greened. Steep embankments should be flattened to reduce erosion. Concrete roads should be replaced by more permeable roads in some cases, and

unnecessary roads should be removed. Unsealed surfaces and the disruption of linear structures improve infiltration and decrease height and speed of runoff peaks. A decrease in road surface area by 50 % may reduce the part of the rain that ends up as surface runoff by 40-50 %. This reduction is lower in case of heavy rain, especially for less permeable soils where this reduction is 10 % at the most.

Forest roads with proper drainage

The goal is to decrease flood risk and erosion by letting road runoff flow off the road in regular intervals. This leads to the water infiltrating locally and increases the time the runoff needs to flow to the receiving water, thereby reducing flow peaks.

Water from runoff-intensive roads should be diverted into the forest stand at as short as possible intervals along the road. Runoff-intensive roads in lowland with cross slopes to both sides, and runoff intensive roads in mountainous regions with cross slopes towards the valley (up to 5 %) should be treated. On roads with steep longitudinal slopes, a cross drainage should be installed at least every 50 m. Road-accompanying ditches should be avoided. In case this is not possible, the ditches should be greened to decrease water velocity. To return the ditch water to the forest stand, infiltration ditches should be installed.

When the water accumulating on roads flows into the forest stand at regular intervals and infiltrates into the soil there, the runoff from forests can be prevented almost completely. The flow distance to a stream increases, flood peaks are buffered and delayed. Normal rainfall can infiltrate almost completely, but the effect is limited for heavy rain events on waterlogged soils.

Construction of retention pools

Naturally occurring and artificial surface depressions can be used as temporary water retention basins that are filled with water during heavy rain events and fall dry during drought periods. Water is held back during heavy precipitation events, buffering floods. This is a small-scale measure and has no connection to constructing large objects such as water reservoirs.

Natural depressions, abandoned fish ponds or the depressions next to roads acting as dams should be used as retention pools, and constructing new ones should only be done when there is no other option. The retention pools should be connected to existing, non-regulated drainage trenches or cross drainages on roads.

The desired size of a retention pool is not large and ranges between a few cubic meters to several thousand cubic meters. Surface water originating from rainfall is caught in retention pools which act as buffer storages to delay runoff. Also, some of the water in retention pools may evaporate or infiltrate.

Wetlands restoration, deconstruction of drainages

Reactivating former wetlands can increase water retention long-term and dampen flood events. The deconstruction of ditches and drainage systems directly affects flood events by increasing the retention capacity of the land and reducing flood travel time to streams.

Wetlands retain water which increases flood travel time to the receiving water, thereby reducing flood peaks. They are also good sediment and contaminant filters, and therefore have positive effects on water quality.

Before applying this measure, some planning should be done. The area has to be mapped, and the impact of a restoration must be assessed. The actual implementation starts with removing or closing off drainage systems, thereby slowing runoff. Constructing linear structures (roads and paths) should be avoided in these areas. The accumulation of linear runoff should be stopped and can, for example, be disrupted by reducing the width of linear flow channels (ditches) using wooden poles. This causes temporary water retention and slows flood waves. Closing drainages leads to a significant decrease in flow speeds. Intact wetlands decrease flood formation, especially because of an increased evaporation through peat mosses as compared to forest soils.

Buffer strips along streams, dolines or sinkholes

Buffer strips along streams, dolines and sinkholes limit erosion processes and are a very effective way to prevent the entrance of various substances into the water body. Forested buffer strips along streams and lakes have to be established in order to protect the open water bodies from direct infiltration of nutrients or sediments, which can be caused by strong precipitation events, erosion processes or logging activities. Streams are sensitive sectors, also in many DWPZ's, and hence have to be protected with highest priority. Buffer strips with dense and vital forest cover can protect the streams from direct infiltration of sediments or nutrient loads and are protective against lateral erosion processes. Forest vegetation has to be stable in buffer strips and management operations have to be carried out extremely cautious. Dolines and sinkholes are karstic features and deserve the same attention like streams, buffer strips are also an adequate solution there.

The intended purpose of the measure is the stabilization of riparian areas in order to mitigate or avoid lateral erosion processes which could mobilize huge amounts of soil- and bedrock substances in case of flood events. This practice also exerts positive impacts on drinking source water protection. The second essential purpose is the protection of the streams from direct input of sediments or nutrient loads, which affects drinking water protection and fishery activities.

Establishing of field shrubs

Field shrubs may act as the transition zone from forest to un-forested land. Shrubs (especially root-intensive trees such as alder) planted parallel to the slope of runoff-intensive areas can slow runoff and increase water retention.

The goals are to decrease surface runoff and soil erosion, and to increase water retention in the transition zone between forests and agricultural land.

Preferable areas are fallow sites parallel to the slope in the transition zone between agriculture and forestry. Hotspots with particularly high runoff should be identified beforehand, where afforestation with field shrubs has the highest mitigation effect on flood formation. The plant choices should be in favor of site-adapted tree species and ecologically stable, root-intensive plants. Tested options are rows of alder with parts of lime, ash or maple as well as rows of lime/hornbeam with parts of oak. Alder should not be used within DWPZ due to its nitrogen-fixation.

BEST LAND USE MANAGEMENT PRACTICES USED IN AREAS WHERE OPEN SPACES DOMINATE

Protection of (water-related) open spaces in regional and local land use planning

The protection of open spaces (in the sense of undeveloped land) is a planning measure, usually applied in regional or local land use plans. The basic principle of this measure is to define high value open space land uses, such as nature conservation, recreation, flood protection, water quality conservation or agriculture, and assign them priority in the land use planning process (e.g. agricultural priority zones). These areas not eligible for zoning building land or other land uses that could harm the purpose of their designation (e.g. infrastructure development, gravel mining). Related to water management flood hazard areas, flood plains with retentive functions or reserve areas for structural flood protection or groundwater protection could be given this kind of priority.

The goal of this measure is to provide the spatial preconditions for flood runoff ("room for the river") and water quality conservation. Furthermore, this management practice contributes to the protection of anthropogenic land uses against the impacts of flooding and to soil conservation in general.

Integration of flood hazard information into regional and local land use planning

Flood hazard information (e.g. flood hazard maps or calculated inundation areas) is displayed in local and regional land use plans. The information should be available for everyone (e.g. in web-based land information systems).

The goal of this measure is to make hazard information available for planning stakeholders so it can be considered in planning processes at local and regional level. Integrating flood hazard information into local and regional land use planning is important both for the local planning authority as a basis for land use planning and for the citizens in general (and land owners in particular) in order to be informed about the spatial extension of potential flood events.

This measure is very effective if planning stakeholders can use the information and implement it in land use plans and development concepts. This implementation should result in a lower degree of land use conflicts between flood risk management and development and thus avoid potential flood damage. Making flood hazard information available to the public also supports awareness for those hazards. If hazard information is integrated and no building land is zoned it also contributes to soil conservation (i.e. to avoid soil sealing).

Implementation of retention pits and local rainwater harvest facilities in local land use plans

Implementation of "green infrastructure" like retention pits and local rainwater harvest facilities in local land use plans is a measure applied by planners and local planning authorities. The measure is aimed at exploiting the potential of local land use planning in designing measures to avoid the adverse consequences of flash floods and river floods.

Local retention of rain water plays an important role in mitigating the negative impacts of flash floods and river floods. The goal of this measure is not to drain the water into the next river and thereby speed up and increase the flood wave but to keep it on site as far as possible so it can percolate or evaporate. Percolation of water is beneficial for the ground water level. Evaporation has a cooling effect which can be used to buffer heat islands in cities and heat phases in general. Local land use planning offers the possibility to preventively integrate retention pits and local rainwater harvest facilities into new housing areas and to raise awareness for small scaled local retention measures.

Coordination of flood risk management at catchment scale

Coordination of flood risk management at catchment scale is a measure applicable at regional, national or international level. Best management practices in this field usually relate to the regional level, mainly realized by a (voluntary) cooperation of municipalities sharing a river catchment or certain river stretches. The basic principle is to coordinate measures of flood risk management (e.g. structural flood protection, flood retention, spatial planning, flood warning) at catchment level and not to divide the catchment into different management areas. This measure is required both by the EU Water Framework Directive and the EU Flood Directive.

The goal of this measure is to increase effectivity in flood risk management in general and flood-related planning in particular. Cooperation of municipalities is able to overcome the so-called "problem of fit" (i.e. administrative areas do not match the biophysical areas relevant for flood risk management) and avoid negative downstream effects caused by upstream municipalities (e.g. flood protection by dikes in the upstream part of the catchment increase flood hazards in the downstream part). The measure is suitable for any kind of river catchments but it is most likely to realize it at regional level.

Implementation of land-saving development measures

Implementation of land-saving development measures is a planning tool applied at local and regional level. The basic principle consists in zoning building land, commercial areas and

infrastructure as land saving as possible. Upon building, soil sealing should be reduced as much as possible. Land that is already sealed and/or built upon and not used anymore should be reused or unsealed.

The intended goal of this measure is to reduce land take and to preserve unsealed land. Land is a limited resource and cannot be increased, therefore it is necessary to treat it carefully. Soil sealing also increases the rate and the velocity of surface water runoff. If soil retains its capacity to soak up water at large scale it has a considerable effect on preventing floods.

The measure is very effective on soil conservation. It is THE measure for soil conservation since its goal is to preserve unsealed land. There are also positive effects on flood control. Positive effects are also expected on water quality conservation since the water gets filtered by the soil which leads to better groundwater quality.

Awareness raising for land-saving development and flood adaptation by participatory local land use planning processes

Awareness raising for land-saving development and flood adaption by participatory local land use planning processes is a planning measure applied at the local level. Participatory planning processes are learning processes for the stakeholders involved. The basic principle of this measure consists in giving people state of the art information and in explaining why it is necessary to implement land-saving development or flood adaptation by participation in the planning process.

The intention of this measure is to raise awareness by involving people into local land use planning processes that deal with land-saving building types (e.g. high density low-rise buildings) or flood adapted building types. The overarching goal is to change peoples' behavior concerning land consumption and risk awareness.

The measure is suitable for participatory settings in local development planning processes.

Land management for river restoration and flood protection

Whether it comes to structural flood protection, to flood retention or to river restoration, the decisive question is about the availability of land. The implementation of those measures on mainly private land is a challenging issue because of the related impacts on property rights and property values as well as the influences on existing land use patterns. Land management according to this best management practice comprises land acquisition (property) by public purchase, land acquisition supported by land consolidation, acquisition of land use rights by easements and acquisition of land use rights by contracts with land owners or by funding schemes.

The goal of this measure is to make land available for the public purposes of river restoration and flood protection without using the instrument of expropriation which if legally possible at all is very

conflicting in implementation. Depending on the measure water management authorities would strive for public ownership on land (e.g. for retention basins or river restoration) or they would rather acquire land use rights by easements or compensate land owners by funding (agri-environmental programs) or contractual agreements (e.g. for land uses in flood plains).

Implementation of nature conservation and water management projects in land consolidation schemes

Land consolidation is a tool to adjust the structure of farmed holdings in order to optimize conditions for agricultural production. In land consolidation schemes landowners allow their holdings to be restructured into larger and more convenient land parcels that are equivalent to the value and size of their original holdings. Land consolidation may also be used for adjusting the structure of land plots to implement non-agricultural projects, such as nature conservation and water management projects. The land required for those projects is either acquired by the authorities in charge (in that case nature conservation or water management authorities) or the farmers involved in the land consolidation scheme have to provide a certain share of their land for those measures (this possibility however is limited). Within the land consolidation procedure the land is allocated to the places where it is actually required for nature conservation and water management purposes. The main goal is to support land acquisition for measures of nature conservation and water management.

CHAPTER 6: CONCLUSIONS AND RECOMENDATIONS

CONCLUSIONS

Water is fundamental to the health of the biosphere, strong economic growth and human social well-being. Despite its relative scarcity and absolute importance to life on earth, fresh water resources are often used inefficiently or polluted unnecessarily.

Policymakers must work towards developing approaches to balance human demands for water with the water requirements of ecosystems. The European Water Framework Directive, which aims to encourage the sustainable management and protection of freshwater resources, brings this agenda into sharp focus in Europe.

Land use change and environmental quality are closely related, and the nature and location of development can significantly influence both the generation and resolution of environmental problems. This places spatial planning, which provides a framework for regulating the development and use of land, in a strong position to affect water quantity and quality issues and thus to aid the achievement of the Directive's goals.

In particular, land use planning has an important function in integrating the use and management of land and water more closely than is presently the case.

Lnd use planning essentially **involves the development and implementation of strategies and procedures to regulate land use and development** in an attempt to manage and balance the numerous pressures placed upon land.

Land use planning has an important role to play in addressing water issues such as flooding and aquatic pollution which are strongly influenced by the nature and location of development.

The Water Framework Directive (WFD) defines a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater [European Commission (EC) 2000]. It aims to protect and enhance the status of aquatic ecosystems. The WFD also provides for the long-term protection of water resources through promoting sustainable water use and the reduction of groundwater pollution, and aims to mitigate the effects of floods and droughts. **Significantly, spatial planning is an established mechanism through which the water management challenges raised within the WFD can be addressed.**

The WFD is the most significant piece of EU water-related legislation to date., it could be argued that the WFD in fact constitutes one of the most groundbreaking pieces of EU environmental legislation. **As noted by the World Wildlife Fund (2001, 1): 'If implemented in a complete and timely manner, the WFD has the potential to be the EU's first "sustainable development" Directive'.**

Additionally, the core EU concepts of the precautionary principle and the polluter pay principle are also advocated by the WFD, and stakeholder participation is a key element of the legislation.

The preparation of river basin management plans (RBMPs) (by competent authorities nominated by the member states) covering river basin districts is the key procedural requirement of the Directive.

The scope of the WFD is clearly far-reaching and its implementation will impact on many sectors from agriculture and forestry to water services and spatial planning.

The successful achievement of the WFD's goals will ultimately depend on the effective integration of land and water management processes.

Planning authorities, therefore, have a key role to play in implementing the WFD through ensuring that the development and use of land is undertaken in a manner that is sensitive to the requirements of the Directive (White and Howe 2003).

Planning relates to both nature and society (Blowers 2000), reflecting the reality of socio-economic influences over environmental issues such as water. Achieving good water status will involve developing more sensitive linkages between human societies and water. Land use planning is in a strong position to help advance this agenda.

Land use planning provides a route into the management of the water environment for concerned stakeholders who can help to strengthen the links between planning, water and the WFD. As Abu-Zeid (1998, 16) noted, stakeholders are a necessary addition to policy making: 'The participation of stakeholders in all aspects of water management is crucial. This should not be restricted to the influential elite.

Article 11 of the WFD concerns the preparation of programmes of measures (POMs). These measures must be developed by WFD competent authorities and included within RBMPs in an effort to meet the Directive's environmental objectives within individual river basin districts. Land use planning procedures can contribute directly to some of the 'basic measures' outlined in Article 11, which are minimum requirements for inclusion within RBMPs. They include measures to (EC 2000):

- Promote an efficient and sustainable water use.
- Safeguard water quality in order to reduce the level of purification treatment required for the production of drinking water.
- Control of point source discharges liable to cause pollution.
- Control of diffuse pollution sources.
- Prohibit direct discharges of pollutants into groundwater.
- Eliminate pollution of surface waters.

- Prevent and/or reduce the impact of accidental pollution incidents, for example as a result of floods.

The previous discussion outlined three ways in which land use planning can contribute to the sustainable use and management of water:

- through the preparation of land use plans,
- development control, and
- the application of planning techniques and approaches such as SEA.

Via these mechanisms, spatial planning can contribute to the successful implementation of the WFD's 'basic measures' and can consequently help to encourage the sustainable management and protection of freshwater resources.

National governments and other stakeholders responsible for the WFD are increasingly recognizing that spatial planning provides an established mechanism that can help them to meet this requirement.

RECOMMENDATIONS

The experiences gained in the first 2 cycles of river basin planning in the EU and the increasing recognition that spatial planning can help in achieving the overall objectives of the WFD accompanied by the ongoing initiatives of the ICPDR and Danubian countries has created supportive environment to making land use planning a transnational effort in large river basins. This however requires long term action and a systematic and focused attention to understanding and managing most important aspects of land use-water interactions for the benefit of our societies. Camaro D Project begun with the intention to provide input into the process of providing transnational perspective to land use planning in support of water management and further development of the Danube basin. Initially it was envisaged that the project will end with Land Use Plan for the Danube basin.

Unfortunately, such a final output is in fact not possible due to the absence of transnational legal framework for such a transnational Plan (Who adopts the plan, who implements it etc.) and recognition that such a framework is yet to be provided by the EU.

Fortunately for all us, a good starting point for transnational land use planning does exist within the WFD Directive and its transnational jurisdiction for all countries of the Danube basin. Camaro D project utilizes this to initiate the process of making land use planning a transnational activity in the Danube basin by suggesting that it becomes an integral part of the river basin planning process under WFD, initially for protected areas under Article 6 of the WFD, and later extending for the whole Danube Basin territory. In this context the Camaro D Project makes the following recommendations:

RECOMMENDATIONS ON INTEGRATION OF LAND USE PLANNING INTO RBDP UNDER WFD

1. *Land use planning should be an integral part river basin development planning as per WFD of the EU and particularly of **RBDP Program of measures**, especially so for protected areas as per WFD Article 6.*
2. *Land use plans for protected areas in article 6 of the WFD should be a constituent of the RBMP for any given basin and especially so for transboundary river basins* considering that EU has no jurisdiction over land use planning at national level.
3. The main spatial unit for water related land use planning should be the river basin district/catchment.
4. DPSIR framework in should be used in land use planning at the river basin scale.
5. Ecosystem based approach focusing on ecosystem services should be at the focus of analyzing causal paths within the DPSIR framework.
6. The following steps should be used in land use planning at the basin level:
    a. Step 1: Assessment of current land use situation in the planning area
    b. Step 2: Defining objectives for land use in the planning area taking cognizance of the overall water management objectives for the river basin/district.
    c. Step 3: Develop the program of measures to be implemented regarding land use in the planning area and integre these measures into river basin Program of measures within the RBDP. Define alternative land use measures with respect to: water retention, water quality and quantity and ecosystem services and analyze preconditions needed to implement the defined land use measures and ways to meet the preconditions.
    d. Step 4: Assess and quantify impacts of implementation of land use measures in terms of water retention, water quality and quantity and ecosystem services.
    e. Step 5: Assess feasibility of the measures and redefine as necessary
    f. Step 6: Select measures for implementation from alternatives analyzed and develop an Implementation Action Plan
    g. Step 7: Implement the land use plan for the planning area
    h. Step 8: Monitor the implementation of the plan and its effects.
    i. Step 9: Repeat the cycle
7. In formulating the land use plan for the planning area take cognizance of the following:
    - Plan as an instrument for making decisions in order to influence the future. Planning is a systematic, integrative and iterative process that is comprised of a number of steps executed over a specified time schedule
    - *Planning is a means to improve and support a sound management. In this sense, planning has to be regarded as a process and not as an objective in itself.*
    - The planning process adopted in the WFD is best characterized by the term ‘end result planning’; from the start of the process it is clear what the final outcome will be.

- In the river basins concerned besides RBDP other processes and other initiatives exist, e.g. the development of regional industrial zones, the building of houses, extension of infrastructure, restructuring the agriculture, construction of recreational areas, etc., from which conflicts with the objectives of the WFD can arise. Make sure you take conflict resolution into consideration when developing the land use plan for the planning area;
- The different Member States have their own planning traditions, which means they all have their own long-established manners of adjusting developments in society, with corresponding division of roles and allocation of tasks between public and private sectors. In order to achieve the objectives in a socially acceptable manner, make sure you capacitate and promote the active involvement of stakeholders and the public in the formulation of the land use plan. Recognize that this may mean that the current planning system may need to be be improved and revised.

8. While the relevant WFD Directive provides a necessary international (transboundary) framework; the actual operational implementation must take place at Member State level. Within this framework there are opportunities to act in different scales: per Member State, per (sub-) basin or per water theme, as long as the prospect of 'good status' stays the leading principle, and the different prescribed steps are followed.
9. Consider making land use plans a legal requirement for protected areas under WFD Article 6.
10. Use available GUIDR implementation toolkit, and especially best management practices focused on particular clusters (small rivers, large rivers, lakes and reservoirs) and land use themes (agriculture, forestry and grassland ecosystems) in defining alternative land use measures for consideration within the program of measures.
11. Plan for and carry out stakeholder empowerment prior to stakeholder involvement and participation in the process of land use plan development for the planning area.
12. Start stakeholder dialogue as early as the phases of problem defining and setting the agenda. Better understanding of the interests of those involved arising during the planning process and so the chance to influence planning will increase their willingness to co-operate in problem solving.
13. Develop a number of reasonable alternatives to consider; evaluating from each one its economic, environmental, political, and social impacts.
14. Build on existing institutions wherever possible, and avoid unnecessary transfers of authority from one body to another. Requirements for shifts of institutional mandates and responsibilities can take a long time, and eventually cause the failure of well-intended reforms.

POLICY AND FRAMEWORK RECOMMENDATIONS TO NATIONAL GOVERNMENTS

In support of the above recommendations we recommend to the National Governments of the Danube basin countries to:

1. Formulate national land use policy framework that promotes sustainable water use and integrated water management and clear rights and obligations for all citizens.
2. Use RBDP planning as a vehicle for translating land use policy into plans and actions and for providing feedback for policy adjustments;
3. Develop an enabling legal and institutional framework for land use planning that:
    - Ensures that economic planning instruments and cycles and national sectoral policies, are taken into account in the preparation of land use plans;
    - Acknowledges the different regional, urban and local situations and the need for spatially coherent territories and balanced regional development;
    - Links and coordinates urban, metropolitan, regional and national plans and ensures coherence between the sectoral and spatial levels of intervention, based on the principle of subsidiarity, with appropriate arrangements for combining bottom up and top-down approaches;
    - Formally confirms partnership and public participation as key policy principles, involves the public (both women and men), civil society organizations and representatives of the private sector in land use planning activities, ensures that planners play an active and supportive role in the implementation of these principles and sets up broad consultative mechanisms and forums to foster policy dialogue on land use issues;
    - Allows the development of new regulatory frameworks to facilitate the iterative and interactive implementation and revision of land use plans;
    - Definition, implementation and monitoring of decentralization and subsidiarity policies and strengthening the role, responsibilities, planning capacities and resources of local authorities in line with the international guidelines on decentralization and the strengthening of local authorities;
    - Strengthening and empowerment of local authorities to ensure that planning rules and regulations are implemented and functionally effective;
    - Stimulating and encouraging collaboration with associations and networks of professional planners, research institutes and civil society to develop land use planning approaches, patterns and practices (or other similar arrangements) that could document, evaluate and synthesize country experience, undertake and share case studies, make information available to the general public and provide assistance to local authorities on request.
    - Setting standards and regulations for the protection of water, other natural resources, agricultural land, green open spaces, ecosystems and biodiversity and their sustainable management;
    - Promotion of the use of land use planning as a facilitating and flexible mechanism rather than as a rigid blueprint. Land use plans should be elaborated in a participatory way and their various versions made accessible and user-friendly, so that they are easily understood by the population at large;
    - Establishing effective financial and fiscal frameworks in support of Land use planning implementation.

- Keeping legislation and regulations, as essential implementation tools, under periodic and critical review to ensure that they are practical and easily enforceable;
- Promotion of monitoring and reporting on Land use planning implementation stages, adjustments and challenges, as well as open and free access to data and statistics, as integral to a democratic policy that should involve land use planning professionals, civil society organizations and the media;

POLICY AND FRAMEWORK RECOMMENDATIONS TO REGIONAL AND LOCAL GOVERNMENTS

To regional and local governments and administration we recommend that they:

1. Provide political leadership for the development of land use plans, ensuring articulation and coordination with sectoral plans and other spatial plans and with neighboring territories, in order to plan and manage land use at the appropriate scale;
2. Supervise professionals and private companies contracted for land use plan preparation, in order to ensure the alignment of plans with local political visions, national policies and international principles;
3. Ensure that land use regulations are implemented and functionally effective and take action to avoid unlawful developments, with special attention to areas at risk, especially protected areas under Article 6 of the WFD.;
4. Share their land use planning experience, engage in cooperation to promote policy dialogue and capacity development and involve local government associations in land use policy and land use planning at national and local levels;
5. Facilitate the effective and equitable involvement of stakeholders, particularly affected communities, civil society organizations and the private sector, in land use planning preparation and implementation by setting up appropriate participatory mechanisms, and engage civil society representatives, particularly women and youth, in implementation, monitoring and evaluation to ensure that their needs are taken into consideration and responded to throughout the planning process.
6. Promote the use of Land use planning as an action plan to improve water management and reduce pollution and the amount of water wasted;
7. Develop a shared strategic spatial vision (supported by adequate maps) and a set of consensual objectives, reflecting a clear political will;
8. Prioritize and phase desired and achievable land use outcomes along adequate time lines and based aligned with the WFD planning cycles;
9. Set up institutional arrangements, participation and partnership frameworks and stakeholder agreements; and
10. Create a knowledge base to inform the Land use planning process and to allow the rigorous monitoring and evaluation of proposals, plans and outcomes;

POLICY AND FRAMEWORK RECOMMENDATIONS TO CIVIL SOCIETY

To civil society organizations and their associations we recommend:

1. Participation in the preparation, implementation and monitoring of land use plans, help local authorities identify needs and priorities and, wherever possible, exercise their right to be consulted in accordance with existing legal frameworks and international agreements;
2. Contribution to the mobilization and representation of populations in public consultations on land use planning, particularly poor people and vulnerable groups of all ages and gender, with a view to fostering equitable development, promoting peaceful social relations and prioritizing the development in the least developed urban areas;
3. Raising the public awareness and mobilization of public opinion to prevent illegal and speculative land uses, particularly those that could endanger the natural environment; and
4. Contribution to ensuring continuity in the long-term objectives of land use plans, even in times of political change or short-term impediments.

POLICY AND FRAMEWORK RECOMMENDATIONS TO PROFESSIONAL ORGANIZATIONS

To planning professionals and their associations we recommend: to engage in:

1. Facilitation of land use planning processes through their expertise during all preparatory and updating stages and mobilizing the groups of stakeholders concerned for their views;
2. Advocating for more inclusive and equitable development, ensured not only by widespread public participation in land use planning but also through the content of planning instruments such as plans, designs, regulations, by-laws and rules;
3. Promotion of the application of the GUIDR principles and advise to decision makers to adopt them and, whenever necessary, adapt them to national, regional and local situations;
4. Advancement of research based knowledge on land use planning and organize seminars and consultative forums to raise public awareness of the recommendations in the GUIDR;
5. Participation in the development of the overall spatial vision and the prioritization of projects that should result from a participatory process involving consultations between all relevant stakeholders and driven by those public authorities which are closest to the public;
6. Development new tools and transfer of knowledge across borders and sectors that promote integrative, participatory and strategic planning;

7. Translation of forecasts and projections into planning alternatives and scenarios to enable political decisions; and
8. Provision of feedback to the authorities on challenges and opportunities that may emerge in the implementation phases and recommend necessary adjustments and corrective measures.

RECOMMENDATIONS ON TRANSNATIONAL LEVEL

Land use types	**Recommendations for implementation of best practices in existing strategies, policies etc. on transnational level (policy level recommendations)**
Agriculture	• Cultivation of permanent crops (fruit orchards, vineyards and s.o.) particularly in the regions in danger of prolonged draughts and on tilted and eroded terrains in the reservoir watersheds; • Development and use of agriculture belts and crop-rotation – alternation of different crops in belts having difference in thickness and term of sowing, different technology of cultivation. All this aimed at the strengthening the antierosion effect in the affected watersheds; • A regulations for the application of fertilizers and pesticides. In the recent years there is a strong tendency for increase of biological farming in the country. • Technical measures - flood control canals, lateral canals and connecting canals; ditches; irrigation and drainage systems, etc.
Forestry	• Avoiding or prohibition of clear cuts, especially on steep slopes must be a common practice in all countries in order to prevent the erosion processes. /e.g. Clear cuts in Bulgaria are prohibited according to Forest Law/. • To ensure the ecological functions of the forests the implementation of sylvicultural activities on time, especially tending and thinnings is essential • Erosion and torrent control through afforestation, using the most appropriate and cost effective methods, applicable on large areas with shallow soils or on the terrains with difficult access • Regular monitoring of the eroded or torrential terrains in order to avoid the disaster risk; use of remote sensing methods to observe large areas for short period of time. Register on torrential watersheds in forest territories exists in EFA • To prevent the bark beetle distribution, regular monitoring should be conducted not only by forest services, but also from relevant

	stakeholders /forest owners, local citizens, etc./ – Stakeholder platform/online communications • The forest fire prevention measures are valid on transnational level, regardless climatic zones. Due to already observed climate changes the fire risk increased and forest fires are happening more in the northern part of Europe. Establishment of common standards for firefighting equipment and for forest fire prevention on transnational level are needed in order to improve the preparedness for the fighting with forest fires and help for better cooperation in case of common activities in different countries. Demonstration and building of the alerting forest fire systems is a good instrument and have to be transferred on transnational level to exchange experience and to improve the coordination between institutions in different countries. • Guideline for restoration of damaged by pest, diseases and natural disturbances forests and their appropriate management was introduced by EFA experts and spread on regional level for implementation. • Prerequisite for successful policy development is active stakeholder involvement in decision making process. This should be ensured during decision making process throughout different instruments /knowledge transfer, workshops, filed trips, mobile expert groups on the spot, etc./
Grassland	• Restoration and enrichment of the eroded natural grassland (meadows, pastures) in the mountain regions particularly when they are in danger of prolonged draughts. • Standards for grazing.
Water management	• Water quality protection • To fulfil the requirements included in River Basin management Plans with the Programme of Measures and Monitoring. • Diminishing flood risk • To fulfil the requirements included in Flood Risk Management Plans (FRMP), maps and Programme of Measures for flood risk prevention and mitigation. • Utilization of early warning and Decision Support Systems for water management in real time. Optimizing the system of monitoring and forecasting of precipitation and river runoff in the whole river basin, incl. the reservoir operation in case of flood and drought. • To maintain the river channels clean from depositions, branches, trunks in order to avoid flooding; • To avoid the construction of buildings and different structures in flooded river terraces; • To apply measures for flood prevention such as ditches, sills, reservoirs, polders, river training, etc. • Drinking water protected zones • The Sanitary protected zones (SPZ) should be maintained according to the relevant legislation.

	• To follow the regulation regimes for proper management in water protection zones, the sanitary protection zones and the buffer zones, in order to protect drinking water, according to the River Basin Management Plans 2016-2020 • Integrated forest and water management for the water-protectiive forests and management of drinking water sources. • Measures with synergic effects should be applied - not only to protect water quantity and quality, but also for climate change adaptation, flood risk prevention, erosion control, increasing of water retention capacity, etc.
Spatial planning	• Coordination with all concerned sectors (forestry, agriculture, water management, grass management) • Measures in urban territories to avoid soil compaction for flood risk prevention.

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