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PROPOSAL FOR GROUNDWATER DAUGHTER DIRECTIVE

EXTENDED IMPACT ASSESSMENT

{COM(2003)550 final}

The White Paper on European Governance stresses that regulatory proposals should be prepared on the basis of an effective analysis of whether it is appropriate to intervene at EU level and whether regulatory intervention is needed. This analysis should also assess the potential economic, social and environmental impact of the proposal, as well as the costs and benefits of the chosen approach. In this context, a new integrated impact assessment method has been developed by the Commission, as set out in the Communication COM 2002/276 on Impact Assessment.¹ The aim of impact assessment is to help structure the policy-making process, identifying and assessing the problem and the objectives pursued. It identifies the main alternative options for achieving the objective and analyses their likely impacts. It outlines the advantages and disadvantages of each option and the synergies and trade-offs. So it should be considered as an aid to political decision-making, not a substitute for it.

This impact assessment concerns the Commission proposal for a Directive establishing strategies to protect groundwater against pollution. A two-stage approach has been followed, namely:

- a **short preliminary assessment**, carried out in January 2003, identifying the problem tackled, and outlining the main objectives of the proposal and the key issues to be considered for the impact assessment; and
- an **extended assessment developed** through consultation of other Commission departments, Member States and stakeholders during the period January-April 2003.

The impact assessment examines the main features of the proposed Groundwater Directive, which is built on the requirements of Article 17 of the Water Framework Directive (2000/60/EC).² In particular, it assesses the options for evaluating the chemical status of bodies of groundwater, and for identifying and reversing significant upward trends in the concentrations of pollutants. It also assesses measures to prevent and control groundwater from point and diffuse sources of pollution.

This extended impact assessment addresses only the economic, social and environmental aspects of this particular proposal. It is therefore assumed that related Directives are or will be fully implemented. These include in particular the Water Framework Directive (WFD), the Urban Waste Water Directive (91/271/EEC),³ the Bathing Water Directive (76/160/EEC),⁴ the Nitrates Directive (91/676/EEC),⁵ the Plant Protection Product Directive (91/414/EEC),⁶ the Integrated Pollution Prevention and Control Directive (96/61/EC),⁷ the Landfill Directive (99/31/EC),⁸ the

¹ COM(2002)276 final

² Council Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy

³ Council Directive of 21 May 1991 concerning urban waste water treatment

⁴ Council Directive of 8 December 1975 concerning the quality of bathing water

⁵ Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources

⁶ Council Directive of 15 July 1991 concerning the placing of plant protection products on the market

⁷ Council Directive of 24 September 1996 concerning integrated pollution prevention and control

Construction Products Directive (89/106/EEC)⁹ and of course the current Groundwater Directive (80/68/EEC).¹⁰

This Extended Impact Assessment describes various options including the choices which have either been made or which are being considered. It also considers the costs and benefits of these options/choices.

1. THE ISSUE TACKLED BY THE PROPOSAL

The Water Framework Directive adopted in December 2000 provides a comprehensive framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. In essence, it requires water resources to be managed in an integrated way at river basin level. It sets as one of its objectives for groundwater the achievement of good chemical status by 2015. However, it gives no clear indication as to what constitutes good chemical status. It also requires that all significant and sustained upward trends in pollution of a groundwater body should be reversed. However, there is no precise definition of a significant upward trend.

Since there was clearly more work to be done on groundwater, Article 17 of the Directive requires the European Parliament and the Council to adopt specific measures to prevent and control groundwater pollution, acting on a proposal presented by the Commission. In presenting this proposal, the Commission is meeting the legal obligation set out in Article 17 of the WFD. For that reason this impact assessment does not discuss justification for the proposal, but only examines two options that could be considered to meet that obligation.

2. THE MAIN OBJECTIVE THE PROPOSAL

Rules to groundwater against pollution have been in place since the adoption of Directive 80/68/EEC, which prevents and limits direct or indirect discharges of a number of pollutants into groundwater. It provides a protection framework by preventing the direct discharge of high priority pollutants (List I) and subjecting the discharge of other pollutants (List II) to an authorisation procedure preceded by a thorough investigation on a case-by-case basis. Monitoring is required only for those specific cases of authorisation and is not generally required for all bodies of groundwater. According to Article 22 of the WFD, Directive 80/68/EEC should be repealed in 2013, after which the protection regime is to be continued through the WFD and this Groundwater Daughter Directive.

In addition, the WFD requires the achievement of good chemical status, and so includes the quantitative and qualitative aspects of groundwater in the monitoring requirements and programme of measures set out in the river basin management plans. While the WFD provides a general framework for groundwater protection, its

⁸ Council Directive of 26 April 1999 on the landfill of waste

⁹ Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products

¹⁰ Council Directive 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by certain dangerous substances

Article 17 requires the adoption of specific criteria for defining good chemical status and for identifying and reversing significant upward trends, along with other specific measures; in other words, it requires the adoption of a Groundwater Daughter Directive.

In practical terms, the groundwater chemical status will have to be monitored by Member States through the River Basin Management Plan defined by the WFD (Article 13). The evaluation will be based on quality standards and/or threshold values established for pollutants, and defined either at Community level or within each river basin district. These can be used to judge whether bodies of groundwater have poor or good chemical status. The identification of significant and sustained upward trends in pollutant concentrations and the trend reversal requirement will complement this mechanism, ensuring that the no-deterioration clause set out in the WFD can be achieved. Finally, specific requirements regarding direct and indirect discharges will both strengthen the existing protection regime and ensure that it continues after Directive 80/68/EEC is repealed in 2013.

3. THE TWO MAIN POLICY OPTIONS FOR ACHIEVING THIS OBJECTIVE

3.1. First option

It is difficult to define "common indicators" that would ensure that the chemical status of groundwater is evaluated in the same way throughout Europe. This is because of the wide variety of types of groundwater – each with their own different parameters - which exist in Europe. This difficulty was highlighted in discussions with stakeholders (see Section 6) and during a workshop on groundwater background chemistry (BaSeLine project funded by DG RTD) held on 27 January 2003.

Given this difficulty, the first option was to require Member States to establish thresholds for pollutants (instead of fixed quality standards) in order to assess the chemical status of bodies of groundwater that are characterised as being at risk. The pollutants selected would be, on the one hand, chemical substances that might originate either from natural or anthropogenic sources (pollution from human activities), and on the other hand, synthetic pollutants that do not occur naturally in groundwater. Compliance with the rules on good chemical status would be based on these thresholds, which would take into account the risks posed by these pollutants for existing and intended uses of the groundwater, related aquatic ecosystems, and directly dependent terrestrial ecosystems.

In addition, the requirement to identify and reverse trends in pollutant concentrations would be included in this first option, with specific requirements for point sources of pollution. These requirements are closely linked to prevention and control of the input of pollutants into groundwater, by prohibiting direct discharges and limiting indirect discharges resulting from an activity on or in the ground.

3.2. Second option

The existing WFD requirements on the chemical status of groundwater (Annex V.2.3.2) are based on a definition of "good chemical status" that makes reference to

quality standards applicable under other relevant Community legislation. The second option considered, therefore, was to establish a regulatory framework whereby good chemical status would be assessed against a comprehensive set of legally binding EU quality standards (maximum permissible concentrations of a range of given substances in groundwater), which would also represent restoration targets.

In order to ensure adequate protection for pristine groundwaters, this option would also include a provision to establish a new status class ("high chemical status"), which was not explicitly requested by Article 17 of the WFD. In addition, there would be specific criteria for identifying and reversing significant and sustained upward pollution trends, as required by Article 17.

4. THE EXPECTED IMPACTS OF THE DIFFERENT OPTIONS

The proposed Directive is part of a larger policy framework (Water Framework Directive, Nitrates Directive, IPPC etc.) which has an overall economic, social and environmental impact. The purpose of this Extended Impact Assessment is not to evaluate the impacts of those existing regulations, but to focus on the groundwater protection measures covered by this proposal, i.e. on the additional impacts of the proposed Groundwater Daughter Directive.

4.1. Economic study

This impact assessment is underpinned by an **economic study**¹¹ – of which an executive summary is provided in annex. The study gives examples by calculating a range of costs and benefits (or avoided costs) for the two options. . The examples are taken from two sources: sample zones and a review of literature. It evaluates different types of costs and benefits using different methodologies, e.g. financial methods (investment costs, maintenance and operating costs, amortisation) for marketable costs (costs of mitigation and restoration measures). The study considers various cost elements , e.g., additional treatment of water (building/maintaining a plant), decontamination of soil and water, search for alternative water resources (new bore-holes, pipes) etc. It also evaluates ‘defensive costs’ (e.g. extra consumption of mineral water due to the pollution of groundwater resources) using interviews with consumers. Finally, it assesses environmental benefits on the basis of the willingness of citizens to pay for the protection of groundwater because of its patrimonial value. An outline of the content of the study is given in Box 1.

¹¹ Economic assessment of groundwater protection, study contract B4-3040/2002/339770/MAR/A1, 2003

Box 1: Outline of the economic study on groundwater protection

The economic study is in three main parts. The first one presents the key findings of a review of the literature, reporting results of case studies that assessed the costs and benefits of groundwater protection and restoration. The second part focuses on the results of three field studies conducted on the basis of primary data. These were studies of one transboundary body of groundwater (between France and Germany), and two aquifers in France and Denmark. The third part summarises the findings of an economic analysis of the Commission proposal. Some of this data has been used for this Extended Impact Assessment.

As explained in the introduction, protecting groundwater against pollution, under either Directive 80/68/EEC or the WFD, generates (or will generate) various social, economic and environmental impacts that are difficult to dissociate. In terms of economic impact, various costs are already covered by both Directives. These include administrative costs (running costs of river basin authorities), monitoring costs, costs to private households and to agriculture and industry (cost recovery related to water use), costs of physical improvements to bodies of groundwater (e.g. replenishment) etc.. These will have to be evaluated in the framework of Article 5 of the WFD before the end of 2004.

- Under Directive 80/68/EEC, monitoring is only required for specific cases (authorisations) and is not required for all bodies of groundwater. In any case, assessment of pollution risks is not really feasible, as there are no quality objectives for the groundwater chemical status. This apparently stringent protection regime does not provide the data needed to evaluate "good chemical status" since it only concerns aquifers to which the authorisation rules apply.
- As for the Water Framework Directive, without the requirement of Article 17, the absence of well-defined criteria would hamper the efficient implementation of the WFD as regards management of groundwater within the river basin management plan. In other words, there is a risk that, without clearer legal framework and guidelines for assessing and monitoring groundwater quality, the present protection regime will not be sufficiently effective and that groundwater resources might deteriorate.

This is why it was decided to include Article 17 in the WFD during the conciliation process.

At present, investment of many EU countries in the water sector, including water supply, water sanitation, provision of irrigation water, river basin management and water pollution abatement, represents over 0.5% of GDP (OECD, 2003), of which groundwater represents only a part. Expenditure on water pollution abatement and control tends to be higher in densely populated countries. The relative shares of the investment and operating components within total pollution abatement and control expenditure also vary from one country to another. Efforts are being made by industry to develop integrated pollution prevention and control technology, which will have a positive economic impact on the long term. Currently, there is growing acceptance of the need to move towards full cost recovery in the provision of household, industrial

and agricultural water services, which is partly reflected e.g. by pollution and abstraction charges. The purpose of the charges is to internalise the external costs of over-exploitation or of pollution. Examples of environmental, social and economic costs or benefits (avoided costs) are given in Table 1.

Without any further requirements above those of Directive 80/68/EEC and the WFD, there are likely to be more and more of derogation requests regarding the application of WFD environmental objectives to "historically" polluted sites. If derogations were granted, many sites would be left as they are with no further measures required other than controls. This implies that the good groundwater chemical status of the affected bodies of groundwater would not be achieved before the end of 2015 (as required by the WFD). So groundwater would remain impacted by polluted sites and this would be translated into a whole range of costs: increased household expenditure on water, damage to wetlands, possible health hazards, water treatment (households, industry), losses to industry and agriculture etc.

Apart from possible economic impacts, not having well-defined criteria for groundwater quality might also raise possible questions about decision-making on groundwater management issues, and might also maintain social distortions in terms of equal access to "safe drinking water". Indeed, a very high level of uncertainty about evaluation of groundwater quality goes hand in hand with uncertainties in decision-making, so there is a risk of wrong decisions being taken (negative or positive) regarding e.g. control or restoration measures. These uncertainties would have a direct impact on society, in particular a loss of confidence in decisions taken by competent authorities, which would directly affect the principle of cost recovery (questions from consumers about the justification of water pricing).

Table 1 - Examples of studies on the cost of groundwater protection and restoration (adapted from the economic study on groundwater protection, ref. 5)

Region studied	Factors assessed	Results	References
Austria	Drinking water purification costs for municipal water suppliers	€ 205 to 214 million as investment, and € 22 to 39 million running costs (for drinking water use only)	Hofreither & Sinabell, 1996
Austria (Danube floodplains)	Value of wetlands for groundwater (willingness to pay for protection costs)	€ 44 to 105 million	Kosz, 1996
Belgium	Clean-up of contaminated sites	€ 600,000 / site as an average, with 60% of costs below € 100,000 and some costs up to € 45 million per site	Ecolas, 2002
Italy (Milano)	Valuation of reduced atrazine concentrations in groundwater	€ 425 to 559 / household / year	Press & Söderqvist, 1998
Finland (Oulu)	Valuation of groundwater as a source for drinking water (willingness to pay)	€ 54 / household / year	Tervonen, 1994
France	Cost for nitrate treatment in 25 plants from various regions	€ 0.24 to 0.28 / m ³ of abstracted groundwater. € 0.19 to 0.22 / inhabitant / year	Lacroix & Balduchi, 1994
Germany (Hesse)	Cost of co-operative agreements for nitrate reduction	€ 0.10 to 0.29 / m ³ of abstracted groundwater	Gramel & Urban, 2001
Sweden	Cost of groundwater protection measures from transport-related sources	€ 10,000 to € 200,000 per km, depending on the measures	Ojala, 2000
Switzerland	Value of forests for groundwater protection (avoided treatment cost)	€ 54 million / year (only use of drinking water was considered)	Küchli & Meylan, 2002
USA	Cost of 28 clean-up measures	US\$ 1,9 million investment cost per site (average) and US\$ 190,000 / year of running cost per site	US EPA, 1999
USA	Complete groundwater clean-up from a 40% contamination	US\$ 144 / household / year	McClelland et al., 1992

4.2. First option

4.2.1. Economic impact

The first option is based on three key elements:

4.2.1.1. Good chemical status

- In this option, evaluation of good chemical status of bodies of groundwater as required by Article 17 of the WFD takes into account the natural variability of aquifer characteristics and distinguishes between chemical substances that occur naturally and pollutants resulting from human activities. The classification of bodies of groundwater is implicitly required by the WFD (Annex II) and does not represent an additional cost to Member States over the WFD. This responds to the objective of the proposed Directive in a flexible fashion.
- The direct costs borne by this first option – which might be regarded as having a negative economic impact – are the systematic monitoring to analyse pollutants in the bodies of groundwater characterised as being at risk. However, using a common methodology to establish pollutant thresholds will have a harmonising effect on the evaluation of groundwater chemical status throughout Europe, which would not have been possible otherwise.
- In the long term, the comparability of data and using similar criteria to evaluate chemical status will facilitate improved groundwater protection through better decision-making with regard to pollution prevention and control measures. This enhanced comparability is difficult to quantify in terms of (positive) economic impact but it is assumed to be largely superior to the costs generated by additional monitoring requirements over those of the WFD.
- The positive economic impact is directly related to cost savings: better decision-making with better measures, enhanced confidence in monitoring data and interpretation, avoiding repetitions of analyses and possible wrong decisions with (negative) side economic impacts.

4.2.1.2. Significant and sustained upward trends

- The requirements to identify and reverse significant and sustained upward pollution trends is also in Article 17 of the WFD. This will imply additional costs over and above the WFD, mainly linked to focused monitoring and reporting (higher frequency required in bodies of groundwater considered to be at risk). But these requirements are necessary to protect groundwater adequately against pollution, by enabling the swift identification of risks and the taking of timely and proportionate measures to reverse pollution trends. They basically make the “no-deterioration” clause of the WFD operational.
- In the long term, this approach will act as an "alarm bell" which rapidly detects pollution threats so early decisions can be taken on the most proportional measures (control or remedial action). This requirement represents a considerable improvement in protection of groundwater against pollution, and hence has a

highly positive economic impact, although this is impossible to quantify at this stage.

- 4.2.1.3. Pollution prevention and control measures
- Related measures to prevent and control groundwater pollution take account of the requirements of Directive 80/68/EEC, and are closely linked with the list of groundwater pollutants to be identified by Member States (for which thresholds have to be established). These are measures to prohibit direct discharges of pollutants (as required by the WFD). There is also a clause on indirect discharges which shall only be permitted on condition that they do not put at risk the achievement of good chemical status. This is also in line with requirements under Directive 80/68/EEC. There are specific measures for preventing/controlling pollution from (historical) point sources, whereby sites already polluted sites should not affect the chemical status of the overall body of groundwater concerned.
- So the first option is a flexible system whereby action will have to be taken but should focus on the risks related to polluted sites. This limits costs to the management of the risk zones, which will be economically advantageous on the long term. This argument is illustrated by the example in Box 2.

Box 2: Example of restoration costs related to a point source of pollution

One example from the economic study is a case of groundwater affected by a point source of serious pollution (potash mining waste), the chief problem being chloride concentrations which exceed quality objectives. By strictly managing the point source (Some 4% of the total aquifer area) it was possible to restore some of it – at a cost of €67 million between 1976 and 2001 (€27 million on investment - e.g. pumping wells and infrastructure to artificially dissolve waste deposits - and €40 million on operation and maintenance). Another €43 million will be spent between 2002 and 2010 on reducing pollution. Without any action, the waste discharges would continue to be a major source of pollution for more than 180 years (estimated by modelling). Strict management of the polluted site made it possible in this case to stop the pollution spreading and to take suitable clean-up measures. Good chemical status (except for the point source) will be reached by 2015, while the polluted area will be controlled and restored over a longer period (and should – according to models - reach good chemical status by before).

- The requirement to check pollution sources is not specific to the proposed directive since it is already covered by WFD requirements. In this context, the checks will have an impact on agriculture and industry, and on urban areas (municipalities), which will be obviously higher in regions with lots of pollution sites. The costs of the measures taken will be charged to those responsible for the pollution (in line with the "polluter's pay principle") when they are known, or to the Member States in the case of "historically" polluted sites. This is illustrated in Box 3.

Box 3: Example of restoration costs arising from diffuse agricultural pollution

The example of the Alsace aquifer demonstrates that costs can be avoided with strict pollution control of nitrates and pesticides. Out of a total population of 1.7 million inhabitants in the region, 432,000 are affected by pollution of the aquifer by nitrates and

pesticides. This has resulted in a total restoration cost of €26 million over the period 1988-2002. Strict pollution control in identified risk areas could have prevented a substantial part of these costs, which are borne by all sectors of the economy. For farmers, the cost has been €2.5 million mainly in changes to farming practices. And a major beer manufacturer had to invest €10 million in a new treatment plan and the necessary connections. Households have paid about €14 million in extra costs.

4.2.2. *Social impact*

- The social impact of the first option is difficult to quantify. Overall, the key elements are all considered to have a positive social impact. First of all, harmonisation of criteria for evaluating groundwater chemical status will represent a clear improvement over existing WFD requirements. Better evaluation of groundwater quality has a directly positive social impact. The same is true for the "trend reversal" principle, which should prevent groundwater quality from deteriorating (not only so that it can be used but also to protect its patrimonial value).
- The proposed prevention and control measures are not radically new and imply a *status quo*.
- Specific criteria for point sources of pollution will have social consequences in that they will raise awareness of the risks related to polluted sites. The reason for public concern to prevent the deterioration of water resources from polluted sites is that they are often in low-income industrial regions where the social benefits of preventing pollution will be higher. So the idea of focused measures on polluted sites is a good way of combining the geographical and social dimensions of the pollution.
- Finally, regulating groundwater on the basis of quality objectives (and not only by issuing permits for discharges of certain pollutants, as under Directive 80/68/EEC) should benefit users by better control of pollution risks. Although when permits were issued there was monitoring to evaluate their effectiveness, without quality objectives it was not possible to make a proper appraisal. Under this proposal, potential risks will be assessed against clear quality objectives (good chemical status).
- In many cases, the willingness of the population to pay for protecting and restoring aquifers demonstrates the patrimonial value of groundwater, i.e. is considered a common heritage.

4.2.3. *Environmental impact*

- Environmental impact can be assessed directly from the economic and social impacts. All elements of the first option have a direct, positive, impact on the environment: through improved evaluation of groundwater chemical status, a tighter no-deterioration clause (based on trend studies), measures to prevent or limit discharges of pollutants, and tighter control of polluted sites through specifications related to point sources of pollution. The option should lead to an

improvement in the environmental quality of groundwater; this was not sufficiently tackled by the current policy framework.

- Bad quality groundwater affects how wetlands function (self-cleaning, water storage). But wetlands have the natural capacity for dealing with waste water. They have a self-cleaning capacity which is often equivalent to the annual capacity of waste water treatment plants (e.g. one hectare (or 10,000 m²) of wetland has a sanitation capacity equivalent to the annual capacity of plant serving 4,000 inhabitants). Compared to the cost of a waste water treatment plant, the value of one hectare of wetland could be estimated at about €3,600. For the storage of freshwater, the value of a wetland has been estimated at about €1.5 /m³.
- The harmonising effect of using pollutant thresholds to evaluate the chemical status of groundwater characterised as being at risk will have a positive environmental impact at EU level because (1) data will be made comparable from one river basin district to another and (2) the groundwater will be managed in the same way. This means that there we shall have a better overall picture of the degradation of groundwater resources, which will make it easier to decide what measures need to be taken. Exchanges of good practices and past experience should help to keep costs reasonable.
- The focus on pollution sites will make it easier to take appropriate action to limit the adverse environmental effects of polluted groundwater on associated ecosystems. For example, in the case quoted in paragraph 4.2.1.3 (potash waste dumps), the polluted groundwater was affecting forest growth. Tight management of the site improved the situation.

4.2.4. *Subsidiarity and proportionality*

- In the first option, Member States are responsible for establishing threshold values to serve as local standards. This approach represents a high level of subsidiarity since they fix their own quality objectives according to the characteristics of the groundwater in each river basin and the local pressures and impacts. Community standards have to be followed only for a limited set of pollutants. Common rules are established for the identification and reversal of pollution trends, as well as for measures for indirect discharges into groundwater which put at risk the achievement of good chemical status of the groundwater body concerned. But this is left up to the Member States to decide how they will implement these requirements.
- In terms of proportionality, the evaluation and monitoring of bodies of groundwater on the basis of quality standards and threshold values are required only for those bodies that were characterised as being at risk (following the analysis of pressures and impacts carried out under the WFD). Authorisations are required only for those activities which represent a risk to groundwater. So this approach can be considered in that it focuses on actual risks, and does not require an extensive appraisal of all ground waters.

4.3. Second option

4.3.1. Economic impact

The second option is based on the three following key elements:

4.3.1.1. Good chemical status

- In this second option, the establishment of boundaries between “poor” and “good” chemical status is based on the establishment of fixed groundwater quality standards for a range of pollutants, similar to the existing nitrates, pesticides and biocides.
- The fixed quality standards are meant to act as restoration targets for all bodies of groundwater where standard concentrations are exceeded. This should provide stringent protection against pollution. However, there could be technical difficulties because of the natural variability in groundwater composition. Furthermore, fixed standards do not distinguish between inputs of pollutants (of human origin) and substances that are naturally present in the water.
- In fact, fixed standards would be too stringent in some cases (e.g. in cases where "polluting" substances are naturally present in groundwater) and would actually imply the restoration of polluted bodies of groundwater without any flexibility other than derogation. The economic impact of achieving good chemical status would then be very high due to the disproportionate costs required to clean it up (e.g. sinking wells to pump out the polluted groundwater). Figures are given in Table 1. It would also create economic distortion between areas that contain high concentrations of naturally occurring substances that are potential hazards and areas that are not "naturally contaminated". Setting similar standards would lead to very different costs depending on each case.
- In addition, the Commission would undoubtedly be flooded with derogation requests, which would be an additional administrative economic burden. To justify these derogation requests would require more investment in the monitoring system, possibly as much as €3,000 per monitoring point per year.
- In other cases, fixed standards might be too lax and might act as a "license to pollute up to the standard values" for bodies of groundwater that do not contain high concentrations of the regulated substances. The consequence could be that unpolluted groundwater could deteriorate while no legal action could be taken. There would also be indirect economic impacts in terms of additional water treatment costs and increase consumption of mineral water.
- Establishing uniform quality standards for all European groundwaters would also mean that all bodies of groundwater had to be monitored (even those not considered at being at risk), so there would be high monitoring costs without obvious long term benefits.
- Finally, with fixed quality standards, it is not possible to evaluate how groundwater interacts with associated aquatic and terrestrial ecosystems, nor to consider the variety of situations encountered.

- The positive impacts of this option are not quantifiable at the present stage. A stringent regime will undoubtedly be of benefit in protecting groundwater resources in the long term. However, it is not certain that EU wide standards would perform that function if they were established without considering the local characteristics of bodies of groundwater.

4.3.1.2. High chemical status

- The definition of a groundwater "high chemical status" will be of direct benefit in protecting pristine groundwater, and would thus reinforce the objectives for protected areas in the WFD and related directives.
- A new high chemical status class would mean a new and costly monitoring and control framework (stricter than the one requested by the WFD). However, it is assumed that unpolluted groundwater can be protected by other means, in particular the provisions of the WFD.

4.3.1.3. Significant and sustained upward trends

- As with the first option, the requirement to identify and reverse significant and sustained upward pollution trends will imply additional costs over and above the WFD, mainly for focused monitoring and reporting (higher frequency required in bodies of groundwater considered to be at risk).
- With the second option, the starting point for trend reversals would be directly linked to the quality standards (trends have to be reversed once 75% of the quality standard concentration is reached). This actually reinforces the good chemical status requirement by detecting specific threats from pollution. However, it focuses on selected substances for which quality standards are established and does not specifically take into consideration the specific characteristics of the bodies of groundwater, or the sources of pollution, which could have a negative impact the chemical status.

4.3.2. *Social impact*

- The high potential cost of stringent quality standards would obviously affect water prices, and this would have a direct social impact. One option was to derive quality standards from drinking water standards. However, these standards were actually established for health reasons rather than for environment protection so they would give the wrong message to the public, since this is protection of groundwater for its own sake.
- The definition of "high chemical status" would meet with a positive reaction from the public, but at the expense of higher management costs (reflected in water prices and in costs to business and industry). Hence, it is doubtful that the second option would adequately respond to society's growing awareness of the patrimonial value of groundwater.
- The second option is likely to encourage more calls to phase out discharges, which would mean industry has to modify or improve its processes. Notwithstanding the direct impact on industry (with a probable negative impact on turnover and

employment), there would also be an increase in water prices, which would have a direct social impact. For industry, the costs of both additional monitoring and extra treatment to reach drinking water quality standards would be too expensive, in particular for SMEs. For households, the additional costs of preventing drinking water pollution have been estimated at about €0.24 /m³. This would have a negative impact on the poorest households.

This is borne out by the examples of water treatment costs given in Table 1.

4.3.3. *Environmental impact*

- It is obvious that much "unpolluted" groundwater contains natural substances in concentrations that are inappropriate for human consumption (unless very costly treatment is applied) and that health-related standards would be inadequate to protect those resources from an environmental viewpoint. So applying drinking water standards to groundwater would not be appropriate. As discussed in paragraph 4.2.1, fixed quality standards that did not take account of the natural variability of groundwater would lead to a situation where protection was either too stringent (with a direct economic impact) or too lax (with a risk of quality deterioration).
- Environmental impact can be looked at from different angles. In some cases, stringent standards would have a positive impact on the environment (e.g. where pollutants are clearly identified) as they would act as restoration targets, thus representing a clear improvement in groundwater quality. But this would entail high costs. In other cases, standards might act as "top-up values" (i.e. you can increase pollution up to the value of the standard) which would be tantamount to a "license to pollute". This would of course have a negative impact on groundwater quality, in particular in zones which are not significantly affected by pollution, and associated aquatic and dependent terrestrial ecosystems.
- The establishment of a "high chemical" status class may at first sound an appealing way of protecting pristine groundwater, and the economic impact would certainly be very positive. However, the costs of making this requirement operational (monitoring, reporting, restoration) would have unacceptable economic impacts.

4.3.4. *Subsidiarity and proportionality*

- The second option sets out a strict system to be uniformly applied by all Member States for all bodies of groundwater. The only subsidiarity aspect in this approach concerns implementation.
- The second option entails potentially high administrative and economic costs, which are not considered to be proportionate to the level of risk. All bodies of groundwater have to be monitored and evaluated on the basis of common standards, which might lead to technical difficulties and decisions that would not take sufficient account of local characteristics. The "high chemical status" class would also represent additional costs, without clear benefits in terms of protecting unpolluted groundwater.

4.4. Conclusions

4.4.1. First option

The first option is stringent in so far it establishes threshold values for groundwater pollutants (on the basis of which the chemical status of bodies of groundwater will be evaluated and a set of actions defined). It also sets criteria for the identification and reversal of significant and sustained upward trends in the concentrations of all pollutants (i.e. substances that both occur naturally and as a result of human activities in groundwater and also synthetic pollutants). In addition, it identifies measures for preventing and controlling pollution to ensure adequate continuation of the protection provided by Directive 80/68/EEC.

It adopts a harmonised approach, using pollutant thresholds for assessing groundwater chemical status in bodies of groundwater at risk, and specific measures to tackle point sources of pollution. This leaves Member States ample flexibility to decide on their own prevention and control procedures and to take appropriate and proportionate actions, which therefore fully justifies the stringency of the first option. For this reason, it is the first option that has been selected (Box 4).

Box 4: Reason for choosing the first option

The first option has been preferred, because of the drawbacks of the other (strict standards) option. This option can be used to build a **flexible approach** that will ensure a **cost-effective level of groundwater protection** against pollution. It improves the current protection system by setting **clear groundwater quality objectives**, while avoiding any duplication with the WFD and leaving Member States maximum flexibility for deciding on control or restoration measures.

The additional economic impact created by the proposal is strictly related to technical requirements for extra control and monitoring of bodies of groundwater (in addition to existing WFD requirements), e.g. for the assessment of background chemical composition, analyses of pollutants in order to establish thresholds, and trend studies. As already explained, this impact is not totally new in that the WFD will already establish the framework for programmes of monitoring and measures. These additional costs will be largely compensated for by the proposed improvements, in terms of harmonised evaluation of good chemical status, reinforcement of the no-deterioration clause (trend studies) and control of polluted sites. In the long term, it is expected that the proposed approach will improve comparability of practices between river basin districts and optimise monitoring, control and restoration measures. Furthermore, improved control will help identify potential problems earlier so that they can be solved more cheaply.

4.4.2. Second option

The second option is more stringent in that it is based on the establishment of quality standards that are derived from drinking water quality standards. It might be appropriate for some substances (e.g. nitrates, pesticides) but it is not really applicable to other substances, because of the variety of characteristics of bodies of groundwater

and the wide variety of sources of pollution. Arguments against this option are summarised in the Box5.

Box 5: Arguments against the strict standards option

The experts consulted considered that it would be very difficult to implement a "strict standards system " because of the **lack of data and the studies** needed to establish sound quality thresholds representative of all European bodies of groundwater. There will be **strict standards for nitrates, pesticides and biocides, but not for other substances**, the main reason being that the costs of non-compliance would be extremely high if a large number of standards were established, without prior studies to check that they are representative.

In addition, it was decided not to include a new status class ("high chemical status") for the protection of unpolluted groundwater in this option because it would generate an unnecessary administrative burden and additional costs. The protection of unpolluted groundwater could be achieved by other means (e.g. protected areas under Article 6 of the WFD, no-deterioration clause etc.).

4.4.3. Conclusion – Selected option

On the basis of the analyses of the two options, it was decided to select the first option for the proposed Commission daughter groundwater Directive. However, some features of the second option have been included in the final proposal. These are a limited set of common quality standards based on existing Community legislation (for nitrates, pesticides and biocides) and the possibility for the Commission to develop a proposal for new Community standards on the basis of the threshold values to be established by Member States.

5. MONITORING AND EVALUATING THE RESULTS AND IMPACTS OF THE PROPOSAL AFTER IMPLEMENTATION

The proposed Directive will be closely linked to implementation of the Water Framework Directive. In other words, the groundwater monitoring and protection system will be incorporated into the river basin management plans, including reporting on the groundwater chemical and quantitative status. The policy can therefore be monitored through regular reporting within the framework of the river basin management plan, i.e. every six years from 2009.

The provision for the establishment of a Regulatory Committee (Article 21 of the Water Framework Directive), which will also concern this Directive, leaves scope for an ex-post evaluation of the policy. In this respect, rules of procedure are to be adopted by the Regulatory Committee when it is set up (end of 2003).

6. STAKEHOLDER CONSULTATION

6.1. Member States and stakeholders

The target group for consultation on this Extended Impact Assessment was the Expert Advisory Forum on Groundwater (EAF). This forum was constituted in November 2001 to discuss all the issues relating to development of the Groundwater Daughter Directive. It is a group with some 50 members, representing the national authorities (mostly environment ministries or agencies) of Member States and Candidate Countries, NGOs (e.g. European Environment Bureau, the Wildlife Trusts), industrial associations (e.g. CEFIC, Eurométaux), unions (e.g. UNICE), water and consumer associations (e.g. EUREAU), agricultural associations (e.g. ECPA, EULA), technical experts (e.g. from the European geological surveys), representatives from European regions (e.g. EPRO), and officers from various EU Commission Directorates-General (e.g. DG AGRI, DG ENTR, DG RTD and DG SANCO).

The EAF Groundwater met five times – November 2001, March, June and October 2002, and March 2003 – to discuss the features of the present draft proposal for a Groundwater Directive. Various options were examined, in particular the two options that are presented in this impact assessment. There was in-depth discussion on the various impact, the results of which are set out in summary documents (minutes of EAF meetings). These were taken into account when drafting both the Groundwater Directive proposal and the Extended Impact Assessment. The arguments for and against in Sections 4.1 and 4.2 are taken from these discussions.

With regard to the current draft, a first outline document has been sent to the EAF members on 21 January 2003. The main elements of the Extended Impact Assessment were discussed at the 5th EAF Groundwater meeting on 10 March 2003, and a first draft of the ExIA was sent to the EAF Groundwater, calling for comments before the 15th April 2003.

6.2. Commission departments

The main elements of the Extended Impact Assessment (as outlined in the Preliminary Impact Assessment) were also discussed with other Commission departments (the Directorates-General for Agriculture, Enterprise, RTD, and Health and Consumer Affairs, and Unit C4 – Biotechnology and Pesticides - of DG Environment) on 5 February 2003. A draft of the ExIA was then sent to, and discussed with these departments (along with the proposed Directive) on 25 March 2003. An advanced draft of the ExIA (incorporating all their comments) disseminated on 31 March, calling for comments before 15 April 2003.

6.3. Acceding States and Candidate countries

Acceding States and Candidate countries have been involved at the same level as Member States and stakeholders (same consultation process as in paragraph 6.1). In addition, two workshops were held with officials and experts from the Candidate countries to discuss specific issues of groundwater management and the way the future groundwater directive will be integrated into the current management practices in these countries. A first workshop on "Groundwater management - Challenges of implementation of the EU Water Framework Directive" was held in Vilnius from 10

to 13 October 2002 and involved some 30 representatives from Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. A second workshop was held in Budapest on 6 March 2003 on the initiative of the Dutch and Hungarian environment ministries. Both workshops demonstrated that a sound groundwater management system is already in place in the Candidate countries, and that the level of awareness of EU groundwater policy issues is very high.

7. COMMISSION DRAFT PROPOSAL AND JUSTIFICATION

- The final policy choice (first option) responds to the requirement of Article 17 of the WFD. It ensures an appropriate level of protection of groundwater while leaving the Member States flexibility in implementing measures that are fully integrated into the WFD framework.
- An ambitious approach based on a system of strict standards was rejected as it would have been difficult to implement technically and would have been very expensive for Member States. The chosen option takes account of local characteristics and is more flexible, and hence more proportionate in terms of the cost/benefits of groundwater protection.
- Because of a lack of data and knowledge, it was not possible to obtain a general picture of concentrations of pollutants in European ground waters, as a basis for establishing common quality standards for a range of substances. Consequently, the Commission proposal asks Member States to establish, within a given time frame, threshold values for pollutants that characterise bodies of groundwater as being at risk. The characterisation work and the establishment of threshold values will provide data and knowledge that will later form the basis for an improved protection (refinement of threshold values, development of possible common quality standards).
- The Common Implementation Strategy of the WFD, including the groundwater issues, may be taken as an accompanying measure for preparing better implementation of both the WFD and the future Groundwater Directive. There is to be a new working group on “Groundwater characterisation and monitoring” whose task will be to develop guidance documents in consultation with Member States, Accession countries and stakeholders. This should help to maximise the positive impacts of the proposed approach and to minimise possible negative impacts.