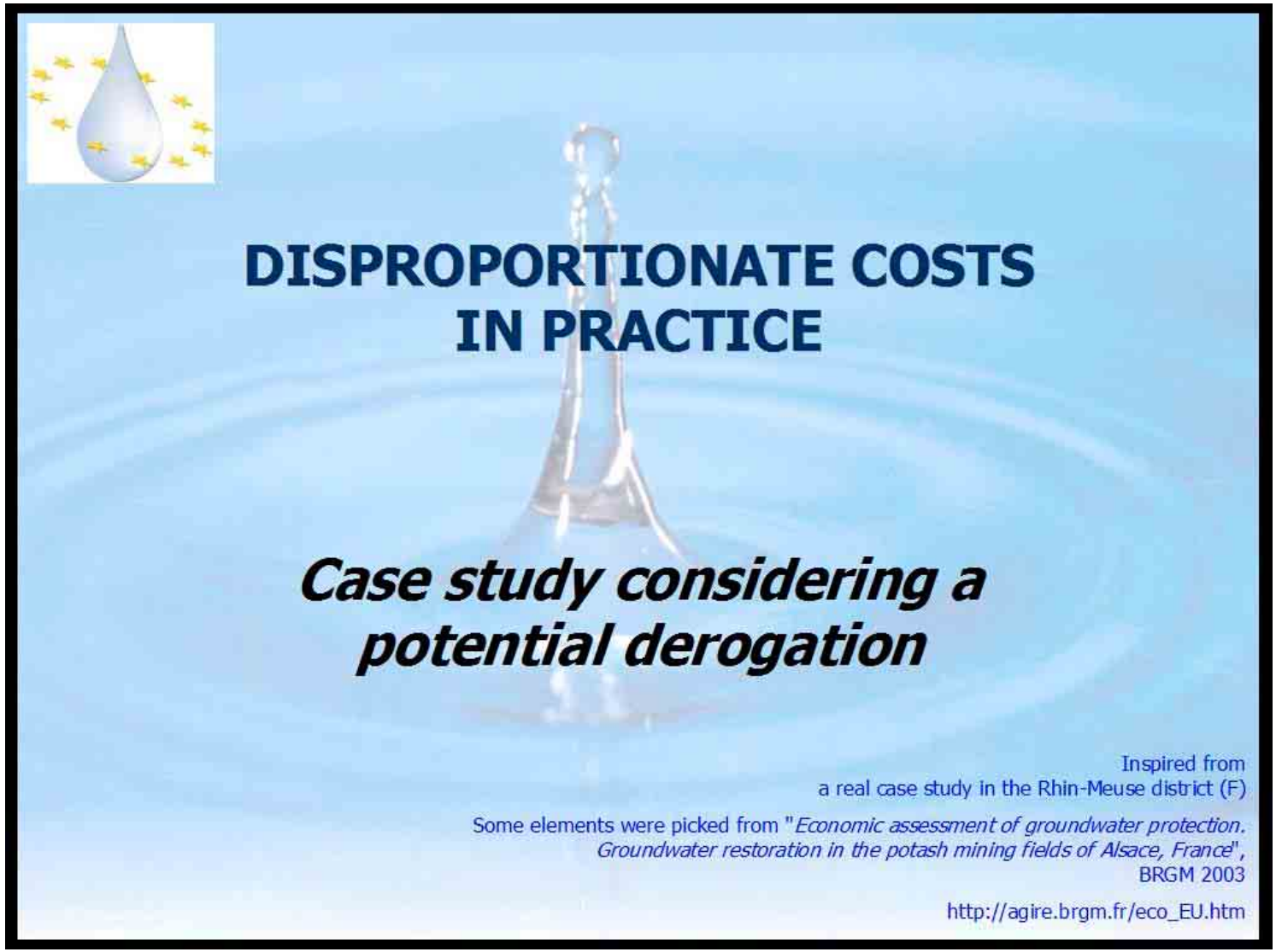


WP-EcoB05

10

Go further 9

30'

Note

This case study is inspired from a real case and uses real data. Relevant practical information is thus provided in the manual (source of data…). However, as it is intended as an interactive presentation, it is recommended to ensure as much participation as possible rather than to deliver data directly.

COMMENTS

Key ideas

This slide provides the references of the WFD articles referring to derogations and recalls the key aspects of the definition.

It is intended as a quick reminder of the concept before presenting the case study itself.

It is important to stress on

i- the fact that when the goal cannot be achieved by 2015 (for technical, economic… reasons), a phasing out must be sought first. Less stringent objective is only a secondary derogation, in extreme cases

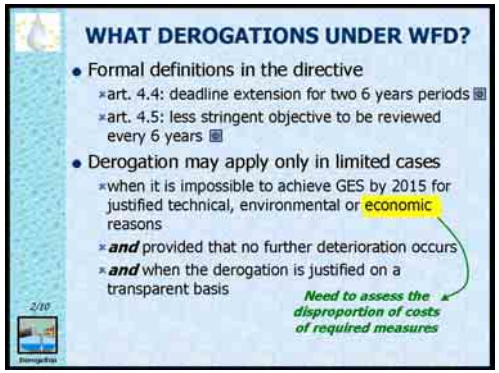
ii- derogations cannot be decided without serious justification, particularly the disproportion of costs of the required measures

iii- assessment of the disproportion is based on cost-benefit analysis

Note

For full quotation of articles 4.4 (time derogation) and 4.5 (less stringent objective), click on the icons.

Go further



YOUR NOTES

COMMENTS

Key ideas

The flow chart identifies the assessment of the disproportion of costs in the general process and indicates the implications:

- cost-benefit analysis of supplementary measures is carried out
- if costs are not disproportionate: reach the goal in 2015
- if costs are disproportionate: consider time extension until 2021 or 2027. These 2 alternative deadlines are derived from art. 4.4 of the directive which sets that "*Extensions shall be limited to a maximum of two further updates of the river basin management plan*"
- if costs remain disproportionate even with implementation of measures phased out until 2027: define less stringent objective and adjust the programme of measures

Note

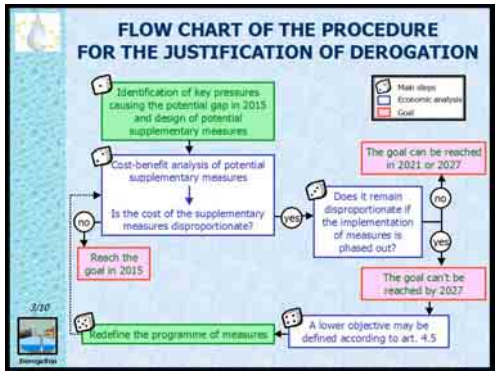
i- there is no formal schedule for the derogation process. According to the WATECO guidance document, it shall be done between the 2004 characterisation and the publication of the first draft of RBMP (2008), so that public participation can take place.

ii- dices appearing on the flow chart identify the main steps of the process. They are used in the following slides to allow trainees to always identify the stage of the procedure being presented.

Go further

Guidance documents (main text, accompanying documents) "*Economics and the environment*" (working group 2.6). On disproportionate costs: see Accompanying document, pp.166-178

http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents&vm=detailed&sb=Title



YOUR NOTES

COMMENTS

Key ideas

Identification on the virtual district map of the water body to which the case study refers: an aquifer.

Note

This case study picks up many elements from the Alsace aquifer case (F) carried out by the Bureau de Recherche Géologique et Minière (BRGM). However, for the purpose of the presentation, fake data is also mixed with real one and is referred to as such.

Factual and descriptive information from the real case is provided all along the manual to allow a concrete description of the case. As the goal is to make it as interactive as possible, trainees should be involved in the analysis of the different stages of the designation procedure.

Go further

The real Alsace aquifer case was presented in the Conference "*Europe of water - Water of the Europeans*" held in Lille (F) in March 2002. Paper presentation can be found in the proceedings.

YOUR NOTES

COMMENTS

Key ideas

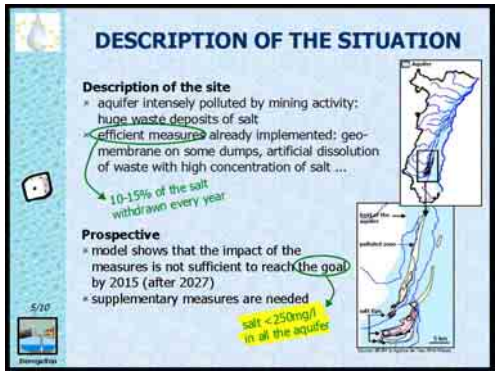
Initial description of the case

i- The aquifer is intensely polluted by salted waste from mining activity which took place since the 1900's. Due to infiltration, waste has generated plumes of polluted water, which have spread progressively in the aquifer.

ii- Since the 1980's, several measures have been implemented to prevent further pollution: some salt tips have been covered, other are artificially diluted, some salt is pumped, etc. Monitoring has showed the effectiveness of these measures: 10 to 15% of the salt contained in the aquifer is removed each year.

iii- A model has been used to help quantify the impact of these measures on water quality. The goal considered is to reduce the concentration of salt below 250mg/l in all the aquifer i.e. 4800 ha left. The model showed that the measures are by far not being sufficient for achieving GES in 2015: business as usual scenario would not allow to achieve the goal before 2027.

In such conditions it is necessary to determine supplementary measures in order to achieve the goal in 2015. Such measures will be assessed from an economic point of view so as to determine their feasibility.



YOUR NOTES

COMMENTS

Key ideas

Three alternative scenario are considered as supplementary measures

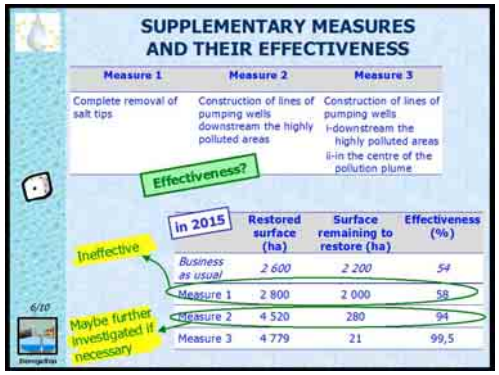
- **measure 1**: complete removal of the salt tips: part of the existing equipment may be used (depollution wells…) but waste would have to be treated on waterproof areas and disposed of;
- **measure 2**: construction of lines of hydraulic barriers to prevent the migration of pollution in the aquifer from highly polluted areas
- **measure 3**: construction of hydraulic barriers plus a line of pumping wells located in the centre of the pollution plume. A pipeline would be needed to evacuate the water pumped

The comparison of the effectiveness of all three measures shows clearly that a)measure 1 doesn't fit: it only halves the surface of the aquifer to be treated b)measure 2 ensures interesting results c)measure 3 ensures to reach the goal by 2015. As measure 2 allows to reach the goal in 2021, it may become an alternative to measure 3 in the case it would generate disproportionate costs in 2015. It would then need to be further investigated.

The model used to assess the effectiveness is a simple one. The degree of detail of the model is important, as the results will determine the next steps of the procedure. Here, the results have been discussed with experts in order to get some form of validation. A degree of uncertainty remains though, which has to be clearly mentioned and taken into account. When possible it should be expressed in practical terms e.g. the goal will be reached in 2015 *plus or minus 3 years*. There is no general method to determine which level of uncertainty is acceptable between the goal and the simulation.

Note

For more information regarding the effectiveness click on the "effectiveness" green frame.



YOUR NOTES

COMMENTS

Key ideas

Here is the process for costs-benefits analysis recommended by WATECO Guidance.

Five main steps are identified which go with some questions and remarks.

All five steps may not always be clearly separated: e.g. the choice of the methodology and the collection of data may (at least partially) go together.

Note that some information regarding costs may come from cost-effectiveness analyse carried out previously when constructing the programme of measures.

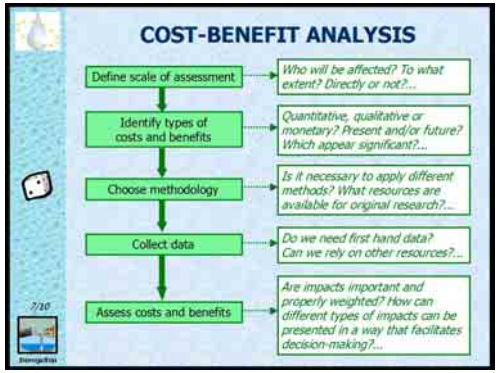
Note

Slides don't follow the procedure step by step as some elements may be presented orally only. E.g. the definition of the scale of the assessment (both physical and relating to the users concerned) is not covered by a specific slide. Elements may be listed orally together with trainees.

Go further

Guidance documents "*Economics and the environment*" (accompanying document, p.173)

http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents&vm=detailed&sb=Title



YOUR NOTES

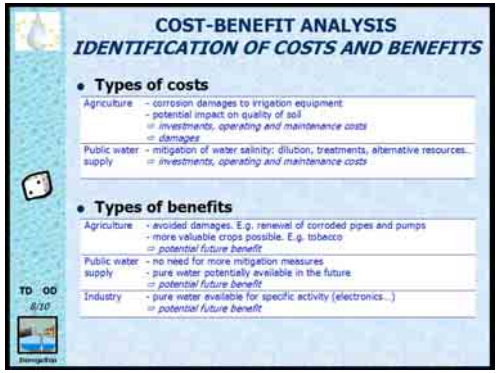
COMMENTS

Most costs and benefits derived from the implementation of both measure 2 and 3 may be estimated on a quantitative monetary basis:

- direct costs for the construction of wells… needed to remove the salt. They can be precisely assessed with figures from the market
- direct benefits are mainly avoided damages for agriculture and public water supply. As most of these damages are marketable (corrosion of equipment, purchase of water from alternative resources…), the benefits can be quantified. The impact on the quality of soil is not significant and is not assessed.
- indirect benefits may be roughly assessed as they are hypothetical. Depending on their estimated amount, further investigations may be carried out in order to reduce the uncertainty and to have a valuable balance of all potential benefits. This will be particularly necessary when costs and benefits will not be very different.

In most cases, quantitative monetary methods may be applied here.

To be continued on next page…



YOUR NOTES

COMMENTS (CONTINUED)

Note

Three sets of slides follow slide 8:

- *set A (slides A9 to A10): costs are not disproportionate and goal can be reached in 2015*
- *set B (slides B9 to B12): disproportion of costs ends in time derogation*
- *set C (slides C9 to C12): disproportion of costs ends in potential derogation on the objective.*

Though all three sets are built on the same basis (same aquifer and context, etc.), they use different data depending on the purpose of each specific presentation (e.g. costs are artificially increased to become disproportionate).

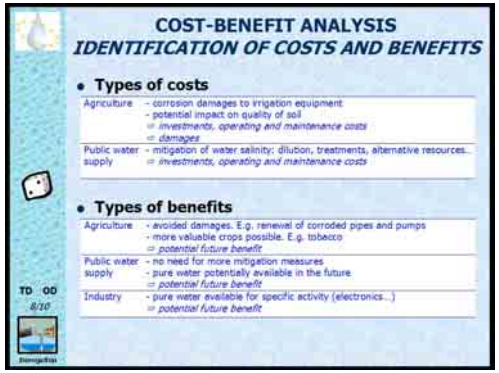
Whatever aspect you wish to present (usual case, time or objective derogation process), you will need approximately the same time i.e. approximately 30'. The first 8 slides apply to all three cases, then the cost-benefit analysis and the following steps change (set of slides A, B or C).

Comments, descriptions and suggestions applying to all three sets of slides are provided in the next pages of the manual referring to slides A9 and A10. Specific information regarding sets of slides B and C is presented in the respective pages of the manual. Would you wish to present then, you will have to combine both sources of information.

To present set A (usual case), just go to the next slide.

To present set B and C (derogations), just click on the acronyms in the margin of the present slide:

- *"TD" for example of time derogation (4 slides from B9 to B12 - numbered from 11 to 14 in the power point file)*
- *"OD" for example of objective derogation (4 slides from C9 to C12 - numbered from 15 to 18 in the power point file).*



YOUR NOTES

COMMENTS

Key ideas

Direct costs refer to infrastructures and operating costs. They are based on market costs.

Environmental costs may exist:

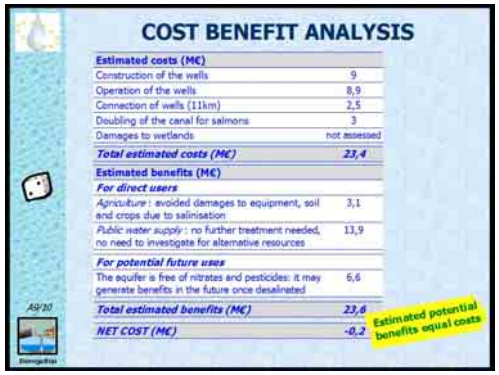
- damages to users of the surface water affected by the measures: e.g. when used for irrigation
- damages to the wetlands.

However, they have not been calculated, as they are considered as not significant here.

In the case they would be considered significant on the basis of a qualitative assessment (experts judgement…) further specific investigations would be necessary to determine more precisely the impact. Proxies could be used to make estimates, particularly regarding the cost of damages on wetlands as this aspect has often been investigated.

The identification of the costs to estimate has been widely based on interviews with people from the mining company. Cross-interviews with other stakeholders would also be necessary: farmers, elected people, neighbours, etc. It is also important to get information from different sources as experts and stakeholders would not necessarily agree. E.g. farmers argued that salt causes damages to the soil structure whereas experts indicated that detailed studies had demonstrated that the impact is marginal.

To be continued on next page…



WP-EcoB05

A9/10

1

YOUR NOTES

COMMENTS (CONTINUED)

Key ideas

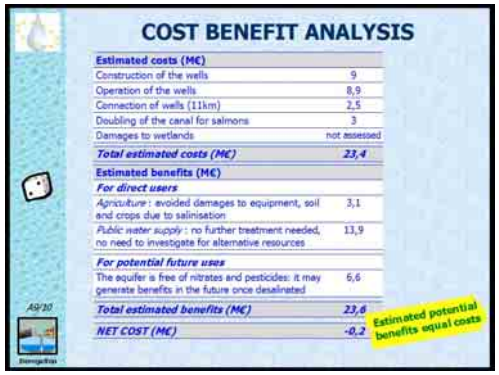
Benefits may be expected once the salt will be fully removed:

i- for direct users, benefits will come from avoided damages

- agriculture sector will avoid costs such as the renewal of corroded pumps and pipes. More valuable crops would become possible, such as tobacco. Though salt causes some damages to crops and soil, they appear to be too limited to allow estimates
- industry doesn't really suffer any damage according to representatives of the industrial sector, as when industrial processes demand high quality of water, either specific treatment plants have been built or factories have moved to other locations. As treatment plants don't treat salt only, it is difficult to identify specific costs and so is the identification of potential benefits thus
- public water supply: two municipal utilities suffer damages from the salt. The first one has to dilute oversalted water with water abstracted elsewhere in order to comply with drinking water standards and to treat corrosion in pipes. The second utility has already abandoned several abstraction points in the "salted sector" and has built a pipeline to bring water bought to municipalities from salt free area. All this has an impact on the price of water. Desalination would allow to relieve these measures and to avoid supplementary costs (search for alternative resources…).

ii- no environmental benefits is expected according to experts as it seems fauna and flora don't suffer from the salinisation of the aquifer.

To be continued on next page…



WP-EcoB05

A9/10

1

YOUR NOTES

COMMENTS (CONTINUED)

Key ideas

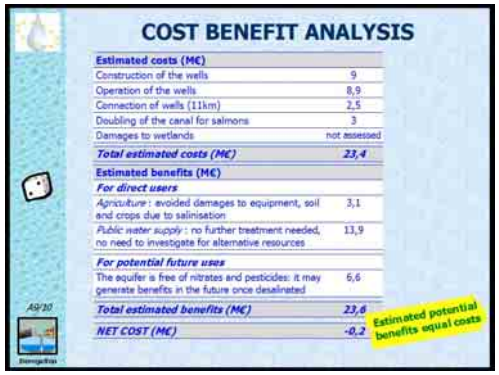
iii- benefits for potential future uses may also be expected: indeed, apart from the salt problem, the quality of the aquifer is very good (free of nitrates and pesticides). Removal of the salt is thus likely to generate benefits in the future if pressure on water resources remains high in the region (urbanisation, industry, agriculture…).

- very high quality of water in the aquifer once salt will be removed is likely to allow economic development as it may attract new industries. The benefits would be both direct (taxes, employment…) and indirect (increased average income in the area).
- as the pressure is increasing on water resources in the region, particularly for the production of drinking water, one may consider that the desalinisation would allow to pump water in the aquifer for this purpose. The benefits would then depend on the volume of water abstracted from the aquifer.

In both cases, further investigations would be necessary, as estimates would also have to take into account trends in demography, in water demand, in degradation of other water resources, etc. Time is also important: some of these benefits may be much higher in 20 years time than in 12 as the pressure on water resources will be higher.

Here, it is interesting to note that rough estimates identify a M€6,6 benefit for these potential future uses i.e. 28% of the total benefits calculated.

In the case the overall costs-benefits ratio would be very finely balanced, it would be necessary to carry out further investigations as such benefits may be determinant to decide on the disproportion of costs and on derogation.



WP-EcoB05

A9/10

1

YOUR NOTES

COMMENTS

Key ideas

Although the cost-benefit analysis demonstrates that the measure is very relevant (it allows reaching the goal in 2015 and it generates potentially high benefits), it is necessary to consider how it may be financed. Here, the de-pollution costs are already funded with public support i.e. by taxpayers indirectly. This is unlikely to change in the near future. The disproportion is thus to be assessed on the cost/household/year basis (60 000 households concerned by the aquifer).

It is then necessary to estimate the ability to pay. Here, 1995 data is available: households' WTP is 94€/year in the area. It was estimated following face to face interviews with 817 households (contingent valuation) consuming water coming from the aquifer. Non users' WTP, which was estimated with 200 interviews, is 57€/household/year.

The cost of measures 3 is approximately 3 times lower than WTP. It is clearly not disproportionate; the goal can reasonably be reached in 2015. Would environmental costs be included in the estimates (damages to wetlands), it would not seriously change.

Note

Assessment of the disproportionality is to be made on a case by case basis. E.g. if the WTP and/or the population concerned were much lower, the costs for measure 3 could be considered disproportionate. Such hypothesis will be addressed in the simulations available in sets of slides B and C.

Go further

For useful examples and advice see Guidance document "*Economics and the environment*" (accompanying documents, p.160)

http://forum.europa.eu.int/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents&vm=detailed&sb=Title

WP-EcoB05

A10/10

1

YOUR NOTES

COMMENTS

Key ideas

The costs of measure 3 have been changed compared to slide A9: total costs have been artificially increased.

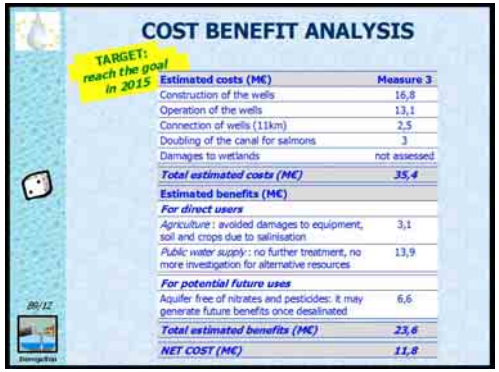
Estimated potential benefits remain the same.

Description of the costs and the benefits proposed for slide A9 is still relevant.

Note

This slide follows slide 8. Slides B9 to B12 present a case of time derogation. They may be reached directly after the presentation of slide 8 by clicking on the "TD" acronym in the margin.

Go further



YOUR NOTES

COMMENTS

Key ideas

In order to estimate the disproportion of costs, note that two key changes have been artificially made with regards to slide A10:

- population concerned by the aquifer has been reduced down to 34 000 households (and not 60 000 anymore as in the real case referred to in set of slides A);
- willingness to pay used for the assessment of the disproportion of costs is now 36€/household/year.

Of course, these two changes, together with the increase of total estimated costs (see slide B9), lead to the judgement that costs are disproportionate: they are 2,4 higher than willingness to pay. It seems realistic to consider that such costs can't be financed.

As a consequence, time derogation appears necessary in order to comply with the goal (good ecological status) in acceptable conditions.

As measure 2 naturally allows reaching the goal by 2021, it will then be compared with measure 3 in order to identify the best one.

Note

Changes made to the population concerned and to the WTP are artificial and aim at providing adequate figures for presenting a derogation process Figures used here have not serious basis. It is important to bear it in mind and to mention it to trainees.

YOUR NOTES

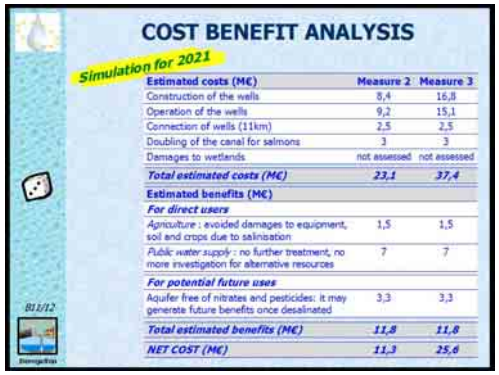
COMMENTS

Key ideas

Description of the costs and the benefits provided for slide A9 is still relevant.

Two major changes compared to slide B9:

- operating costs for measure 3 are higher than previously estimated as the implementation period is 6 year longer. A 25% increase is then applied
- estimated benefits are reduced as they will be fully ensured in 2021 only. It may then be necessary for utilities to launch specific supplementary measures (extension of the pipe to purchase water in another municipality, renewal of some pipes due to salinisation, etc.). Benefits expected in 2021 will then be lower than those expectable in the case the goal would be reached in 2015.



Estimated costs (M€)	Measure 2	Measure 3
Construction of the wells	8,4	16,8
Operation of the wells	9,2	15,1
Connection of wells (11km)	2,5	2,5
Doubling of the canal for salmons	3	3
Damages to wetlands	not assessed	not assessed
Total estimated costs (M€)	***23,1***	***37,4***
Estimated benefits (M€)		
For direct users		
Agriculture : avoided damages to equipment, soil and crops due to salinisation	1,5	1,5
Public water supply : no further treatment, no more investigation for alternative resources	7	7
For potential future uses		
Aquifer free of nitrates and pesticides: it may generate future benefits once desalinated	3,3	3,3
Total estimated benefits (M€)	***11,8***	***11,8***
NET COST (M€)	***11,3***	***25,6***

WP-EcoB05

B11/12

1

YOUR NOTES

COMMENTS

Key ideas

In the case of measure 2, the costs seem affordable: 37,7€/household/year to be compared with a willingness to pay of 36€. The goal can thus be reached in 2021 applying measure 2.

Although costs are little higher than WTP, it seems the gap may be filled as:

i- WTP estimates have a degree of uncertainty

ii- "disproportion" means a significant difference (here the difference is ~5% between cost and WTP)

iii- it seems reasonable to consider that organisations financing the measures (mining company, water agency, local authorities…) may find an agreement to fill the gap.

This opinion could be (highly) different if trends would show that the population is decreasing (less jobs, etc.). Then, the financial burden of the restoration would be born by a decreasing number of households, what could lead to reconsider the decision regarding the disproportion.

Note

This slide is the last one of the presentation if you choose to present the case study on time derogation (set of slides B).

WP-EcoB05

B12/12

1

YOUR NOTES

COMMENTS

Key ideas

The costs of measure 3 have been changed compared to slide A9:

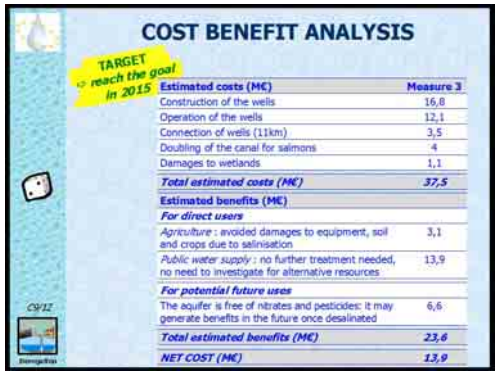
- total costs have been artificially increased.
- the cost of the damages to wetlands is estimated at 1,1 M€. Such figure is derived from the use of proxies. As costs for wetlands have been investigated many times in the past, figures coming from such works may be applied here. Data was picked in a 1996 assessment of the replacement cost of wetlands involved in support of low-water mark in another part of the country. Unitary estimated cost was 5900€/ha. Surface of wetlands referred to here is 187 ha.

Description of the costs and the benefits provided regarding slide A9 is still relevant.

Note

This slide follows slide 8. Slides C9 to C12 present a case of derogation based on less stringent objective. They may be reached directly after the presentation of slide 8 by clicking on the "OD" acronym in the margin.

Go further



Estimated costs (M€)	Measure 3
Construction of the wells	16,8
Operation of the wells	12,1
Connection of wells (11km)	3,5
Doubling of the canal for salmons	4
Damages to wetlands	1,1
Total estimated costs (M€)	***37,5***
Estimated benefits (M€)	
For direct users	
Agriculture : avoided damages to equipment, soil and crops due to salinisation	3,1
Public water supply : no further treatment needed, no need to investigate for alternative resources	13,9
For potential future uses	
The aquifer is free of nitrates and pesticides: it may generate benefits in the future once desalinated	6,6
Total estimated benefits (M€)	***23,6***
NET COST (M€)	***13,9***

WP-EcoB05

C9/12

1

YOUR NOTES

COMMENTS

Key ideas

As the cost/household/year would be around 49€ to implement this measure, it is considered as disproportionate: such cost is 36% higher than the willingness to pay.

The goal can't be reasonably reached in 2015 then.

Time derogation may be considered. Measure 2 will then be estimated too as it may reveal to be more interesting than measure 3 (it ensures to reach the goal in 2021).

YOUR NOTES

COMMENTS

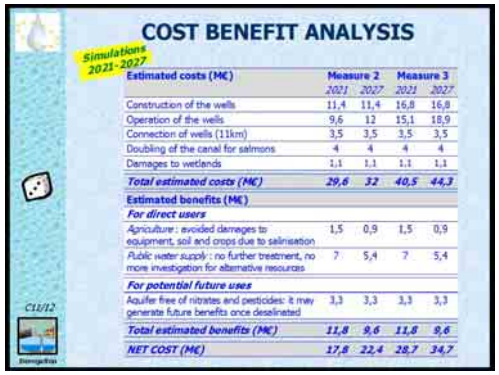
Key ideas

Measures 2 and 3 are compared for both 2021 and 2027 goals.

Most comments applying to slide B9 are relevant here.

Note some key points though:

- the cost for damages to wetlands is taken into account for both measures
- operating costs increase over time as indicated for slide B9, on a 25% basis every 6 years
- benefits for potential future uses remain the same over the time: it is considered that regional pressure on water resources will seriously increase until 2027 and that the potential benefits will be at least as big as in 2021. This hypothesis is then opposite to that applied to benefits to direct users (B11).



Estimated costs (M€)	Measure 2		Measure 3	
	2021	2027	2021	2027
Construction of the wells	11,4	11,4	16,8	16,8
Operation of the wells	9,6	12	15,1	18,9
Connection of wells (11km)	3,5	3,5	3,5	3,5
Doubling of the canal for salmons	4	4	4	4
Damages to wetlands	1,1	1,1	1,1	1,1
Total estimated costs (M€)	***29,6***	***32***	***40,5***	***44,3***
Estimated benefits (M€)				
For direct users				
Agriculture : avoided damages to equipment, soil and crops due to salinisation	1,5	0,9	1,5	0,9
Public water supply : no further treatment, no more investigation for alternative resources	7	5,4	7	5,4
For potential future uses				
Aquifer free of nitrates and pesticides: it may generate future benefits once desalinated	3,3	3,3	3,3	3,3
Total estimated benefits (M€)	***11,8***	***9,6***	***11,8***	***9,6***
NET COST (M€)	***17,8***	***22,4***	***28,7***	***34,7***

YOUR NOTES

COMMENTS

Key ideas

The disproportion of costs is considered here for both measures and for both deadlines (2021 and 2027).

Given the willingness to pay (36€/household/year) implementation of either measure 2 or 3 by 2021 would entail disproportionate costs (at least 34% higher than WTP).

However, figures are rather different for measure 2 with the 2027 deadline (cost of measure 3 remains disproportionate).

Indeed, as the estimated cost/household/year is only a little bit higher than WTP (9%), it appears necessary to estimate more accurately both costs and potential benefits, particularly those for potential future uses for at least two reasons:

- good ecological status is the fundamental goal of WFD and all efforts must aim at reaching this goal before considering lower objective (what would be the case here if costs for measure 2 are considered disproportionate). Therefore, when costs don't clearly appear disproportionate, it is necessary to get accurate data in order to reduce uncertainty;
- some costs and benefits are not very accurately estimated in the analysis: a) costs to wetlands are based on proxies, b) benefits for potential future uses are roughly estimated whereas it seems that they may become quite high by 2027 (pressure on water resource…).

It is also important to indicate that population may increase by 2027, what will simultaneously increase the potential number of households. Ability to pay may then increase, what may be determinant with such a limited gap between estimates and WTP.

WP-EcoB05

C12/12

3

YOUR NOTES

COMMENTS

Key ideas

Go further section:

WP-EcoB05

Go further 1

1

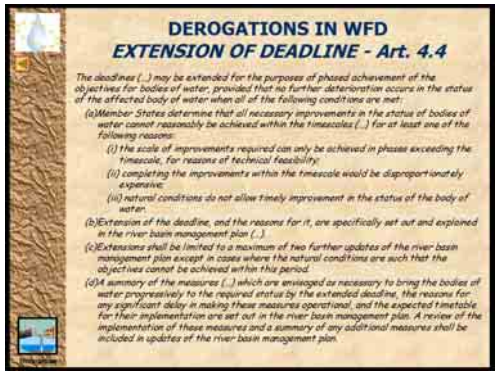
YOUR NOTES

COMMENTS

Key ideas

Quotation of art. 4.4 of the directive: time derogation.

This slide may supplement slide 2 in order to provide all detailed conditions required when seeking such derogation.



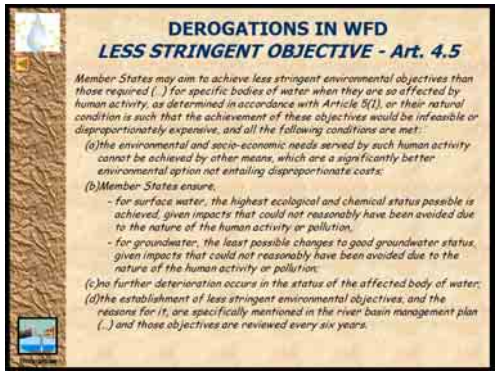
YOUR NOTES

COMMENTS

Key ideas

Quotation of art. 4.5 of the directive: derogation based on less stringent objective.

This slide may supplement slide 2 in order to provide all detailed conditions required when seeking such derogation.



YOUR NOTES

COMMENTS

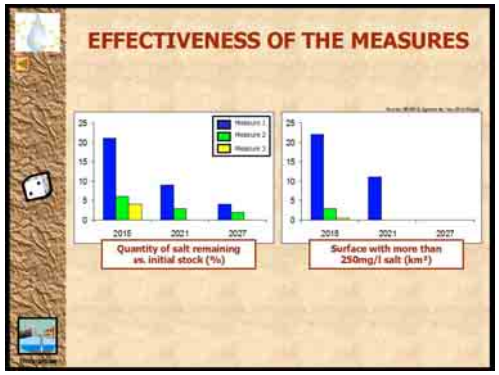
Key ideas

Here, the effectiveness of the three measures is compared on different basis in order to get a better view.

These tables demonstrate that the choice of the indicator used to evaluate the result of a given measure is highly important.

Note

To go back to slide 6, click on the "go back" button on the top of the margin.



WP-EcoB05

Go further 4

1

YOUR NOTES