Common Implementation Strategy
Working Group 2B: Drafting Group ECO1

Information Sheet on the methodology to prepare a baseline scenario

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Prepared by DG eco 1

AIMS OF THE PAPER

The aim of the paper is to (a) provide suggestions on the possible organisation of work for the implementation of the Baseline scenario (BLS), (b) identify the type o methodologies available, and (c) to provide hints and illustrations of results that may come from the development of a BLS.

FUNCTIONS OF BLS

The Art.5 Characterisation is to take place before 2004 in order to provide an input to the decision-making and public participation processes from 2005 to 2009 and in order to prepare a programme of measures that should be started by 2009. As such it is necessary to integrate the current dynamics of the water status and policy as soon as possible, avoiding an assessment and a prognosis that would be obsolete when used for water management planning. In particular, it is necessary to anticipate the likely results rom the completion of existing European water directives, that are not yet fully implemented(e.g. from completing the implementation of the Urban Waste Water Directive and of the Nitrate Directive). At the same time, some environmental factors may worsen (e.g. pesticides...). Deriving a Baseline Scenario is then useful for:

- Helping in characterisation of uses by pointing out trends to pay attention to (e.g. pointing out a need for attention to some specific urban, industrial or farming development).
- Setting out compliance plans for existing EU Directives in terms of estimated investment including forecasts of such investments and/or discharges and abstractions after implementation of these plans.
- Providing information on likelihood of failing to meet the objectives looking forward to 2015 (ann.II; e.g. providing data on forthcoming changes in chemical discharge, to be taken as one of the risk assessment criteria)
- Evaluating the significant issues at stake (art.14; e.g. pointing out the progress that was made in the last ten years and the “emerging” issues of water management for the next decade)
- Providing clarity in relation to the incremental impacts of the Water Framework Directive itself as opposed to the impacts of already agreed European and national legislation of trends that would continue in the absence of the Directive.

A baseline scenario is to be taken as a “projection” of business-as-usual policies and trends. It is not necessarily a prediction of a likely 2015 situation: things can change, and should change, after decision-making and implementation. Nor is it a definition of the aims and objectives of the district: on the contrary it involves stressing the unwanted or insufficient evolutions in order to highlight the need for action. It is not an exploration of various “possible futures” that would result from sudden changes in business or environmental conditions. Such elaboration should come after BLS, and be based on its results, with possible use of prospective/foresight methodologies.

Be alert!

- *BLS is a proposed means for integrating the various approaches needed for the WFD, especially between skills related to Impact & Pressures, Public participation, surface and groundwater, economic analysis...The Wateco guidelines suggest making projections of relevant drivers for 2004, and suggest compiling the scenario results for 2006.*
- *BLS provides a general statement of the evolution in the near future all things being equal, as a support to the definition of the river basin management plan. It is not a tool for a precise determination of the likely future of water bodies, and should not by itself be used to justify a decrease of the present environmental vigilance (esp. with respect to the monitoring programme)*

OUTLINE OF METHODOLOGY

The overall principle of BLS can be summarised as follows:

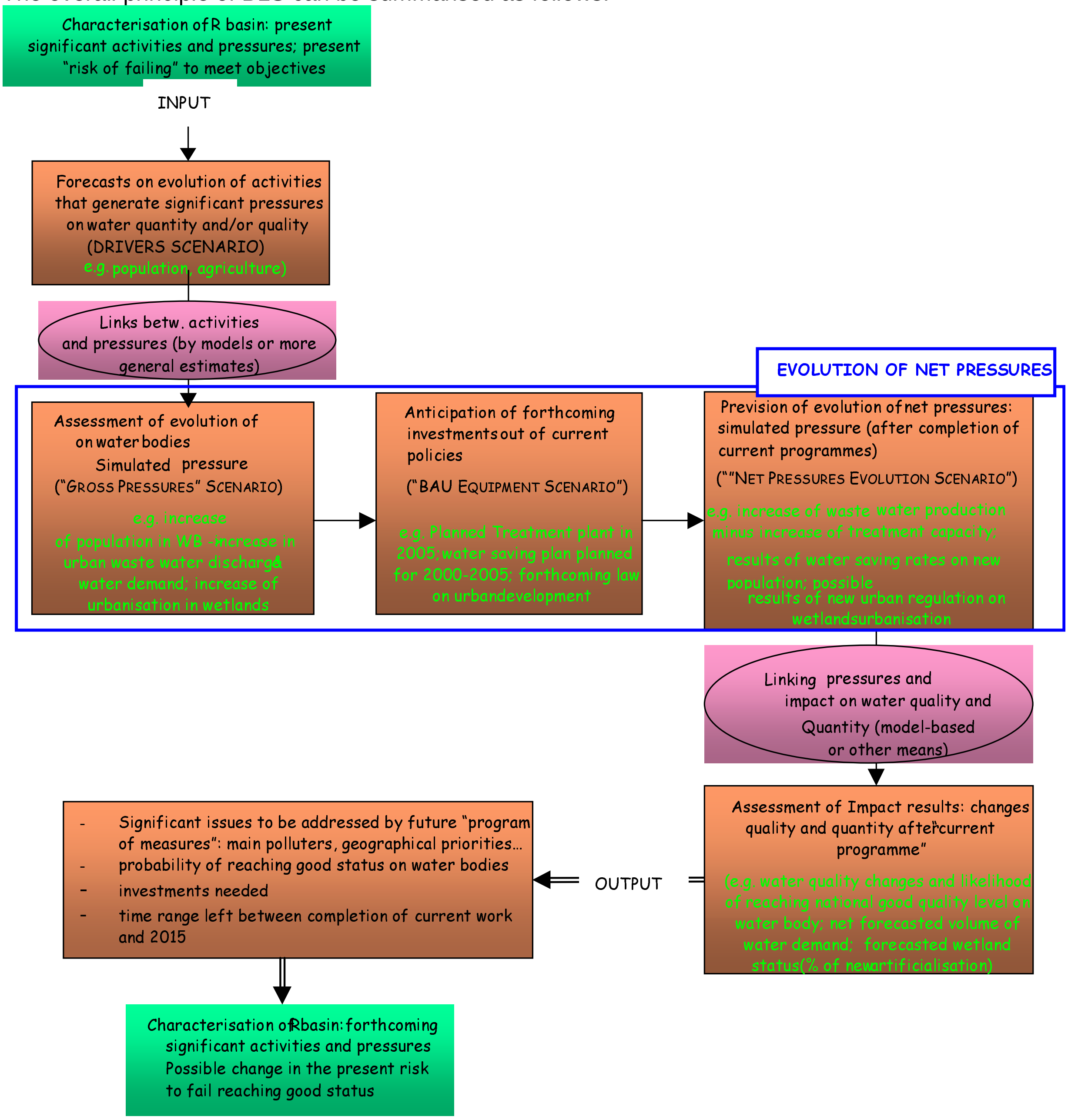


Figure 1. Schematic logical steps on BLS
(green boxes: inputs and outputs to River basin characterisation)

PROPOSED STEPS IN DERIVING A BLS

There are four steps in the derivation of the BLS:

1. Assessing and defining the significant activities and pressures
2. Evolution of activities generating significant pressures on waterbodies
3. Evaluation of net pressures
4. Possible outputs of the baseline scenario.

I. ASSESSING AND DEFINING THE SIGNIFICANT ACTIVITIES AND PRESSURES

Problem to be solved: selecting the most relevant subjects to focus on for data collection, improvement and for calculation; though avoiding insufficient notice of significant emergent issues.
Proposal:

1) Starting with an initial screening of the present main water management issues for the basin on the basis of the RB characterisation and economic analysis of water use. Consider first defining major pressures on water quantity and quantity, and major changes during the preceding decade.
2) Then pay attention to possible "emergent" issues out of trends analysis, by putting those first findings into an initial expert desk-based review.

(1) Example from "Risk analysis and the role of International Basin Scenario", RIZA, Oct. 2003 (translated). Definition of economic activities generating a significant pressure on water condition.

	Sectors	Activities generating pressure
Primary Sector	Agriculture	1. Horticulture
		2. Bulbs
		3. Greenhouse horticulture
		4. Other horticulture activities
		5. Outdoor breeding
		6. Indoor breeding
		7. Mixed farms
	Fishing	8. River and coastal fishing
	Extraction	9. Sand extraction
Secondary sector	Agro-food	10. Agro-food industry
	Metal industry	11. Raw Metal industry
		12. Transformed Metal industry
	Chemistry	13. Petrochemistry
		14. Chemistry
	Other industrial sectors	
Tertiary sector	Services	15. Navigation
		16. Water and Energy distribution companies
		17. Environmental services
		18. Leisure activities

(2) Seine-Normandy Water Agency: Example of "new pollutants" as emerging issues noticed after expert review. Where it was commonly thought that the major sources of domestic pollution were under control, it appears now that chemical micro-pollutants are increasing, due in part to the evolution in house-cleaning habits and to other domestic discharges such as medicine (attributed to the increased diversity and specificity of cleaning products).

These results were pointed out during experts groups, in reaction to an initial optimistic statement on the evolution of domestic pollution.

Handy hints

- It may prove efficient to propose first a general statement based on current data and knowledge, on which various experts are invited to and provide reactions in order to create a better (shared) understanding of ongoing and future issues.

II. EVOLUTION OF ACTIVITIES GENERATING SIGNIFICANT PRESSURES ON WATER BODIES (DRIVERS SCENARIO)

Purpose: making a baseline scenario for the development of activities (industrial production, agriculture, population growth and consumption…) is commonly needed as a basis for assessing the likely evolution of pressures, and for assessing the activity sectors that will be responsible for the remaining pressures (and then should be targeted in the RB management plan). In some cases, when the evolution of pressures is apparently well known, and when the link between activities and pressures is considered to be certain and stable by both policy-makers and stakeholders, it may not be necessary to undertake a detailed scenario for the evolution of activities. Such conditions will probably be rare, and most often proposing a pressures evolution scenario for the evolution of pressures will have to be based on scenario for the evolution of the drivers.

1. BOTTOM-UP VERSUS TOP-DOWN APPROACHES

Two symmetrical means of making a drivers scenario are possible for a given river basin: (1) build up a local forecast for each important driver in the basin, and check afterwards its coherence with global forecasts (bottom-up); (2) start with general forecasting of population & urban development, social structure, economy and apply it to the River basin by interpolation of trends to its local drivers, and then check the quality of interpolation by assessing the likelihood of local drivers behaving as in the average situation (top-down). Considering that the top-down option is most often less data demanding and time-consuming, and considering the deadlines of the WFD, the following section focuses on this method.

2. DESIGNING A TOP-DOWN DRIVERS SCENARIO

For example the drivers scenario may use information from :

- Growth assumptions for each major activity from now to 2015 (or even further 2021 & 2027…)
- Evolution of land use (e.g. surface and farming practices)
- Evolution of industrial sectors. This task may prove the most difficult, because each sector is rather specific in terms of development and economic drivers: one activity can disappear while another benefits from a boom. Then, precision would theoretically require a development scenario for each industrial sector (N.B. it is difficult to make out industries with significant impact on water quality, moreover, those that are not significant today may become so in the future, so they should not be put aside).
- Evolution of agriculture and CAP: the least easy to assess in terms of “business-as-usual”, for it is likely to incur heavy changes in the near future. But the scenario development will focus generally on some specific aspects relevant for the basin, thus enabling to restrict the agricultural forecasts to some sectors. “Risk analysis and the role of International Basin Scenario Example of drivers scenario method” (RIZA, NL)

1. Changes in economic growth, specifically in the major influential economic sectors.

The mean term scenarios from the Dutch Plan Central Bureau were used to derive an estimate of endogenous evolutions in the economic sectors. They provide an outlook of economic evolution for the relevant sectors, and the Central Plan Bureau developed two scenario versions, an optimistic and a pessimistic one. These 2 versions have been used for passing from the present situation to the 2015 situation image.

2. Demographic evolution

The study used the data from the national "PRIMOS". The database provides estimates about population evolution for each postal-code zones.

3. Land occupation changes

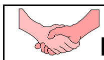
Important attention was paid to the evolution of the rate of built surfaces, for its importance in the sanitation capacities. Land occupation was (partly) derived from population growth and from economic growth (points 1 & 2 above). Estimating the evolution of the rate will be based on data provided by the Dutch Statistics Bureau (e.g. publication "Bodemstatistiek 2000") and by the Central Bureau of Plan (for example "De ruimtevraag tot 2030 in twee scenarios").

4. Technological change and climate change

Technological and environmental changes can exert an influence on the pressures. The corresponding evolutions and their impact will be studied in a forthcoming expert meeting. These evolutions may then be treated in the risk analysis after checking that they are not already included in the scenarios mentioned above. Technological is an important variable especially in forecasting industrial de-pollution. Industrial de-pollution can result from decrease of industrial production in the basin, from increase of industrial pollution abatement equipment, and from technological changes in production that reduces unitary pollution loads (i.e. per unit of production). Ideally, these three components of industrial pollution forecasting should be treated separately in business-as-usual forecasting. If the components are not available at first, forecasts will have to be based on a general pollution reduction rates, for example out of observation of past trends.

Be alert!

- *Check the consistency between drivers projections by defining their overall conditions for realisation and spelling out the general economic forecasts that underpin the projections (e.g. general growth, world markets, national demography, national and local policy development priorities…). Consistency will be favoured by basing drivers projections on general forecasts of European, national and/or regional situation (economy, households consumption, European and world markets, European integration).*


Handy hints

- To avoid investment in inefficient work for industrial scenario: derive "general" forecasts on industrial discharge volume, derived from past data on industrial effluent trends. For example, consider alone the pollution abatement rates of industrial sectors, and past trends in that matter.
- Examine past trends to see if the factors included in the forecasts are a good explanation of past evolution. Factors that don't explain past trends well, might not properly explain future forecasts either.

3. CONSISTENCY BETWEEN FORECASTS USED BY RIVER BASINS IN EUROPEAN MEMBER STATES

The main source of information is general prospective documentation on economic and social forecasts: growth, agricultural policy, land planning and housing, consumption habits, industrial sectors forecasts, etc. Such overall forecasts are an important means to ensure general coherence in further forecasting, by providing explicitly some kind of "backcloth" on which to draw specific water related forecasts on agriculture, population and industry.

Apart from what might already be available on activities, it is often found that some drivers or context variables are common to the evolution of population, agriculture and industry. "Common general forecasts" of these drivers for all European member states are not readily at hand for now. However, consistency between the River basins scenarios should come from the use of similar general "forecast references". The evolution of the main drivers being mostly determined at European or even world-wide scale, the projections made for Europe's economic sectors may provide a good basis: see OECD economic forecasts, EC forecasts, etc. In addition, it may then prove efficient to share common prospective data between RB engaged in such processes, at European, then national, then regional level, especially for international rivers.

4. TREATMENT OF UNCERTAINTIES

Any projection is subject to several possibilities of change and variation in its basic assumptions: it is often said that long-term forecasts are always false. It should be recognised, however, that a forecast is inevitable. It is either explicit or implicit. Making no forecast implicitly defines the future as the same as today. As such explicit forecasts are only “less false” than no anticipation and taking the present situation for a sufficient representation of 2009 or another future situation. It may then prove useful to:

- Separate and assess in turn the different kinds of variations in assumptions
- bear in mind the necessity of a sensitivity analysis of the BLS results
- manage the likelihood of a need for continuous updating of the BLS

It is proposed to examine three kinds of variations in the assumptions that will form the basis of BLS

4.1. Treating undetermination by BLS “versions”

Some variation will come from the unavoidable undetermination of certain variables: although a demographic evolution is fairly easy to forecast, it is not possible to forecast with confidence the evolution of an industrial sector, of long term regional economic growth, of food markets… To treat such undetermination, a solution can be the definition of two or more “versions” of a BLS, by coherent combination of various assumptions on the most relevant and undetermined drivers. These versions are still “baseline” inasmuch as they do not suppose a fundamental change in the current conditions of the situation: they are still “business as usual”, but take in consideration the variation of important drivers. However the production of several “versions” will have to be limited by the ability of the technical assessments made in River Basin Characterisation to handle such variations of the BLS results.

The question of choosing a “most probable” version may then come to discussion. Choosing a version will be necessary if the results from the versions provide different assessment of the likelihood for a given water body to meet the objectives. This choice should be then discussed in decision-making arenas and be kept transparent; the sensitivity of the probability assessment to that choice should be assessed.

Seine-Normandy example.

A combination of two main variables appeared relevant for water use by economic activities:

- General economic growth that determines more or less the evolution of: urban development, changes in households’ social typology and consumption levels, industrial sectors, agricultural markets, and policy systems.
- The level of environmental protection investment (de-pollution or quantitative management) from water investment decision-makers: level of implementation of laws/standards, level of investments conditioned by the available financing.

Each of these variables can take two main statuses: slow or better economic growth; more or less environmental efforts. Thus crossing these variables implies building four versions of the baseline scenario. However one of then was considered inconsistent (better growth associated with lower environmental efforts).

	Slow growth	More important growth
Decrease in water protection investment	**“Slow down” version**	
Investment effort equal as today’s	**“Continuation” version**	**“Recovery” version**

4.2. Treating lack of data: sensitivity analysis and data improvement programme

Some possible errors and variations will come from the lack in knowledge for some variables. For such cases, a recommended method could be to evaluate the sensitivity of the main BLS results to the less known variables:

- If the analysis shows an important sensitivity to these variables, the range of error should be evaluated. When the range of error appears too large for confidence in the results, issuing the results should be postponed until knowledge improves.
- When the sensitivity is moderate or low, a probability assessment of the variable should be defined and working assumptions established on this basis.
- For all non-negligible variables, to design and implement a data improvement programme, focusing on the most sensitive and less known variables.

4.3. Treating uncertainties: "what if" scenarios and other futures thinking methodologies

Some possible errors and variations will come from the evolution of some variables that are naturally subject to large-scale or unpredictable changes (e.g. a series of extreme meteorological events after climate change, significant social or political changes…). Such variations are poorly suited to probability assessment, and coherence between such assessment is often very difficult. As suggested by the WATECO guidance, their treatment may be undertaken after 2004 through the various futures thinking methodologies: foresight, prospective, what-if scenarios… This can be taken as the step further to the BLS assessment.

Key outputs from this task!

- Definition of a Business-as-usual relevant drivers scenario
- Possible definition of several "versions" of BLS with respect to undetermination of some major drivers
- Sensitivity analysis and data improvement programme

III. EVOLUTION OF NET PRESSURES

1. HANDLING ISSUES WITHOUT QUANTITATIVE LOCALISED DATA

Problem to be solved: how to derive business-as-usual forecasts on pressures without relying on quantitative data covering sufficient parts of the RB and how to organise work in order to produce results in reasonable time (and/or budget) while enabling a minimum of participation and knowledge sharing? How to make use of partial data on environmental previsions (data about evolution of one only parameter, or limited to specific region, or incomplete series…)?

Proposal: the solution will have to come from a qualitative approach. Efficient methodologies with respect of time and budget constraints may be based on "expert groups". Such groups are aimed at using partial knowledge to build a judgement on evolution, based on partial data plus deliberation. Various expert judgement methodologies can be used, such as scientific forums, panels and conferences, statistical inquiries, "Delphi" method (interrogation of experts, statistical measurement of "average" estimates, and re-evaluation by expert of their initial judgement)…

SEINE-NORMANDY EXAMPLE OF "EXPERT GROUP" METHOD

Attention was paid to separate "scientific" expertise (focused on actual partial results and interpretation, possessing experience and field knowledge, but limited for overall conclusion and synthesis by incomplete data) and "drafting expertise" (aimed at risking judgement and synthesis by making use of inputs from science and techniques). The process was organised with a two-group configuration:

- (1) Drafting group, of 12 people balancing fields and organisations, meeting once a month during 6 months and in charge of drafting synthesis on business-as-usual projections.
- (2) Wider group of "scientists and experts" were invited to hearings on each chosen issue. Experts brought (1) partial documentation to take into account (2) personal views on evolution of drivers, of pressures, and impacts. They then were consulted on the synthesis written by the drafting group to check the veracity in the use of data.

Type of results obtained by this method:

(1) Summary results: table of positive and negative trends for each issue.
(2) Participation in estimation of risk of non-compliance for each water body

For each issue, developed assessment of past trends, drivers, ability of ongoing policies and programme to change anything in the present trends, and future projections.

SAMPLE RESULTS ISSUED FROM THE PROSPECTIVE GROUP HEARING ON THE EVOLUTION OF PESTICIDES.

Composition of scientific and experts group: representative from professional farmers organisation, water specialist from French Institute of Environment, representative from a major chemical industry, from Ministry of Agriculture, from Ministry of Environment, from agricultural sciences institute…

POSITIVE EVOLUTIONS	NEGATIVE EVOLUTIONS
• The molecules used by farmers are more and more efficient at low concentration → probable decrease of concentrations in waters but uncertainty about the secondary effects on human health	
• Preservation of water quality in delimited and specific zones like « sanctuary » (far from dense human activities) • ↗ of the monitoring of concentration in water ; therefore increasing awareness of users (agricultural or not) about the global risk	• ↗ of concentrations of nitrates and pesticides in the aquifers and rivers (inertia of the aquifers systems) • regional specialisation of agriculture

POSSIBLE FACTORS OF CHANGE	RESULTING BASELINE STATUS
• CAP : the payment of subsidies being in part independent from the volume of production, and linked to the respect of environmental standards could help in capping pesticides use (possible positive change) • Forthcoming updating of the authorisation of molecules; progressive homogeneity in regulations applied to all molecules in the Union (positive change) • Slow increase of political pressure from public opinion and water users (positive change)	General degradation of water quality on the pesticides parameter in the district, if the possible factors of change are not implemented. This is due to very slow circulation and degradation phenomenon in the soil. Preservation of a few zones, even creation of hydrological « sanctuary », (free from pesticides) but these are necessarily limited.

Handy hints

- A clear definition and selection of the themes to deal with is needed: concentrate on the significant ones for water quality
- Pay attention to the constitution of the drafting group: appraisal can be only partially based on scientific evidence; separate “judgement” from “scientific knowledge”.

Key outputs from this task!

- Scenario(s) at river basin scale on the development of pressures for which qualitative data are not at hand, taking into account the evolution of drivers, the policies being implemented, and the links between drivers and pressures
- Pointing out the most significant issues likely to develop in the future

2. HANDLING ISSUES WITH QUANTITATIVE LOCALISED DATA

Problem: how to focus and organise work so that best use is made of pressures and impact data and of basin characterisation? How to participate in the determination of the significant issues of the district? How to help in assessing probability of reaching certain objectives, and for identifying the water management challenges for the first programme of measures?

Proposal: building a quantitative database linking drivers and equipment with pressures.

2.1. Elaborating a numerical database linking drivers, equipment and pressures

Quantity and quality issues are posed by “water services” and “water uses”. Both can be taken as the result of some activity (driver) that generate “gross” pressures (e.g. urban development that generates population development and consumption; industrial development that generates increase of production and industrial effluent flows…).

The “gross pressure” is more or less treated by some equipment (e.g. house equipment that is more or less water-efficient, industrial treatment plant, connection in sewage network). Then the equipment releases a “net pressure” (e.g. net water demand per inhabitant, net pollution flows to the environment). By deduction of the projected equipment capacity from the projected gross pressure, a simulation of the “net pressures” evolution after the completion of existing directives and ongoing policies can be developed.

A quantitative baseline scenario can be based on a database linking the above 3 components: present activities, gross pressure linked to the activity, characteristics of equipment in place.
At the chosen geographical unit, the database may be organised in 3 sheets:

(1) Activities sheet. Activities are considered together in the geographical unit, and their technical-economic dimensions are described (limited to relevant dimensions for characterising pressure: volumes abstracted by activity, pollution flows produced by activity…).
(2) Equipment Sheet. Equipment in water management related to the activities: average type of equipment or consumption rates according to the type of housing, dams, pollution treatment capacities…)
(3) Pressures Sheet. Net pressures related to activity and equipment: consumption ratios, net pollution discharges located in the geographical unit. These data can be expressed in any pressure parameter: abstracted volumes per month/year, pollution discharges in quantity/day or /year…

Be alert!

- *Pay attention to a clear organisation of the database, so it can be used continuously to test other scenarios, to evaluate sensitivity…*

A) Linking activities and pressure

A definition of the links between drivers and pressures needs to be developed in close collaboration between various fields of expertise from regarding the pressures. It can take the (very classical) form of “pollution-functions” and “abstraction-functions” linking the relevant activity’s dimensions (most often production size) and the corresponding pressures through a numerical table. The function can be very simple (fixed value for a general kind of production) or more sophisticated.

Example of distribution of work between economic analysis and Impress and calculation linking drivers to pressures: extract from “Risk analysis and the role of International Basin Scenario Example of drivers scenario method” (RIZA, NL)

Steps of Risk analysis	Specific aspect	Designation of group mainly in charge of the aspect
1. Description of Water bodies's present status	Present situation: socio-economic drivers	Economics Working Group
	Present situation: technologic and environmental drivers	Human Activities pressures (HAP) WG
	Resulting pressures and present status of water bodies	HAP WG
2. Simulated 2015 status of water bodies	Future evolution of socio-economic drivers	Economics WG
	Future evolution of technologic and environmental drivers	HAP WG
	Resulting pressure and simulated status of water bodies	HAP WG
3. Environmental objectives signification for water bodies	2015 environmental objectives for water bodies	HAP WG
4. Gap between simulated status and environmental objectives	Gap identification	HAP WG
5. Forthcoming steps	Cost-effectiveness of measures and possible derogations	Economics WG

Source: RIZA.

Example of calculation of pressures resulting from domestic wastewater sewage

B = EVF*EF*RF

B: Domestic waste water sewage

EVF: Number of Equivalent-Habitants (EH) connected to a sanitation plant, at present and in the future according to estimates (2015)

EF: 0,0051 kg/EH/year

RF: Sanitation rate (approx. 80 % then RF= 20 %) or other in case of technological evolution

On that basis, a pressure differential can be calculated between present and 2015.

Handy hints

- For the forecast of this “gross pressure”, a functional link between human activities and pressures needs to be established. In the current situation of imperfect knowledge, such a link may prove essential: when insufficient data is available on activities (for cost-recovery and basin characterisation purpose), it will help in assessing activities based on available data on pressures. Conversely, when data on pressures are lacking (on some geographical sector, for BLS and water body assessment purpose and for the designing of the management plan), it will help in assessing pressures likely evolution through available data on drivers and their evolution.
- For the water pollution and abstraction that are subject to charges (environmental taxes…), this link is currently established through the available data on the nature of the activity (size and nature of city, firms & farms…) associated with data on the nature of pressure (nature and quantity of discharge and abstraction).

B) Choice of scale

The database does not need to be built at water body level. If sufficient data of this kind is not available at water body scale, a forecast can be calculated nevertheless at broader scale (e.g. group of similar water bodies). Besides, the relevant scale should be linked with the quantity or quality measurement points (geographical precision in activities and pressures is of little use if there is no possible way of distinguishing the corresponding local variation in pressures and impacts).

Handy hints

- The scale of the BLS calculation and results should be based preferably on the scale of available data on pressures. If needed, let the geographical scale of “pressures” data (GIS-based data on discharge and abstraction…) define the adopted scale for economic analysis and BLS calculations.
- Do not wait for “economic GIS data”: most often economic data will not be available in geographical format at first (rather at regional scale and sector scale; however some social and spatial data on human activities may be suited to GIS calculation, such as population and city implantation). Instead and if needed, prepare for integration of relevant economic information into GIS based technical data on the pressures afterwards.

2.2. Evaluating the evolution of activities generating pressures

This step is about applying the general drivers forecasts mentioned in part II to the basin, sub-basins or any other needed regional scale, and eventually to integrate the drivers forecasts to the database. Links between the general description of drivers (population density, sectors of activity, types of agriculture…) and the local description of drivers must be established.
Illustrations will be displayed below.

Box example 2. Example of database and calculation for cattle pressures on Marne Pilot RB:
1) Number of animals
The calculation for the number of animals projected in 2015 was based on:
- Prolongation of the past evolution (1998-2000) by geographical unit ("canton") using an annual rate of variation
- Then local adaptation depending on the profile of the "canton" (local area):
    - if growth of extensive bovines in the past then the future growth is capped to 70% or +20 000 animals
    - if decrease of bovines in the past in favour of intensive breeding installations then decrease of bovines comprised between 20% and 50% and increase of breeding installations of at least 20% (minimum number of animals 200 and maximum 3200)
    - if decrease of bovines in the past in favour of cultures or urbanisation, then decrease of the number of animals of at least 20%

To calculate the corresponding discharges, the following table was used:

2) Discharge by quality parameter and type of animal (source: extract from the National general inventory for agriculture)

Animal	Milk cows	Milk Sheep	Pork	Poultry
P kg/year	16,06	2,82	1,01	0,22
N kg/year	85,00	10,00	9,75	0,45
OM kg/year	657,00	77,29	54,75	2,19
Susp. Matt. kg/year	1 204,50	141,71	82,13	9,86

Retrospective study and use of already-made projections (population) and discussion and breakdown of the national projections to a basin level by interviewing experts (workshop).

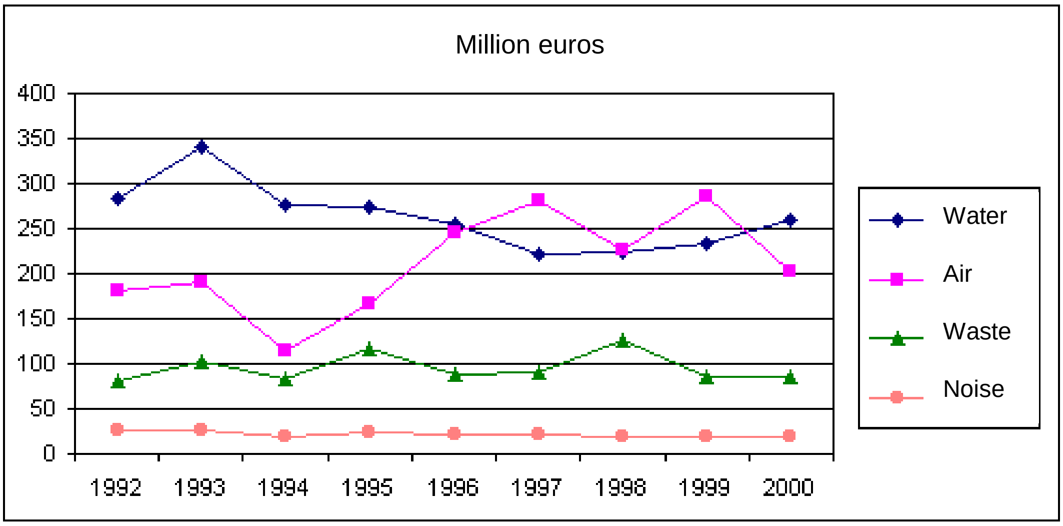
Example of industry:

Retrospective information:

	Share of industrial employment in the total regional employment (%)	1990-2000 evolution of industrial employment (%)	Share of the region in the national industrial AV	Main industrial sectors
Ile de France	11,6	-15	20,3%	Printing, car industry
Centre	21,8	-1,4	4,5%	Plastic industry, metals
Champagne-Ardennes	22,8	-2,9	2,5%	smelting, metals
Basse Normandie	20,3	+2,3	2,5%	agribusiness (milk and meat), metals
Haute Normandie	22,2	-2,1	4,9%	car industry, electrical equipment, plastic industry
Picardie	24,7	-2,6	3,4%	plastic industry, agribusiness, metal

Source: national economic statistics (INSEE)

Evolution of industrial investments in water ("Eau"), air, solid waste ("Déchets") and noise ("Bruit") between 1992 and 2000



Source: French Ministry of Industry. National Survey on environmental expense.

The database development work is mostly a matter of impact and pressures knowledge, and may serve the "DPSIR" (Driver-Pressures-State-Impact-Response) appraisal process. Water economics are used primarily for helping in focusing work on significant issues, describing activities, and afterwards in activity scenario development.

Key outputs from this task!

- As seen in part II., it is useful to propose several "versions" of BLS, combining different possible future trends in drivers, taking uncertainties and other possible variations in consideration.
- The result of this stage of work is to be given in terms of awaited growth rates of drivers represented in the database, and should feed its first sheet. It would produce a "Drivers scenario"
- Projection of "gross pressures" evolution at relevant local scale

Handy hints

- Organise expert workshops, and use data collected for RB characterisation, to translate global projections into local projections

2.3. Assessing forthcoming investments out of current policies

This deals with feeding the second sheet of the database. It involves collecting knowledge on forecasted implementation of regulations, land-use planning and urban development, etc.

The existing programmes of measures are then to be translated into assumptions of future development (or decrease) of equipment in 2nd database sheet mentioned above: storage, pollution abatement, and other equipment. E.g.: urban w water directive leading to further pollution abatement in 2005 leading to further effects on abstractions and discharges post 2005.

Handy hints

Indicative list of existing water and environment directives to be taken in consideration for assessing forthcoming investments and current environment policies. Directives on:
Surface water Quality (75/440/EEC)
Hazardous substances (76/464/EEC)
Urban Waste Water (91/271/EEC)
Nitrates (91/676/EEC)
Drinkable water (80/778/EEC)
Bathing waters (75/160/EEC)

The result of this stage of work is to be given in terms of awaited equipment capacity and in terms of time targets: what equipment capacity is to be developed (or decreased) and when. It would produce an "Business As Usual Equipment scenario".

Be alert!

- Most often it will not be necessary to choose between MS legal security and realism, when dealing with the rate of implementation of existing European directives. In the context of BLS, the delays in local implementation of existing directives need not be reported in detail, inasmuch as they will not extend over 2015 (which is presumably the case in general). Indeed, it is simply needed to assess "how many years will remain" between the completion of demanded works and 2015, if some gap is forecasted between the simulated quality after works and the possible conditions for the good ecological status.

Handy hints

- Use municipalities program of works and knowledge of local experts
- The usefulness of BLS will depend on its realism, by means of evaluating the potential gap between the efforts in the years to come and the quality demanded by the WFD. Then only the programmes of works that are effectively decided and taken as certain should be considered: programmes that are clearly decided upon by decision-makers and for which financing is defined.

2.4. Evaluating the evolution of net pressures

Based on the results described above, the database may calculate, for each geographical sector: [present drivers * growth assumptions] * [gross pressure per unit of drivers] – [forthcoming capacities]

= a "baseline net pressures evolution scenario". This scenario will provide data describing the supposed pressure evolution in time.

Box example 4. Pressure evolution calculation for Seine-Normandy district

Parameter	WATER SERVICES USERS						INDUSTRY			CATTLE	
	Present charges	Variation *after works*				Resulting charges	Present charges	Variation *after works*	Resulting charges	Present charges	Resul-ting charges
		total	Of which piped storm water	Of which individual waste water treatment	Of which wastewater treatment plant discharge						
Susp. Matt. (kg/j)	492 190	-48%	-37%	-3%	-9%	253 821	117 299	-43%	67 239	80 197	0
OM (kg/j)	274 301	-45%	-34%	-4%	-7%	151 082	95 016	-51%	46 419	42 830	0
N (kg/j)	136 797	-67%	-15%	-3%	-49%	44 775	13 240	-69%	4 079	5 686	0
P (kg/j)	28 368	-63%	-16%	-2%	-44%	10 569	3 043	-77%	706	1 090	0

Source of data on discharges: data collected along with collection of "redevances" (water-based earmarked taxes collected by the Water Agency). Source of data on forecasted works: Water agency experts & Specific study (Ecodecision for Seine-Normandy Water Agency and Regional Directorate of the Ministry of Environment-DIREN).

Handy hints

- BLS quality and quantity results are not a "2015 prediction". Rather they suppose the pressure evolution that comes out of the "equipment scenario". The latter only takes account of what is presently decided upon, and of its time limit (2015 or before).

2.5. Evaluating the possible result in terms of impact on quality and quantity

This task relies mostly on impact and pressure competences. It can be made through:

- Ecological numerical modelling if available: fed with the "baseline evolution of pressures" data
- Rough estimates for each parameter, then refined out of expert judgement and debate. E.g. for a given parameter: present current discharges, present quality level, possible future reduction of net discharge out of the BLS of pressures, possible change in quality level. Then discussion with experts (ideally local water administrations, etc.).

Handy hints

- Experts are always necessary to validate results of a model
- Organise a sensitivity analysis not long after production of the BLS results, and engage in a continuous process of updating, upgrading and reviewing.

An example of map presentation of such result is presented below.

IV. POSSIBLE OUTPUTS OF THE BASELINE SCENARIO

BLS is intended to provide multiple outputs, both for enabling the economic analysis and for supporting the rest of the WFD implementation.

1. OUTPUTS TO THE ECONOMIC ANALYSIS

- BLS provides a way of describing the dynamics of current water use and pollution. By assessing the major trends of social-economic drivers and the evolution of present water management issues, it helps giving relief to the economic analysis and makes use of the economic figures for water policy-making. By evaluating the likely improvements awaited from a business-as-usual policy (i.e. decrease in some pollution kinds / improvement in some sectors / decrease of unitary water consumption…), as well as the likely degradations (i.e. increase or progressive unveiling of pollution previously hidden / increase of demand, localised environment degradation…), it points out what will be important in the future and what is progressively becoming less problematic.

- The “equipment scenario” is an assessment of foreseen investment/behavioural adaptation and of the effect of these changes. By evaluating the awaited effect of what could be considered of the “basic measures” of water policy, it is then an output for the River Basin Management Plan preparation after 2004. BLS delivers a basis on which to assess afterwards the “remaining efforts”, especially through the need of supplementary measures to meet the 2015 objectives in comparison with the forecasted situation after completion of basic measures. Thus it provides the basis for the selection of possible measures and for the evaluation of their cost.
- Eventually BLS participates in building the cost-recovery analysis by at least two outputs. (1) The evaluation of future costs and their share among water services and uses allows addressing the near future evolution of cost-recovery status (by assessing changes in the burden of cost and changes in the environmental damages and costs for the environment and resource). (2) By providing an assessment of the present distribution of responsibility in the pollution and abstraction through the compilation of the database, which is helpful for assessing the contribution of households, industrial sectors and agriculture to the costs of water services.

2. OUTPUTS TO INTERNATIONAL RIVERS MANAGEMENT PLAN

In the international districts, the national baseline previsions are not sufficient for obtaining a full-blown picture of the foreseen evolution of pressures. Each downstream basin has to take into consideration the influence of actions undertaken in upstream basins.

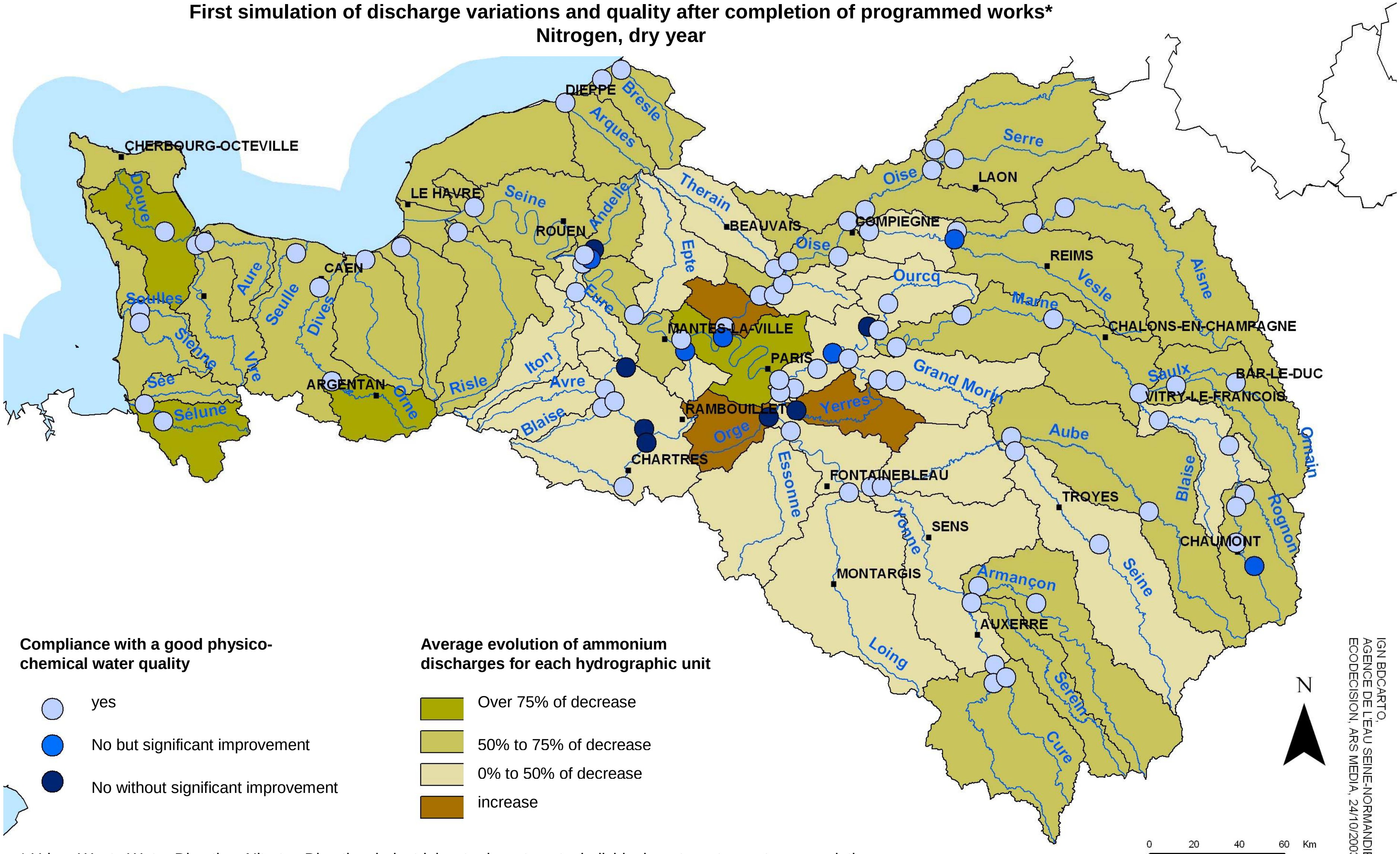
Example: extract from “Risk analysis and role of International Basin Scenario” (translated)
Box 2-3. Meeting the 2015 WFD objectives
One of the WFD objectives is the prevention of any degradation of quality. Achieving this objective requires taking in consideration the likely evolutions in the upstream basins. Let us consider a pressure, of which 80% are due to activities upstream and only 20 % to activities in the basin located downstream. If the pressures upstream increases by an annual rate of 2 % during the 2003-2015 period, the result is a more than 100 % increase of pressure for the downstream basin due to the activities upstream and abroad. In such a situation of course, the WFD can not be met.

3. OUTPUTS TO THE GENERAL WFD PROCESS

- BLS is intended to provide a convenient way of integrating the various approaches needed for implementing the WFD. Its realisation itself needs skills and approaches to be brought together in a balanced way, helping each approach to focus and to simplify.
- The outputs of the BLS provide major insights to the identification of options for the designation of the interim overview of the significant water management issues identified in the river basin (art. 14).
- It is intended to provide an assessment of progress and regression towards good status due to existing directives and other current policies (water or general policies, e.g. agricultural, land planning…). It provides essential outputs to the evaluation of the likelihood that water bodies within the River Basin District will fail to meet the environmental quality objectives set (Annex II). It must be reminded though that BLS results should be taken as participating in a more general probability assessment: they do not provide by themselves sufficient reasons for lowering monitoring objectives of water bodies.
- One important output of BLS to the water management and decision-making will come from measuring the “room for manoeuvre” for meeting the environmental objectives: the combination of the forecast situation compared to the objectives and time left to meet the objectives[1]. This may be expressed in terms of annual mean investment needs after fulfilment of existing directives. Eventually it will prepare decision-makers for identifying the dimensions of the programme of supplementary measures and possible derogation if needed.

[1] Good status definition will not be agreed when the BLS has to be issued. However, the BLS should not wait for this definition. The heaviest part of the BLS will come from assessing the current and projected investment rate and its effect on the status of water. Comparing this foreseen status with the objectives is only one possible output, and can be easily revised when the common European objectives are defined.

Baseline scenario, continuation "version"
First simulation of discharge variations and quality after completion of programmed works*
Nitrogen, dry year



* Urban Waste Water Directive, Nitrates Directive, industrial water investments, individual waste water systems regulations…