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**ECONOMIC COMMISSION FOR EUROPE**

**WORLD HEALTH ORGANIZATION  
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MEETING OF THE PARTIES TO THE  
PROTOCOL ON WATER AND HEALTH  
TO THE CONVENTION ON THE PROTECTION  
AND USE OF TRANSBOUNDARY  
WATERCOURSES AND INTERNATIONAL  
LAKES

Working Group on Water and Health

First meeting  
Geneva, 26–27 June 2008  
Item 6 of the provisional agenda

DEVELOPMENT OF TARGETS AND INDICATORS

**PROPOSED TARGETS AND INDICATORS OF PROGRESS ACCORDING TO  
ARTICLE 6, PARAGRAPH 2 (H) TO (N) OF THE  
PROTOCOL ON WATER AND HEALTH**

Draft guideline by the Task Force on Indicators and Reporting<sup>1</sup>

**I. BACKGROUND**

1. The present document was prepared by the Task Force on Indicators and Reporting, which had its first meeting on 13 and 14 March 2008 in Geneva. This meeting was prepared by a core group on indicators and reporting, which met on 22 and 23 January in Geneva. The document was prepared following the decision of the first meeting of the Parties to entrust the

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<sup>1</sup> The present document was submitted late due to resources constraints.

Task Force with the preparation of guidelines for target-setting for all targets under article 6, paragraphs (a) to (n) (see the programme of work for 2007–2009 adopted at the first meeting of the Parties, ECE/MP.WH/2/Add.5 - EUR/06/5069385/1/Add.5). The present document includes targets and indicators for article 6, paragraphs h) to n), those for article 6, paragraphs a) to g) are presented in document ECE/MP.WH/WG.1/2008/L.2 - EUR/08/5086340/10.

2. At their first meeting (Geneva, 17–19 January 2007), the Parties to the Protocol on Water and Health established the Working Group on Water and Health as an open-ended subsidiary body responsible for the overall implementation of the programme of work. In accordance with its terms of reference, the Working Group: (a) reviews progress achieved, in particular by the different task forces; (b) proposes modifications to the work programme to adapt to changing conditions; and (c) reports to the Meeting of the Parties (see ECE/MP.WH/2/Add.2 - EUR/06/5069385/1/Add.2 and ECE/MP.WH/2/Add.5 - EUR/06/5069385/1/Add.5).

3. The annex to this document – which should be read together with documents ECE/MP.WH/WG.1/2008/L.1 - EUR/08/5086340/9 and ECE/MP.WH/WG.1/2008/L.2 - EUR/08/5086340/10 – will become an integral part of the guidelines.

4. Due to time constraints during the meeting, the Task Force on Indicators and Reporting was able to discuss only the options presented for targets and indicators for article 6, paragraphs 2 (a) to (g). Subsequently, the joint secretariat requested Parties and Signatories to submit written comments, which have also been integrated in the present document.

5. At the meeting, the Task Force reiterated that the process of target-setting completely depends on the situation and priorities in the different Parties. It also recognized, however, the need for regional harmonization as well as that the Protocol requires Parties to cooperate and develop commonly agreed targets and consistent reporting.

6. Consequently, the guidelines will include two kind of indicators for target-setting:

(a) A core set of common indicators which will be part of the reporting system under the Protocol and should thus be used by all Parties. The Task Force recommended the use of common (mandatory) indicators for targets set in accordance with article 6, paragraphs 2 (a) to (d);

(b) Possible options for targets that Parties could set in accordance with article 6, and on related indicators that would allow for measuring progress towards the achievement of these targets.

## **II. FUTURE WORK TO BE UNDERTAKEN BY THE TASK FORCE ON INDICATORS AND REPORTING**

7. The guidelines for target-setting as well as the options for targets and indicators will be revised and further elaborated by the core group on indicators and reporting and the Task Force. They will also be enriched with experience collected at the workshop on target-setting and reporting scheduled to be held on 2 and 3 December 2008 and further elaborated at the second

meeting of the Task Force (4 December 2008). The guidelines are expected to be finalized by the Task Force's third meeting, tentatively scheduled for March 2009.

### **III. PROPOSED ACTION BY THE WORKING GROUP ON WATER AND HEALTH**

8. The Working Group on Water and Health is invited to comment on this document and provide recommendations for further work to be undertaken by the Task Force on Indicators and Reporting and its core group.

9. In particular, the Working Group is invited to discuss and agree on:

(a) The set of core (mandatory) indicators to be used by all Parties recommended by the Task Force and the need for additional mandatory indicators;

(b) How Parties which have already set their targets should behave in case of inconsistency with mandatory indicators.

## Annex

### PROPOSED TARGETS AND INDICATORS OF PROGRESS ACCORDING TO ARTICLE 6, PARAGRAPH 2 (H) TO (N) OF THE PROTOCOL ON WATER AND HEALTH

#### I. QUALITY OF DISCHARGES OF WASTEWATER FROM WASTEWATER TREATMENT INSTALLATIONS TO WATERS WITHIN THE SCOPE OF THE PROTOCOL (ART. 6, PARA. 2 (h))

##### A. Background rationale

1. Article 6, paragraph 2 (h), of the Protocol requires the setting of targets and target dates related to the quality of discharges of wastewater from wastewater treatment installations to waters within the scope of the Protocol. This indicator refers explicitly to the quality of wastewater discharges from wastewater treatment systems which are often not reported on and often do not reach legal requirements.

##### B. Approach to setting targets and identifying indicators: options available and non-mandatory indicators

###### *Discharges from wastewater treatment installations treating essentially domestic wastewater*

2. COD<sup>2</sup>, BOD<sup>3</sup> and total suspended solids, nitrogen and phosphorus are well-established environmental indicators. However, they indicate potential health effects of wastewater discharges only indirectly and might need to be supplemented by health indicators (e.g. faecal coliforms, pathogens) and a risk management approach should be added.

3. Possible indicators for discharge of domestic wastewaters include:

(a) Cases of non-compliance with national standards for COD, BOD reduction/concentration, total suspended solids, nitrogen and phosphorus;

(b) Non-compliance with standards for pathogens.

###### *Discharges from wastewater treatment installations treating essentially industrial wastewater*

4. Chemical pollution of industrial wastewater should also be considered, and targets and indicators defined. The approach might focus on the existence and enforcement of a permit system for effluent discharges from industrial facilities. As a second step, targets could focus on the quality of the discharge and the quantity of dangerous chemical substances released.

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<sup>2</sup> Chemical oxygen demand.

<sup>3</sup> Biochemical oxygen demand.

5. Possible indicators for discharge of industrial wastewaters include:
- (a) Existence of a permit system for effluent discharges and enforcement (qualitative);
  - (b) Number of cases of non-compliance with existing emission standards for certain dangerous substances, to be defined by each Party on local considerations;
  - (c) Quantity of dangerous substances released to the waters in the scope of the Protocol.
6. Moreover targets may be set on the number of treated wastewater tests carried out as compared to the number of treated wastewater tests required by applicable standards or legislation.

### **C. Relevant regional or global obligations and reporting systems**

7. The EU Wastewater Directive 91/271/EEC sets standards for BOD, COD and total suspended solids. For drinking water capture zones under sensitive areas, it also requires compliance with standards for nitrogen and phosphorus.
8. The EU Integrated Pollution Prevention and Control (IPPC) Directive 96/61/EC includes an indicative list of the main polluting substances to be taken into account if they are relevant for fixing emission limit values.

## **II. DISPOSAL OR REUSE OF SEWAGE SLUDGE FROM COLLECTIVE SYSTEMS OF SANITATION OR OTHER SANITATION INSTALLATIONS (ART. 6, PARA. 2 (i), first part)**

### **A. Background rationale**

9. The first paragraph of article 6, paragraph 2 (i), of the Protocol requires the setting of targets and target dates related to the disposal or reuse of sewage sludge from collective systems of sanitation or other sanitation installations taking into account the guidelines for the safe use of wastewater, excreta and greywater in agriculture and aquaculture of the World Health Organization (WHO) and the United Nations Environment Programme (UNEP).<sup>4</sup>

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<sup>4</sup> See [http://www.who.int/water\\_sanitation\\_health/wastewater/gsuww/en/index.html](http://www.who.int/water_sanitation_health/wastewater/gsuww/en/index.html).

## **B. Approach to setting targets and identifying indicators: options available and non-mandatory indicators<sup>5</sup>**

10. Possible indicators for this include:

(a) Existence of national standards for reuse of sludge and wastewater: procedural requirements, limit values for toxic metals and pathogens, mainly *E. coli* (and for helminth based on local health targets, where appropriate);

(b) Basic statistics:

(i) Sludge produced (either in ton/year or ton/m<sup>3</sup> treated);

(ii) Treatment means: drying beds, mechanical dewatering, incineration;

(iii) Disposal of raw sludge (% to nature, % applied to agricultural land, % reused in construction inside and outside the wastewater treatment plant);

(iv) Disposal of dewatered sludge of raw sludge (% to nature, % applied to agricultural land, % reused in construction inside and outside the wastewater treatment plant);

(c) Cases of non-compliance with standards for toxic metals and pathogens.

## **C. Relevant regional or global obligations and reporting systems**

11. Eurostat and the European Environment Agency (EEA) collect data on total sewage sludge production from urban wastewater, reuse of sludge for agriculture, composting, landfill, incineration and other methods of disposal;

12. The EU Urban Wastewater Treatment Directive 91/271/EEC stipulates that sludge arising from wastewater treatment shall be re-used whenever appropriate. Disposal routes shall minimize the adverse effects on the environment and competent authorities shall ensure that the disposal of sludge from urban wastewater treatment plants is subject to general rules or registration or authorization.

13. The Council Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture regulates the use of sewage sludge in agriculture in such a way that contamination of soil and pollution of water does not occur from metal contaminants, nitrates and phosphates.

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<sup>5</sup> Hungary suggested the adoption of a common indicator for this area.

**D. Pending issues**

14. None of the identified indicators is based on the risk management approach.

**III. QUALITY OF WASTEWATER USED FOR IRRIGATION PURPOSES  
 (ART. 6, PARA. 2 (i), second part)**

**A. Background rationale**

15. The second part of article 6, paragraph 2 (i), of the Protocol requires the setting of targets and target dates related to the quality of wastewater used for irrigation purposes the taking into account the guidelines for the safe use of wastewater and excreta in agriculture and aquaculture of WHO and UNEP.<sup>6</sup>

16. Not all countries have developed detailed national legislation on the re-use of treated wastewater. One reference would be the WHO Guidelines.

17. The Guidelines define (see Vol. 1, p. 32) verification as the application of methods, procedures, tests and other evaluations, in addition to those used in operational monitoring, to determine compliance with the system design parameters and/or whether the system meets specified requirements (e.g. microbial water-quality testing for *E. coli* or helminth eggs, microbial or chemical analysis of irrigated crops). The guidelines describe the minimum verification monitoring recommended to assess microbial performance targets for wastewater and excreta use in agriculture and aquaculture (p. 33) under conditions of urban and rural application of wastewater.

**B. Approach to setting targets and identifying indicators: options available and non-mandatory indicators**

18. The WHO Guidelines recommend the following minimum verification monitoring of microbial performance targets for wastewater and excreta use in agriculture and aquaculture:

Activity/exposure	Water-quality monitoring <sup>a</sup> parameters	
Agriculture	<i>E. coli</i> per 100 ml <sup>b</sup> (arithmetic mean)	Helminth eggs per litre <sup>b</sup> (arithmetic mean)
Unrestricted irrigation		
Root crops	≤ 10 <sup>3</sup>	≤ 1
Leaf crops	≤ 10 <sup>4</sup>	
Drip irrigation, high-growing crops	≤ 10 <sup>5</sup>	
Restricted irrigation		

<sup>6</sup> Guidelines for the Safe Use of Wastewater, Excreta and Greywater, WHO/UNEP, available from: [http://www.who.int/water\\_sanitation\\_health/wastewater/gsuww/en/index.html](http://www.who.int/water_sanitation_health/wastewater/gsuww/en/index.html).

Activity/exposure	Water-quality monitoring <sup>a</sup> parameters	
Labour-intensive, high-contact agriculture	$\leq 10^4$	$\leq 1$
Highly mechanized agriculture	$\leq 10^5$	
Septic tank	$\leq 10^6$	
Aquaculture	<i>E. coli</i> per 100 ml <sup>b</sup> (arithmetic mean)	Viable trematode eggs per litre <sup>b</sup>
Produce consumers		
Pond	$\leq 10^4$	Not detected
Wastewater	$\leq 10^5$	Not detected
Excreta	$\leq 10^6$	Not detected
Workers, local communities		
Pond	$\leq 10^3$	No viable trematode eggs
Wastewater	$\leq 10^4$	No viable trematode eggs
Excreta	$\leq 10^5$	No viable trematode eggs

<sup>a</sup>: Monitoring should be conducted at the point of use or the point of effluent discharge. Frequency of monitoring is as follows:

- Urban areas: one sample every two weeks for *E. coli* and one sample per month for helminth eggs.
- Rural areas: one sample every month for *E. coli* and one sample every 1–2 months for helminth eggs.

Five litre composite samples are required for helminth eggs prepared from grab samples taken six times per day. Monitoring for trematode eggs is difficult due to lack of standardized procedures. The inactivation of trematode eggs should be evaluated as part of the validation of the system.

<sup>b</sup> For excreta, weights may be used instead of volumes, depending on the type of excreta: 100 ml of wastewater is equivalent to 1–4 g of total solids; 1 litre = 10–40 g of total solids. The required *E. coli* or helminth numbers would be the same per unit of weight.

19. In line with the approach taken above, possible indicators include:

- (a) Lack of compliance with the relevant parameter;
- (b) Where appropriate, the concentration of viable helminth or trematode eggs per litre depending on the type of agricultural product grown (root crops, leaf crops, drip irrigation of high-growing crops) and the type of irrigation applied (labour-intensive, high-contact agriculture; (highly) mechanized agriculture, etc.);

20. Clearly, the selection of the individual indicators will depend to a great extent to the type of agriculture used at the national and even at the local level, and on the national legislation.

#### IV. QUALITY OF WATERS WHICH ARE USED AS SOURCES FOR DRINKING WATER (ART. 6, PARA. 2 (j), first part)

##### A. Background rationale

21. The first part of article 6, paragraph 2 (j), of the Protocol requires the setting of targets and target dates related to the quality of waters used as sources for drinking water.

22. Given the possibility of applying advanced treatment process to water used as a source of drinking water and obtaining perfectly safe water also from contaminated sources, this target does not specifically aim at protecting human health, but rather promotes protection of the resources. Neither water safety plans nor EU legislation set quality standards for waters used for the abstraction of drinking water; however, the protection of such waters is still considered important since:

- (a) It is an important driving force for general protection of water resources;
- (b) Prevention of pollution is often cheaper and easier than treatment;
- (c) National and EU legislation anyhow set standards for the quality of surface and groundwater.

**B. Approach to setting targets and identifying indicators: options available and non-mandatory indicators**

23. Possible indicators include:

- (a) Existence of quantitative standards and other measures for the protection of waters used as sources for drinking water. The setting of standards for water quality should take into account the water abstraction and treatment technologies applied. For practical reasons, if it is not possible to identify locally specific standards, it may be feasible to include a safety factor allowing the targets on surface water to be higher than the targets for drinking water;
- (b) Cases of non-compliance with these standards;
- (c) Preservation of some baseline quality indices, like chlorophyll-a, total organic carbon, absorbable organically bound halogens and *E. coli*;
- (d) A composite index can be the cost of the treatment of a unit volume of treated surface water at constant energy costs.

**C. Relevant regional or global obligations and reporting systems**

24. According to the EU Water Framework Directive 2000/60/EC, EU Member States shall identify, within each river basin district, all waters used for the abstraction of drinking water and bodies of water intended for such future use (Art. 7 (1)), and establish, in the absence of relevant measures adopted at Community level within six years after the Directive entered into force, environmental quality standards for substances on the priority list of substances (see Decision 2455/2001/EC) for all such surface waters and controls on the principal sources of these substances, and for all subsequent substances included on such list, in the absence of action at the Community level, five years after their inclusion on such list.

25. The repealed EU Abstraction Directive 75/440/EEC laid down non-binding “guide” values and binding “imperative” values and required Member States to monitor the quality of surface waters from which drinking water is abstracted and to take measures to ensure that it complied with the minimum quality standards;

26. According to the EU Groundwater Directive 2006/118/EC, measures to prevent and control groundwater pollution should be adopted, including criteria for assessing good groundwater chemical status and criteria, for the identification of significant and sustained upward trends and for the definition of starting points for trend reversals. The Directive includes standards for nitrates and pesticides.

## **V. QUALITY OF WATERS USED FOR BATHING** **(ART. 6, PARA. 2 (j), second part)**

### **A. Background rationale**

27. The second part of article 6, paragraph 2 (j), of the Protocol requires the setting of targets and target dates related to the quality of waters used for bathing. Bathing waters differ significantly from country to country. Thus, each Government should classify its bathing waters (inland and coastal waters) and set standards for the different categories.

### **B. Approach to setting targets and identifying indicators: options available and non-mandatory indicators**

28. A combination of the WHO Guidelines for safe recreational water environment<sup>7</sup> and the EU Bathing Water Directive 76/160 and 2006/7/EEC and limit values is recommended. When needed, recommended parameters may go further than the EU legislation, for instance as promoted by Blue Flag<sup>8</sup>, since clean bathing waters are important for the development of tourism and high bathing-quality standards provide an incentive for treating wastewater, e.g. in coastal areas.

29. Possible indicators include:

(a) Bathing waters where *E. coli* and intestinal *Enterococci* values over a specified limit value occur or test results exceed it during a season. No limit value with this aim is currently specified by the new Bathing Water Directive 2006/7/EEC but the composite limit value for the assessment of several test results throughout several seasons may be applicable. Thus the indicator can be:

(i) The number of freshwater samples (designated for bathing) with either *E. coli* counts exceeding 1000/100 ml or intestinal *Enterococcus* counts exceeding 400/100 ml in percent of the total number of samples; or

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<sup>7</sup> See [http://www.who.int/water\\_sanitation\\_health/bathing/en/](http://www.who.int/water_sanitation_health/bathing/en/).

<sup>8</sup> See [www.blueflag.org](http://www.blueflag.org).

(ii) The number of coastal/transitional water samples (designated for bathing) with either *E. coli* counts exceeding 500/100 ml or intestinal *Enterococcus* counts exceeding 200/100 ml in percent of the total number of samples; or

(iii) The same, but on the basis of bathing waters where the above limits are exceeded throughout any one season;

This is the approach with the closest conformity with the existing WatSan\_S1 indicator; however, the limit value can be subject to further considerations (see also below);

(b) Number of designated bathing locations and percentage of bathing waters under control monitoring is an indicator option currently under development by the WHO working group for the European Environment and Health Information System (ENHIS). The only difficulty here is the problem of gathering accurate data about the uncontrolled waters frequented by “wild bathers”. This, however, is a clearly health-related concern, and the indicator should thus be encouraged;

(c) The new assessment scheme of the new EU Bathing Water Directive 2006/7/EEC, which should be implemented by 2015, is based on a compound statistical measure of the water quality of each of the bathing waters. Targets and indicators bound to this scheme are plausible for EU Member States, but may seem too “artificial” and laborious to follow for others. Therefore, the above-mentioned, more direct indicators may be preferred with the advantage that EU Member States that use the assessment scheme of the Directive can also easily infer the data needed for it;

(d) Number of bathing waters covered by Blue Flag or other nationally or internationally accepted award schemes also addressing the quality of the water;

(e) One way in which potential hazards can be brought together on a location specific basis is through the development of a recreational water safety plan. This includes a programme for monitoring and assessment as well as a management plan. WHO suggests that such a safety plan be adapted from a country or regionally specific generic plan, which could include a hazard rating scheme and an overall recreational water rating. The advantage of adapting a generic plan is that all recreational water areas in a specific area are rate against the same scale, thus allowing national action;

(f) An upcoming indicator can be the number of bathing waters for which a bathing water profile is publicly available. Displaying bathing water profiles is an obligation for EU Member States by the 2011 season, but the exact meaning and contents requirement is still under development. The system, however, seems worthy of being followed by non-EU Parties.

30. The WHO Guidelines<sup>9</sup> provide the following guideline values for microbial quality of recreational waters:

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<sup>9</sup> WHO, 2003. Guidelines for safe recreational water environments, Vol. 1 Coastal and fresh water, Geneva, WHO, p. 70.

95 <sup>th</sup> percentile value of intestinal enterococci/100 ml (rounded values)	Basis of derivation	Estimated risk per exposure
≤ 40 A	This range is below the NOAEL in most epidemiological studies	<1% GI illness risk < 0.3% AFRI risk The upper 95 <sup>th</sup> percentile value of 40/100ml relates to an average probability of less than one case of gastroenteritis in every 100 exposures. The AFRI burden would be negligible/
41 – 200 B	The 200/100ml value is above the threshold of illness transmission reported in most epidemiological studies that have attempted to define a NOAEL or LOAEL for GI illness and AFRI	1–5% illness risk 0.3–1.9% AFRI risk The upper 95 <sup>th</sup> percentile value of 200/200ml relates to an average probability of one case of GI in 20 exposures. The AFRI illness rate at this upper value would be less than 19 per 1000 exposures, or less than approximately 1 in 50 exposures
201 – 500 C	This range represents a substantial elevation in the probability of all adverse health outcomes for which dose-response data are available	5–10% GI illness risk 1.9–3.9% AFRI risk This range of 95 <sup>th</sup> percentiles represents a probability of 1 in 10 to 1 in 20 of gastroenteritis for a single exposure. Exposures in this category also suggest a risk of AFRI in the range of 19–39 per 1000 exposures, or a range of approximately 1 in 50 to 1 in 25 exposures
> 500 D	Above this level, there may be a significant risk of high levels of minor illness transmissions	> 10% GI illness risk >AFRI risk There is a greater than 10% change of gastroenteritis per single exposure. The AFRI illness rate at the 95 <sup>th</sup> percentile point of >500/100ml would be greater than 39 per 1000 exposures, or greater than approximately 1 in 25 exposures.

Notes: Abbreviations used: A – D are the corresponding microbial water quality assessment categories used as part of the classification procedure. AFRI=acute febrile respiratory illness; GI = gastrointestinal, LOAEL = lowest-observed-adverse-effect level, NOAEL = no observed adverse effect level. For other notes please refer to the original literature.

31. The new EU Bathing Water Directive<sup>10</sup> provides the following values for microbial quality of bathing waters:

<sup>10</sup> Directive 2006/7/EEC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC.

**For inland waters**

	A	B	C	D	E
	<b>Parameter</b>	<b>Excellent quality</b>	<b>Good quality</b>	<b>Sufficient</b>	<b>Reference method or analysis</b>
1	Intestinal enterococci (cfu/100 ml)	200 (*)	400 (*)	330 (**)	ISO 7899-1 or ISO 7899-2
2	Escherichia coli (cfu/100 ml)	500(*)	1000 (*)	900(**)	ISO 9308-3 or ISO 9308-1

(\*) Based upon a 95-percentile evaluation.

(\*\*) Based upon a 90-percentile evaluation.

**For coastal waters and transitional waters**

	A	B	C	D	E
	<b>Parameter</b>	<b>Excellent quality</b>	<b>Good quality</b>	<b>Sufficient</b>	<b>Reference method or analysis</b>
1	Intestinal enterococci (cfu/100 ml)	100 (*)	200 (*)	185 (**)	ISO 7899-1 or ISO 7899-2
2	Escherichia coli (cfu/100 ml)	250(*)	500 (*)	500(**)	ISO 9308-3 or ISO 9308-1

(\*) Based upon a 95-percentile evaluation.

(\*\*) Based upon a 90-percentile evaluation.

32. While the old Directive required regular monitoring of 19 pollutants or other parameters (e.g. water colour), the new Directive has reduced the list to just two microbiological indicators of faecal contamination, *E. coli* and intestinal *Enterococci*. It applies to surface water where a large number of people are expected to bathe, establishing a method for monitoring bathing water quality during the bathing season. The classification of water quality at a bathing site is determined on the basis of a four- or three-year trend instead of a single year's result as at present.

### **C. Relevant regional or global obligations and reporting systems**

33. A relevant indicator is the Watsan\_S1 Recreational Water Quality indicators collected through ENHIS.

34. The EU Bathing Water Directive requires EU Member States to provide the European Commission with the results of the monitoring and with the bathing water quality assessment for each bathing water, as well as with a description of significant management measures taken. The Commission will then publish an annual summary report on bathing-water quality in the Community, including bathing-water classifications, conformity with the Directive and significant management measures undertaken.

35. The EU Bathing Water Directive also requires elaboration of bathing-water profiles for all designated bathing waters. The profile consists of a description of the bathing water; identification and assessment of causes of pollution; assessment of potential for proliferation of

cyanobacteria, macroalgae and phytoplankton; and in case of any risks, management measures to be taken. The profile must be reviewed at regular intervals depending on the water quality.

**VI. QUALITY OF WATERS USED FOR AQUACULTURE OR FOR THE PRODUCTION OR HARVESTING SHELLFISH (ART. 6, PARA. 2 (j), third part)**

**A. Background rationale**

36. The third part of article 6, paragraph 2 (j), of the Protocol requires the setting of targets and target dates related to the quality of waters used for aquaculture or for the production or harvesting shellfish.

**B. Approach to setting targets and identifying indicators: options available and non-mandatory indicators**

37. Possible indicators in this area include:

(a) Existence of targets and parameters for waters used for aquaculture or for the production or harvesting shellfish, including physical, biological and chemical parameters;

(b) Compliance with the existing standards.

**C. Relevant regional or global obligations and reporting systems**

38. The Shellfish Directive 79/923/EEC requires that certain substances are monitored in the water in which the shellfish live and grow. These substances can threaten the survival of shellfish, inhibit their growth or make them too expensive to treat before they can be used as a food source. For each substance, the Directive specifies the minimum number of samples to be taken and the percentage of samples that must meet these standards.

**VII. APPLICATION OF RECOGNIZED GOOD PRACTICE TO THE MANAGEMENT OF ENCLOSED WATERS GENERALLY AVAILABLE FOR BATHING (ART. 6, PARA. 2 (k))**

**A. Background rationale**

39. Article 6, paragraph 2 (k), of the Protocol requires the setting of targets and target dates related to the application of recognized good practice to the management of enclosed waters generally available for bathing. If not managed properly, enclosed waters can represent significant risks, including microbiological and chemical contamination. The WHO Guidelines for safe recreational water environments<sup>11</sup> include a number of good practice principles and

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<sup>11</sup> See [http://www.who.int/water\\_sanitation\\_health/bathing/bathing2/en/](http://www.who.int/water_sanitation_health/bathing/bathing2/en/).

recommendations, but no quantitative parameters. Many countries have their own laws and standards or if not, will set them.

## **B. Definition**

40. According to article 2 of the Protocol, “enclosed waters” means artificially created water bodies separated from surface freshwater or coastal water, whether within or outside a building.

## **C. Approach to setting targets and identifying indicators: options available and non-mandatory indicators**

41. Public pools and spas are generally required to be equipped with water treatment and disinfection appliances in order to ensure an acceptable low risk of infections transmitted via the water. This requirement is clearly subject of resources available for health promotion in less developed countries. Pools operated with water of recognized medicinal composition can be exempted as the treatment and disinfection may damage the effect. In this case, however, the water exchange, user frequency, bathing duration and other operational parameters should be under strict control and use should generally be limited for patients with medical condition.

42. Public pools without regard to their type should be managed by personnel with approved education and training and management practice should be subject to regular control by health or other competent authorities. A key aspect of this control is the water quality, which should be checked by an accredited or otherwise notified laboratory beside the pool-side checks done by the operator.

43. A desirable achievement would be public pools being operated under a certified risk-based management system (pool safety plan-based system). This might be subject of an extended target for the future.

44. Possible indicators in this area include:

- (a) Existence of national standards for enclosed bathing waters;
- (b) Cases of non-compliance with national targets and standards and/or good practices for enclosed waters generally available for bathing, for example:
  - (i) Appropriate treatment, including filtration;
  - (ii) Proper application of chlorine or other disinfectants;
  - (iii) Daily thorough cleaning;
  - (iv) Good ventilation;

(v) Complete draining and cleaning of the hot tub and pipework, at least weekly.

(c) Number of public pools (including spa pools and all other types covered by the of the WHO Guidelines) equipped with approved water recirculation, treatment and disinfection appliances in percentage of the total number of public pools. Medicinal pools may be exempted only if the damage by the treatment to the chemical composition of the water with attributed medicinal effect is proven. Natural (non-enclosed) pools are also exempted, and are subject to different requirements/regulation (if any);

(d) Number of public pools operated by management under the control of competent authority acting on the basis of relevant legal instrument versus all public pools. The control should include the regular assessment of the quality of the water by the authority itself or by an accredited third-party laboratory, and should extend to a minimum number of bacteriological and possibly some chemical and physical parameters;

(e) Number of public pools complying with the legal water quality (and possibly, management- and environment-related) requirements during any one year versus all public pools). A national system of compliance assessment should be available, otherwise a more simple but less comprehensive indicator of the number of non-compliant test results per public pool per year;

(f) A composite indicator of the number of public pools operated in the framework of establishments equipped with an approved pool safety system versus all public pools could also be used.

45. Different guidelines pertain to the routine sampling frequencies and operational guidelines for microbial testing during normal operation of spas and pools<sup>12</sup>:

<b>Pool type</b>	<b>Heterotrophic plate count</b>	<b>Thermotolerant coliform (<i>E. coli</i>)</b>	<b><i>Pseudomonas aeruginosa</i></b>	<b><i>Legionella</i> spp.</b>
Disinfected pools, public and heavily used	Weekly (< 200/ml)	Weekly (<1/100ml)	When the situation demands (<1/100ml)	Quarterly (<1/100ml)
Disinfected pools, semi-public	Monthly (<200/ml)	Monthly (<1/100ml)	When the situation demands (<1/100 ml)	Quarterly (<1/100ml)
Natural spas	n/a	Weekly (<1/100ml)	Weekly (<10/100ml)	Monthly (<1/100ml)
Hot tubs	n/a	Weekly (<1/100 ml)	Weekly (<1/100ml)	Monthly (<1/100ml)

<sup>12</sup> WHO, 2006. Guidelines for safe recreational environments, Vol. 2, Swimming pools and similar environments, p. 97. See [http://www.who.int/water\\_sanitation\\_health/bathing/bathing2/en/](http://www.who.int/water_sanitation_health/bathing/bathing2/en/).

## VIII. IDENTIFICATION AND REMEDIATION OF PARTICULARLY CONTAMINATED SITES (ART. 6, PARA. 2 (L))

### A. Background rationale

46. Article 6, paragraph 2 (l), of the Protocol requires the setting of targets and target dates related to the identification and remediation of particularly contaminated sites which adversely affect waters within the scope of this Protocol or are likely to do so, and which thus threaten to give rise to water-related diseases.

### B. Approach to setting targets and identifying indicators: options available and non-mandatory indicators

47. Due to the huge number of contaminated sites in many countries and the enormous financial and time resources required for assessing all sites, it is necessary to limit any indicators to those sites adversely affecting surface or groundwater. There are programs to assist developing and transition economies in carrying out rapid environmental and health assessments.<sup>13</sup> The process includes the following steps:

(a) Step 1: Inventory of contaminated sites;

(b) Step 2: Identification of those contaminated sites which have an adverse effect on surface or groundwater through risk assessment;

(c) Step 3: Remediation action taken (e.g. percentage of sites where risk reduction measures are completed and where need for remediation measures is estimated related to the estimated total number of sites to be identified by surveys).

### C. Relevant regional or global obligations and reporting systems

48. A relevant indicator measured by EEA is the CSI 015 indicator, "Contaminated sites management".

49. The term "contaminated site" refers to a well-delimited area where the presence of soil contamination has been confirmed. The severity of the impacts to ecosystems and human health can be such that remediation is needed, specifically in relation to the current or planned use of the site. The remediation or clean-up of contaminated sites can result in a full elimination or in a reduction of these impacts. The indicator shows progress in four main steps: (1) preliminary study; (2) preliminary investigation; (3) main site investigation; and (4) implementation of risk reduction measures. Possible indicators could include:

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<sup>13</sup> See for instance the Rapid Environmental and Health Risk Assessment (REHRA) project, a joint effort of WHO/Europe and the Ministry for the Environment of Italy. The REHRA project developed a tool enabling national authorities and regional bodies to rapidly rank environment and health risks from a wide variety of active and inactive industrial sources, and to plan appropriate measures. See [http://www.euro.who.int/watsan/CountryActivities/20030729\\_10](http://www.euro.who.int/watsan/CountryActivities/20030729_10).

- (a) Number of sites managed/to be managed at different management steps;
- (b) Percentage of sites where risk reduction measures are completed and where need for remediation measures is estimated, as related to the estimated total number of sites to be identified by surveys;
- (c) Expenditures are provided in million Euro per capita per year and million Euro per GDP.

**IX. EFFECTIVENESS OF SYSTEMS FOR THE MANAGEMENT,  
DEVELOPMENT, PROTECTION AND USE OF WATER RESOURCES  
(ART. 6, PARA. 2 (M))**

**A. Background rationale**

50. Article 6, paragraph 2 (m), of the Protocol requires the setting of targets and target dates related to the effectiveness of systems for the management, development, protection and use of water resources, including the application of recognized good practice to the control of pollution from sources of all kinds. In addition, according to article 6, paragraph 5 (b), Parties shall establish water management plans in transboundary, national and/or local contexts, preferably on the basis of catchment areas or groundwater aquifers. The public shall be involved.

**B. Approach to setting targets and identifying indicators: options available and non-mandatory indicators**

51. Targets could focus on: (a) how to manage water resources in a sustainable way (i.e. targets related to the process of managing); (b) the deriving (ambient) water quality; and (c) the availability of the water resources.

*Options for targets and indicators on the process of managing water*

52. Targets and indicators could be derived from the pillars of Integrated Water Resources Management, namely:

- (a) Targets and indicators related to the enabling conditions (e.g. revision of laws, enforcement of laws/regulations);
- (b) Targets and indicators related to institutional measures (e.g. decentralization of decision-making, establishment of river basin organizations);
- (c) Targets and indicators related to management instruments (e.g. river basin management plans, mediation of water conflicts);

(d) Targets and indicators related to cross-cutting issues (e.g. financing water management, public involvement).

***Options for targets and indicators on ambient water quality and availability of the water resources***

53. Since water scarcity is projected to become a major problem in the region, it is very important to include indicators on water quality and availability. In addition, since there are significant differences between national and river basin conditions, targets should be set at both levels.

Water quality

54. Targets and indicators could be based on national systems of water classifications (e.g. the percentage of water falling into classes I, II, III, etc., for non-EU countries; the percentage of waters having good ecological/chemical status for EU countries).

Water quantity

55. Targets and indicators could refer to:

- (a) Population living under water scarcity;
- (b) Water exploitation index at the national and river-basin levels;
- (c) Abstraction of water for domestic needs per person.

**C. Relevant regional or global obligations and reporting systems**

56. The EU Water Framework Directive requires submission of several reports, for instance River Basin Management Plans, reports on river basin districts and competent authorities and others.

**X. FREQUENCY OF THE PUBLICATION OF INFORMATION ON THE QUALITY OF DRINKING WATER SUPPLIED AND OF OTHER WATERS RELEVANT TO THE PROTOCOL (ART. 6, PARA. 2 (N))**

**A. Background rationale**

57. Countries shall set the frequency of the publication of information on the quality of the drinking water supplied and of other waters relevant to the targets set, in the intervals between the publication of information on the collection and evaluation of data on the progress towards the targets. Such publication should take place every three years, as decided by the Meeting of the Parties to the Protocol.

## **B. Relevant regional or global obligations and reporting systems**

58. Parties to the Protocol shall publish at least every three years the results of data collection and evaluation in accordance with the requirements of article 7, paragraph 2, of the Protocol. Moreover, in accordance with article 7, paragraph 4, of the Protocol, Parties shall review progress made in achieving the targets every three years.

59. The reporting obligation frequency in relevant EU directives is as follows:

(a) EU Bathing Water Directive 76/160/EEC: reporting on an annual basis;

(b) Drinking Water Directive 98/83/EEC: each Member State shall publish a report every three years on the quality of water intended for human consumption with the objective of informing consumers;

(c) Nitrate Directive 91/676/EEC: every four years;

(d) Urban Wastewater Treatment Directive 91/271/EEC: every two years.

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