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INTEGRATED MANAGEMENT OF WATER AND RELATED ECOSYSTEMS

WATER AND CLIMATE ADAPTATION IN TRANSBOUNDARY BASINS, INCLUDING FLOOD AND DROUGHT RISK MANAGEMENT

## WATER AND ADAPTATION TO CLIMATE CHANGE

Note by the secretariat

*Summary*

The present document is submitted pursuant to a decision made by the Working Group on Integrated Water Resources Management at its fourth meeting (Geneva, 8–9 July 2009; ECE/MP.WAT/WG.1/2009/2). The document presents activities related to water and adaptation to climate change in the Convention's workplan for 2007–2009, in particular the development of the draft Guidance on water and adaptation to climate change. The document also includes a proposal for a decision by the Meeting of the Parties to support implementation of the Guidance. The annex contains the main messages of the Guidance.

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# I. BACKGROUND ON THE GUIDANCE DEVELOPMENT

1. Hydrometeorological records and climate projections provide abundant evidence that water resources are vulnerable and can be strongly affected by climate change, with wide-ranging consequences for human societies and ecosystems. Nearly all countries in the United Nations Economic Commission for Europe (UNECE) region are expected to be negatively affected by the impacts of climate change, which will vary considerably from region to region and even from basin to basin. The *First Assessment of Transboundary Rivers, Lakes and Groundwaters*[1] has shown that in many basins climate change impacts are being seen already.

2. Very few countries have developed adaptation strategies so far. The fact that many water bodies, especially in the UNECE region, cross boundaries means that risks and challenges are shared and that solutions therefore need to be coordinated. Transboundary cooperation in developing adaptation strategies is currently, however, almost non-existent.

3. To tackle these problems and to promote adaptation to climate change in the UNECE region, in particular in the transboundary context, the Meeting of the Parties to the Convention decided at its fourth session (Bonn, Germany, 20–22 November 2006) to create a Task Force on Water and Climate under the joint leadership of the Netherlands and Germany and entrusted it to prepare a Guidance on water and adaptation to climate change.

4. To achieve this task, the Task Force held two meetings (Bonn, Germany, 22–23 November 2007 and Geneva, 24 April 2009) and established a drafting group made up of representatives of national authorities and international organizations. The drafting group was composed of representatives of Armenia, Belarus, Finland, Germany, Hungary, Italy, the Netherlands, Spain, Switzerland and Uzbekistan as well as the United Nations Educational, Scientific and Cultural Organization (UNESCO), UNECE, the World Meteorological Organization (WMO) and the Regional Office for Europe of the World Health Organization. The drafting group was chaired by the Netherlands.

5. In accordance with a decision made by the joint meeting of the Bureaux of the Convention and of the Protocol on Water and Health (13 September 2007), the Task Force cooperated with the Task Force on Extreme Weather Events under the Protocol on Water and Health, led by Italy. Thus the Guidance also covers health issues.

6. As decided by the Working Group on Integrated Water Resources Management at its fourth meeting (ECE/MP.WAT/WG.1/2009/2, paras. 30–31), the Guidance is presented under separate cover (ECE/MP.WAT/30). The Guidance is based on experience and good practices in the UNECE region; its preparation relied on a broad consultative process. Beside the two meetings of the Task Force on Water and Climate, the Guidance was reviewed and discussed at the first meeting of the Task Force on Extreme Weather Events (Rome, 23–24 April 2008), and at the third and fourth meetings of the Working Group on Integrated Water Resources Management (Rome, 22–24 October 2008 and Geneva, 8–9 July 2009, respectively).

[1] See ECE/MP.WAT/2009/25, available at: http://www.unece.org/env/water/publications/pub76.htm.

7. The workshop on "Water and Adaptation to Climate Change: Joining Efforts to Adapt" (Amsterdam, 1–2 July 2008) was also an important step in the Guidance's preparation. This workshop was organized by the Governments of the Netherlands, Germany and Italy in cooperation with UNECE and the Regional Office for Europe of the World Health Organization. It allowed for sharing experiences and thus assisting Governments with developing strategies for adaptation to climate change in the water sector and the related health aspects. In particular, it addressed the benefits of and mechanisms for transboundary cooperation in adaptation activities, as well as institutional, policy, legal, scientific and financial aspects of adaptation in the water sector, including cross-cutting issues such as education.[2]

8. The Guidance's development was also informed by a survey conducted by the Task Force on Water and Climate in the first half of 2008. The survey was distributed to non-member countries of the European Environment Agency (EEA) in the UNECE region, and explored countries' adaptation needs and the measures already undertaken.[3]

9. Besides having been circulated for three rounds of comments to the Convention's focal points, the Guidance was also submitted for review to 20 experts with specific competence on the different aspects covered by the Guidance. The numerous comments of the experts were discussed by the Task Force on Water and Climate at its second meeting and were subsequently incorporated into the document, as recommended by the Task Force.

10. The Guidance is intended to guide Parties to the Convention and Parties to the Protocol on Water and Health in the implementation of the Convention's and the Protocol's provisions in the context of climate change.

11. The Guidance provides a framework to develop, step by step, an adaptation strategy. It aims to support decision makers from the local to the transboundary and international levels by offering advice on the challenges caused by climate change to water management and water-related activities, and thereby supporting the development of adaptation strategies.

12. The Guidance aims to put special emphasis on the specific problems and requirements of transboundary basins, with the objectives of preventing, controlling and reducing transboundary impacts of national adaptation measures and thereby preventing and resolving possible conflicts related to the impact of climate change on water resources. However, the Guidance is based on the existing, only very partial, experience with climate change adaptation in the transboundary context, and hence reflects this incomplete knowledge.

13. The Guidance builds on the concept of integrated water resources management (IWRM), which many countries are in the process of implementing. Climate change adds to the complexity of IWRM implementation.

14. The Guidance is a general strategic roadmap to adaptation of water management to climate change but needs to be tailored to specific local situations. It therefore does not provide a

[2] For more information, see http://www.unece.org/env/water/meetings/water_climate_workshop.htm.

[3] A similar survey was conducted by EEA in 2007 for EEA member countries. The findings of the UNECE survey are available at:
http://www.unece.org/env/water/meetings/Water.and.Climate/workshop/Report_survey_260608.doc.

detailed overview of all possible measures or elements of an adaptation strategy, since these depend on the local and sectoral contexts.

## II. THE WAY FORWARD: IMPLEMENTATION OF THE GUIDANCE

15. The Guidance calls for action in adaptation to climate change in the water sector now: by adopting it, the Parties commit to such action and to the Guidance's implementation. Proposed activities to support the Guidance implementation under the Convention's workplan for 2010–2012 include action at three levels (see also ECE/MP.WAT/2009/L.1):

(a) Promotion, capacity-building and awareness-raising activities;

(b) Action on the ground, through pilot projects;

(c) Exchange of experience, good practices and lessons learned regarding climate change adaptation and water in different parts of the UNECE region, in particular by taking advantage of the Task Force on Water and Climate as a pan-European platform for the exchange and coordination of activities (including those under the pilot projects).[4]

## III. PROPOSED ACTION BY THE MEETING OF THE PARTIES

16. The Meeting of the Parties may wish:

(a) To adopt the Guidance on Water and Adaptation to Climate Change (ECE/MP.WAT/30);

(b) To invite the Parties and non-Parties to the Convention to implement the Guidance in the framework of cooperation on transboundary water management, and, to the extent appropriate, in the national context, in particular through the development of pilot projects;

(c) To request the Working Group on Integrated Water Resources Management and the Task Force on Water and Climate to promote the implementation of the Guidance, including through the development of capacity-building and awareness raising activities;

(d) To review, at its sixth session, experience with the Guidance's implementation and decide, if need be, to update the Guidance in the light of practice and lessons learned;

(e) To express its gratitude to the Governments of the Netherlands and Germany for their leadership in the development of the Guidance and the financial contributions made, and to thank Switzerland and Italy for their support;

[4] More information can be found in document ECE/MP.WAT/2009/5.

(f) To commend members of the drafting group and especially the lead authors of the Guidance, the Task Force on Water and Climate and the Task Force on Extreme Weather Events, as well as all the reviewers and all other persons who contributed to the Guidance, for their excellent work.

## Annex

## MAIN MESSAGES OF THE GUIDANCE ON WATER AND ADAPTATION TO CLIMATE CHANGE

1. **The world needs to adapt to climate change in water management without delay.** Hydrometeorological records and climate projections provide abundant evidence that water resources are vulnerable and can be strongly affected by climate change, with wide-ranging consequences for human societies and ecosystems. Although climate change can also have positive consequences for some countries, such as a prolonged growing season, overall nearly all UNECE countries are expected to be negatively affected. The impacts will vary greatly from region to region. They include an increased frequency and intensity of floods and droughts, worse water scarcity, intensified erosion and sedimentation, reduction in glacier and snow cover, sea level rise, salinization, soil degradation, and damage to water quality, ecosystems and human health. Many countries are already experiencing some impacts and are paying the economic and social price. Attempts to mitigate climate change have begun, but they will take too long to show results any time soon. So it is both urgent and cost-effective to start adapting now.

**2. Uncertainty should never be a reason for inaction. Action and research on adaptation should be pursued simultaneously.** What we know about climate change is qualified by a level of uncertainty. All the same, we can identify trends that allow us to act. A twin-track approach, combining immediate action and further research, is therefore recommended. Water management and water-related policies and measures need to be adapted now to climate change on the basis of what we know already. At the same time, we need to do more research into the effects of climate change to deepen our knowledge. National and international funding organizations should give priority to water management research focusing on climate adaptation. This obviously requires continuous communication and interaction between science and policy. Pursuing this approach requires political leadership, especially when funds are limited.

3. **Adaptation needs to be flexible.** This is required by the uncertainties which exist about the direction and nature of change the climate is causing in hydrological systems. Interventions chosen should be flexible enough to deliver maximum benefits under a range of conditions instead of being designed for what are thought to be the “most likely” future conditions. If conditions change again, or if the changes prove different from those expected today, the measures taken should be capable of changing in step. Win-win, no-regret and low-regret measures should have priority. Another approach to uncertainty is to reduce the current sources of vulnerability, for example by increasing resilience and the capacity for adaptation. Ecosystems provide a wide range of services, including climate and flood regulation, so increasing their resilience is vital.

4. **The process of developing and implementing adaptation measures should build on learning-by-doing.** The steps taken may not achieve the desired results, or they may have unexpected side-effects, while the effects of climate change may also run counter to expectations. This again highlights the need for flexibility, and for continuous evaluation to see whether the actual results really match those desired. Only in this way can strategy changes be

made in good time. Pilot projects are a helpful way to develop and implement adaptation strategies.

5. **Water is central to many different sectors that directly depend on water being available and of high quality. Therefore, water management can limit or enhance adaptation of water-related sectors.** Climate change's impacts on water are expected to have cascading effects on human health and on many parts of the economy. They include agriculture (increased demand for irrigation and forestry), energy (reduced hydropower potential and cooling water availability), recreation (threats to water-linked tourism), fisheries, and navigation. Serious impacts on biodiversity also loom.

6. **Implementing integrated water resources management supports adaptation.** The core principles of IWRM include planning at the river basin level, strong intersectoral cooperation, public participation and making the best use of water resources. The same principles also underpin any effective adaptation strategy. So incorporating climate change effects into IWRM and encouraging its wide adoption will also advance adaptation.

7. **Any adaptation policy needs to consider climate change as one of many pressures on water resources. Others include population growth, migration, globalization, changing consumption patterns, and agricultural and industrial developments.** These different stressors interfere with each other and can have positive and negative feedbacks. This means adaptation should be coordinated with other water management measures and integrated in an overall strategy. Scenarios can be helpful in assessing the possible effects of different pressures and in developing water management measures.

8. **Effective adaptation to climate change requires a cross-sectoral approach including at the transboundary level, in order to prevent possible conflicts between different sectors and to consider trade-offs and synergies between adaptation and mitigation measures.** Uncoordinated sectoral responses can be ineffective or even counterproductive, because a response in one sector can increase the vulnerability of another sector and/or reduce the effectiveness of its adaptation responses. Climate change adaptation should be integrated into existing policy development, in planning, programmes and budgeting, across a broad range of economic sectors – a process generally called "mainstreaming". And mitigation measures should be considered in the light of their consequences for adaptation options, and vice versa. For example, biofuel production as a mitigation measure can have negative impacts on water supply and food production, while building settlements in flood-prone areas not only increases vulnerability, but can also hinder the implementation of adaptation measures.

9. **Barriers to adaptation in the legal, institutional and policy spheres must be removed. Legislation should be developed flexibly, to be able to cope with different possible climate impacts.** Legislation should not present barriers for adaptation, and should be flexible enough to accommodate continuing environmental and socio-economic changes. It should actually foster or promote adaptation. Existing legislation and transboundary agreements may need revising. As a first step, existing legislation, from the local to the transboundary levels, should be assessed for its capacity to support adaptation. For example, legislation prohibiting the re-use of wastewater may need to be changed into legislation that sets requirements for its safe

use. Transboundary agreements should include provisions for addressing flow variability and the availability of safe water.

10. **Implementing national legislation and international commitments supports adaptation.** A number of international agreements include provisions and have developed tools that can support the development of adaptation strategies. Countries should take into account and build on such provisions to maximize results and ensure the coherence of the policies and measures they adopt. The EU Water Framework Directive (EU WFD), for instance, builds on the principles of IWRM and the ways countries should cooperate in water management. Together with its guidelines on climate change adaptation, the concepts of the EU WFD support the development of adaptation strategies.

11. **Transboundary cooperation is both necessary and beneficial in adapting to climate change. It is necessary throughout the entire process of developing and implementing an adaptation strategy.** International basins constitute about half of the Earth's land surface. The fact that many water bodies, especially in the UNECE region, cross boundaries means that risks and challenges are shared and that solutions therefore need to be coordinated. Transboundary cooperation in developing adaptation strategies is currently almost non-existent. However, it is not only necessary to ensure that unilateral measures do not do significant damage to riparian countries. It is also essential to make sure they offer benefits to all riparian Parties, for example by sharing the costs and benefits of adaptation measures or by reducing uncertainty through the exchange of information. Measures should therefore be taken only if they are the product of wide consultation and sound science. Transboundary cooperation can broaden our knowledge base, enlarge the range of measures available for prevention, preparedness and recovery, and so help to find better and more cost-effective solutions. The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) offers a sound framework for cooperation at the transboundary level on adaptation.

12. **When planning adaptation across boundaries, riparian countries should focus on preventing transboundary impacts, sharing benefits and risks in an equitable and reasonable manner and cooperating on the basis of equality and reciprocity.** By considering costs and benefits on a basin scale, new options for adaptation open up that can prove more cost-effective. Countries' differing capacities also need to be taken into account.

13. **Knowledge and experience need to be exchanged to enhance the capacity of countries to adapt.** Climate change is a relatively new phenomenon, and we do not yet know everything about its effects on the quantity and quality of water resources and its related influence on human health. Little experience is available yet in developing adaptation strategies and measures, and even less at the transboundary level. Knowledge developed by countries and experiences in implementing measures in basins, both successful and less successful examples, can help other countries to reduce risks, including environment-related health-risks.

14. **Ensuring that data and information are readily available is crucial for making climate projections and identifying vulnerable groups and regions. So sharing information, including that from early warning systems, between countries and sectors is essential for effective and efficient climate change adaptation.** Data collection should cover all aspects of

the hydrological cycle and should take into consideration the needs of the end-users, but also include social and economic information. Early-warning systems are essential for preparedness for extreme weather events and should be developed at the transboundary level, to allow for the effective sharing of information. They should also be closely linked to seasonal and long-term climate and weather forecast systems. Monitoring and observation systems should be capable of adapting to the changes in information needs that could develop in the future. By sharing information, countries and sectors can extend and deepen their understanding of climate change effects, improve their models, and better assess the vulnerabilities connected to climate change, especially in a transboundary basin. Information exchange, or even better, joint information collection, is therefore imperative to build the knowledge base needed to face the effects of climate change. Riparian countries should work on common scenarios and models to develop a joint understanding of possible impacts.

15. **Effective adaptation strategies are a mix of structural and non-structural, regulatory and economic instruments and measures, education and awareness-raising to tackle the short-, medium- and long-term impacts of climate change.** In many cases no single measure can fully address the effects of climate change. Successful adaptation strategies therefore combine a variety of measures that target different groups and timescales. Any adaptation strategy should include measures in all the steps of the adaptation chain: prevention, improving resilience, preparation, reaction and recovery. Risk management should be made the priority, not crisis management.

16. **Adaptation measures should strive to be cost-effective, environmentally sustainable, culturally compatible and socially acceptable. Prioritization of measures should be based on the results of vulnerability assessments, costs and benefits assessments, as well as on development objectives, stakeholder considerations and the resources available.** As a first step, available measures should be described comprehensively, in terms of their benefits, risks, costs, possible side-effects and uncertainties. Secondly, measures need to be compared and ranked. Ways of doing this include systematic qualitative analysis, semi-quantitative analysis in order to compare different attributes or parameters, and full quantitative analysis of risks, costs and benefits.

17. **Water supply and sanitation, especially during extreme weather events, require special attention in adaptation policy, as they are essential for good health**.[5] Health hazards may be caused by extreme temperatures, an increase in water temperature, water scarcity, and chemical and biological contamination of water used for different purposes (including food production and processing). Adaptation, especially in the local and transboundary context, should take account of such events. Increasing water scarcity may limit access to water for sanitation, reduce the self-cleaning capacity of sewers and limit the ability of natural ecosystems to assimilate wastes. Flooding may cause contamination and, especially in large cities, storm-water overflows and pollution.

[5] See the draft Guidance on Water Supply and Sanitation in Extreme Weather Events, developed under the Protocol on Water and Health. The latest version is available at: http://www.unece.org/env/water/meetings/wgwh/Secondmeeting_2009/Information_docs._edited/Inf_doc.5_WSS_Guidance.doc.

18. **Adaptation may be costly, but it is much more cost-effective to start it now, because costs will be much higher once the effects of climate change are irreversible. Paying for adaptation should be done by a mix of public and private funding.** Pricing mechanisms and markets can help to achieve a more efficient allocation of water resources, but equity should never be neglected. Mechanisms like insurance can play an important role in adaptation when extreme weather is involved. They should be part of a country's disaster risk reduction and prevention strategy.

19. **Stakeholder participation is crucial for all steps of the development and implementation of adaptation strategies and measures.** From identifying information needs to vulnerability assessment, planning and choosing priority adaptation measures, the knowledge, capacity and views of everyone involved are crucial to ensure sound, effective and sustainable adaptation. Including utilities managers is also crucial, to ensure that the water supply and sewerage services continue to function under changing conditions.

20. **Education, capacity-building and communication are imperative for effective adaptation.** Ignorance or lack of awareness can be important causes of vulnerability. Working to ensure that both water professionals and society-at-large are well informed about causes and consequences of climate change will enhance their ability to cope and can also help to prevent unsuitable adaptation.

21. **Climate change and the need for adaptation is also an opportunity for innovation and new technologies.** The need for adaptation requires a paradigm shift: thinking outside the box. This may stimulate alternative and innovative approaches. In particular, it is crucial to shift from a supply-side approach to a more sustainable, "demand-side" approach to water resource management, focusing on conserving water and using it more efficiently. In countries where climate change also has positive impacts, society should aim to maximize the benefits from these impacts, for example using a prolonged growing season to increase the number of annual harvests.

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