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REGIONAL COOPERATION ON SHARED WATER RESOURCES
FINAL REPORT ON THE PREPARATION OF THE INVENTORY
OF SHARED WATER RESOURCES IN WESTERN ASIA

Summary

Strengthening cooperation between member countries on shared water issues is one of the main objectives of the ongoing collaboration between the Economic and Social Commission for Western Asia (ESCWA) and the Federal Institute for Geosciences and Natural Resources of Germany (Bundesanstalt für Geowissenschaften und Rohstoffe (BGR)). The *Inventory of Shared Water Resources in Western Asia*, prepared within the framework of the ESCWA-BGR cooperation, constitutes the first effort led by the United Nations to catalogue and characterize both surface and groundwater resources across the region in a comprehensive, systematic and unified manner. It covers all surface and groundwater resources shared between Arab countries in Western Asia and also includes data on water resources that are shared with neighbouring non-Arab countries. Its main purpose is to provide a sound scientific basis for further dialogue on shared water resources between riparian countries.

The Inventory is composed of 9 chapters on surface water and 17 chapters on groundwater, and contains over 200 figures, tables and text boxes. Each chapter includes a map and presents key aspects of hydrology, hydrogeology, water resources development and use, as well as the status of cross-border cooperation and management efforts.

A comprehensive review and process of consultation with experts and country representatives was undertaken throughout the preparation of the study. The process was facilitated by the members of ESCWA Committee on Water Resources and the identification of national focal points to support the finalization of the publication. The drafting and review process also involved regional and international experts who provided scientific guidance, identified shortcomings, suggested additional sources of information and ensured the coherence of the final document.

The Inventory thus provides an up-to-date review of the state and evolution of shared water resources in Western Asia, based on recent and comprehensive data series and solid trend analyses. A pre-release of the Inventory took place during the Stockholm World Water Week 2012 and included the launch of a website that allows users to download individual chapters and maps of the Inventory, and subscribe to receive publication updates as new content becomes available.

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I. INTRODUCTION AND BACKGROUND

1. Water scarcity has always been a key aspect of life in the Arabian Peninsula, the Arab Mashreq and Mesopotamia. Communities living in those arid and semi-arid regions historically shared the water of rivers, springs and wadis. In the second half of the twentieth century, technological advances and large-scale irrigation schemes boosted water demand in the agricultural sector and human settlements continued to expand as the population grew. This transformation considerably affected the issue of shared water and had a big impact on the flows and quality of water, especially in downstream countries. Agricultural production also flourished with the introduction of groundwater pumps in the 1960s and 1970s, which resulted in a large-scale intensive development of groundwater use. The arid climate and low rainfall levels also contributed to the fact that groundwater abstraction quickly exceeded recharge rates, which led to the drying up of springs, streams and shallow groundwater bodies that previously flowed across national boundaries. Further advances in drilling and pumping technology allowed for the exploitation of deep groundwater reserves, which were created thousands of years ago and are non-renewable under current climatic conditions.
2. In transboundary water bodies, substantive changes like the disruption or pollution of surface or groundwater systems in one country can have a damaging impact on the water and land resources of adjacent countries. Such changes can alter the quantity and quality of water provided. Cooperation across national borders and across the region is therefore essential to achieving a sustainable management of shared water resources in the Arab region. Accurate and up-to-date information on shared surface and groundwater systems is necessary to inform stakeholders and foster dialogue, with a view to attaining that goal through cooperation rather than conflict.
3. While interest in the region's shared water issues has grown in recent years, in-depth research and data collection has focused mainly on surface water bodies and disputes related to the Euphrates, Tigris, Nile and Jordan basins. However, even in those more frequently discussed cases, local conditions and problems are often overlooked and information sources such as maps and data series are outdated. In addition, other basins, including most 'hidden' groundwater systems, have not been systematically assessed.
4. Strengthening cooperation between member countries on shared water issues is one of the main objectives of the ongoing cooperation between the United Nations Economic and Social Commission for Western Asia (ESCWA) and the Federal Institute for Geosciences and Natural Resources of Germany (Bundesanstalt für Geowissenschaften und Rohstoffe (BGR)). This goal has been pursued by providing support to ESCWA member countries in a variety of areas, including integrated water resources management, monitoring, negotiations, capacity-building, the strengthening of institutional and legal frameworks, and through the preparation of the Inventory.
5. The *Inventory of Shared Water Resources in Western Asia*, prepared within the framework of the ESCWA-BGR cooperation, is the first United Nations-led effort to take stock of both shared groundwater and surface water resources in Western Asia in a comprehensive, systematic and unified manner.

II. JUSTIFICATION

A. PURPOSE

6. The Inventory focuses on the Western Asia region and aims to do the following:
 - (a) Document the state of shared water resources and their use;
 - (b) Improve the knowledge base and facilitate access to information on shared water resources;
 - (c) Create an awareness of the importance of shared water resources;
 - (d) Stimulate an informed discussion in countries and especially between riparians;

(e) Support regional processes to foster an improved dialogue and strengthen the cooperation on shared water resources.

7. The Inventory makes an important contribution to the regional debate on shared water resources by engaging and targeting a variety of audiences, including experts in the water, environment and other sectors, decision makers, Government representatives, academics, donors, specialized agencies and representatives of international and non-governmental civil society organizations.

B. SCOPE

8. The Inventory covers all surface and groundwater resources shared between Arab countries in Western Asia and also includes data on water resources that are shared with Iran, Israel and Turkey. For each of the addressed freshwater bodies, it raises key aspects of hydrology, hydrogeology and water resources development, use and management. It also examines the status of cooperation between the relevant riparian countries.

9. The objectives, scope and preliminary findings of the Inventory were presented to the ESCWA Committee on Water Resources during its ninth session, held in Beirut from 23 to 25 March 2011. The Committee adopted the following recommendations, then endorsed at the twenty-seventh session of ESCWA in May 2012, to support the finalization of the publication:

Recommendation (d) to member countries: Encourage the parties responsible for mapping and identifying the shared water resources to take advantage of the inventory of shared water resources in the Western Asia region that is being prepared within the framework of the regional cooperation project between ESCWA and BGR;

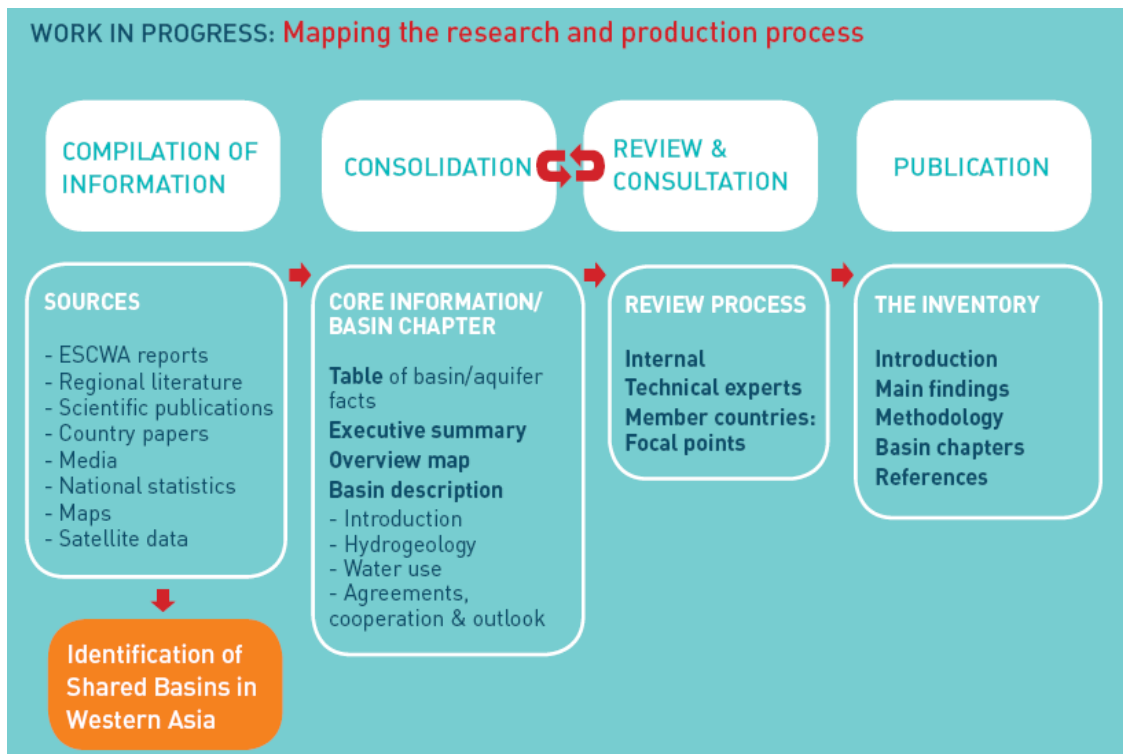
Recommendation (j) to ESCWA: Send formal requests to the members of the Committee to nominate national focal points to follow up the preparation of an inventory of shared water resources in the ESCWA region. It is very important that the members of the Committee respond to the requests within two weeks of the date of receipt.

III. PREPARATORY PROCESS

10. The preparation of the Inventory began with a desk study of the existing literature and was subsequently conducted through a comprehensive review and consultation process with experts and representatives from ESCWA member countries, which contributed significantly to the content of the study.

11. The information on basins was initially collected and summarized from ESCWA reports, regional literature, scientific publications, country papers, national and regional maps and data sets, satellite imagery, media reports and other grey literature. Subsequent consultation with authorities in concerned ESCWA member countries (Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Saudi Arabia, Syrian Arab Republic and Yemen) aimed to improve and enrich the content of the relevant chapters. This goal was achieved through information exchange, site visits, regional workshops, consultations and tailored questionnaires on basins.

12. The work process was facilitated throughout its various stages by the members of the Committee on Water Resources and by regional and international experts. Consultations with them helped to provide scientific guidance, identify shortcomings, determine additional sources of information and ensure overall coherence across chapters. Figure 1 provides a schematic overview of the undertaken preparatory process.

Figure 1. Preparation of the Inventory

A. CONSULTATIONS WITH COUNTRIES

13. ESCWA member countries have been involved at all stages in the preparation of the Inventory. The main platform used for consultations with those countries is the ESCWA Committee on Water Resources. The timeline and main milestones of the consultation process are reviewed below:

- *Committee on Water Resources – eighth session (December 2008)*
The concept of the Inventory was presented to the Committee in December 2008. While no recommendation mentioned the publication specifically, the Committee endorsed the continued work of ESCWA in building national institutional and legal capacities, and conducting assessments of the application of the principles underlying the integrated water resources management.
- *Committee on Water Resources – ninth session (March 2011)*
Following a presentation of the scope, status and preliminary findings of the Inventory, the Committee recommended the nomination of focal points in ESCWA member countries to support the further preparation and finalization of the Inventory and encouraged Governments to consider its outcomes.
- *Nomination of Inventory Focal Points (April-September 2011)*
ESCWA requested members of the Committee on Water Resources to nominate national focal points to facilitate the preparation of the Inventory. Nominations were received from April to September 2011. Many of the nominated focal points were also members of the Committee on Water Resources and were hence already familiar with the Inventory and its process of preparation.

- *Regional Consultation Meeting with Member Countries (October-December 2011)*
Focal points gathered in Beirut from 29 November to 1 December 2011 for a briefing on the progress achieved to date in the preparation of the Inventory. That meeting also aimed to encourage open and transparent discussions between riparian countries on specific basins, based on the preliminary findings of the literature review and on consultations with experts. An information note on the preliminary overall findings of the Inventory and dedicated question sheets for each of the shared basins were prepared and sent to countries in early November 2011. The meeting was attended by focal points and experts from 8 of the 13 countries that had nominated focal points. Participants reiterated their support for the Inventory and agreed to submit the data requested in the question sheets.
- *Follow-up and informal consultations (December 2011 - June 2012)*
Focal points who could not attend the regional consultation meeting were informed of its outcomes in early December 2011. Missions by members of the Inventory team to selected member countries were undertaken with a view to following up on data submissions. Further clarification and discussion of the preliminary findings, the applied methodology and the next steps in the consultation process were also discussed. The deadline for the submission of information was extended twice upon the request of member countries. Focal points were encouraged to consult with experts and counterparts in other national authorities to allow for a comprehensive review of the question sheets and information submitted.
- *Commenting on Chapters (May 2012 – December 2012)*
The draft chapters on basins were successively made available to focal points for comments and feedback. Draft chapters were released only to the riparian countries of a shared basin. Countries were requested to submit their comments on each chapter within a month of the receipt of the chapter. The deadline for feedback on the draft chapters was extended to December 2012 to give ESCWA member countries the maximum opportunity to submit feedback.

B. CONSULTATIONS WITH EXPERTS

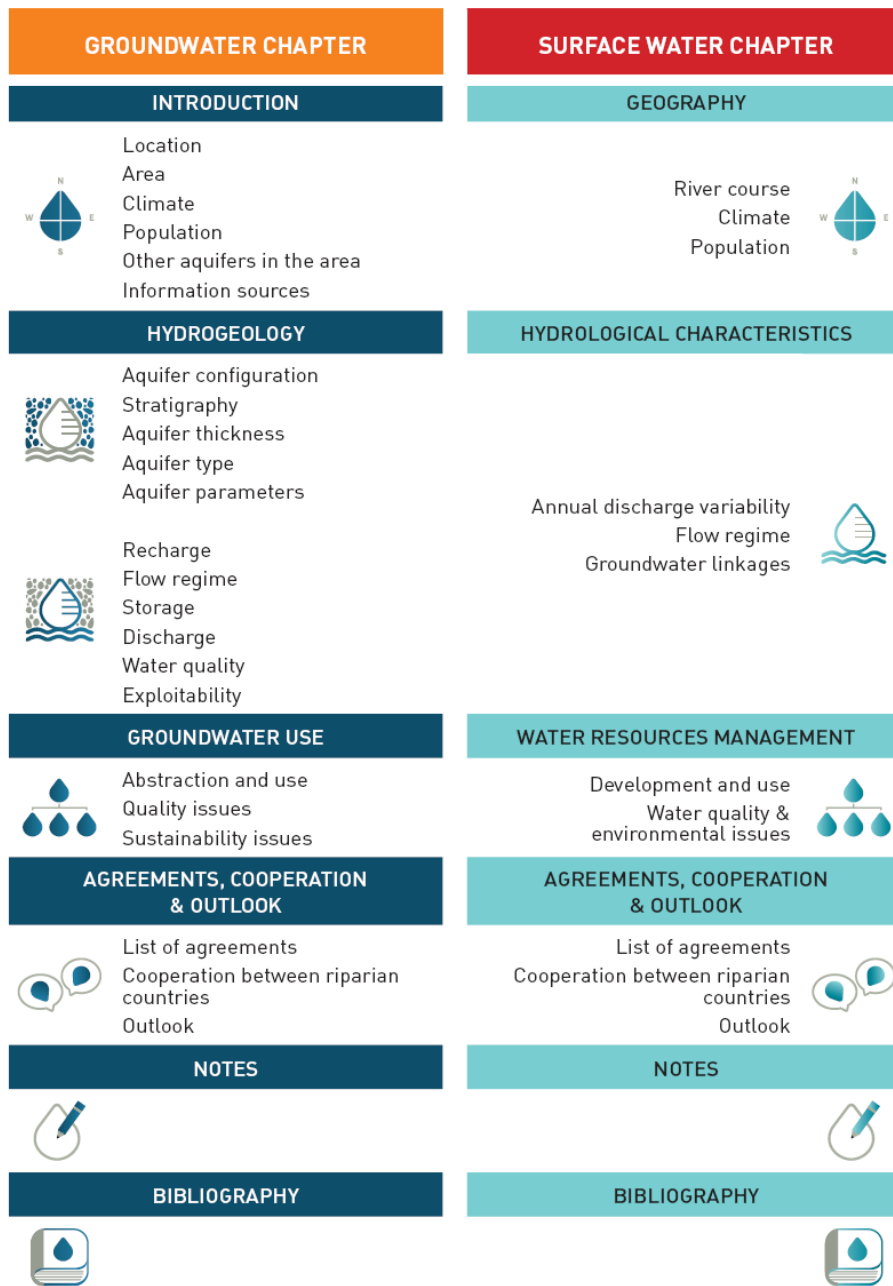
14. The draft chapters were also reviewed by selected experts, many of whom had already been consulted during earlier stages of the research process. In addition, meetings and regional consultations undertaken at ESCWA and in international forums were used to vet the approach and arrange informal back-to-back meetings with focal points and other experts. The final draft chapters were subsequently edited and proofed according to United Nations editorial standards and in coordination with ESCWA Conference Services.

IV. STRUCTURE AND CONTENT

15. The Inventory is divided into two parts. Part I focuses on surface water; Part II focuses on groundwater resources. Each part opens with an overview and methodology chapter, followed by descriptive chapters on each of the shared water basins (basin chapters). In total, there are 9 surface water and 17 groundwater chapters that address key aspects of hydrology, hydrogeology, water resources development and use. They also examine the status of cross-border cooperation and management efforts at the basin level.

16. Basin chapters follow a unified structure, all beginning with an overview map displaying the main features of the basin, an overview table highlighting main facts and figures about the basin and a summary of the most relevant issues raised in the chapter, especially regarding water use, trends and management. More detailed information is found in the main sections of each chapter, which vary in length depending on the availability of information and the depth of the required analysis. Each basin chapter concludes with a bibliography of all the documentation used in the chapter.

Figure 2. Structure of the Basin Chapters



17. Many parts of the basin descriptions are written in a non-technical language to be made accessible to a wide range of audiences, stakeholders and interested readers. This approach was particularly pursued in the sections on ‘Geography’, ‘Water use and Development’ and ‘Agreements and Cooperation.’

18. Specialized technical information is presented in other parts of the basin chapters – especially in the ‘Hydrology/Hydrogeology’ sections, which are aimed at a more specialized audience, namely academics and government technical advisors. The scheme illustrated in figure 2 allows readers to easily identify and navigate between different chapter sections of varying technical nature.

19. The Inventory features more than 600 pages of detailed information and contains over 60 maps. It provides an up-to-date view of the state and evolution of shared water resources based on recent,

comprehensive data series and solid trend analysis displayed in over 200 figures, tables and text boxes. Emphasis is placed on the visual presentation of data that increases its accessibility to readers of various technical backgrounds. A wide range of exclusive pictures from remote areas in the region are also used to illustrate the chapters and help to visualize the basins themselves.

20. The Inventory is characterized by its comprehensiveness and level of detail. It examines the major shared surface water resources that are already extensively covered in the literature, but also attempts to uncover new linkages and to highlight minor or newly classified shared basins by way of scientific analysis and interpretation. The analysis is the outcome of an unbiased scientific process and is thus primarily descriptive in nature. All information and data on shared river basins and aquifer systems in the region are duly referenced to allow for independent verification and further reading and research.

V. DISSEMINATION

21. A pre-release of the Inventory took place on 28 August 2012 during the Stockholm World Water Week, in a side event jointly organized by ESCWA and BGR. It was attended by regional and international water experts and researchers. A core component of the side event was the launching of the website dedicated to the Inventory (www.waterinventory.org), where users are able to read short summaries with key facts and figures for all shared basins and groundwater aquifers in Western Asia. The website also allows the downloading of individual chapters and maps, and provides regular updates on the publication through subscription services. The website's innovative navigation and search features allow users to browse through the main findings of the Inventory.

22. The official release of the *Inventory of Shared Water in Western Asia* will take place in the Arab region during the first half of 2013.
