ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA

THE ENVIRONMENT IN THE TRANSBOUNDARY CONTEXT IN THE ESCWA REGION: SITUATION AND RECOMMENDATIONS

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Executive summary

Over the past several centuries, the ecosystem has gradually deteriorated under the onslaught of unchecked population growth and escalating demand for natural resources. More recently, the world's environmental challenges have become far more severe, involving air quality, water and marine pollution, land degradation, waste management, biodiversity loss, ozone layer depletion and global warming. The effects of this environmental deterioration are manifest worldwide, affecting each and every country, not merely the major polluters. Moreover, ecosystems, by nature, transcend the delineation of politics and geography and often span national borders and thus create, even impose, international environmental linkages that demand holistic and cooperative approaches for their effective management. From this acknowledgement stems a critical dimension of environmental challenges; that which is transboundary in nature.

It is only recently that challenges and responses specific to transboundary environments began to emerge and capture the attention of policymakers and States. An increasing number of Governments are now developing crosscutting policies and institutions responsible for addressing environmental impacts in a transboundary context. This trend has led to transboundary environmental cooperation on air quality, transportation, hazardous material, protected areas and other issues, in addition to the freshwater agreements, which represented the earliest efforts to manage cross-national environments. Consequently, and in response to growing threats to the environment and natural resources, countries have formulated multilateral environmental agreements at the global, bilateral and regional levels to structure cooperation and collaboration on the efficient management of shared resources (water, air, and land) and the assessment and mitigation of adverse environmental effects. The proliferation in recent decades of international environmental agreements, with their varied geographical or functional concerns, reflects a shared commitment to resolve cross-national environmental challenges through intergovernmental cooperation.

In the Economic and Social Commission for Western Asia (ESCWA) region, the management of the environment has made significant progress over the past three decades, involving the establishment of governmental systems and regional institutions, as well as the formulation of environmental policies. The global water crisis has grave implications for the ESCWA region, considered to be one of the most water-stressed regions of the world.[1] With the conservation and protection of freshwater resources a major priority, regional transboundary environmental policy and cooperation have focused primarily on water. Beyond that, there has been insufficient exploration of the management of key cross-national environmental challenges in the region. These include marine environments and coastal zones, air pollution, land degradation and other emerging issues. The transboundary environmental impact of armed conflicts also needs further consideration, with particular reference to the ESCWA region. This need is especially critical given that ESCWA countries share several natural resources at the regional and sub-regional levels. Unfortunately, there is no reliable database in which these resources are identified and classified; and neglect and conflict continue to constrain their effective management.

For ESCWA, the issue of transboundary environments clearly emerges as one of critical concern, reflecting ESCWA's ongoing commitment, underpinned by its mandate, to address regional environmental challenges and promote sustainable development through effective regional environmental management. This study was undertaken by ESCWA within the framework of its 2004-2005 programme of work on sustainable management of the environment. It aims to define and contextualize transboundary environmental challenges in the ESCWA region, and to provide a critical assessment of governance mechanisms, including comparative analysis drawing on international experiences. As such, this study is the first attempt to identify the main transboundary issues in the ESCWA region and to review the current management policies adopted by the member countries, highlighting their effectiveness and shortcomings in the light of current regional and global agreements. This study is therefore offered as a practical contribution to the definition and understanding of environmental issues that are strictly transboundary in nature in the ESCWA region, with recommendations for the formulation of regional policy structures and the establishment of effective mechanisms for their implementation.

[1] United Nations Environment Programme (UNEP), *Global Environmental Outlook* (GEO-3), 2002.

To that end, this study focuses on the current state of shared resources and the problems confronting them. While water has dominated the geopolitics of the ESCWA region for centuries, and its management has been the focus of regional efforts, most international bodies of water in the ESCWA region are not regulated by comprehensive international agreements. However, several piecemeal agreements do exist, and these have applied the principles of international law to water-sharing principles of cooperation, inclusive participation and mutual gain. The cross-national implications of water scarcity across the region are increasingly aggravated by the over-exploitation of water resources—and their pollution. Meanwhile, there are mounting challenges confronting the coastal and marine environments. These include dumping at sea, unsustainable fishing practices, pollution from oil spillages and discharges of land-based effluents, as well as habitat destruction caused by land-filling, reclamation and dredging.

The transboundary environment in the ESCWA region is also threatened by air pollution, which is transported across the region and beyond. The particular issue of persistent organic pollutants (POPs) is now recognized as a transboundary threat, and strategies to mitigate its effects are emerging at the regional level. The situation is aggravated by a lack of stringent policies to control air pollution at source point. The results are already manifest in the region and beyond, namely: a general deterioration of air quality, with sporadic episodes of severe air pollution; acid rain; and the drastic regional and global consequences of climate change.

The terrestrial environment of the ESCWA region suffers from land degradation, as manifested in the current trends of biodiversity loss, deforestation and desertification, as well as land pollution from waste disposal and land reclamation for urbanization. Without a clear regional stance on genetically modified organisms (GMOs), their unintentional transboundary movement remains an additional threat to the transboundary environment of the ESCWA region.

Furthermore, a distinctive component of the transboundary environmental challenge in the ESCWA region is armed conflict. For the past four decades, the erratic political climate of the ESCWA region has resulted in numerous wars waged at both national and regional levels, in the form of internal conflicts, occupations and invasions. When compounded with chronic pre-war pollution and environmental stresses, wartime transboundary environmental damage has had devastating repercussions on the region, both directly and indirectly.

Other transboundary challenges have emerged globally, with implications for the environment in the ESCWA region, especially the global environmental crisis of hazardous waste management. The region lacks the capacity to manage hazardous waste safely: it lacks appropriate storage and disposal facilities; it lacks the requisite skills to evaluate risks and monitor controlled dumping or recycling; and it lacks, as yet, the capacity to undertake detection, remediation or possible treatment. For all these reasons, the ESCWA region has been exposed periodically to the problem of illegal trans-frontier dumping.

Within such a context of compelling global and regional transboundary environmental challenges, this study focuses on the challenges facing transboundary governance, and provides an assessment of current Multinational Environmental Agreement (MEAs) and regional structures and mechanisms. The picture of transboundary environmental governance that emerges is a collage of challenges, at both the regional and global levels, especially in implementation and monitoring.[2] Although efforts to devise global governance structures have been mostly successful as a basis for cooperation and management of potential transboundary challenges, a common deficiency remains the lack of appropriate disincentives and penalties to deter violations. The interdisciplinary nature of transboundary environmental challenges makes the cooperation and compliance of all stakeholders a necessary prerequisite for an effective environmental regime. Any global or regional cooperation or agreement must therefore be centred on unifying environmental standards and regulations, information and expertise sharing, and public involvement.

In the ESCWA region, there is a glaring absence of legally binding agreements or effective laws on the management and protection of trans-national environmental resources, let alone of holistic environmental

[2] E.L. Miles et al, *Environmental Regime Effectiveness: Confronting Theory with Evidence*. (Cambridge: MIT Press, 2002).

strategies at the national and regional levels. Cross-national agreements, when they exist, refer to principles of general environmental protection or regulation, but tend to remain partial, inequitable, and lack adequate means of monitoring and enforcement. In addition, regional and national mechanisms that govern the management of the environment of the ESCWA region are segregated to sectoral approaches which remain unequal to the task of tackling the huge and diverse transboundary environmental challenges in an integrated manner. Furthermore, this study has revealed that most attempts to manage the transboundary environment in the ESCWA region are severely impeded by political limitations, a lack of serious cooperation, inadequate financial resources, inefficient national environmental legislation, and inadequate enforcement of existing regulations. In addition, most ESCWA countries are subject to recurrent political volatility and insecurity, which further hinder communication and cooperation within and beyond the region.

This study concludes with recommendations on the establishment of effective collaboration and joint management of transboundary environmental challenges and, in so doing, reveals the imperative need for ESCWA member countries to implement environmental governance agreements at the global and regional levels. In a region plagued by conflict, the erratic political and security situation can only sharpen the critical need to formulate well-defined transboundary strategies and mechanisms for cooperation and coordination to enhance the resolution of disputes over shared resources. The dispute resolution mechanisms that exist in the region, including joint committees, regional commissions and international agencies, do offer substantial support to member countries in their negotiations. However, these mechanisms fall short of playing a decisive and conclusive role. Capacity building is another integral component of effective transboundary management in the ESCWA region. Facilitated by regional organizations and international agencies, capacity building entails first the acknowledgement and understanding of transboundary challenges, and then the fostering of regional cooperation through institutions, ministerial forums and regional non-governmental organizations (NGOs). Capacity building could also be achieved by improving environmental technology skills and expertise in the ESCWA region. Enabling agencies, including regional and international NGOs, could play a vital role by offering training sessions and workshops.

A lack of funding remains a major obstacle to the implementation of agreed policies and the enforcement of environmental laws. The same lack of funding impedes vital environmental data collection, the establishment of databases, information sharing and the application of contemporary technology. Without accurate environmental information it remains impossible to identify and assess accurately transboundary environmental issues specific to the region. Improved environmental information collection—and the harmonizing of environmental standards—must therefore underpin the development of appropriate regional policies and mechanisms to mitigate cross-national environmental challenges. Inadequate regional financial mechanisms, though partially compensated for by financial support from various international agencies, place further constraints on the continuous effort to seek new and sustainable funding resources.

Furthermore, there is a need to identify and assess the transboundary environmental implications of regional and national projects and activities. This should precede execution and carry through beyond the post-project monitoring phase. As such, the effective implementation of transboundary environmental impact assessment relies on establishing the means for notification and consultation, effective public participation and sustainable financing, as well as mechanisms for dispute settlement.

Having overcome the above challenges, ESCWA member countries would then be empowered to implement current environmental agreements, and to propose guidelines on the formulation and enhancement of regional agreements specifically dealing with transboundary environmental issues. This process would consequently generate improved cooperation within and beyond the region to promote and contribute to effective global transboundary environmental governance. ESCWA, in cooperation with other regional and international organizations, is best situated to catalyse and facilitate these processes and mechanisms.

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ABBREVIATIONS

AFESD	Arab Fund for Economic and Social Development
ASEAN	Association of Southeast Asian Nations
CAMRE	Council of Arab Ministers Responsible for the Environment
CEDARE	Centre for Environment and Development for the Arab Region and Europe
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLRTAP	Convention on Long-Range Transboundary Air Pollution
EIA	environmental impact assessment
ESCWA	Economic and Social Commission for Western Asia
EU	European Union
ECE	Economic Commission of Europe
FOC	flag-of-convenience
GAP	Southeast Anatolia Development Project (Turkish acronym, *Guneydogu Anadolu Projesi*)
GCC	Gulf Cooperation Council
GEF	Global Environmental Facility
GHG	Green House Gases
GIS	Geographical Information System
GM	Genetically Modified
GMO	Genetically Modified Organism
ICRI	International Coral Reefs Initiative
IMO	International Maritime Organization
IUCN	The World Conservation Union
IUU	illegal, unreported and unregulated
JCEDAR	Joint Committee on Environment and Development in the Arab Region
LDC	Least Developed Country
LMO	living modified organism
MAP	Mediterranean Action Plan
MEA	Multinational Environmental Agreement
MARPOL	International Convention for the Prevention of Pollution from Ships
NBI	Nile Basin Initiative
NGO	non-governmental organization
NTEAP	Nile Transboundary Environmental Action Project
OECD	Organization for Economic Cooperation and Development
OILPOL	Convention for the Prevention of Pollution of the Sea by Oil
PERSGA	Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden
POP	Persistent Organic Pollutant
PTEE	potentially transboundary environmental effect
ROPME	Regional Organization for the Protection of the Marine Environment
TEIA	transboundary environmental impact assessment
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	Kyoto Protocol to the United Nations Framework Convention on Climate Change
WHO	World Health Organization

I. OVERVIEW OF TRANSBOUNDARY ENVIRONMENTS

With the proliferation of global efforts in recent decades to advance environmental issues and policies, as reflected in the growing number of international environmental agreements, there has been a growing awareness of the gravity of environmental threats, especially those that are transboundary in nature.[3] Member countries of the Economic and Social Commission for Western Asia (ESCWA), which represent the focus of this study, have witnessed an exponential increase in population levels. This has inevitably led to environmental over-exploitation and deterioration. Most ESCWA member countries have now ratified international environmental agreements and have committed themselves to enhancing relevant governance structures, to develop action plans and submit reports on the state of the environment. However, the resulting sectoral approaches and fragmented policies have failed to define or address adequately the challenges that are specifically transboundary in nature.

This study is therefore an attempt to identify and tackle the major transboundary environmental threats in the ESCWA region. It addresses the current regional management mechanisms and policy structures, compares them to those in place at a global level, and draws from the experiences of other regions to generate recommendations for improving environmental management in the transboundary context. As such, it constitutes a major contribution to the definition and understanding of strictly transboundary environmental issues in the ESCWA region.

A. DEFINING AND CONTEXTUALIZING TRANSBOUNDARY ENVIRONMENTAL CHALLENGES

Given that nature tends to transcend politics and geography, ecosystems remain largely oblivious to boundaries, functioning as a coherent system regardless of maps and borders. Indeed, ecosystems often span national borders and create, even impose, international environmental linkages that demand holistic and integrated management.

The earliest efforts to manage transboundary environments are to be found in regional agreements relating to freshwater resources that cross national borders, dating as far back as 1820.[4] Although States have extended their collaborative efforts on environmental degradation and its consequences to other issues, including air quality, hazardous materials and protected areas, the challenges specific to transboundary environments only began to emerge and capture the attention of policymakers and States relatively recently. An important turning point occurred in 1979 when scientists established a relationship between the levels of sulphur dioxide emissions generated in Europe and the acidification of the Scandinavian lakes.[5] Studies confirmed the tendency for air pollutants to travel great distances. As a consequence, transboundary issues were revealed to be a serious environmental problem, demanding immediate action and collaboration among the affected countries, resulting in the adoption of the Convention on Long-Range Transboundary Air Pollution later that same year.[6]

B. THE TRANSBOUNDARY ENVIRONMENT IN THE ESCWA REGION

The recent recognition of the transboundary nature of many environmental problems has led an increasing number of Governments to develop crosscutting policies and institutions, such as inter-ministerial

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[3] L. Mastny, and H. French, "Crimes of (a) global nature", *World Watch Magazine*, vol. 15, No. 5 (September/October 2002), p. 13. According to Mastny and French, the United Nations Environment Programme (UNEP) estimates that "there are now more than 500 international treaties and other agreements related to the environment, more than 300 of them negotiated in the last 30 years".

[4] T.M. Parris, "Managing Transboundary Environments", *Environment*, vol. 46, No. 1 (January/February 2004), p. 3. Examples of such agreements include the 1885 Treaty Concerning the Regulation of Salmon Fishery in the Rhine River Basin; the 1889 Convention on United States of America-Mexico International Boundary and Waters; and the 1909 United States of America-Canada Boundary Waters Treaty.

[5] See the Convention on Long-range Transboundary Air Pollution, which is available at: www.unece.org/env/lrtap/lrtap_h1.htm.

[6] This Convention, along with other main transboundary environmental conventions, treaties and protocols is discussed in detail below in the section entitled "The Challenges of Transboundary Governance".

or inter-departmental committees, with the primary duty to mitigate environmental issues in the transboundary context. Given the interconnectedness of environmental issues and their transboundary nature, regional and interregional agreements have been developed to resolve these challenges.

In the ESCWA region, the management of the environment has made significant progress due to the increasing level of environmental commitment shown by member countries over the past three decades.[7] This has been translated into the establishment of new environmental governance systems and the transformation of older ones, including the founding of such regional institutions as the Council of Arab Ministers Responsible for the Environment (CAMRE) and the Joint Committee on Environment and Development in the Arab Region (JCEDAR). However, there remains a substantial need to move beyond the establishment of institutions and policies to the implementation of integrated environmental strategies at both the national and regional levels. While efforts have concentrated on managing natural resources such as air quality and water quantity, and in identifying environmental challenges in various sectors and at national levels, issues of a transboundary nature have not been adequately defined or explored, let alone effectively managed or regulated.

[7] ESCWA, "Governance for sustainable development in the Arab region: Institutions and instruments for moving beyond an environmental management culture" (2003).

II. MAIN TRANSBOUNDARY CHALLENGES IN THE ESCWA REGION

ESCWA member countries share most of their natural resources. With the conservation and protection of freshwater resources a fixed and central priority in the region, especially in the Arabian Peninsula, cooperative efforts and transboundary environmental policy have concentrated on water resources. Additional key challenges in the ESCWA region hinge on the implications of land degradation, food security, the marine environment, hazardous waste and air pollution for the management of transboundary environments. However, these have not hitherto commanded a comparable level of attention.[8]

A. MANAGING SHARED WATER RESOURCES

Water is essentially a political, environmental and development issue. It has dominated the geopolitics of the ESCWA region for centuries. Currently, the region is one of "the most water-stressed regions of the world, with more than 70 million people living in areas under severe water stress".[9] Most of the international bodies of water in the region are not regulated by comprehensive international agreements. There are some agreements, which have adapted the principles of international law to water sharing principles of cooperation, inclusive participation and incentives for mutual gain; however, they are seldom signed by all the riparian States.[10] Moreover, equitable distribution is only one component of the challenge of international water courses; optimal use and ecological protection of river systems or aquifers are other key prerequisites for sustainable water management in the region. The over-exploitation of water resources and their pollution by industrial effluents and agricultural discharges of waste and by-products further bedevil the cross-national implications of water scarcity in ESCWA member countries. It has been predicted that, in the continued absence of effective agreements on the efficient use and management of water resources in the region, the coming years will witness conflicts over water, rather than oil.[11]

In the ESCWA region, water strain started to show in the 1970s with increasing demand due to population growth and economic development, and diminishing availability.[12] However, international water management and protection schemes lack an integrated regional approach, which would require cooperation and communication among co-riparians willing to abide by international water law, invoking such principles as reasonable and equitable utilization, prior notice and negotiation. Constructive cooperation over international waters has involved intergovernmental commissions, as exemplified in Europe by the successful management of the Rhine and the Danube, involving collective recognition of the need to support economic development, water resource protection, and peaceful management of conflicts. In the ESCWA region, by contrast, agreement on water allocation, monitoring, reporting and enforcement mechanisms need to be further addressed. The following section examines the challenges facing international water resources in the ESCWA region (renewable groundwater and surface water resources).

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[8] UNEP, GEO-3 (2002). A particular difficulty emerges with respect to transboundary environmental issues in the ESCWA region, namely, the lack of relevant data and research: the main body of literature relates to international water resources, while information regarding other shared resources remains vague and patchy.

[9] UNEP, GEO-3 (2002).

[10] ESCWA, Federal Institute for Geosciences and Natural Resources, Germany (BGR), Gesellschaft für Technische Zusammenarbeit (GTZ), "Enhancing negotiation skills on international water issues in the ESCWA region" (2003).

[11] Numerous studies have been published in recent years supporting this argument at both the regional and international level, including: G. Bromberg, "Water and peace", *World Watch Magazine* (July/August 2004), pp. 24-30; H. Haftendorn, "Water and international conflict", *Third World Quarterly*, vol. 21, No. 1 (February 2000), pp. 51-68; H.P.W. Toset et al, "Shared rivers and interstate conflict", *Political Geography*, vol. 19 (2000), pp. 971-996.

[12] M.J. Haddadin, "Water issues in the Middle East: Challenges and opportunities", *Water Policy*, vol. 4 (2002), pp. 205-222. According to Haddadin, water strain is the ratio between shortage and water availability, with shortage measured as the difference between requirements and availability.

1. *Rivers*

The major international rivers in the ESCWA region are shared between countries lying both within and beyond the region, and include the following: the Tigris and the Euphrates, both shared by Iraq, the Syrian Arab Republic and Turkey; the Orontes (or Assi), shared by Lebanon, the Syrian Arab Republic and Turkey; the Jordan (including the Yarmouk), shared by Jordan, Lebanon, Palestine and the Syrian Arab Republic; and the Nile, the world's longest river, with nine riparian parties of which only Egypt is an ESCWA member State. Years of effort have yielded the establishment of formal agreements (such as the Nile Basin Initiative) on the management of shared water resources. However, most are partial, ineffective and inequitable in terms of the full spectrum of riparian rights. At the regional and interregional levels, cooperation on water usage and management is heavily affected by prevailing political tensions and ongoing conflicts. The water issue becomes especially vexed when rivers cross the occupied zones in Palestine: the issue is then inevitably perceived as an integral part of the negotiations to resolve the Arab-Israeli conflict.

The main challenges, namely, water allocation and quality monitoring, involve not only the source country, but the entire river, and thus the interests of all riparian countries. The major sources of river and freshwater pollution are the discharges of untreated agricultural, industrial and domestic wastewater into the river streams, in addition to solid wastes. Intensive activities at river docks and the use of herbicides and pesticides further pollute the rivers.[13] At another level, the uncoordinated usage of river water and the implementation of projects in one country will adversely affect the morphology of the river, including the availability and quality of the water in the downstream countries. As such, the storage and diversion of water on international rivers through the construction of dams has long been a source of tension between riparian countries in the ESCWA region.[14] The impact of dams on downstream countries is manifold, where the reduced flows have a significant effect on river ecology, soil fertility and fish abundance, over and above the needs for water for irrigation and human consumption.[15] For instance, hydro-political tensions among the three riparian countries of the Euphrates river, namely, Iraq, the Syrian Arab Republic and Turkey, have existed since the 1960s, and have been revived recently with the establishment of the Southeast Anatolia Development Project (known as the GAP project), which when completed could significantly reduce downstream water quantity and quality.[16] There have been various incidents in recent years, such as when Turkey shut off the flow of the Euphrates River to fill the Ataturk dam in 1990, depriving Iraq and the Syrian Arab Republic of water for some 30 days, almost triggering armed conflict between the countries. Moreover, excessive upstream diversion of water and unregulated water extraction from the Jordan and Yarmouk Rivers, and the uncoordinated exploitation of the natural resources of the Dead Sea, have caused it to shrink to a third of its former size some 50 years ago, thus jeopardizing its ecology and threatening its very existence.[17]

This exploitation of international rivers has been further accentuated in times of war, when inequitable distribution and utterly unwarranted degradation of the quality of shared water resources have been used as a weapon to suppress populations, causing irreversible damage to the transboundary environments in the ESCWA region. In Iraq, the zone where the Euphrates and Tigris meet was drained to suppress an armed conflict. This led to the drying up of natural waterways and ecosystems that had been present for more than a million years. Conflict in the region has also allowed Israel to profit from its military strength and to exploit

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[13] UNEP, GEO-2000.

[14] H.L. Beach et al, *Transboundary Freshwater Dispute Resolution: Theory, Practice and Annotated References* (New York: United Nations University Press, 2000).

[15] The principles of the World Commission on Dams (WCD), which are based on equitable and reasonable utilization, no significant harm, prior information and a focus on benefit-sharing, have yet to be implemented at the regional level in West Asia. Available at: www.dams.org and www.unep-dams.org.

[16] H.L. Beach et al, *Transboundary Freshwater Dispute Resolution: Theory, Practice and Annotated References* (New York: United Nations University Press, 2000), p. 89. The GAP energy and agricultural development aims at constructing 21 dams and 19 hydroelectric plants on both the Tigris and Euphrates.

[17] G. Bromberg, "Water and peace", *World Watch Magazine*, (July/August 2004), pp. 24-30.

most of the waters of the Jordan River, ignoring the rights of Jordanians and Palestinians to use this vital freshwater resource.[18]

2. *Aquifers*

In considering transboundary water management issues, limited attention has so far been given to the issue of aquifers underlying more than one country. This is reflected in the insufficient coverage of the topic in international treaties, except for the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes that specifically includes groundwater. However, there remains no international agreement that deals exclusively with groundwater. Thus, the inclusion of transboundary groundwater within the legal regime governing international water courses is a relatively new issue in international water law.

Aquifers are groundwater systems that are often the only source of fresh water, particularly in regions with arid and semi-arid climatic conditions (as in some ESCWA countries), and represent a vital guarantee of both national and regional water security (see figure I). At the regional level, some cross-national groundwater aquifers are renewable, including the aquifers underlying the border areas between the Syrian Arab Republic and Turkey; Israel and Lebanon; Jordan and the Syrian Arab Republic; Iraq and the Syrian Arab Republic; and Israel and the West Bank.[19] Others are non-renewable aquifers containing fossil water, including the Nubian sandstone aquifer underlying Chad, Egypt and the Libyan Arab Jamahiriya; the basalt aquifer underlying Jordan and Saudi Arabia; and that underlying the Arabian Peninsula shared by Iraq, Jordan and the Syrian Arab Republic. Additional deep non-renewable aquifers underlie Iraq, Kuwait and Saudi Arabia; Jordan and Iraq; and Iraq and the Syrian Arab Republic. Although the water in some of these aquifers is partially sufficient to meet freshwater demand, the quality varies greatly owing to the level of salinity in the shallow renewable aquifers, and in the case of deep non-renewable aquifers, due to the variation in amounts of total dissolved solids (TDS).[20]

On the transboundary level, any disruption or pollution of the aquifer in any of these countries can have a damaging impact on the groundwater resources in the adjacent countries in terms of quantity and/or quality of water. These transboundary implications may not be immediately apparent, but may nevertheless be very hard to reverse. As mentioned above, the lack of regional and international agreements concerning the management of these shared resources, and the lack of appropriate up-to-date equipment and systems that allow the identification of other shared aquifers, further aggravate the situation.

A major challenge to the management of these groundwater resources is pollution resulting from the infiltration of contaminants from sewage, industrial waste, pesticides and other man-made materials. Water pollution is not limited to the introduction of such contaminants: it also includes activities such as over-exploitation—usage in excess of the rate of recharge. This practice, also referred to as groundwater overdraft, is a severe and prevalent problem, especially in the Gulf States. Over-pumping from groundwater reserves is often carried out to meet the demands of population growth, agricultural development and industrial needs. This harms the future viability and productivity of the aquifers and, in coastal areas, may result in the intrusion of seawater into the aquifer as a consequence of the formation of large cones of depression. Thus, the aquifer, a primary source of freshwater, deteriorates with time and water availability is further reduced. As a consequence, such countries as Jordan, Iraq and the Syrian Arab Republic that share what used to be an underground source of fresh water are now faced with the new challenge of finding other water sources. The seriousness of the problem is being felt especially in countries of the Arabian Peninsula, namely, Bahrain, Oman and the United Arab Emirates. Moreover, the mining of mineral resources, the development of dams and other water works projects, and the diversion of rivers from their natural course can also deplete or pollute interconnected groundwater aquifers.[21]

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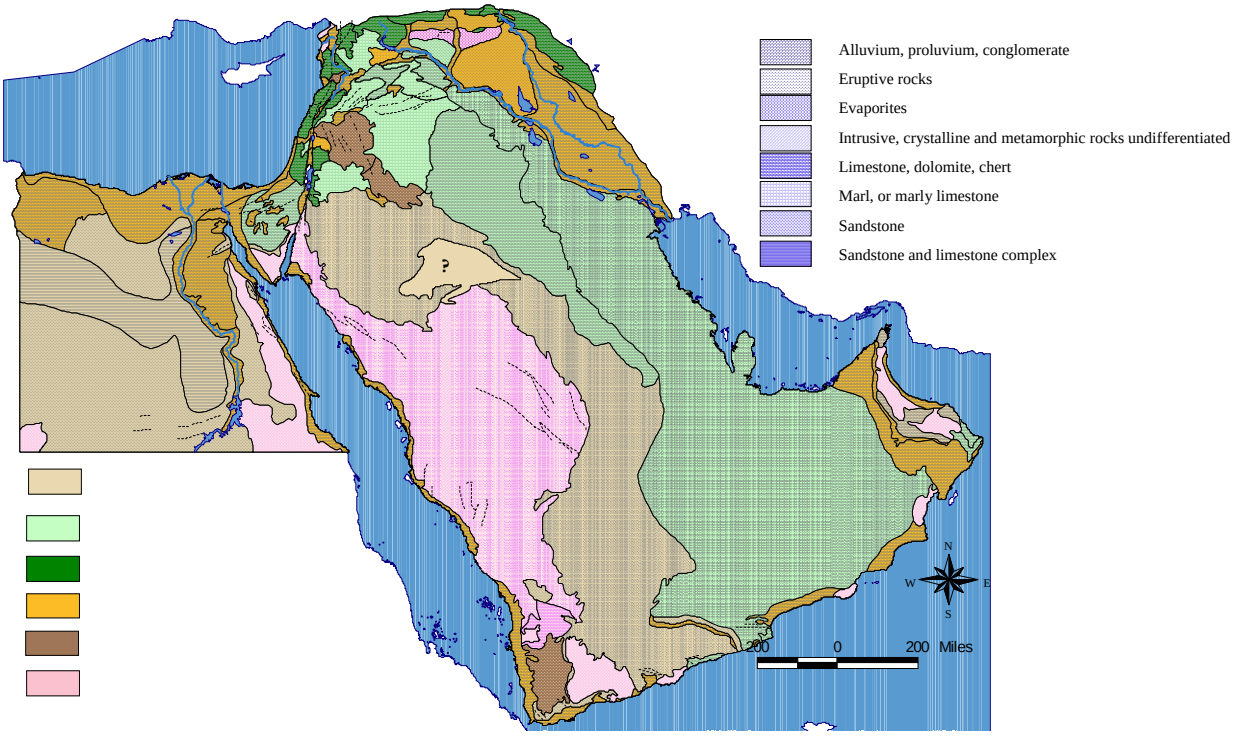
[18] N. Saab, "Wars over waters over oil" (in Arabic), *Environment and Development*, vol. 8, No. 60 (2003), pp. 12-13.

[19] M.J. Haddadin, "Water issues in the Middle East: Challenges and opportunities", Water Policy, vol. 4 (2002), p. 206.

[20] ESCWA, 1998. "Transboundary water resources in the ESCWA region: utilization, management and cooperation" (1998), p. 12.

[21] ESCWA, "Transboundary Aquifer Resources Management Programme: summary note" (2000).

Figure I. Map of groundwater resources in the ESCWA region



Extensive sedimentary basins with relatively high productivity of essentially fossil groundwater of acceptable quality (mainly sandstones of Cretaceous or older ages)

Extensive sedimentary basins with generally high but variable productivity of essentially fossil groundwater with potential for significant Salinization (mainly carbonates of Cretaceous-Paleogene ages)

Local or discontinuous sedimentary basins limited mostly to mountainous areas containing renewable good quality groundwater, with variable productivity and commonly discharging as springs (mainly karstic carbonates of Cretaceous to Miocene ages)

Local or discontinuous sedimentary/alluvial basins limited mostly to the vicinity of tectonically active zones containing renewable groundwater, with variable productivity and high potential for salinization (Miocene to Quaternary in age)

Local or discontinuous volcanic basins related to the Red Sea-Dead Sea rift system containing renewable groundwater, with variable productivity and high potential for salinization (Miocene to Quaternary in age)

Localized zones in crystalline rocks and/or overlying sedimentary formations with no groundwater or very limited yields of groundwater of variable quality (intrusive and evaporitic rocks)

In response, and in accordance with the mandate of ESCWA to promote regional and sub-regional cooperation, ESCWA conducted a regional project from 1994 to 1995 that aimed to improve the state of knowledge of water resources in the region through the application of modern techniques, namely, the use of remote sensing and Geographical Information Systems (GIS). Completed in 1996, the project included a regional assessment of surface and groundwater sources and the formulation of water strategies with an emphasis on international water resources, with maps produced to show groundwater flow pattern, water quality, aquifer boundaries, existing development areas and potential areas for future development.[22] With the assistance of this study, it is hoped that more aquifers will be identified, and that transboundary pollution or damage will be inhibited.

[22] ESCWA, 1998. "Transboundary water resources in the ESCWA region: utilization, management and cooperation" (1998), p. 22.

B. TRANSBOUNDARY MARINE ENVIRONMENTS AND COASTAL ZONES

Many countries in the ESCWA region share a common marine environment: Lebanon, Palestine and the Syrian Arab Republic share the Mediterranean Sea; the Arabian Gulf is shared by Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates; and Egypt, Jordan, Palestine, Saudi Arabia, and Yemen share the Red Sea. The challenges that face coastal and marine environments are caused by increasing pressures on both terrestrial and marine natural resources, and include indiscriminate dumping at sea; fishing practices and over-exploitation of fishing resources; oil spillage and discharge of land-based effluents; and habitat destruction through alteration of coastal zones by land-filling, land reclamation and dredging.

1. *Marine pollution: waste, oil spills and industrial effluent discharges*

The marine environment of the ESCWA region has been subjected to pressures from unprecedented rates of urban and industrial growth. Estimates based on 1995 population figures suggest that almost 39 per cent of the population in the region lives within 100 kilometres of coast.[23] This has had detrimental effects on the environment in the form of substantial marine pollution, accentuated by the lack of stringent environmental laws, and specifically waste disposal regulations in ESCWA member countries. Haphazard and direct deposits of untreated waste and sewage remain the largest source of contamination, by volume, of the marine coastal environment. Other sources of pollution are indiscriminately dumped toxic and industrial wastes, as well as the seepage of toxic substances, further endangering the marine ecosystem. On the transboundary scale, the most severe problems of marine pollution involve the carriage and dispersal by wind and wave movement of such pollutants as oil spills. The mitigating effect of dispersal will depend on the toxicity of the waste (the nature of the pollutants and the concentration initially discharged). The Arabian Gulf, for example, is a land-locked, relatively shallow body of water with a circulation pattern that, although not dominated by wind-driven flow, permits pollutants to drift from the coastal waters of one country to another. This circulation pattern enabled the Gulf ecosystem to recover from the release of millions of barrels of crude oil from al-Neiruz oilfield during the Iran-Iraq war. However this same pattern caused oil spills during the invasion of Kuwait to travel as far as the Gulf of Oman.[24]

Other major contributing factors to marine pollution, especially in the Gulf States, are oil spills and the disposal of oil-contaminated water and sludge into the marine environment, whether following an accident or deliberate direct discharge from oil tankers or pipelines. According to the Global Environment Outlook, published by the United Nations Environment Programme (UNEP) in 2000, some 1.2 million barrels of oil are spilled each year in the Arabian Gulf.[25] The two Gulf wars in the region have further contributed to the increased release of oil and of oil by-products into the marine ecosystem, and to the physical and ecological destruction of the coastal environments of the Shatt al-Arab.[26] With regard to marine pollution, the evident consequences are manifested in the permanent oil spots in the sea, sand and shore pollution, reduction in fish stocks and aquatic organisms, contamination of sea products and their related effects on public health in the ESCWA region.

Additionally, the challenge to meet the demand for freshwater in the ESCWA region has led to the investigation and implementation of non-conventional methods of obtaining freshwater. Considerable progress in desalination technology has been achieved in the member countries of the Gulf Cooperation Council (GCC), which was established in 1981 and comprises Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates). These countries account for more than half of the world's production capacity, with approximately 1.5 billion cubic metres of freshwater generated annually by desalination of sea or

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[23] UNEP/ROWA, *GEO-3 Technical Report*, (2002), which is available at: www.unep.org.bh/MARINE.htm.

[24] H. Khordagui, "Comments on current environmental events in Kuwait", *Environmental Management*, vol. 15, No. 4 (1991), pp. 445-459.

[25] UNEP, GEO-2000.

[26] UNEP/ROWA, *GEO-3 Technical Report*, (2002), which is available at: www.unep.org.bh/MARINE.htm.

brackish waters.[27] However, such alternative water resource activities rely on energy-intensive thermal desalination plants that are mainly located along the coasts, and that cause severe pollution due to increased emissions, causing acid rain deposits in other downwind countries.[28]

2. *Sea transport: dumping at sea, ballast water and littering*

The seas of the ESCWA region include some of the busiest in the world, rendering the marine environment susceptible to pollution from a variety of sources. More than 30 per cent of the world's oil tankers travel through the Arabian Gulf en route to and from the oil terminals on the Gulf coast where crude oil and petroleum products are loaded.[29] Moreover, in the ESCWA region, the production per capita of hazardous waste is among the highest in the world on account of the types of industry present, in particular the chemical and petrochemical industries.[30] Accidental oil spills and ship-source pollution also remain a great threat, especially when shipments being transported consist of hazardous chemicals and toxic waste en route to proper disposal (see figure II). However, the most flagrant harm to transboundary marine environments in the region is caused by the deliberate, illegal and completely unregulated dumping at sea of common waste materials generated by sea fleets. This includes cargo residues, waste discharges of commercial ships and passenger vessels, tank washings and oil sludge, and waste oil. Moreover, as ships travel to and from seaports, ballast water stored in the hulls of oil tankers is discharged illegally, transferring with it organisms from foreign ports, which presents a threat to local biodiversity and fish populations.[31] While ballast water is essential for safe shipping, it poses serious ecological, economic and health threats. Given the serious safety concerns regarding the current practice of reballasting at sea and the related unknown environmental impact, there is ongoing global consideration of various approaches and techniques to limit the introduction of invasive species through better regulation of ballast water discharges. These global efforts have yet to take effect in the region.[32]

The indiscriminate dumping at sea that causes regular pollution either occurs because of lack of storage or treatment capacity onboard vessels, or to avoid the high cost of disposal on land. Another factor is the absence of adequate reception facilities in seaports in the ESCWA region. For that purpose, several member countries, first Oman, then all the other GCC member countries, agreed to ratify the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), which governs the protection of the marine environment, regulates the disposal of garbage and other pollutants at sea, and entails the establishment of adequate and proper reception facilities in seaports.[33]

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[27] UNEP, *GEO-3 Technical Report* (2002).

[28] More information is available at: www.unep.org.bh/freshwat.htm.

[29] UNEP, GEO-2000.

[30] UNEP, GEO-3 (2002).

[31] L.M. Hraster, "Two if by sea: Invasive species are changing the ocean environment", *E: the Environment Magazine*, vol. 13, Issue 3 (May/June 2002), p. 18.

[32] Reballasting involves vessels emptying their ballast tank at sea and refilling them with mid-ocean sea water, in theory washing out bacteria, plants and animals imported from foreign ports. According to the International Maritime Organization (IMO), several treatment technology options may replace reballasting as safer, more cost-effective, successful, and environmentally friendly practices. http://globallast.imo.org/index.asp?page=ballastw_treatm.htm&menu=true. See also K. Christen, "Environmentalists, water agencies seek stricter controls on ballast water discharges", *Environmental Science & Technology*, vol. 33, Issue 7 (1 April 1999), pp. 151-152.

[33] More information on the MARPOL Convention is available at: www.imo.org/home.asp.

Figure II. Booms for containing an oil spill

3. *Marine life: fishing and drifting fishnets*

The problem of illegal, unreported and unregulated fishing (IUU fishing) is growing globally in scope and intensity, and especially in the ESCWA region in the absence of agreements to regulate fishing activities. IUU fishing includes operating without licences; targeting and catching prohibited species or continuing to fish during prohibited periods set aside to preserve stocks; using outlawed types of gear or fishing techniques; disregarding catch quotas; or non-reporting or under-reporting of species and catch weights. The effects of this over-exploitation of the world's fish resources on marine ecosystems are considerable given that fishing does much more than simply remove the targeted species. It affects the whole ecological balance of transboundary marine environments and also threatens the livelihood of coastal communities that rely heavily on trade in fish and seafood consumption.[34] Consequently, the decline in marine fisheries production and increased prices result in low per capita consumption, especially among the poor and the fishing communities in the ESCWA region that sustain the industry. Moreover, treaties to regulate over-fishing generally require the nation where a ship is registered to enforce the terms of agreement. This has given way to the global tendency of commercial fishers to register their ships with countries that are unable or unwilling to enforce such treaties. This syndrome of flag-of-convenience (FOC) vessels has therefore become widespread, and includes one-tenth of the world's fishing fleet, thereby constituting a further threat to the depletion of fish-stocks worldwide.[35]

The effects of over-fishing on the marine environment in the ESCWA region are further accentuated by the increased level of pollution from waste, wastewater and oil spills, causing not only a decline in the quantity and quality of marine resources, but also an increase in the distribution and frequency of red tides and associated fish kills in the coastal region of some ESCWA member countries. Such incidents have caused the collective death of fish as well as mammals, reptiles and birds, having occurred repeatedly on the eastern coast of Qatar and Saudi Arabia, and in the Arabian Gulf, specifically in Bahrain, Kuwait, Oman,

[34] Food and Agriculture Organization (FAO), "The conservation and management of shared fish stocks: legal and economic aspects", *FAO Fisheries Technical Paper*, No. 465 (2004), which is available: www.fao.org/docrep/007/y5438e/y5438e00.htm.

[35] L. Mastny, and H. French, "Crimes of (a) global nature", *World Watch Magazine*, vol. 15, No. 5 (September/October 2002), p. 20.

Qatar, Saudi Arabia and United Arab Emirates.[36] The most recent catastrophe occurred in August and September 2001, when 3,000 tons of dead fish floated on the surface of Kuwaiti waters. At the time, several possible reasons emerged, ranging from the discharge of wastewater to oil pollution, increased water temperatures due to the high level of pollution, and the streptococcus bacteria. However, the exact cause remains either unknown or concealed.

Meanwhile, long-term, low-level marine contamination sets up critical pathways by which pollutants, including trace metals and polynuclear aromatic hydrocarbons (PNAH), endanger ecosystems and human health. The hazards are global in scope due primarily to the long-range transport of such pollutants through the migration of fish species through international waters, thereby dispersing the effects from contamination source to ecosystem to marine life and consumers across regions. Environmental mercury levels, for example, have increased considerably globally, with high concentrations reaching the aquatic food chain (fish and marine mammals) and coastal human populations, which in the ESCWA region are especially susceptible through their diet.[37] Although mercury levels were not considered alarming a decade ago in some ESCWA member countries, they are now recognized as a significant regional challenge. However, continuous monitoring of fish quality and awareness-raising of the hazards of industrial pollution discharges into the marine environment remain a challenge.[38] Moreover, marine ecosystems in the ESCWA region also include vast coastal areas and mudflats, mangrove swamps, sea grass and coral reefs. The region contains eight per cent of the world's mapped coral reefs, but the majority are deteriorating and are classified as at risk from over-fishing and oil spills.[39]

Another severe threat to marine life takes the form of fishnets that drift from one country to another and on to coastlines owing to negligence or accidents at sea (see figure III). This leads to the deaths of certain marine species, especially large mammals that become entangled in them. Given that such issues as fishing net specifications (length of net and mesh sizes) remain unregulated in the ESCWA region and in international waters alike, alternative methods are being sought to overcome the threats. These include experimental techniques that spread audio waves of a specific frequency in the water in order to deter marine life from fishnets. If proven to be harmless to mammals and marine ecology, this could be promoted regionally as a low cost solution to the problem. It is accepted worldwide that fisheries have a serious effect on the marine mammal population, primarily through interactions that are operational in nature, including entanglement of mammals in fishing gear or accidental killing of marine mammals in fishing operations, but solutions are still a matter of contention (see figure IV).[40]

The increase in marine litter from sea and land-based sources constitutes another threat to marine wildlife through entanglement or ingestion. At the regional level, the increasing production and use of plastic in the Arabian Gulf of the ESCWA region, combined with inadequate waste disposal practices, have heavily polluted the west coast with sea-borne industrial plastics originating from manufacturing plants in neighbouring countries (see figure V).[41] The impact of this pollution on the transboundary marine environment is further accentuated by the land-locked nature and hydraulic pattern of the Arabian Gulf.

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[36] UNEP/ROWA, *GEO-3 Technical Report*, (2002), which is available at: www.unep.org.bh/MARINE.htm. For more detailed reporting, see R. Haddad, "The secret to the collective death of fish in the Kuwait Sea" (in Arabic), *Environment and Development*, vol. 6, No. 43 (October 2001), pp. 18-23; and M.A. Jerjis, "Collective death of fish in the Arabian Gulf" (in Arabic), *Environment and Development*, vol. 6, No. 43 (October 2001).

[37] UNEP, *Global Mercury Assessment*, which is available at: www.chem.unep.ch/mercury/Report/Key-findings.htm.

[38] H. Khordagui, "Mercury in seafood: A preliminary risk assessment for Kuwaiti consumers", *Environment International*, vol. 17 (1991), pp. 429-434. See also the Regional Awareness-raising Workshop on Mercury Pollution – a Global Problem that Needs to be Addressed (Beirut, 11-14 October 2004), which was organized within the framework of UNEP Mercury Programme and whose salient details are available at: www.chem.unep.ch/mercury/WS-Beirut-Oct04.htm.

[39] UNEP, GEO-2000.

[40] FAO, "An updated world review of interactions between marine mammals and fisheries", *FAO Fisheries Technical Paper*, No. 251, Supplement 1 (1991), which is available at: www.fao.org/DOCREP/003/T0452E/T0452E00.htm.

[41] H.K. Khordagui and A.H. Abu-Hilal, "Industrial plastic on the southern beaches of the Arabian Gulf and the western beaches of the Gulf of Oman", *Environmental Pollution*, (1994), pp. 325-327.

In the transboundary context of the ESCWA region, concern is if anything heightened by the dearth of information or statistics on the damage inflicted on the marine populations. There can be no doubt that the conservation and management of shared fish stocks in the ESCWA region is hampered by over-exploitation and pollution of marine life. The damage to the marine habitat and environment has consequences at the transboundary level ranging from falling quantities of sea products, to marine life contamination and extinction, to the destruction of coral reefs, to socio-economic repercussions affecting the sustainability of coastal populations in neighbouring countries.

Figure III. Drifting fishnets on the shores of the Arabian Gulf

Figure IV. Slaughtered sea turtles on the shores of the Arabian Gulf

Figure V. Industrial plastics litter the coastal marine environment of the Arabian Gulf

C. TRANSBOUNDARY AIR POLLUTION

The major difficulty in controlling air pollution is the fact that it cannot be contained or confined to any national or regional boundary. It is strongly affected by meteorological factors which can attenuate the effects of air pollution in one region and intensify it in another, often not the source country. It is in the nature of air pollution that it is produced locally but takes its toll at the local, regional and even global level. The transboundary effect can only be mitigated through the application of stringent control policies at source point.

Transboundary air pollution in the ESCWA region has increased drastically over the past 50 years, as yet another consequence of population growth and socio-economic development, especially in cities of more than one million inhabitants, including Baghdad, Beirut, Cairo and Damascus.[42] The increased number of vehicles, power production and industrial facilities, compounded with dust and sandstorms and the predominant warm climate in certain countries of the region, have all contributed to the uncontrolled release of air pollutants. In the absence of strict laws and regulations, the level of air pollution has, more often than not, exceeded permissible international levels.

1. *Emission of air pollutants*

Efforts at the global level to decrease or at least stabilize air pollutant emissions have had some success since the introduction of stricter environmental regulations and enforcement policies, beginning in the 1970s. Regionally, in the member countries of ESCWA, socio-economic development, population growth and the development of the oil industry have led to increased use of heavy fuels for power generation, cement production, oil refining and desalination of water. In addition, the electrical power sector is dominated by thermal electricity generation, which contributes heavily to the emission of Green House Gases (GHGs).[43] Although ESCWA countries differ in their level of industrialization, the lack of environmental regulations has permitted the survival of outdated industrial installations responsible for much of the air pollution. There has to date been only limited introduction of the cleaner technologies which reflect the global shift from end-of-pipe solutions to more pro-active preventive measures, especially in the power generation and transport sectors. This slow progress is unfortunately in keeping with the incremental development of mechanisms and applications regionally.[44] However, it should be noted that in the electricity

[42] UNEP, GEO-2000.

[43] ESCWA, "Options and opportunities for greenhouse gas abatement in the energy sector of the ESCWA region: Volume II – The power sector (2001).

[44] UNEP, GEO-3 (2002).

sector remarkable progress has been achieved towards reducing emissions through the increased use of natural gas, installation of larger generating units and the rehabilitation of aged power plants.[45]

Air contamination in the ESCWA region is also attributed to the transport sector, with its reliance on vehicular transportation, especially in urban areas and during heavy traffic congestion (see figure VII). Road transport in the ESCWA region, with Saudi Arabia representing 44.9 per cent of the regional volume, causes a variety of environmental and health impacts.[46] Although the use of natural gas in the transport sector has increased, the pollution is aggravated by such regional trends as high rates of private vehicle ownership, which reached 2.2 and 1.9 persons per vehicle in Lebanon and Kuwait, respectively; and ageing of vehicle fleets (in Egypt, for example, 65 per cent of cars are at least 10 years old and 25 per cent are more than 20 years old). However, a reduction in emitted pollutants is expected as a result of regional efforts to apply traffic strategies and fuel regulations in most ESCWA countries.

Meanwhile, another form of fossil fuel combustion results in aircraft engine emissions, mostly released at altitude and, given the transboundary nature of air pollution, impacting local and regional air quality at ground level over huge areas. Air traffic is increasing in the ESCWA region, which is considered a major air transit route. The fleets that operate exclusively within it do not all meet mandatory aircraft engine certification standards, and therefore do not all abide by the international environmental protection standards governing aircraft emissions and the improvement of air traffic management systems.[47] However, as in the road transport sector, efforts to modernize air fleets in the region will ultimately serve to reduce the contribution of the transport sector in the ESCWA countries to regional air pollution.

Figure VI. Air pollution from cement industries constitutes a major contributor to global warming

Source: www.healthandenergy.com/coal.htm.

[45] ESCWA, "Options and opportunities for greenhouse gas abatement in the energy sector of the ESCWA region: Volume II – The power sector (2001).

[46] ESCWA, "Options and opportunities for greenhouse gas abatement in the energy sector of the ESCWA region: Volume I – The transport sector (2001), p. 3.

[47] See the International Civil Aviation Organization, which is available at: www.icao.int//icao/en/env/index.htm; and F. Shaaban, "Air pollution from vehicles in the Arab world", *Environment and Development*, vol. 9, No. 78 (September 2004), pp. 18-23.

Figure VII. Air pollution caused by a traffic jam

2. *Climate change*

The long-range transport of air pollutants contributes to global warming. In ecosystems already beleaguered by increasing resource demands, unsustainable practices and environmental pollution, as in the ESCWA region, the additional environmental stress caused by global warming becomes highly problematic. Although GHG emissions are mostly produced by industrialized economies, their transboundary effects are unevenly distributed among countries and regions. The power and transport sectors of the ESCWA region release large amounts of GHGs into the atmosphere, a problem aggravated by unsustainable energy consumption patterns.[48] Emissions of GHGs, other pollutants and ozone depleting substances have adverse transboundary environmental impacts at the regional and global level on natural resources (air, water and land), as well as impacts on global warming, especially through the release of carbon dioxide (CO_2). Accordingly, even though on a global comparative scale, the ESCWA region generates the lowest volume of emissions, the consequences of global warming affect it directly, not so much because of its own regional and interregional level of emissions, but because of the transboundary effect.[49]

3. *Acid rain*

The current levels of air pollutants from various emission sources in the ESCWA region also contribute to the environmental problem of acidification. This refers to the phenomenon associated with the transformation of gas emissions into acidic compounds which are transported across regions through the atmosphere and deposited on aquatic resources and terrestrial ecosystems. In fact, due to the high level of sulphur in fuel oil used in power production, emissions contribute not only to acid rain, but also to two other major environmental problems, namely: urban ozone and global climate change. As such, the environmental implications of air pollution transcend the transboundary context of the ESCWA region and affect the whole globe.[50] Across the world, recognition of the gravity of the issue has led to intensified efforts to clean the air in order to reduce the acidification of lakes, as well as the damage to forests, wildlife and human heath. Acid rain has been high on the environmental agenda for several decades, primarily in North America, Western Europe and industrialized countries in other regions. The core issue remains the intensification of preventive measures to control emissions.

[48] ESCWA, "Options and opportunities for greenhouse gas abatement in the energy sector of the ESCWA region: Volume I – The transport sector (2001), p. 3.

[49] According to the GEO-3, a modest 187 million tons of carbon are generated annually in the ESCWA region, compared to the world total of 6,234 million tons.

[50] ESCWA, "Options and opportunities for greenhouse gas abatement in the energy sector of the ESCWA region: Volume II – The power sector (2001).

4. *Sporadic episodes of air pollution*

The recurrence of armed conflict in the region in recent decades has further aggravated transboundary air pollution, as elaborated in this study. Explosives and fires have caused the air-borne dispersal of particulates, drastically increasing the pollution load. The fires in the oilfields of Kuwait during the Gulf wars, for example, produced black smoke that affected the air quality in the whole region and jeopardized the health of many individuals.

Other forms of air pollution have emerged lately in the region, as testified by the increase in incidents such as the Black Cloud, first encountered in Egypt in 1999.[51] Many factors contributed to its formation; politicians blamed farmers for burning rice straw and other agricultural waste during the harvest period, and scientists blamed emissions in excess of air pollution standards. The main culprit remained air pollution from uncontrolled car emissions. This was compounded by the combustion of domestic and municipal solid waste; industrial activities that failed to comply with environmental standards; and the burning of agricultural by-products. The regional impact of such a transboundary environmental problem is comparable to the experience in South East Asia of the Black Haze episode. This was the result of the intentional open burning of forests, compounded by high rates of air pollution from the transport and industrial sectors, as well as land clearing and deforestation beyond the borders of these countries.[52] Intensified by causally unrelated meteorological factors, the transboundary haze pollution problem had severe environmental ramifications in the countries of the affected region, including prolonged dry seasons and increased forest fires.

D. LAND MANAGEMENT

The terrestrial environment of the ESCWA region presents a diversity of ecosystems, ranging from forests in the north to sub-tropical mountainous vegetation in the south and south-west, to vast deserts between the northern and southern parts of the region. While the severity of land degradation varies from one sub-region to the other, the causes of this degradation are the same. Among the main factors that contribute to this land degradation are pressures on land resources to increase food production, urban agglomeration, exposure to wind and water erosion, exploitation of land resources through over-grazing and forest clearance, and mismanagement of solid wastes.

In the ESCWA region, misguided and short-sighted environmental policies have resulted in damage to ecologies. A singularly egregious example is the marshlands of south Iraq, of which approximately seven per cent remained by early 2003 after decades of devastation through a policy of drainage and diversion.[53] The environmental consequences of drying these marshlands produced significant changes in the ecology of the Gulf extending beyond the political boundaries of Iraq. The re-flooding of the marshes could only be achieved through negotiations with all other riparian countries of the Tigris and Euphrates Rivers, to re-supply the water needed to restore and maintain the marshes, and thus to enable the repatriation of the 40,000 former residents. Substantial, if not complete, ecological recovery has been achieved to date, but serious environmental stresses and degradation remain a challenge.

1. *Biodiversity loss, deforestation and desertification*

Decreased biological diversity of terrestrial species is mainly attributed to habitat loss as a consequence of increased developmental projects, heavy pollution and lost vegetation cover. Overall, a very modest 4.4 per cent of the land in the ESCWA region is not exposed to a high risk of desertification.[54] The

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[51] A black cloud blackened the skies of Egypt, and continues to do so, especially during the months of October and November every year. “Cairo’s black cloud: many names for one catastrophe” (in Arabic), *Environment and Development*, vol. 8, No. 58, (January 2003), pp. 30-31.

[52] E. Quah, “Transboundary pollution in Southeast Asia: the indonesian fires”, *World Development*, vol. 30, No. 3 (2002), pp. 429-441.

[53] UNEP, *GEO Year Book: An Overview of Our Changing Environment 2004/5. West Asia*, (2005), p. 39.

[54] UNEP, GEO-2000.

main challenges relate to population and economic pressures that not only sacrifice fertile land to rapid urbanization, industrial installations and transportation infrastructure, but also consume the declining natural resource base. The vicious cycle is further accentuated by the prevalence of various forms of wind erosion in the ESCWA region, coupled with water erosion, amounting to substantial annual soil loss in the mountainous areas and deforested hill slopes.[55] In addition, poor irrigation techniques have depleted groundwater resources and have led to land degradation. Moreover, like the environment itself, certain local tribal communities pay no heed to political borders, allowing their herds to overgraze both within and beyond the borders of their home countries. Overgrazing exposes the loose soil and contributes to the formation of moving sand dunes, which encroach on installations and agricultural land, leading to more frequent dust storms in the Gulf sub-region. The moving sand dunes and dust storms, known locally as *tooz*, are recognized environmentally for their transboundary nature.

From a transboundary perspective, loss of vegetation cover in the region contributes to climate change and global warming, and disturbs underlying aquifers. Natural forests that used to cover most of the northern territories of the region have been exposed to a long history of over-exploitation due to the increased demand on land resources in the form of land clearing, fires, quarrying and mining, and tourism that have destroyed the forests and their habitats. Fortunately, most countries in the ESCWA region have formulated national action plans to combat desertification, including reforestation programmes and the updating of farming and irrigation techniques.

In the past, the people of the region devised indigenous technologies to protect the rangelands and to mitigate the effects of desertification and drought. This unique land management process, designed to conserve natural resource and known as Al-hema, Hamiyah and Sann systems, allocated protected areas for grazing during drought seasons, provided for a sustainable use of natural resources and banned hunting during certain times of the year, thereby protecting biodiversity. In more recent years, protected areas and parks have been established in all parts of the region. Over the past two decades these have steadily increased in size and in quantity (from only 10 protected areas in 1970 to 54 in 2002).[56] Although the network of protected areas is characterized by various discrepancies in legislation and management, it nevertheless has the potential to lead to the reinforcement of transboundary biodiversity protection.

New industries, including nature-based tourism and eco-tourism, have also been introduced in the region. However, given the economic drive behind eco-tourism, it could, in the absence of effective regional supervision, lead to the degradation of the very natural resources and habitats upon which it depends.[57] The organization of desert tours for tourism or hunting purposes has affected the fragile desert environment in many ESCWA member countries and threatens some migrating species with extinction. Eco-tourism has caused the disturbance of the nesting and resting habitat of migrating species of birds in the region, thus placing further pressures on the transboundary conservation and protection efforts. Furthermore, eco-tourism has encroached on regional marine parks with transboundary environmental impacts on the rare and already endangered marine species, coral reefs, seagrass and mangroves.

Under the terms of the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the trafficking of threatened species is illegal. Although most countries of the ESCWA region have ratified the Convention, the transboundary trade in wildlife continues, as does the flouting of hunting laws that periodically protect endangered species. These problems can be attributed to a lack of political will, funding or equipment to monitor effectively the region's wildlife. However, the use of trade sanctions has worked well in persuading countries to uphold their responsibilities under CITES. The illicit trade in falcons in the United Arab Emirates, for example, led to sanctions that were lifted as soon as the

[55] UNEP, GEO-3 (2002).

[56] These are predominantly in the Arabian Peninsula, which has 35 of the region's protected areas. UNEP, *GEO-3 Technical Report* (2002).

[57] O.A. Llewellyn, "The WCPA regional action plan and project proposal for North Africa and the Middle East", *PARKS: The International Journal for Protected Area Managers*, vol. 10, No. 1 (February 2000), pp. 2-10. See also articles in the same journal by P.J. Seddon, F. Abu-Izzedin, S.A. Mohammad, and K. Irani and C. Johnson.

Government strengthened legislation and enforcement.[58] On a more positive note, the decision taken during the GCC summit held in Kuwait in December 1997 to adopt a by-law to protect and develop wildlife in GCC member countries has resulted in the successful protection of an endangered species, namely, the Arabian oryx, and its re-introduction into the wild in reserves and parks across the region.[59]

2. *Waste disposal along border areas*

Wastes and by-products of manufacturing processes create refuse in such quantities that safe disposal—with minimal risk to human health and the environment—poses a formidable challenge. In the absence of regulation of the disposal and management of solid waste in the ESCWA region, haphazard dumping has continued unchecked, especially in remote areas near international borders. Although sanitary landfills are used, especially in some GCC member countries, open dumping and burning are still common, especially in rural districts where municipalities lack the capacity to regulate inappropriate waste disposal. Inadequate waste collection and disposal systems cause serious hazards to the environment. Solid waste generates gases and leachate that percolates into the ground, particularly during thunderstorms and flash floods, transporting with it all the contaminants and heavy metals into the soil and water tables. As discussed above, this pollution of underlying groundwater further accentuates the problem of water scarcity in the ESCWA region by contaminating shared water resources.

At a regional level, industrial activities constitute major generators of hazardous waste and lack proper infrastructure, especially for waste disposal. While the quantity of hazardous waste generated regionally is limited, it is estimated that oil-producing countries generate two to eight times more hazardous waste per capita than the United States of America.[60] Current regional conflicts have further exposed the problem of transboundary waste management, as highlighted in the situations that have emerged between Palestine and Israel. The latter disposes its wastes, including toxic waste, into the Palestinian territories, threatening not only the environment but also the health of local residents. In that context, a full report was prepared by UNEP regarding the state of the environment in Palestine and Israel, identifying the major common issues, particularly the issue of waste disposal and handling.[61]

3. *Urbanization: landfill and reclamation*

In each country in the ESCWA region, urbanization is concentrated in one or two cities, where new investment, industry, employment opportunities, education and health services flourish. Urban growth has been more rapid in the GCC member countries. In Kuwait, 97 per cent of the population was urban in 1995, and the other member countries not much less urbanized.[62] Throughout the region, these urban centres have expanded and encroached on agricultural land, forest and coastal areas. In an effort to expand coastal cities in the region, land reclamation has become an extremely prevalent means of extending coastlines to create new land for development. In the name of real-estate development, this remaking of the geography of the coastal zones has imposed a heavy toll on the environment, primarily through pollution and destruction of the marine and terrestrial ecosystems and habitats. Furthermore, these artificial extensions are often built out of construction debris and waste, which present risks if not properly handled. Implications of a transboundary nature apply especially to the marine environments of ESCWA member countries. The proximity and contiguity of these environments, and the water circulation pattern near the shore, could easily conspire with the sheer scale of reclamation projects to inflict significant ecological damage and stresses on the coastal environments of several neighbouring countries.

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[58] L. Mastny, and H. French, "Crimes of (a) global nature", *World Watch Magazine*, vol. 15, No. 5 (September/October 2002), pp. 12-22; and the "Summary Record" of the Consultative Meeting on Trade in Falcons for Falconry (Abu Dhabi, 16-19 May 2004) which is available at: www.cites.org/eng/prog/falcon.shtml.

[59] UNEP, GEO-2000.

[60] Ibid.

[61] UNEP, "Desk study on the environment in the Occupied Palestinian Territories" (2003) which is available at: www.unep.org/Documents.Multilingual/Default.asp?DocumentID=67.

[62] UNEP, GEO-2000.

E. IMPACT OF WARS AND POLITICAL INSTABILITY

A distinctive type of transboundary environmental challenge in the ESCWA region is armed conflict. Not only has the environment suffered as an incidental victim, it has also been used, or rather abused, as a weapon of destruction. On the one hand, in the fight over natural resources, the environment has been at the centre of tensions between neighbouring countries, often culminating in armed conflict. On the other hand, those very same hostilities have given rise to irreversible damage to the natural ecosystems through deliberate military actions, with consequences for the whole region. Global efforts to promote environmental peacemaking, which focuses on the environment as an opportunity to bring nations closer together to overcome transboundary problems as well as military conflicts, provide approaches for addressing these issues in the ESCWA region, but have remained limited to date.[63]

For the past four decades, the ESCWA region has suffered numerous wars at both the national and regional levels in the form of internal conflicts, occupations and invasions. The combined impact of wartime environmental damage and pre-war chronic pollution and environmental stresses has had devastating repercussions on the region, both direct and indirect.

1. *Direct environmental harm*

In recent years the region has witnessed unprecedented levels of environmental damage to the marine and terrestrial ecosystems in the aftermath of various wars. These conflicts pale into relative insignificance compared to the 1991 war in Kuwait, which resulted in oil spills contaminating 1,500 kilometers of the Gulf coast.[64] The 60 million barrels of oil released in the desert during that war formed 246 oil lakes of thick toxic sludge composed of sand mixed with oil and seawater. Not all the oil-soaked areas were subsequently rehabilitated. Five per cent of the oil persists in oil lakes which continue to pollute the desert soil and pose a grave threat of contamination of already scarce groundwater resources. At least one groundwater aquifer, representing 40 per cent of the freshwater reserve of Kuwait, is already deemed contaminated,[65] while the long-term impacts on fisheries and the marine environment have yet to be assessed.[66] That war imposed additional stress on the marine environment, especially in the Arabian Gulf, where refineries, oil terminals, storage facilities, offshore oil fields and tankers were deliberately targeted. The resulting oil spills not only affected coastlines, coral reefs, fisheries, sea turtles and sea birds, but also threatened to drift towards numerous power and desalination plants along the southern coasts of the Arabian Peninsula, and thus infiltrate the main source of drinking water in Qatar, Saudi Arabia, and other GCC member countries.[67]

The implications of war damage for the environment in Kuwait and the whole Gulf region took several other forms as well, including air and marine pollution, land surface disruption, erosion and contamination.[68] The deliberate torching of oilfields, oil wells and facilities cast a cloud of pollution that first covered the country, then gradually the whole region, spreading a toxic micro-layer of oily film on the sea surface (see figure VIII). The black smoke also blocked the sunlight, thereby lowering air and sea temperatures, with a drop of 10 degrees recorded in Kuwait and northern Saudi Arabia. Therefore, the environmental impact of atmospheric deposits, including smoke particle fallout, on neighbouring and down-wind countries in the

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[63] The concept of peace parks, often created in transboundary areas of ecological significance, has evolved and their numbers proliferated to include hot spots between several hostile nations. M. Clayton, "Environmental Peacemaking" (4 March 2004), which is available at: www.csmonitor.com/2004/0304/p14s03-stss.html.

[64] Green Cross International, "An environmental assessment of Kuwait: Seven years after the Gulf War" (December 1998), which is available at: www.gci.ch.

[65] Ibid.

[66] UNEP, GEO-2000.

[67] H. Khordagui, "Environmental impacts of the war on Iraq", which is available at: www.escwa.org.lb/divisions/sdpd/iraq/environment.html.

[68] H. Khordagui, "Environmental impact of the Gulf War: An integrated preliminary assessment", *Environment Management*, vol. 17, No. 4 (1993), pp. 557-562.

region increased the threat of severe local and regional air pollution, especially in GCC member countries, but even as far afield as China.

In many wars the physical destruction of environmental facilities, often deliberate, usually inflict further damage at the transboundary level. These facilities include water and waste treatment plants, storage and distribution facilities, waste collection systems, desalination and power plants, monitoring stations, as well as the administrative infrastructure and environmental data and resources. In the Gulf sub-region, land degradation dating back to before the occupation of Kuwait was aggravated by the use of off-road vehicles, which caused the break up of the upper sand and soil horizons. This subsequently intensified wind and water erosion. Moreover, the huge islands of military waste and abandoned ordnance still awaiting proper disposal, some of which are highly volatile and liable to explode, continue to threaten the already fragile desert ecosystem. In the most recent armed conflicts in the ESCWA region, namely, the war in Iraq, war chemicals and military manoeuvres in the desert are expected to have increased pressures on the region's fragile ecosystems.[69]

Figure VIII. Burning of oil wells during the 1991 Gulf war

There may never be a comprehensive reckoning of the full effects of war-inflicted damage on the transboundary environment. Some of the effects will probably take several decades to dissipate, and others may well prove to be irreversible. Although the environment is undergoing some natural recovery, whereby the marine ecosystem and fisheries have progressively regained prewar status, human intervention is needed, with the use of sophisticated and expensive remediation techniques to accelerate the process. While water and marine environments have recovered somewhat, soil pollution is likely to persist for some years to come. Costly clean-up activities are needed, but at the regional level, the necessary knowledge, technology and funds are lacking.

2. *Indirect environmental harm*

The direct damage to the environment caused by war is compounded by the indirect impact of human migration to escape war and its effects. People inevitably choose new locations with existing environmental stresses and fragile ecosystems. Additional causes of displacement include natural disasters, industrial accidents, long-term environmental degradation and development. In the wake of war, the environment is further stressed by the improper disposal of hazardous materials and wastes, land mines, the contamination of natural resources and soil erosion. Any or all of these factors can reduce or inhibit agricultural production (especially food) and effectively preclude the return home of displaced persons.

In recent decades, the fluctuating growth of urbanization and somewhat erratic demographic shifts in the ESCWA region have reflected the effects of protracted wars and political instability. As a consequence of these conflicts, there have been mass migrations to the major cities across the region in search of safety and

[69] For a detailed overview of key environmental issues in the context of the current conflict in Iraq, refer to the report prepared by the Post Conflict Assessment Unit of UNEP, entitled "Desk study of the environment in Iraq" (April 2003), which is available at: http://postconflict.unep.ch/high2.htm.

shelter in the first instance, then socio-economic and political stability. These internal and regional migration trends have resulted in a population imbalance, with concentrations of people a function of safety and economic opportunity. This has placed great strain on the capacity of certain transboundary regional environments.[70] In the panic of war, and the immediate post-war era, initial damage to the environment results in the sudden arrival of displaced people and the associated activities needed to sustain them. The first group of refugees will rely on such natural resources as wood and freshwater. Consequently, refugee camps are more often than not established on already fragile ecosystems, including river banks and wooded areas. The basic survival needs and sheer population density of refugee camps will tend to preclude the early establishment of waste infrastructure, and relegate the protection of the transboundary environment and the maintenance of biodiversity to positions of secondary importance.[71]

Refugees and migrants have at least been able to move during those conflicts. By contrast, as exemplified by the ongoing aggression against the Palestinian people, the environment has been used as a military tool, involving the seizure, exclusive use, and inequitable distribution of natural resources, especially water. In addition, the influx of Palestinian refugees in neighbouring countries, mainly Jordan, Lebanon and the Syrian Arab Republic, as a result of recurrent conflicts since the middle of the past century, and most recently the Gulf Wars, has caused a total of 3.1 million refugees between 1950 and 2003 to live outside the Palestinian territories, of whom only 600,000 are registered in refugee camps.[72] The numbers and duration of stay indicate that many of these refugees have achieved a sense of permanence in the host countries, in the absence of a political resolution to their plight. This constitutes an additional and fairly permanent stress on the environment. Furthermore, refugee figures to 2003 show Yemen to be one of the main countries of asylum for Somalis.

F. EMERGING TRANSBOUNDARY CHALLENGES

1. *Trade in hazardous waste*

Worldwide, trade in hazardous wastes has increased steadily in recent years, mainly due to the high cost of hazardous waste management in developed countries, and to the "low or non-existent environmental standards, less stringent laws, and an absence of public opposition due to a lack of information concerning the dangers involved".[73] Only 10 per cent of the 300 to 500 million tons of hazardous waste generated worldwide each year is shipped legally across international borders under the terms of the 1989 Basel Convention (conducted by contract agreement with Governments seeking profits). The large percentage of remaining hazardous waste is disposed of illegally, and is known as the transfrontier "silent trade" that has become a truly global environmental threat.[74] While some hazardous wastes are destined simply for disposal, others are subject to resource recovery, recycling or reuse, causing an equally serious threat in view of the misinformation driving the activities of users and handlers. Despite the multilateral and regional agreements to control the movement of hazardous waste based on a process of prior informed consent, there is a lack of transparency in the exchange of information. The ineffectiveness of international monitoring mechanisms must be addressed as a matter of urgency.

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[70] Environmental refugees are identified as those "people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (natural and/or triggered by people) that jeopardized their existence and/or seriously affected the quality of their life". While environmental migrants make a voluntary and rational choice, environmental refugees are compelled to flee due to irreversible environmental situations, resulting in an estimated 10 million environmental refugees worldwide. D. Keane, "The environmental causes and consequences of migration: A search for the meaning of 'eEnvironmental refugees'", *Georgetown International Environmental Law Review*, vol. 6, No. 2 (2004), pp. 209-223.

[71] Ibid., p. 222.

[72] United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), which is available at: http://www.un.org/unrwa/ refugees/camp-profiles.html.

[73] Z. Lipman, "A Dirty dilemma: Hazardous waste trade", *Harvard International Review*, vol. 23, No. 4 (2002), p. 68.

[74] L. Mastny, and H. French, "Crimes of (a) global nature", *World Watch Magazine*, vol. 15, No. 5 (September/October 2002), p. 18.

The ESCWA region has been periodically exposed to the problem of illegal transfrontier dumping. The region lacks the appropriate storage and disposal facilities to manage hazardous waste safely, has only limited capacity for the evaluation of risks, controlled dumping or recycling, and inadequate resources for detection, remediation or possible treatment. As the experience of Lebanon shows, it was only through "public pressure, expressed mainly through non-governmental organizations (NGOs), and the mass media", that the situation was ever investigated, yet to this day what is known cannot be described even as a partial picture of the amounts, nature and locations of wastes dumped.[75] Haphazard waste disposal threatens public health and the environment through contamination of groundwater, coastal ecosystems, soil and vegetation. It is impossible to overstate the urgency of the need for increased regional and global cooperation to tackle the transboundary challenges of hazardous waste transfer. To that end, the Lebanese Decree 64/88 of August 1988 declared a total ban on the import of hazardous waste; however, the decree is silent on the question of implementation. Subsequently, the 1995 Beirut Declaration on "Action for a Healthy Environment" was the result of a conference that stressed the importance of regional collaboration on the issue. Such efforts remain ineffective without the human, technological and financial resources for proper management and disposal. At present, relevant contractual agreements are not necessarily binding. The lack of environmental impact assessments (EIAs), monitoring systems and remedial strategies drastically constrains long-term analysis of the effects on the regional environment and on public health of poorly managed hazardous waste disposal.

2. *Persistent organic pollutants*

In addition to the foregoing picture of atmospheric pollution in the ESCWA region, the issue of persistent organic pollutants (POPs) is beginning to surface as a transboundary environmental threat. POPs are a group of pollutants, including pesticides, industrial chemicals and unintended by-products, that persist in the environment and take a long time to break down. Given that they can travel great distances and accumulate in the tissue of living organisms, they pose a transboundary threat to human health and the environment, regionally and globally. Efforts to reduce and/or eliminate the release of POPs into the environment can be linked to efforts to support cleaner production methods. Clean production strategies offer an integrated and preventive approach to industries that aim at promoting industrial processes to reduce the adverse impacts on the environment by improving their efficiency (namely, resource and energy use) or by engaging in less polluting production methods. Cleaner production often entails both technological and financial adjustments, which can include substituting more environmentally friendly alternatives for POPs. Such initiatives are just beginning to take place in the ESCWA region.

3. *Genetically modified organisms (GMOs)*

There is an intense debate regarding the use and handling of genetically modified (GM) technologies and products throughout the world, including in the ESCWA region.[76] To date, there remains no agreement on the mix of environmental opportunities and risks associated with using genetically modified organisms (GMOs). In terms of benefits, GMOs are designed to increase plant productivity, exhibiting resistance to pests. As such, they offer a potential means of reducing pesticide run-off into surface and groundwater, and a means to improve agricultural productivity for large-scale and low-income farmers. This could in turn reduce adverse environmental effects associated with land degradation, the transformation of forests into agricultural land, excessive livestock grazing and watershed damage. As a consequence, it is argued, fewer natural habitats would be destroyed, and ultimately more biodiversity would be preserved in areas that might otherwise be affected by agricultural production.[77]

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[75] M. Jurdi, "Transboundary movements of hazardous waste into Lebanon: Part 1 – The silent trade", *Journal of Environmental Health*, vol. 64, No. 6 (January/February 2002), pp. 9-14. According to Jurdi, it is assumed that more than 2,000 tons of hazardous waste, contained in approximately 16,000 barrels and 20 containers, were dumped illegally in inland and coastal sites in Lebanon.

[76] ESCWA, "Towards a policy framework for genetically modified organisms (GMOs) in the ESCWA region: assessing the case of Lebanon" (2005). While nearly all ESCWA member countries have signed the Convention on Biological Diversity (CBD), slightly fewer than half have signed the Cartagena Protocol (CP); only two have ratified it (Egypt, Jordan), two others have acceded to it (Oman and the Syrian Arab Republic); and the remaining nine signatories to the CBD (Bahrain, Iraq, Kuwait, Lebanon, Qatar, Saudi Arabia, United Arab Emirates and Yemen) have not yet signed the CP.

[77] R. Paarlberg, "Genetically modified crops in developing countries: promise or peril?", *Environment*, vol. 42, No. 1 (January/February 2000), pp. 19-27.

Alternatively, inappropriate labelling, handling, cultivation and monitoring of GM-seeds pose significant threats to biodiversity and biosafety. Many GM-seeds tend to become dominant in areas where they are planted, and can easily cross-breed in neighbouring fields and vegetation that may not be allocated to GM crop production. This creates new plant breeds and can result in the loss of the genetic diversity of local species. The difficulty of testing and differentiating between crops grown with GM seeds and those cultivated from natural sources further complicates the problem. As such, the management of GM cultivation requires rigorous application of labelling, planning and cropping regimes to guard against the destruction of local plant species and habitats. However, there is limited capacity to manage effectively this process in developing countries and among small-scale producers. Indeed, a recent survey of farmers in Lebanon conducted by ESCWA found that many were not aware of the various environmental aspects of GM crop cultivation, and were not even sure whether or not GM seed varieties were being traded locally.[78]

The transboundary environmental implication of GMOs is that they present a threat to biodiversity in the region. Although scientific evidence remains inconclusive, GMOs used for food, feed or for processing may also present risks to human health. As such, trade in agricultural inputs, agro-food and feed in the region should be subject to a policy that establishes whether and, if so, how to label products derived from GM-inputs. Currently, only certain countries in the ESCWA region, including Saudi Arabia, require the labelling of GM-derived products, and global consensus has not yet been reached regarding the labelling, handling or liability schemes regarding the use of GMOs under the Cartegena Protocol of the United Nations Convention on Biodiversity.

Aware that they lack the institutional capacity to manage these powerful new agro-technologies safely, several developing countries have opted to keep GM seeds out of their farming systems entirely for fear that under-regulation of traceability, labelling, identification and monitoring of GMOs could result in significant threats to the local environment.[79] Moreover, the ability to make informed decisions concerning GMOs is hindered by the lack of information regarding their potential environmental and health impacts in the region. Without a clear regional stance on the use of GMOs, there remains the threat of the unintentional transboundary movement of GMOs, possibly infiltrating the transboundary environment of the ESCWA region.

4. *Transboundary environmental impact assessment*

The use of environmental impact assessment (EIA) is gaining more attention regionally, and many countries in the ESCWA region have adopted national EIA policies and procedures. However, in practice, discrepancies exist both at the national and regional levels in terms of "objectives, range of application, scoping techniques, impact assessment criteria, accuracy of evaluation, validity of prediction, post-project monitoring capabilities, and enforcement".[80] Moreover, given the potentially adverse transboundary environmental impacts of projects and activities in one country on another, there is a compelling need for the adoption of transboundary environmental impact assessment (TEIA) as a regional policy to address environmental concerns and to prevent their transboundary effects. Given the extent of transboundary environmental challenges in the ESCWA region and the variety of large-scale projects that entail potentially transboundary environmental effect (PTEE), there is a growing need to assess cross-frontier impact through a shared and harmonized approach to TEIA.[81]

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[78] ESCWA, "Towards a policy framework for genetically modified organisms (GMOs) in the ESCWA region: assessing the case of Lebanon" (2005).

[79] R. Paarlberg, "Genetically modified crops in developing countries: promise or peril?", *Environment*, vol. 42, No. 1 (January/February 2000), pp. 19-27.

[80] ESCWA, "Development of guidelines for harmonized environmental impact assessment suitable for the ESCWA region" (2001), p. 1.

[81] Ibid., p. 20.

III. THE CHALLENGES OF TRANSBOUNDARY GOVERNANCE: A REVIEW OF GLOBAL AND REGIONAL AGREEMENTS

Until only recently, transboundary environmental cooperation was limited to freshwater-related agreements. Currently, the scope of transboundary environmental agreements encompasses such issues as air quality, transportation, hazardous materials and protected areas. The subsequent proliferation of environmental agreements in recent decades, each with its own focus on geographical delineations or functional concerns, reflects the commitment of States to pursue common initiatives to resolve transboundary environmental challenges.[82] While some agreements were established within pre-existing institutions with broad mandates for cooperation that extend well beyond the environment, others were built upon institutional arrangements established for managing shared resources. A third type of environmental agreement seeks to globalize transnational issues, instead of dealing with them as strictly independent bilateral or regional challenges.[83] However, reaching such international agreements constitutes only a first step; the challenge remains in implementing and enforcing them. When countries ratify treaties and become responsible and liable for upholding their terms, they must then enact and enforce the necessary implementing regulations at the national level. A common deficiency of these agreements is the lack of appropriate penalties to deter treaty violations, especially at the national level. Moreover, given that transboundary issues span the fields of environment, trade, industry, economics, public health, international cooperation and sustainable development, the backing of all constituencies must be secured for environmental regimes to become effective. Thus, international environmental crime can only be overcome and resolved through the coordinated efforts of Governments, international institutions, businesses, NGOs and citizens alike.

A. GLOBAL GOVERNANCE AGREEMENTS: THE IMPORTANCE OF IMPLEMENTING MEAS

At a global level, a lot of effort has been expended on transboundary environmental issues. Most countries have drafted agreements and principles of cooperation to deal with their shared resources and any other activity that may create a transboundary problem. Cooperation already exists among the countries of North America, Europe and Asia. These agreements set out the basis for cooperation, and the identification and mitigation of potential transboundary challenges; most have succeeded, to a greater or lesser extent. The major requirements for any of these cooperative efforts and agreements centre on unifying environmental standards and regulations, the sharing of information and expertise, and public involvement. It is generally accepted that public awareness and support campaigns are necessary to ensure the success of any prevention programme.

The Convention on Long-Range Transboundary Air Pollution (CLRTAP) was adopted in 1979 and entered into force in 1983 to address some of the major environmental challenges facing Europe through scientific collaboration and policy negotiation. It is an institutional framework widely held to have served as a catalyst when different points of view fuelled political tension among the Economic Commission of Europe (ECE) member countries.[84] The Convention emerged from the environmental crisis of the 1960s when scientists established the relationship between sulphur emissions and the acidification of Scandinavian lakes located downwind. It lays down the fundamentals for controlling transboundary air pollution and points to the type of intergovernmental cooperation needed. Although CLRTAP primarily targets air pollution in Europe, both Canada and the United States of America number among the 49 parties to the Convention to date. Since this regional agreement was opened up to non-regional members, it has offered a global perspective on the issue of transboundary environmental management. The eight Protocols, only one of which has not yet entered into force, are considered an extension to the Convention and specify further obligations accepted by the ratifying parties (see table 1).

[82] O.R. Young, "Hitting the mark", *Environment*, vol. 41, No. 8 (October 1999), pp. 20-29.

[83] T.M. Parris, "Managing transboundary environments", *Environment*, vol. 46, No. 1 (January/February 2004), pp. 3-4.

[84] More information on the Convention is available at: www.unece.org/env/lrtap/lrtap_h1.html.

TABLE 1. PROTOCOLS OF THE CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

Protocol	Adopted	Entry into force
The 1984 Geneva Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)	1984	1988
The 1985 Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent	1985	1987
The 1988 Sofia Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes	1988	1991
The 1991 Geneva Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes	1991	1997
The 1994 Oslo Protocol on Further Reduction of Sulphur Emissions	1994	1998
The 1998 Aarhus Protocol on Persistent Organic Pollutants (POPs)	1998	2003
The 1998 Aarhus Protocol on Heavy Metals	1998	2003
The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone	1999	Not yet in force

Source: International Enviromental Agreements (IEA) database, which is available at: http://iea.uoregon.edu/database/index.php?&t=treaties&m=MEA&o=Sig_Date&sy=&.

The Protocols to the CLRTAP raise issues related to the use of the best available technologies and techniques for controlling, reducing or eliminating various types of emissions. They also call for the collection of data on emissions and cost-sharing of monitoring programmes. This underpins the review, assessment and reporting of relevant air pollution levels in Europe in light of the agreements. Currently, there are some 100 monitoring stations in 24 ECE countries that participate in the programme. As a consequence of the emerging Protocols, a committee was formed to review periodically the progress made on these issues and to report to the Convention Secretariat. While the agreements are non-prescriptive in terms of how to fulfil the terms of the Convention and its Protocols at the national level, the CLRTAP has had a noticeable impact on policymaking in Europe, and has clearly contributed to the reduction in air emissions in that region.

A milestone of the holistic approach to global climate change is the 1987 Montreal Protocol (to the 1985 Vienna Convention) on Substances that Deplete the Ozone Layer. It is considered one of the world's most successful environmental treaties given that it mandated restrictions on gas emissions and resulted in a dramatic decline in the use of certain chemicals that damage the thin, vital layer of stratospheric ozone.[85] The Vienna Convention set an important precedent inasmuch as it first marked agreement in principle among nations to tackle the global environmental problem of ozone layer depletion. However, it was the Protocol that established the phase-out schedules for certain pollutants. The effectiveness of this regime lay in its intrinsic format, which relies on a series of revisions based on periodic scientific and technological assessments, as well as on constant updating of control measures and phase-out schedules. This effectiveness has been achieved through a series of amendments to the Ozone Treaties (namely, those adopted in London in 1990, Copenhagen in 1992, Montreal in 1997, and Beijing in 1999), which subsequently entered into force to revise control measures, establish financial mechanisms and set out trade restrictions. Among ESCWA member countries, as of August 2004, only Iraq had not ratified the Ozone Treaties.

Having just entered into force in 2005, the 1997 Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) is another key policy instrument adopted by the international community. It seeks to address the issue of global change due to greenhouse gas emissions (rising sea levels and changing rain distribution).[86] The Protocol, which shares the Convention's objectives, principles and institutions, imposes detailed, legally binding commitments on industrialized countries to limit or reduce

[85] The Vienna Convention, its Montreal Protocol and Amendments are available at: www.unep.org/ozone.

[86] The Kyoto Protocol to the Framework Convention on Climate Change is available at: http://unfccc.int.

their greenhouse gas emissions. To help them achieve their individual targets, the Protocol provides an indicative list of domestic policies and measures that could help mitigate climate change and promote sustainable development. As of February 2005, 141 States and regional economic integration organizations had deposited instruments of ratification, accession, approval or acceptance to the Kyoto Protocol. These include only seven from the ESCWA region, namely, Egypt, Jordan, Oman, Qatar, Saudi Arabia, United Arab Emirates and Yemen, although all ESCWA member countries are parties to the UNFCCC.

Growing international support for the use of EIA to deal with transboundary environmental protection, and specifically at the regional level of Europe, led to the adoption of the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) in 1991, which later came into force in 1997. The Espoo Convention is the first multilateral treaty of its kind. It lays down the general obligations of the parties to assess the impact of certain activities and projects, and to notify and consult one another as to the possibility of significant adverse environmental impacts across borders.[87] The novel aspect of the Convention is that it was the first to raise the importance of the transboundary applications of EIAs, and has thus influenced many subsequent conventions, agreements and ministerial declarations. This Convention gives the parties an option to withdraw four years after ratifying, or at any subsequent time, thereby releasing themselves from the relevant recommendations and commitments. This innovative legal agreement aims at sustainable development through prevention, reduction and control of transboundary environmental impacts. It also calls for proactive cooperation among the signatory parties, whereby each country drafted its own EIA rules and regulations, reformed its environmental laws, identified common environmental issues, and organized agreements concerning management of and investment in environmental resources. The Convention further encourages public participation in the process, and allows for bilateral or multilateral agreements to enhance its implementation.[88] Further to the Espoo Convention, and given that more and more countries are extending the scope of EIAs from the project level to that of policymaking and planning, the Protocol on Strategic Environmental Assessment (SEA Protocol), developed in Kiev in 2003, will, when it is in force, provide for SEAs to be undertaken at a much earlier stage than EIAs. SEAs will thus serve as a key tool for sustainable development planning and for regulating Transboundary Environmental Impact Assessment (TEIA).

At another level, worldwide concern with regard to the transboundary movement and disposal of hazardous waste has increased since the late 1970s, especially when wastes are exported from industrialized nations to developing countries that have low cost, unsafe and unsanitary disposal sites. The key international agreement for the control of transboundary movements of hazardous waste is the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, which came into force in 1992 (see table 2). As of February 2005, a total of 164 countries had ratified the Convention, including the countries of the European Union (EU) and all ESCWA member countries, with the exception of Iraq and Palestine.[89] Nations that have ratified the Convention are allowed to ship hazardous wastes to, from or through other parties to the Convention only; the exception to this requirement applies if a separate bilateral agreement covers relations with a given trading partner that is not a party to the Convention, as long as the agreement reflects the environmentally sound management of wastes. However, given that it is based on the principle of prior notice and consent, and uses a system of permits to track the pathway to disposal, many countries lack adequate or indeed any legislation or qualified agencies to prevent or penalize illegal waste trafficking and dumping. An interesting component of this Convention is that it applies to those that are not party to the Convention as well, since it governs the ways in which signatories to the Convention relate to all countries, not only to those that have ratified the agreement.

[87] In article 9 of the Convention, it is mentioned that all signatory parties must allow time for the implementation of the EIA in a transboundary context, and must set up and/or intensify research programmes to improve EIA processes and instruments. UNECE, 1998. “Protecting our environment: how environmental impact assessment can help”.

[88] The Espoo Convention is available at: www.unece.org/env/eia/convratif.html.

[89] The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is available at: www.basel.int/ratif/convention.htm.

Box. Key features of the Basel Convention

- To dispose of hazardous waste in the generating country
- To reduce the amount of hazardous wastes in terms of quantity and hazardousness
- To establish serious controls and check points on the export and import of hazardous wastes
- To prohibit the shipment of hazardous wastes into countries that lack the technical know-how to dispose safely of these wastes
- To cooperate, exchange information, transfer technology and harmonize standards and guidelines among the signatory countries dealing with hazardous wastes

Rethinking of the effectiveness of the Basel Convention has emerged from current controversies revolving around such issues as the assignment of responsibility for harmful substances, or the lack of a clear definition of hazardous waste, whereby the lack of a distinction between "waste" and "product" has given leeway to shipments of hazardous waste undertaken under the pretence of recycling commodities.[90] Furthermore, the weak compliance and enforcement of the Basel Convention resulted in the generation of waste-import bans at national and regional levels. As a result, several remedial measures were undertaken, including the adoption of the Classification and Characterizations of Wastes Annex to the Convention in 1998 to specify various types of waste. Moreover, a new Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and their Disposal, initiated in December 1999, is not yet in force, although it was developed to discourage illegal activity. However, the Protocol only covers harm that may occur in transit, not after disposal, and only applies to damage suffered within the jurisdiction of a contracting party to the agreement. Additionally, because the Convention fails to ban all transboundary movements of hazardous waste (except to Antartica), it was criticized as indirectly encouraging illegal trafficking. The Ban Amendment of 1995 was prepared to prohibit exports from countries listed in a proposed new annex. The Syrian Arab Republic is the latest of the five ESCWA member countries to have ratified the Ban Amendment, and is the only one to accede to the Protocol on Liability and Compensation.

In 2004 and in order to enhance training in the management of hazardous waste, the Basel Convention established Regional Centres for Training and Technology Transfer across the world.[91] A related multilateral agreement regarding trade in transboundary waste is the 1992 Organization for Economic Cooperation and Development (OECD) Council Decision on the Control of Transboundary Movements of Wastes Destined for Recovery Operations (Council Decision C(2001)107/final). Adopted in 2001 and later amended in 2002, the agreement requires that the country of origin provide the destination country with adequate and timely information on the shipment, giving the latter the option of approving or objecting to the proposed shipment.

With regard to freshwater, one of the main agreements concerning the management of water resources in Europe is the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention), which came into effect in 1996. It is intended to strengthen national capacity for the protection and sound management of transboundary surface waters and groundwater, and the formation of multilateral and bilateral agreements among riparian European nations.[92] It thus urges all parties to prevent, control and reduce water pollution from point and non-point sources. It also includes provisions for monitoring, research and development, consultations, warning systems, mutual assistance, institutional arrangements, the exchange and protection of information, and public access to information. The Convention

[90] Z. Lipman, "A dirty dilemma: The hazardous waste trade", *Harvard International Review*, vol. 23, No. 4 (2002), pp. 67-71.

[91] Egypt houses the centre in the ESCWA region, namely, the Cairo Basel Convention Regional Centre for Arab States (BCRC).

[92] The Water Convention is available at: www.unece.org/env/water/text/text.htm.

has been extended by two Protocols, namely: the 1999 Protocol on Water and Health; and the 2003 Protocol on Civil Liability.[93]

Concerning transboundary marine environments, the first international regime to address marine pollution was the Convention for the Prevention of Pollution of the Sea by Oil (OILPOL), at the heart of which are a series of discharge standards. The agreement was subsequently restructured and resulted in the International Convention for the Prevention of Pollution from Ships (MARPOL), which was originally adopted in 1973 and substantially amended in 1998. With the administrative support of the International Maritime Organization (IMO), the restructured MARPOL Convention has become a far more effective regime, primarily as a result of the monitoring programmes of Governments and the whole shipping industry in the building and operation of ships and ports. Given that all ESCWA member countries are also members of the IMO, the Convention has substantially contributed to the protection of the marine environment in the region. The more so since the Oman Sea area of the Arabian Gulf was designated, under MARPOL annex I, a new "special area". It was thus considered, like other special areas (including the Mediterranean and Red Seas) to be so vulnerable to pollution by oil that oil discharges have been completely prohibited, with minor and well-defined exceptions. In its present form, the Convention imposes a stricter system of equipment standards and the provision of reception facilities in ports, to limit all marine and many atmospheric pollutants carried or produced by vessels.[94]

Furthermore, the Agreement on the Protection of Marine Environment from Land Based Pollution was signed in the Hague in 1995 and mainly concentrates on discharges of wastewater into the marine environment. The most recent effort to protect transboundary marine environments is the International Convention for the Control and Management of Ships' Ballast Water and Sediments, which was adopted in 2004 and gained its first signatories in January 2005.[95] The Ballast Water Convention "contains measures to prevent the potentially devastating effects of the spread of harmful aquatic organisms carried by ships' ballast water" through the implementation of ballast water management procedures. To that end, IMO provided the technical support and expertise in implementing the GEF/UNDP/IMO Global Ballast Water Management Programme (GloBallast), which aims at assisting developing countries in meeting the terms of the Convention. With the increasing threat to transboundary marine environments as a result of increasing global seaborne traffic, the Convention, when in force, will be vital in limiting the transfer of invasive species that may prove ecologically harmful when released in non-native environments.

The 1982 United Nations Convention on the Law of the Sea (UNCLOS) contains only one provision on the management of transboundary fish stocks, namely Article 63(1), which reads as follows:

> "Where the same stock or stocks of associated species occur within the exclusive economic zones of two or more coastal States, these States shall seek, either directly or through appropriate sub-regional or regional organizations, to agree upon the measures necessary to coordinate and ensure the conservation and development of such stocks without prejudice to the other provisions of this Part [V]".[96]

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[93] Within the framework of this Convention, a project on transboundary water cooperation in the Newly Independent States (NIS) was held in Moscow in collaboration with ECE, UNDP regional office for Europe, the Ministry of Natural Resources of the Russian Federation, the Swedish Environmental Protection Agency, and the Agency for Environmental Assessment. The aim of the project was to examine and assess the approaches used and propose means for strengthening relationships and bilateral agreements in Eastern Europe.

[94] The OILPOL and MARPOL Conventions are available at: www.imo.org. R. Mitchell et al, "International vessel-source oil pollution" in *The Effectiveness of International Environmental Regimes: Causal Connections and Behavioral Mechanisms*, Young, O.R. ed. (Cambridge: MIT Press, 1999), pp. 33-90.

[95] Brazil and Spain were the first signatories. More information is available at: www.imo.org/Newsroom/mainframe.asp?topic_id=1018&doc_id=4656.

[96] The United Nations Convention on the Law of the Sea (UNCLOS), which is available at: www.un.org/Depts/los/convention_agreements/convention_overview_convention.htm.

As such, the Convention imposes a duty on the relevant coastal States to negotiate over arrangements for the management of transboundary stocks; however, it does not impose a duty on them to reach such an agreement. Beyond this, the 1982 Convention does not elaborate on management and conservation objectives, on principles of allocation of the catch among the relevant States, or on how cooperation is to be achieved. In further attempts to strengthen implementation of the provisions of the UNCLOS, the Fish Stocks Agreement attempts to achieve this objective by providing a framework for cooperation on the conservation and management of those resources.[97] Until February 2005, the majority of ESCWA member countries had signed the UNCLOS, namely, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia and Yemen. However, in the absence of bilateral or regional agreements pertaining specifically to the management of transboundary fish stocks, the Convention has not taken full effect regionally. This is further reflected in the fact that none of the ESCWA member countries has so far signed the 1995 Fish Stocks Agreement, which was adopted in 1995 and entered into force in 2001.

In parallel efforts to protect the biodiversity of transboundary environments, the Cartagena Protocol on Biosafety to the Convention on Biological Diversity was adopted in 2000 and came into force in 2003. With 111 parties, including four from the ESCWA region (Egypt, Jordan, Oman and the Syrian Arab Republic), the objective of the Protocol is to ensure an adequate level of safe transfer, handling and use of living modified organisms (LMOs) resulting from modern biotechnology.[98] While specifically focusing on transboundary movements and the effects on the conservation and sustainable use of biological diversity, the Protocol also takes into account risks to human health. Furthermore, the Protocol stipulates that parties may enter into bilateral, regional, and multilateral agreements and arrangements with non-parties regarding intentional transfer of LMOs across borders.

To further protect biodiversity, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) aims at controlling, but not necessarily banning, trade in endangered species with the support of a network of NGOs and intergovernmental organizations that contribute substantially in assisting and monitoring its implementation.[99] With its 167 parties (only nine of which are from the ESCWA region), the Convention has succeeded in restricting the illicit international trade in endangered species. However, critics of the Convention find its overall effectiveness to be low, owing mainly to the rigid classification of endangered species and to its weak enforcement. Such shortcomings have rendered the Convention more flexible in controlling, rather than banning, trade in endangered species, and more reliant on research-based knowledge.[100]

B. REGIONAL GOVERNANCE AGREEMENTS

The conventions and agreements briefly reviewed above have helped to improve the global environment in its transboundary context through international cooperation, information sharing and the unification of environmental policies, laws and standards. As such, they provide valuable insights and lessons on how to mitigate common transboundary environmental problems and to secure better outcomes to be applied at the regional levels.

[97] The Fish Stocks Agreement is available at: www.un.org/Depts/los/convention_agreements/convention_overview_fish_stocks.htm.

[98] The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is available at: www.biodiv.org/default.shtml. For a study on GMOs in the ESCWA region, refer to "Towards a policy framework for GMOs in the ESCWA region: Assessing the case of Lebanon" (2005).

[99] The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is available at: www.cites.org.

[100] M. Curlier and S. Andresen, "International trade in endangered species: The CITES regime" in *Environmental Regime Effectiveness: Confronting Theory with Evidence*. E.L. Miles et al eds. (Cambridge: MIT Press, 2002), pp. 357-378.

1. *Regional organizations for facilitating regional intergovernmental agreements*

The countries of the EU have pioneered the area of transboundary environmental agreements, as shown by the extent and effectiveness of environmental conventions adopted in Europe, including those facilitated by the ECE. The various bodies of the EU responsible for regional environmental policymaking are primarily the European Commission, the European Parliament and the Council of Ministers.[101] Further to the above mentioned treaties, namely, the CLRTAP, Espoo Convention on EIA and the Water Convention, the ECE has negotiated additional environmental treaties relating to the marine environment. These are as follows:

(a) The Convention on the Transboundary Effect of Industrial Accidents, held in Helsinki in 1992 and which entered into force in 2000;[102]

(b) The Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention), first adopted in 1974 and entered into force in 1980, then revised in 1992 and in force since 2000;[103]

(c) The Convention for the Protection of the Marine Environment of the North-East Atlantic - Oslo and Paris Conventions, adopted in 1974, revised and combined into the OSPAR Convention in 1992, in force since 1998;[104]

(d) The Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, adopted in 1998, and in force since 2001.[105]

At a bilateral level in Europe, the Norwegian-Russian regime for the Fisheries of the Barents Sea is an agreement that specifies the procedures for managing shared fish stocks in order to avoid conflict in a strategically sensitive area, considered among the most biologically productive in the world.[106] The establishment of the Mixed Fisheries Commission provides a mechanism and ongoing forum for cooperation and application of the terms of this agreement.

In North America, transboundary issues gained more attention, and agreements were formulated among those countries dealing with shared water resources, hazardous waste and air pollution, relating particularly to the problem of acid rain. Among the most prominent is the agreement between the Government of the United States of America and the Government of Canada concerning the Transboundary Movement of Hazardous Waste, which was signed and came into effect in 1986.[107] The agreement sets grounds for proper management and disposal of hazardous material, and for its shipment to facilities that are authorized by the importing jurisdiction. Similar agreements regulating environmentally sound management of hazardous waste in North America include the agreement between Mexico and the United States for Cooperation on Environmental Programs and Transboundary Problems, Annex III, Transboundary Shipment

[101] J. Wettestad, "Clearing the air: Europe tackles transboundary pollution", *Environment*, vol. 44, No. 2 (March 2002), pp. 32-40.

[102] The Convention on the Transboundary Effect of Industrial Accidents is available at: www.unece.org/env/teia.

[103] The Regional Seas Conventions and Protocols, Partner programmes are available at: www.unep.ch/regionalseas/legal/conlist.htm.

[104] The Regional Seas Conventions and Protocols, Partner programmes are available at: www.unep.ch/regionalseas/legal/conlist.htm.

[105] The Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters is available at: http://www.unece.org/env/pp/ctreaty.htm.

[106] O.R. Young, "Hitting the Mark", *Environment*, vol. 41, No. 8 (October 1999), p. 24.

[107] The agreement is available at: http://iea.uoregon.edu/database/index.php?t=treaties&m=MEA&id=684. Moreover, at a bilateral level, agreements to regulate specifically the transboundary transfer of hazardous waste exist between the United States and the Philippines, Malaysia, Mexico and Costa Rica; and between Germany and Zimbabwe, Afghanistan and KFOR/NATO.

of Hazardous Waste and Hazardous Substances, which entered into force in 1987.[108] Furthermore, the agreement between Canada and Chile on Environmental Cooperation was established to foster environmental cooperation and to enforce environmental laws, including those governing water, air, toxic substances and wildlife in both countries.[109] In addition, cooperation between the parties had to be strengthened to better conserve, protect and enhance the environment, including wild flora and fauna, through the improvement of environmental laws, regulations, procedures, policies and practices. Once more, the public appears to have played a focal role, and public participation is to be encouraged as a prime component in the development and application of cross-national environmental laws. The two most critical aspects of these regional agreements and mechanisms, if they are to be effective, are their comprehensiveness and the importance placed on the role of public participation.

2. *Intergovernmental institutions at the regional level*

On the other side of the globe, the South-east Asian countries have effectively collaborated on transboundary environmental governance to reduce the impact of serious transboundary problems. In 1992, the Singapore Summit and the Kuala Lumpur Accord on Environment and Development provided a clear illustration of collaboration among neighbouring countries, united in their aim to limit the effects of the haze (which severely affected regions of South-east Asia in 1997).[110] Then in 1995 the Association of Southeast Asian Nations (ASEAN) Cooperation Plan on Transboundary Pollution was adopted. It mainly relates to transboundary atmospheric and ship-borne pollution and to movement of hazardous wastes.[111] It sets out guidelines on the best means to deal with the transboundary issues identified, and acknowledges the need for public acceptance and participation, and the support of countries at both the regional and international level to facilitate assistance and the exchange of information.[112] In the light of the latest haze experience, the ASEAN Environment Ministers have in addition agreed on a Regional Haze Action Plan, which sets out cooperative measures needed among member countries to address the problem of smoke haze arising from land and forest fires.[113] The ASEAN Agreement on Transboundary Haze Pollution was adopted in 2003 to further inhibit and monitor this transboundary haze pollution through concerted national efforts and intensified regional and international cooperation, supported by the establishment of the ASEAN Coordinating Centre for Transboundary Haze Pollution Control (also referred to as the ASEAN Centre).

In the ESCWA region, regional mechanisms are exemplified by the establishment of the Council of Arab Ministers Responsible for the Environment (CAMRE), which is considered a major milestone. The Council is concerned mainly with policy issues at the national and regional levels, and therefore aims at issuing declarations and at fostering environmental agreements and cooperation among the ESCWA member countries. CAMRE adopted the Arab Declaration on Environment and Development (1986) and the Arab Statement on Environment and Development and the Future Outlook (1991). The Council also established the Joint Committee on Environment and Development in the Arab Region (JCEDAR) to enhance cooperation among Arab countries.

In 1985, the countries of the Gulf Cooperation Council (GCC) approved environmental principles for widening and increasing environmental regional surveys, education, training and information sharing among the countries of the sub-region to improve environmental conditions.[114] Among the regional coordination bodies that have also forged new alliances with regional and international institutions and organizations, the

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[108] The agreement is available at: http://iea.uoregon.edu/database/index.php?t=treaties&m=MEA&id=686.

[109] The agreement is available at: http://can-chil.gc.ca/English/Resource/Agreements/AECCC/Default.cfm.

[110] N. Badenoch, "Transboundary environmental governance: principles and practice in mainland South-east Asia", *World Resources Institute* (2002). The Association of Southeast Asian Nations (ASEAN) includes the following member countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

[111] The ASEAN Cooperation Plan on Transboundary Pollution is available at: www.aseansec.org/8926.htm.

[112] D.A. Singh, "ASEAN Cooperation Plan on Transboundary Pollution" (2001), which is available at: http://www.asean.or.id/function/ envt/content.htm.

[113] The ASEAN Agreement on Transboundary Haze Pollution is available at: www.aseansec.org/9050.htm.

[114] UNEP, GEO-2000.

Cooperation Council for the Arab States of the Gulf Secretariat General is a sub-regional cooperative framework to effect coordination, integration and inter-connection in all fields in order to achieve unity. The GCC contributes to the regulation of transboundary environments in its member countries.

The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA) was established in 1995 and includes four countries from the ESCWA region, namely, Egypt, Jordan, Saudi Arabia and Yemen. PERSGA enhances regional efforts and programmes for the conservation and protection of biodiversity in the marine and coastal environments in its area of activities spanning the Red Sea, the Gulf of Aqaba, the Gulf of Suez, the entirety of the Suez Canal and the Gulf of Aden. In similar efforts, the Regional Organization for the Protection of the Marine Environment (ROPME) was established on 1 July 1979 with members including Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates.

3. *Non-governmental regional coordination*

The Centre for Environment and Development for the Arab Region and Europe (CEDARE) was created to build capacity in its member countries and promote environmental management skills, technology transfer and environmental education. CEDARE was established on the basis of a joint commitment by the three principal sponsors, namely, the Government of Egypt, the Arab Fund for Economic and Social Development (AFESD) and the United Nations Development Programme (UNDP). The function of CEDARE is that of an enabling agent in support of sustainable development initiatives at national, sub-regional and regional levels, stimulating the implementation of international conventions and agreements.[115]

C. TRANSBOUNDARY ENVIRONMENTAL MANAGEMENT IN THE ESCWA REGION IMPLEMENTING GOVERNANCE AGREEMENTS

Most ESCWA member countries have only begun to formulate environmental policies in recent decades. They have for the most part concentrated on expanding the mandates of existing environmental institutions or on building new ones, with a focus on such activities as establishing national committees, conducting national studies and preparing national plans. Although progress has been achieved at the national level in terms of institutional arrangements, especially in water resource management and legislation, there has been very limited progress in managing and developing shared sources at the regional or sub-regional level. In the ESCWA region there has been no assessment of environmental challenges that are specifically transboundary in nature. The following section examines the region's experience in the management of transboundary environments.

1. *Implementing multinational environmental agreements*

Countries of the ESCWA region have ratified or acceded to some 64 international and regional environmental conventions and agreements, yet compliance remains limited and largely contingent on international financial support.[116] When international attention spotlights specific environmental issues, then the related convention or protocol is supported regionally with funding for capacity building, monitoring and reporting, which in turn results in the development of national by-laws on the implementation of international conventions. With the exception of the Montreal Protocol, monitoring of compliance by means of international MEAs is not well developed.

In Saudi Arabia, the Jeddah Memorandum of Understanding (MOU) was signed in 1998 between UNEP, CAMRE, PERSGA and ROPME. It sets a model for regional cooperation and coordination in managing and planning environmental issues in the region and expects ratifying States to cooperate with respect to environmental projects and to identify programmes related to coastal and marine environmental protection. Further to the MOU, the Jeddah Declaration of 2000 considers urgent environmental issues and

[115] The Centre for Environment and Development for the Arab Region and Europe (CEDARE) is available at: www.cedare.org.eg/main.aspx.

[116] UNEP, GEO-2000.

recognizes the responsibility of the leaders, scientists and representatives of Arab countries in achieving sustainable development through the incorporation of ethical and moral aspects into environmental policies.[117]

At another level, and catalysed by CAMRE, Arab leaders met in 2001 in Abu Dhabi to identify environmental priorities and to develop agreements on urgent environmental issues in the region. As a consequence, and in recognition of the urgent need to alleviate poverty and improve the living standards and economic conditions of the Arab citizen through programmes on sustainable development and environmental protection, Arab Governments prepared and signed the Abu Dhabi Declaration. The Declaration recognizes that rapidly increasing development will lead to environmental imbalances, and hence recommends the need to link developmental requirements with environmental protection mechanisms in order to prevent and mitigate the potentially adverse effects of development. Moreover, the Arab Ministers agreed to develop human resources, introduce the environment into the academic curriculum and improve the dissemination of environmental information by the media.[118]

Finally, members of the GCC are working together to unify all the laws and regulations dealing with the various aspects of the environment. In 1985, they adopted a strategic framework on general policies for environmental protection and ratified the unified regulations, including those for protection of wildlife development, GCC EIA regulations, general and environmental regulations, unified regulations for the handling of radioactive material, and for waste handling and procedures for transfer of hazardous waste through the GCC borders.[119] Action is currently underway for approval of the Regional Strategy for the Protection of the Environment and Preservation of Natural Resources, and to prepare a draft of the regional environmental strategy on levying the energy/carbon tax.

As mentioned above, ROPME was created with a view to strengthening governance in the region by providing assistance for the implementation of the Kuwait Action Plan for the Protection and Development of the Marine Environment and the Coastal Areas, as well as the Kuwait Regional Convention for Co-operation on the Protection of the Marine Environment from Pollution, and its Protocols.[120] Considered one of the few regional agreements to prevent, abate and combat marine pollution, the Kuwait Convention was adopted in 1978 and entered into force in 1979. It encompasses the six GCC countries and Iraq. The Convention is a legally binding instrument that requires regional cooperation on scientific and technical research, and the development of an integrated management approach to the use of the marine environment and the coastal areas.

In further efforts to protect marine transboundary environments of the region, several protocols related to the above Convention have also been adopted by ROPME member States.[121] The most recent is the Kuwait Protocol on Marine Pollution Resulting from Exploration and Exploitation of the Continental Shelf, adopted in 1989 and in force since 1990. This Protocol aims at preventing and controlling marine pollution from offshore operations, while taking into account the best available and most economically feasible technology.[122] The Protocol dictates that any offshore activity must be conducted under a licence by a competent State authority and mandates application of EIA guidelines with the implementation of works accordingly. Other binding protocols in the region include the Protocol Concerning Regional Co-operation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency, adopted in 1978 and in force since 1979; the Protocol for the Protection of the Marine Environment against Pollution from Land-

[117] Within that context, the role of UNEP is to provide support, organize meetings and seek any necessary assistance in order to integrate resources and expertise for the planned projects. More information is available at: www.unep.org.bh/jeddah.htm.

[118] The UNEP/Regional Office for West Asia (ROWA) is available at: www.unep.org.bh.

[119] See www.gcc-sg.org/index_e.html.

[120] See www.ropme.org.

[121] For more details on these protocols, see www.ropme.org/pages/legal.htm.

[122] The Kuwait Protocol on Marine Pollution Resulting from Exploration and Exploitation of the Continental Shelf is available at: http://sedac.ciesin.org/entri/texts/kuwait.marine.pollution.1978.html.

Based Sources, adopted in 1990 and in force since 1993; the Protocol on the Control of Marine Transboundary Movements and Disposal of Hazardous Wastes adopted in 1998; and a protocol on the conservation of biological diversity and the establishment of protected areas (under preparation).

Although established in 1995, PERSGA was formally announced during the Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention), which was adopted in 1982 and has been in force since 1985.[123] The Jeddah Convention and its 1982 Protocol concerning Regional Cooperation in Combating Pollution by Oil and other Harmful Substances in Cases of Emergency provide a basis for regional cooperation. The provisions of the Protocol are complemented by those of MARPOL and the Basel Conventions to combat pollution at sea. Although only four ESCWA member countries are members of PERSGA, the organization has nevertheless managed over the past decade to play an active role in safeguarding the transboundary environment of the whole ESCWA region through its regional activities, projects and programmes. This includes developing international laws to protect the regional environment; cooperating with IUCN in conducting marine assessments in Saudi Arabia and Yemen and in establishing a marine national park in Jordan; and contributing to ongoing training and capacity building.

As mentioned above, the activities in the region of both PERSGA and ROPME are covered by the 1999 Jeddah MOU, a fruitful regional move as a result of which various transboundary issues in the ESCWA region have been addressed. In addition, as a reflection of regional efforts to protect coral reefs and through the International Coral Reefs Initiative (ICRI), PERSGA and ROPME, have proposed regional strategies—supported by the EU through the GCC—for the protection of coral reefs, as well as protocols on the protection of biodiversity and the creation of protected areas in the marine environment.[124]

The Mediterranean Action Plan (MAP) is another regional cooperative effort involving 21 countries bordering the Mediterranean Sea, including Egypt, Jordan, Lebanon, Palestine and the Syrian Arab Republic from the ESCWA region. The aim of MAP is to implement the 1976 Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention) and its six Protocols (see table 3).[125] Later amended in 1995 to become the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, which entered into force in 2004 and is in the process of being ratified, a seventh protocol to the Convention dealing with Integrated Coastal Areas Management is under preparation.

TABLE 2. PROTOCOLS OF THE BARCELONA CONVENTION

Protocol	Adopted	Entry into force
Dumping Protocol: Protocol for the Prevention of Pollution in the Mediterranean Sea by Dumping from Ships and Aircraft	1976	1978
Prevention and Emergency Protocol: Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea	2002	1976/2004
LBS Protocol: Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources	1980	1983
SPA and Biodiversity Protocol: Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean	1995	1982/1999
Offshore Protocol: Protocol for the Protection of the Mediterranean Sea against Pollution resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil	1994	pending
Hazardous Waste Protocol: Protocol for the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous wastes and their Disposal	1996	pending

[123] The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden is available at: www.persga.org.

[124] See www.unep.org.bh/legistla.htm#Coral.

[125] The Barcelona Convention and Mediterranean Action Plan (MAP) are available at: www.unepmap.org/home.asp.

In the ESCWA region, Egypt, Lebanon and the Syrian Arab Republic are among the 22 contracting parties that have acceded to the Convention and its Protocols. Although the transboundary effect of the MAP agreements has been increasingly visible at the transnational level—in raising issues and in implementation—change at the national level, including financial contributions, has been somewhat limited.[126] That applies in particular to the parties that had low environment-related capacity at the outset.

2. *Regional and national agreements*[127]

At both the regional and national levels, the mechanisms that govern the management of the transboundary environment of the ESCWA region can be classified in terms of sectoral approaches. To begin with, the agreements regarding international water bodies in the ESCWA region are at best partial and thus not capable of meeting the compelling challenges; none of the agreements include all other riparian countries, and many focus on water allocation, disregarding the water quality component.

Regarding the Nile River, although the 1959 Agreement on the Full Utilization of the Nile Waters (Nile Water Treaty) provides for the inequitable distribution of water resources among all riparian States, it is nevertheless the only written agreement on water resources shared by Egypt. Despite decades of attempts and a series of negotiations undertaken by the countries of the Nile Basin, no mutual agreement or legal framework emerged regarding the management of the Nile, mainly for lack of political will amid an atmosphere of mistrust among the countries concerned. Nevertheless, given the disparities of the Agreement in regulating the management and utilization of the water and its limitation to the countries upstream of Egypt and Sudan, the Nile riparian countries took a historic step in establishing the Nile Basin Initiative (NBI), which provides "an institutional mechanism, a shared vision, and a set of agreed policy guidelines to provide a basin-wide framework for cooperative action".[128] Launched in 2004, the Nile Transboundary Environmental Action Project (NTEAP) provides a strategic framework for environmentally sustainable development of the Nile River Basin and supports basin-wide environmental action linked to transboundary issues.

In another ESCWA sub-region, Iraq, Turkey and the Syrian Arab Republic share the Tigris and Euphrates river basins. Despite the ongoing bilateral and tripartite negotiations that have occurred since the mid-1960s to regulate the equitable allocation of the flow of these two Rivers, a multilateral agreement has not yet been reached. Nevertheless, some progress has been made. Meetings have resulted in the establishment of a protocol of the Joint Economic Committee in 1980 between Iraq and Turkey, with Syrian participation beginning in 1983, to enable a joint technical committee to resolve cross-national water issues. However, this committee, along with more recent bilateral meetings, has failed to find a permanent settlement to the water conflicts. A bilateral riparian agreement concluded in 1990 between Iraq and the Syrian Arab Republic stipulates the exact flow through one country to the other. However, Turkey, which is the source co-riparian country, has maintained only temporary arrangements with the Syrian Arab Republic, the latest of which was in 2001.[129] The uneasy status quo has been further aggravated by the ongoing implementation of the Southeast Anatolia Development Plan (GAP), as well as the erratic political and security situation in the sub-region.

A third international river that crosses the countries of the ESCWA region, the Jordan River, originates in the anti-Lebanon region and flows through Jordan, Lebanon, Palestine and the Syrian Arab

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[126] J.B. Skjaerseth, "The effectiveness of the Mediterranean Action Plan", in *Environmental Regime Effectiveness: Confronting Theory with Evidence*, E.L. Miles et al. (Cambridge: MIT Press, 2002), pp. 311-330.

[127] This section is based on the following: H.L. Beach, et al, *Transboundary Freshwater Dispute Resolution: Theory, Practice, and Annotated References* (New York: United Nations University Press, 2000); M.J. Haddadin, "Water issues in the Middle East: Challenges and opportunities", *Water Policy*, vol. 4 (2002), pp. 205-222; and H.B.S. Hirzalla, "Water resources agreements and practices in selected shared water resources in the ESCWA region" (1998).

[128] See the Nile Transboundary Environmental Action Project, which is available at: www.nileteap.org/about.asp.

[129] UNEP and FAO, *Atlas of International Freshwater Agreements*, (2002), which is available at: www.transboundarywaters.orst.edu/publications/atlas.

Republic. Conflict and lack of agreement concerning its uses has long existed and has been accentuated by the Arab-Israeli conflict, which overshadows attempts to reach agreement on the usage of the water among the riparian countries. Intertwined with the Arab-Israeli peace negotiations, and with the complex political issues of water rights and allocations, several milestones have been reached to date in terms of mediating a comprehensive settlement on the Jordan River and its tributaries. On the one hand, progress was achieved with the 1994 Israel-Jordan Treaty of Peace that addresses the water allocations for the Jordan river basin, including the Yarmouk River and the Wadi Araba groundwater resource, and calls for preventive water pollution measures. On the other hand, and although the Interim Agreements of 1993 and 1995 between Israel and Palestine also recognize the principle of water rights for both people, they defer quantifying allocations until final negotiations are sealed. There is in addition a bilateral agreement, though not an effective one, which has existed between Jordan and the Syrian Arab Republic since 1953 (the original was replaced by another in 1987). There have been unilateral projects on the shores of the Jordan River consisting of out-of basin transfers and storage facilities. However, the agreements do not cover the whole territorial extent of the river and exclude Lebanon and the Syrian Arab Republic. As a result, these partial efforts remain ineffective in dealing with the regulation of a water resource that must be protected and allowed to transcend politics and conflict.

IV. RECOMMENDATIONS FOR IMPROVING TRANSBOUNDARY ENVIRONMENTAL MANAGEMENT IN THE ESCWA REGION

There is a clear and pressing need for ESCWA member countries to implement environmental governance agreements, both at the global and regional levels. Further to that, the effective management of transboundary environments in the ESCWA region requires the creation of enabling environments for regional collaboration and mechanisms to combat transboundary environmental threats. The recommendations that follow pertain specifically to the ESCWA region.

A. CONFLICT RESOLUTION MECHANISMS

As exemplified by transboundary freshwater management, attempts at environmental conflict resolution in the ESCWA region are directly linked to the erratic political and security situation. Third parties and the international community have been instrumental in sponsoring multilateral activities and bilateral negotiations, but these have not resulted in well-defined strategies for transboundary cooperation and coordination. The dispute resolution mechanisms that exist in the region, such as joint committees and bilateral working groups, do support member States during negotiations, but fall short of playing a decisive role in the settlement of disputes. There remains therefore an urgent need for a legal and institutional framework to settle transboundary environmental disputes, ensure continuous dialogue and achieve environmental security in the ESCWA region. Conflict management approaches must promote prevention and avoidance of conflict, peaceful settlement and resolution, as well as developing comprehensive negotiation capabilities and strategies with committed partners.[130]

B. CAPACITY BUILDING

1. *Understanding the challenges*

Environmental pollution and resource management at the national and regional levels are emerging as priority issues of concern. The transboundary components of these environmental issues have not been fully addressed in ESCWA member countries. Beyond identifying cross-border environmental issues specific to the region and their effect on the global environment, the challenges also encompass a hard-headed assessment of the effectiveness of legal and institutional frameworks that have to date proved inadequate.

2. *Increasing cooperation*

Regional cooperation among ESCWA member countries is fostered through existing institutions and ministerial forums, including the League of Arab States (LAS) and CAMRE, and is further facilitated by regional coordination efforts and linkages with such organizations as PERSGA, ROPME and CEDARE. Increased regional cooperation must be underpinned by strengthening institutions, including Governments, joint committees, NGOs, researchers and other stakeholders. This can be achieved through improved communication, the exchange of knowledge and enhanced tools for transboundary environmental management. Furthermore, in addition to developing national environmental policies, ESCWA member countries have benefited from the services and assistance of several international agencies and organizations. The most important contributor is the United Nations, which includes several organizations dealing with environmental issues, including UNEP's Regional Office for West Asia, ESCWA, UNDP, Capacity 21 and the World Health Organization Regional Centre for Environmental Health Activities. These institutions contribute substantially to strengthening the capabilities of ESCWA members, and in assessing and mitigating shared environmental problems. However, cooperation and effective communication among ESCWA member countries are hindered by political constraints and various conflicts.

[130] ESCWA, *A Manual for ESCWA Member Countries on Dispute Resolution of International Water Resources* (2004).

3. *Improving environmental technology skills and expertise*

There is a persistent shortage of environmental specialists in the ESCWA region. The existing environmental agencies need to further develop their capacities to tackle environmental challenges on a transboundary scale. At present, any attempts to improve environmental standards are held back by the lack of skilled manpower and technological expertise. To remedy this situation, regional institutions and local and international NGOs have been involved in developing training sessions and workshops to improve environmental technology and skills.

4. *Identifying funding resources*

Despite all the above-mentioned channels of cooperation, a major obstacle in ESCWA member countries remains the lack of funding to implement agreed policies or to enforce the relevant laws. It should nevertheless be noted that some financial help has been forthcoming in the form of loans for environmental projects on such problems as solid waste management, water management and air pollution. Moreover, the UNDP Regional Bureau for Arab States provides guidance and support to ESCWA members through implementation of projects funded by the Global Environmental Facility (GEF).[131] However, new and sustainable sources of funding must be found with the following aims: for data collection, establishing a database, sharing information, applying contemporary technology, designing management schemes and, above all, enhancing monitoring and reporting capacity.

5. *The role of regional NGOs*

Community awareness is low, and there is little public participation in or scrutiny of the management of transboundary environmental issues in the ESCWA region. There are several channels through which public awareness and the profile of NGOs can be raised.

The media can play a key role in the translation and dissemination of information on transboundary environmental issues. First, journalists should be helped to gain a more thorough understanding of these regional issues and encouraged to raise public awareness on key topics. This would in turn facilitate public participation in the decision-making process. The transboundary dimension of environmental challenges should also be integrated within environmental education, which is still in its infancy in the ESCWA region and should be further strengthened and incorporated into academic curricula at all levels. In addition, the role of regional environmental NGOs must be strengthened to maintain pressure on Governments to take appropriate action, and to ensure the involvement of various stakeholders at the regional level. This can only be achieved through the combined efforts of Governments, international institutions, businesses, local and regional NGOs, and citizens of ESCWA member countries.

C. ENVIRONMENTAL INFORMATION COLLECTION AND HARMONIZING ENVIRONMENTAL STANDARDS

It is impossible to identify and quantify transboundary issues specific to the region—let alone address them through appropriate policies and implementation mechanisms—without accurate and coherent environmental data. Unfortunately, the available data tend to be disconnected, incoherent and dispersed, for lack of cooperation among significant institutions and governmental bodies across the region, or indeed even within a single country. A framework for environmental monitoring in the ESCWA region must be developed, incorporating harmonized methodologies and technologies and, above all, a transboundary perspective. All ESCWA member countries have already recognized the need to improve the quantity, quality, credibility, accessibility and comparability of environmental data. This can be achieved only by regulating continuous monitoring activities and data collection methodologies, relying on the latest technologies, supported by appropriate capacity building and sustainable funding.[132]

[131] Global Environmental Facility. Available at: www.gefweb.org.

[132] ESCWA, "Environmental monitoring system in the ESCWA region" (in Arabic) (2004), which was presented during the Expert Group Meeting on Upgrading Environmental Monitoring Systems in the ESCWA Region (Beirut, 29-30 November 2004).

D. TRANSBOUNDARY ENVIRONMENTAL IMPACT ASSESSMENT

There is a wide variety and scale of economic activity in the ESCWA region, whose potential transboundary environmental implications should be considered from the earliest planning phase, prior to authorization, and continue through to the execution and post-project monitoring phases. Recognition of the potential threat of transboundary environmental problems needs to be complemented by the establishment of mechanisms for notification and consultation, effective public participation, financing and dispute settlement. These are the basic prerequisites for effective formulation and implementation of transboundary environmental impact assessments (TEIAs) in the ESCWA region. A joint regional body of experts and representatives of Governments, NGOs and regional and international organizations is needed. This body could negotiate a regional policy and agreement on TEIAs and thereby contribute significantly towards averting transboundary environmental problems.

Given that EIA methods and procedures remain relatively new in the region, ESCWA member countries would in the first instance benefit from harmonized environmental policies and standards, which entail the unification of EIA standards and procedures at the national level. Proceeding from a familiar regulatory foreground, each country could then negotiate TEIAs in confidence, based on common components and philosophies, and as a natural extension of national EIA policies.[133]

In such a context, a multilateral regional convention could be formulated similar to the one facilitated by ECE in 1991, namely: the Espoo Convention on Environmental Impact Assessment in a Transboundary Context, which entered into force in 1997. The Convention's Protocol on Strategic Environmental Assessment, signed in Kiev in 2003, would, when ratified, require parties to conduct assessments of the environmental consequences of their policies and programmes. Lessons drawn from preparation of the Protocol could also assist the ESCWA region to consider the transboundary environmental implications of national development programmes and policies of member countries within a strategic planning framework.

[133] ESCWA, "Development of guidelines for harmonized environmental impact assessment suitable for the ESCWA region" (2001).