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# A Policy Framework for Combating Desertification in the Arab Region

**Abstract:** It is widely accepted, that desertification is simply land degradation in the dry lands due to a number of factors including climatic variations and human activities. The Arab region is particularly vulnerable to several development problems that are caused by mismanagement of natural resources of its marginal dry lands. This paper provides a brief synthesis of the rapid population increase and the expanding urbanization, loss of productive land and biodiversity and the deterioration of the water resources in the Arab region. The consensus of opinion indicates that resources management practices have been unsustainable. That induced disruption of social systems, ecological degradation, increasing population pressure and poverty. The evidence indicates inherent lack of appropriate government policies and weak institutions. Because desertification problems are not addressed systematically and because these time-delayed problems are difficult to handle in the future, they need to be addressed as policy issues now. The discussion highlights the need to consider a wider range of collective and coordinated policies at the level of the Arab region to combat the problems of desertification.

**Keywords:** Desertification, Population growth, Urbanization, Ecological Degradation, Environmental Policies.

## Introduction

The Arab region lies within arid, semi-arid and dry sub-humid areas, which are characterized by harsh environment, fragile ecosystems and limited water resources and arable lands. The region is particularly vulnerable to several developmental problems and adverse impacts of natural resource degradation and desertification. Diverse and intensive efforts to assess and combat desertification in the Arab region at the national, regional and international levels indicate the seriousness of this problem. One should appreciate all these efforts, especially those of international bodies (UNEP, UNDP, FAO, ICARDA, UNESCO, WB, IsDB),

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تحليل بنية سياسات مكافحة التصحر في الوطن العربي

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المستخلص: التصحر هو تدهور الأراضي المنتجة في المناطق الجافة وشبه الجافة وشبه الرطبة نتيجة لسوء الاستغلال البشري لمواردها المتجددة ونتيجة للتغيرات المناخية. وتتعرض النظم الأيكولوجية الهامشية التي تغطي مناطق واسعة من الدول العربية للاستغلال الجائر والتدهور على نمط غير ملائم بيئياً. ويهدف هذا البحث إلى تقديم تحليل موجز عن التزايد لسكاني والنمو الحضري في الوطن العربي، وفقدان الأرض لإنتاجيتها وحيويتها واختفاء التنوع البيولوجي والتدهور النوعي والكمي للمياه. وتتفق الآراء والمعطيات العلمية بأن إدارة واستغلال الموارد الطبيعية المتاحة في الدول العربية كانت على نسق غير مستدام مما أدى إلى الإخلال بالنظم الاجتماعية والتدهور الأيكولوجي واتساع رقعة الصحراء في وقت تتزايد فيه الضغط السكاني والطلب على المياه والغذاء. وتؤكد نتائج الدراسة قصور السياسات الحكومية الرامية لمعالجة ظاهرة التصحر، كما بينت النتائج ضعف البناء المؤسسي ذات العلاقة في البلدان العربية.

ولأن آثار التصحر لم تعالج في حينها، وحيث تتفاقم هذه المشاكل مع مرور الزمن فلا بد من وضع أو تغيير السياسات البيئية الحالية. وقد أوصت الورقة بإتباع سياسات متوافقة ما بين الدول العربية لمعالجة آثار التصحر.

كلمات مدخلية: التصحر، النمو السكاني، النمو الحضري، التدهور الأيكولوجي، السياسات البيئية.

regional bodies (CAMRE, ACSAD, AOAD, UNEP-ROWA, CEDARE, ICARDA, ESCWA, ALECSO) and other national and regional bodies. Success stories of combating desertification in several Arab countries are numerous. However, these achievements were limited to small/demonstration areas, the approaches in many cases were neither integrative nor well financed and their containment of the desertification problem was somehow limited.

During the last two decades (1979-1999) projects to prepare national plans of action to combat desertification (NPACD) for almost all countries of the region were developed with the assistance of UNDP, UNEP, ESCWA, FAO and other international organizations (ESCWA, 1993). The NPACDs, along with studies, research and training activities carried out by UNEP, UNDP, AOAD, ACSAD, ICARDA, FAO, CEDARE and national and regional institutions, were aimed at improving utilization methods of the available natural resources in a way compatible with the principles of

sustainability. The objectives of this study are to provide a synthesis of the major and closely interconnected priority issues of desertification in the Arab region, and to highlight the need to consider a wide range of collective and coordinated policies at the regional level to combat desertification.

**Formulating a Policy Framework**

For a policy framework to be conducive to meaningful action away from the undesirable “business as usual” and to lead to a more desirable future situation, such a framework needs to be based on a number of feasible scenarios.

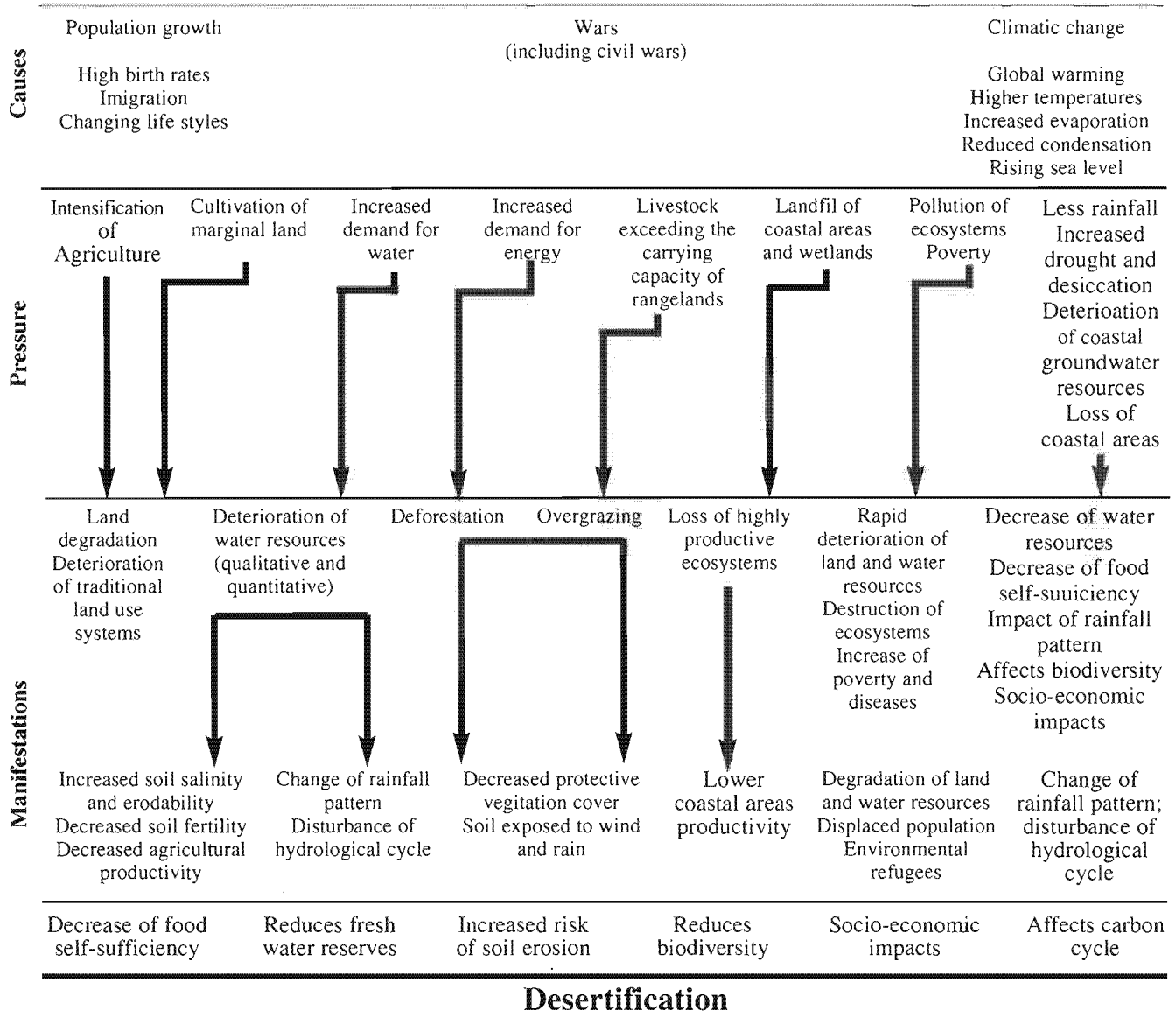
Furthermore, such scenarios, if they are to be effective, will have to be based on convincing prioritization of the many conflicting issues and considerations involved in such a complex situation,

where the social, the economic, and the environmental factors are so closely intertwined.

Practically all previous studies so far of the phenomenon of desertification place three issues at the top of the agenda for combating desertification:

1. rapid population increase and the consequent expanding urbanization;
2. loss of productive land (forest, agricultural, pastoral, or biodiversity habitat); and
3. rapid deterioration in quality and quantity of water resources.

Needless to say, these three priority issues are closely interconnected (Figure 1). However, for formulating a useful policy framework to combat desertification and a practical coping mechanism, we need, as a first approximation, to treat each one separately.

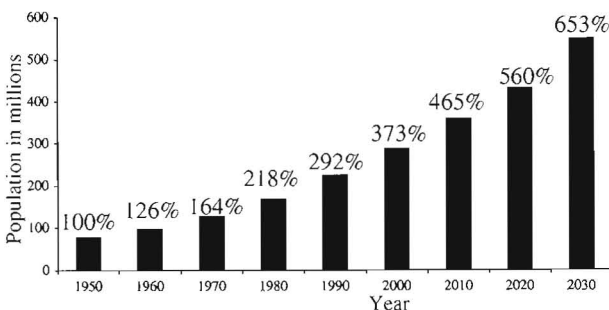


**Figure 1.** Main driving forces for desertification in the Arab Region and their impacts  
Source: Aba Hussain, et al., 1999

## Population/Urbanization

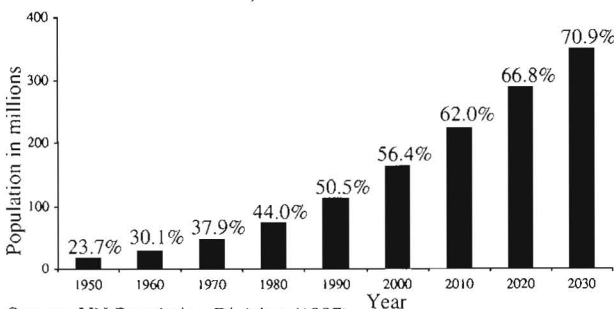
This is the most complex and sensitive issue. Unlike the other two, it is at the level of the social, rather than the physical, environment. It is encouraging to note that almost throughout the whole of the Arab region this issue is receiving far more attention than it did in the recent past. The population conference in Cairo is an encouraging example. Even in the sparsely populated countries, issues such as new symptoms of rising unemployment/underemployment of a better educated young generation forming an increasing ratio of the overall population and concern about the long term impacts of expatriate labour are causes for real concern about the future. This situation has been recently aggravated by the complications brought about by the dwindling importance of natural resources in national economies and the expected impacts of globalization.

Suffice to note here that over the last five decades the population in the Arab region has almost quadrupled, (from about 77 million in 1950 to some 288 million in 2000; Figure 2). This is the highest growth rate worldwide (UNSPD, 1997). The Arab region has also witnessed a concomitant high increase in the urban population. In 1950, less than a quarter of the population (23.7%) was urban. At present more than 56% live in urban areas. Urbanization is expected to rise in a "business-as-usual" scenario to 62% in 2010, 67% in 2020, reaching 71% in 2030 (UNSPD,1997; Figure 3).



Source: UN Population Division (1997)

**Figure 2:** Population growth in the Arab region and relative increase, 1950=100%



Source: UN Population Division (1997)

**Figure 3:** Urban population and percent urbanization in the Arab region

Having said that, it is obvious that the best we could do is to note this priority issue, keeping it in mind in our deliberations, monitoring efforts to address it in the future, and emphasizing its crucial significance for the final outcome of policies and actions in dealing with the other two priority issues at the level of the physical environment.

## Loss of Productive Land

Historically, there has been a long and well-established relationship between the desert's marginal resources and the population of the region. Communities in the region have developed indigenous experience and applied tools, technologies and regulations to protect and improve their land and water resources. Subsistence farming and grazing maintained balanced and sustainable use in the Arab region until the middle of the last century. Modern agricultural systems were introduced to marginal lands and some rangelands to meet the increasing demand for food and feed. The aridity, deforestation, overgrazing and the cultivation of crops on rangelands have led to the deterioration of the natural vegetation cover and accelerated the rate of land degradation and desertification. Ample examples of such deterioration have been highlighted by several researchers (Al-Hassan, 1991; Al-Kuthairi, 1992; Shorbagy, 1986; ESCWA, 1994; AOAD, 1995; Nahal, 1995 and Batanouny, 1998).

Recent syntheses of relevant data on the status of desertification/land degradation in the Arab region were carried out by ACSAD (LAS/UNEP/ACSAD,1996). Such information, however, is qualitative (Abdelgawad, 1997) and indicates that most of the land resources in the Arab region are either desertified or vulnerable to desertification (Table 1), thus affecting food security and development in the region. More than 88.4% of the total area, due to both climatic and anthropogenic factors, is desertified or vulnerable to desertification (Shakhtra, 1987). Out of 14.2 million km<sup>2</sup> total area, 12.64 million km<sup>2</sup> are desertified and vulnerable to desertification (Abdelgawad, 1997; Table 1). Wind and water erosion, salinization and water logging, loss of nutrients and pollution of soil and water are the main forms of land degradation prevailing in the Arab region (Table 2).



**Table 1. Areas Desertified\* and Vulnerable to Desertification in the Arab Region\*\***

Country	Area km <sup>2</sup>	Area Vulnerable to Desertification		Desertified Area	
		km <sup>2</sup>	%	km <sup>2</sup>	%
Algeria	2,381,000	230,000	9.66	1,970,000	82.74
Bahrain	670	-	-	670	100
Djibouti	21,783	872	4	20,911	96
Egypt	1,100,145	36,000	3.27	1,064,145	96.73
Iraq	437,500	237,563	54.3	166,687	38.1
Jordan	89,206	10,000	11.21	71,000	79.59
Kuwait	17,818	-	-	17,818	100
Lebanon	10,400	-	-	-	-
Libya	1,806,530	180,653	10	1,625,877	90
Mauritania	1,030,700	343,223	33.3	618,420	60
Morocco	710,850	195,000	27.43	455,000	64.01
Oman	300,000	23,000	7.67	267,000	89
Palestine	21,090	4,408	20.9	8,500	40.3
Qatar	11,610	-	-	11,610	100
Saudi Arabia	2,250,000	170,000	7.56	2,080,000	92.44
Somalia	638,000	534,000	82.7	87,000	13.64
Sudan	2,505,813	650,000	25.94	725,200	28.94
Syria	185,180	109,020	58.87	18,500	9.99
Tunisia	163,610	59,000	36.06	65,000	39.73
United Arab Emirates	83,600	-	--	83,600	100
Yemen	536,869	89,687	16.18	407,182	75.84
<b>Total</b>	<b>14,302,374</b>	<b>2,872,426</b>	<b>20.08</b>	<b>9,764,120</b>	<b>68.27</b>

Source: Shakhatra (1987)

\* Desertified by climatological and anthropogenic activities.

\*\* The figures in this table are in line with the estimates of ACSAD in 1994 for some Arab countries as reported by Abdelgawad (1997).

**Table 2. Land Degradation Types and Causes in the Arab Region (1000 Hectares)**

Country	Chemical degradation	Physical degradation	Water erosion	Wind erosion	Other inundated lands
Algeria	8406	-	3858	12309	172378
Bahrain	-	-	-	-	-
Djibouti	-	-	54	381	-
Egypt	2486	88	-	1369	87205
Iraq	10457	21	1154	3090	-
Jordan	367	-	332	3237	287
Kuwait	40	-	-	281	-
Lebanon	700	-	65	-	-
Libya	1772	-	1264	23722	97044
Mauritania	1013	407	84	17402	76292
Morocco	551	-	3626	622	34639
Oman	167	-	2772	3653	12437
Palestine-	-	-	-	-	-
Qatar	18	-	-	191	-
Saudi Arabia	2647	-	212	49445	99781
Somalia	234	-	2195	8872	10543
Sudan	14157	2574	17329	22330	71114
Syria	2531	21	1154	3090	-
Tunisia	862	-	3787	4023	3404
United Arab Emirates	449	-	118	1070	1665
Yemen	437	-	5582	6197	8657
<b>Total</b>	<b>47294</b>	<b>3111</b>	<b>43586</b>	<b>161284</b>	<b>675446</b>

Source: FAO, 1992.

Inventory and Assessment of Land Resources for Near East and Africa Region, Paper for the 11<sup>th</sup> session of the Regional Commission on Land and Water Use in the Near East, Tunis, Tunisia, 7-11 September.

## Deterioration of forests

Deterioration of forests in the Arab region has taken several forms, namely reduction of their areas, drop in the productivity of existing forests and loss of reproduction capabilities. Accurate estimates of deteriorated forest areas in the region are not available or not complete. However, some examples can highlight the seriousness of the problem. The forest areas have decreased in all Arab countries (Abdelgawad, 1997); in Morocco from 13.5 million hectares (ha) to only 3.2 million ha in 1994. In Algeria, 4 million ha were lost to fires. In Tunisia, only 120 thousand ha were available in 1994, out of an historical 300 thousand ha. Sudan lost 194 thousand ha annually throughout the period 1968-1981, and 50% of forests have been lost in Syria. The productivity of the existing forests has also been reduced; in Sudan, 75% of forests productivity has been lost. The economic value of lost area and productivity needs to be assessed. The devastating impacts on biodiversity and on the social life of the local communities are obvious but no proper analysis is available so far.

## Loss of Biodiversity and Habitats

The people of the Arab region have traditionally made sustainable use of their natural habitats and conserved the biodiversity until recently by applying "Al-Hema System" for the protection of their rangelands and forests, by prohibiting grazing and hunting during certain months of the year, by organizing the use of forests and by making early efforts to screen for the genetic improvement of cereals, sheep and Arabian horses as long as ten thousands years ago (Ucko and Dimbelby, 1969). At present, however, the over exploitation of these natural resources has led to overgrazing, deforestation and the extinction of several native plants and animals (Kingdon, 1990; Balouet, 1990; and Batanouny, 1995 and 1998).

About 25,000 plant species (10% of the world) come from the Arab region, out of which 25% are endemic to the arid and semi-arid ecosystems of the Arab region and 10% are medicinal plants (Al-Eisawi, 1998). The Arab region has lost thousands of plant varieties, strains and cultivars of vegetables and crops during the last decades and about 800 plant species of the region are threatened (Batanouny, 1995). Consequently, many of the rich and diverse forms of small mammals and birds in the region are threatened (Batanouny, 1995, UNEP,

1999). Additionally, desertification threatens fauna species by denuding critical habitats. In Kuwait, for example, desertification is one of the primary threats to several species of animals, including deer, Arab ostriches, baboons and several important apex predators (UNEP, 1997).

Despite the chronic situation and the importance of biodiversity to the region, no accurate statistics are available about the magnitude and the economic values of the losses in biodiversity and habitats in the Arab region.

**However, we cannot ignore the interaction between population growth and land degradation when it comes to food sufficiency in the region.**

As desertification reduces agricultural yields, food security is threatened. The stakeholders usually develop a survival strategy to meet their urgent requirements that leads to over-exploitation of accessible natural resources. The most frequent consequences of these survival attitudes are:

- to considerably worsen the impacts of the aridity cycles (droughts), and the desertification, and
- to weaken economies in the countries affected, particularly when they have no other resources than their agriculture.

These consequences are further exacerbated by frequent political crises (hostilities and wars), generally leading to migration, causing suffering and even death to hundreds of thousands of people.

## Rapid deterioration of water resources

Freshwater resources in the Arab region are the most limited and precious among natural resources. Recent estimates indicate that the total amount of annual renewable water resources available in the Arab region at present is about 262.9 million m<sup>3</sup>, made up of 226.5 million m<sup>3</sup> of surface and 36.3 million m<sup>3</sup> of ground water. In addition, a reserve of about 11,874 billion m<sup>3</sup> of nonrenewable (fossil) groundwater can be exploited (Table 3, ACSAD/UNESCO, 1990 and 1996). There is, however, great variability among the Arab countries in their share of these resources and their uses.

The present water deficit in the region (the difference between renewable water resources available and demand) was estimated by UNESCO/ALECSO (Attia *et.al*, 1999) to reach the level of 28.3 billion m<sup>3</sup> in the year 2000. This figure

**Table 3: Water Resources in the Arab Region and Predicted Water Demand and Deficit \***

Water Resources and Uses	Range		Average, Arab region	Source
	Minimum (Country)	Maximum (Country)		
<b>Water Resources</b>				
Average annual rainfall, mm/y	15 (Egypt)	657 (Lebanon)	—	ACSAD (1996)
Amounts of rain water, billion m <sup>3</sup> /y	0.04 (Bahrain)	1169.8 (Sudan)	2545.5	ACSAD (1996)
Renewable surface water resources, billion m <sup>3</sup> /y	0.0 (Kuwait & Qatar)	60.48 (Iraq)	226.5	ACSAD (1996)
Renewable groundwater resources, billion m <sup>3</sup> /y	0.11 (Bahrain)**	7.5 (Morocco)	36.25	ACSAD (1996)
Total Renewable water resources, billion m <sup>3</sup> /y	0.21 (Bahrain)**	64.04 (Iraq)	262.89	ACSAD (1996)
Non renewable water resources, billion m <sup>3</sup>	1.36 (Lebanon)	4000 (Sudan & Libya)	11,874	ACSAD (1990)
Water use, total, billion m <sup>3</sup> /y	0.075 (Djibouti)	59,500 (Egypt)	148,755	Shahin (1985)
	0.122 (Djibouti)	63,100 (Egypt)	191,117	ACSAD (1996)
<b>Water Uses</b>				
Water use, according to sector %,				
Agriculture	50.9 (Bahrain)	97.0 (Somalia)		Attia <i>et al.</i> , 1999
Domestic	3.0 (Iraq & Somalia)	39.2 (Bahrain)		Attia <i>et al.</i> , 1999
Industry	0 (Somalia)	12.6 (Algeria)		Attia <i>et al.</i> , 1999
<b>Predicted Water Demand and Deficit (2000 – 2030)</b>				
Prediction years	Year 2000	Year 2015	Year 2030	
Total water demand, billion, m <sup>3</sup> /y	211.61	295.73	413.1	Attia <i>et al.</i> , 1999
Predicted total water deficit, billion, m <sup>3</sup> /y	28.303 <sup>(2)</sup>	75.410 <sup>(3)</sup>	173.822 <sup>(4)</sup>	Attia <i>et al.</i> , 1999
Countries with no water deficit	Mauritania, Morocco, Sudan, Somalia Algeria, ,Djibouti, Syria, Lebanon Iraq, Oman, & Yemen	Mauritania, Morocco,Somalia, AlgeriaDjibouti, Syria, Lebanon,	Mauritania Morocco Somalia Algeria Lebanon	

Source: AbaHussain *et al.*, 1999

\* Based on data extracted from the respective sources mentioned.

\*\*Al-Zubari (1999) ; (2) Deficit in 10 countries; (3) Deficit in 14 countries; (4) 16 Deficit countries.

is expected to increase to 75.4 billion m<sup>3</sup> in 2030. Water shortages will certainly speed up the rate of desertification in the region, particularly in those Arab countries with larger deficits of freshwater (Table 3).

Unless appropriate alternative water policies are in place and corrective measures are taken rapidly the impacts of desertification will become catastrophic in most Arab countries. Although technologies for mitigation are known and local and international experience is available, proper assessments are needed, sustainable development plans are required and allocation of sizeable financial resources at national, regional and international levels should be given top priority in future development plans.

### Consequences

The adverse impacts of the forms and causes of desertification depicted in Table 4 continue to affect natural resources at accelerated rates. If the present policies in the Arab countries

continue as “business as usual”, irreversible desertification will become widespread and the cost of importing food and combating desertification will become a real burden on the economy and development of the region.

### Conclusions

There is a shortage of material, research results, pilot projects, and recommendations about the causes and impacts of desertification phenomena and national and international action to reverse these processes. After more than three decades of planning and implementation in the Arab region to date, evidence indicates that little has been achieved. Actually desertification continues to intensify, aggravating the loss of both the land and its productivity, and lowering its capacity to support the growing population. One should, therefore, raise the question: **Assuming that comprehensive efforts to combat desertification will succeed, will we be able to meet human needs in the Arab region?**

**Table 4. Matrix of Critical Issues Leading to Desertification in the Arab Region**

Impacts	Sources	Evidence	Problem Type
<ul style="list-style-type: none"> <li>• Slowing down of socio-economic development plans</li> <li>• Decrease of food self-sufficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Aridity</li> <li>• Rapid population growth</li> <li>• Intensive agricultural schemes</li> <li>• Present agricultural and water policies</li> </ul>	<ul style="list-style-type: none"> <li>• Low per capita available water and arable land with time</li> </ul>	<ul style="list-style-type: none"> <li>• Limited water and land resources</li> </ul>
<ul style="list-style-type: none"> <li>• Increasing water scarcity</li> <li>• Salinization and loss of agricultural lands</li> <li>• Negative impact on society and environment</li> </ul>	<ul style="list-style-type: none"> <li>• Overexploitation of water</li> <li>• Irrational water demand</li> <li>• Discharge of wastewater</li> <li>• Lack of awareness</li> <li>• Lack of integrated agricultural and water policies</li> </ul>	<ul style="list-style-type: none"> <li>• Depletion of groundwater and surface water</li> <li>• Intrusion of salt water (sea and saline water)</li> <li>• Contamination of surface water and shallow aquifers</li> </ul>	<ul style="list-style-type: none"> <li>• Water quality deterioration</li> </ul>
<ul style="list-style-type: none"> <li>• Degradation of irrigated lands</li> <li>• Reduction of agricultural productivity</li> <li>• Degradation of water resources</li> <li>• Increase of poverty and rural urban migration</li> </ul>	<ul style="list-style-type: none"> <li>• Extensive traditional practices</li> <li>• Intensive agricultural schemes</li> <li>• Intensive use of agro-chemicals</li> <li>• Lack of awareness and participation of stakeholders</li> <li>• Lack of integrated agricultural development policies</li> </ul>	<ul style="list-style-type: none"> <li>• Increase of soil and water salinity</li> <li>• Increase of salinized cultivated areas</li> <li>• Decrease of soil fertility</li> <li>• Decrease of agricultural productivity</li> </ul>	<ul style="list-style-type: none"> <li>• Progressive deterioration of irrigated lands</li> </ul>
<ul style="list-style-type: none"> <li>• Loss of rangelands and food production</li> <li>• Increase soil erosion</li> <li>• Escalation of sand dune encroachment</li> </ul>	<ul style="list-style-type: none"> <li>• Population pressure and increased food demand</li> <li>• Inappropriate agricultural practices</li> <li>• Lack of awareness</li> <li>• Policies adopted for development</li> </ul>	<ul style="list-style-type: none"> <li>• Low and unsustainable productivity of marginal lands</li> <li>• Increase of sand drifts and dust storms</li> </ul>	<ul style="list-style-type: none"> <li>• Cultivation of marginal lands (lands between arable and rangelands)</li> </ul>
<ul style="list-style-type: none"> <li>• Loss of</li> <li>• Productivity of rangelands</li> <li>• Food resources</li> <li>• Biodiversity</li> <li>• Soil by wind and water erosion</li> </ul>	<ul style="list-style-type: none"> <li>• Mismanagement of rangelands (overgrazing, wood cutting tourism)</li> <li>• Socio-economic factors</li> <li>• Increasing pressure for food security</li> <li>• Adopted policies and programmes for development</li> </ul>	<ul style="list-style-type: none"> <li>• Change of natural plant cover</li> <li>• Deterioration of land productivity</li> <li>• Increased soil erosion, sand drifts and dust storms</li> </ul>	<ul style="list-style-type: none"> <li>• Deterioration of rangeland</li> </ul>
<ul style="list-style-type: none"> <li>• Reduction of agricultural productivity</li> <li>• Increasing poverty</li> <li>• Loss of rural income</li> <li>• Increasing rural/urban migration</li> <li>• Marginalization of rural areas</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing pressure on land at local and regional levels</li> <li>• Sedentarization of nomads and pastoral communities</li> <li>• Local effects of structural adjustment programme</li> <li>• Inappropriate interventions such as top-down planning and intervention</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriation of productive lands for urban and industrial development</li> <li>• Development of large scale private agricultural farms</li> </ul>	<ul style="list-style-type: none"> <li>• Development policies and interventions</li> </ul>
<ul style="list-style-type: none"> <li>• Poor water and land development and management</li> <li>• Wasteful uses of resources</li> <li>• Progressive expansion of desertified areas</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of financial resources</li> <li>• Inadequate technical capabilities, training and research</li> <li>• Lack of coordinating effort and networking for combating desertification</li> <li>• Lack of sustainable development plans for desertified areas</li> </ul>	<ul style="list-style-type: none"> <li>• Continuing degradation of water and land resources</li> <li>• Lack of integrated agricultural and water policies</li> <li>• Duplication of efforts</li> <li>• Lack of awareness</li> </ul>	<ul style="list-style-type: none"> <li>• Weak institutions</li> </ul>

Source: AbaHussain *et al*, 1999



This question, although outside the domain of the present paper, is of great importance and worth thorough investigation.

By the end of the second millennium, and in spite of continuous efforts to combat and mitigate desertification, this issue is still on the top of the agenda of environmental concerns at the national, regional and international levels. Constraints that hinder the reversal of the desertification processes are mainly due to the lack of

- adequate and validated information on the different aspects of the problem, especially the socio-economic impacts of desertification;
- integrated land use plans and policies;
- well-identified sustainable development plans for desertified areas;
- appropriate integrated natural resource management policies;
- application of appropriate technologies for efficient and sustainable use of land and water resources;
- allocation of financial resources;
- active awareness campaigns; and
- targeted appropriate training on assessment and mitigation of desertification.

### Future Outlook

The problem of desertification is manageable in principle as indicated by the achievements recorded for several Arab countries, although limited to certain aspects of desertification and to some locations. Improvement of irrigation systems and water management practices, introduction of new advanced technologies in rainfed agriculture, improvement of rangeland management and animal husbandry technologies, fixation of drifting sands and reforestation of denuded lands, conservation and sustainable use of biodiversity, and provision of new alternative employment of local people all were successfully achievable on a trial basis in several locations in some Arab countries and proved their technical feasibility. Extending these successes at the national level, however, needs political will and economic resources with due consideration given to effectiveness and sustainability. Such actions require adequate information to prepare well identified action plans for combating desertification, and accurate assessment of the affected resources, the economic losses, and the real cost of mitigation.

The need now is for collective and coordinated work at the level of the Arab region. We propose to start with a meaningful discussion in the following areas:

- establishing a regional database for desertification in Arab countries capable of providing efficient services to all countries in the region;
- identifying the magnitude of the different causes of desertification and evaluating the actual impacts on the natural resources in the different Arab countries;
- surveying both the appropriate indigenous and modern technologies for combating desertification in the region;
- assessing the economic losses and cost of mitigation measures based on real successful trials applicable to similar localities in Arab countries; and
- developing early warning systems.

*However, it is worth stressing the need to establish a mechanism for the Arab region to coordinate activities related to combating desertification. This mechanism should include, in addition to the member states, all regional organizations and institutions dealing with various aspects of desertification. The regional arrangement should address the implementation of the above activities, fund raising drives and development of regional positions at international forums in an multidisciplinary and integrated manner.*

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