

# ARAB ENVIRONMENT IN 10 YEARS



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## Environmental research in the Arab world: A bibliographic review

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# Introduction

## **This presentation:**

- Presents an update on the state of research in the Arab world during the past 10 years.
- Highlights and identifies contributions and impacts of Arab scholars by analyzing bibliometric data.
- Addresses research collaboration at regional and local levels in the Arab region.
- Discusses the influence of Arab journals on environmental research.
- Provides recommendations to improve research in sub-sectors of the field.

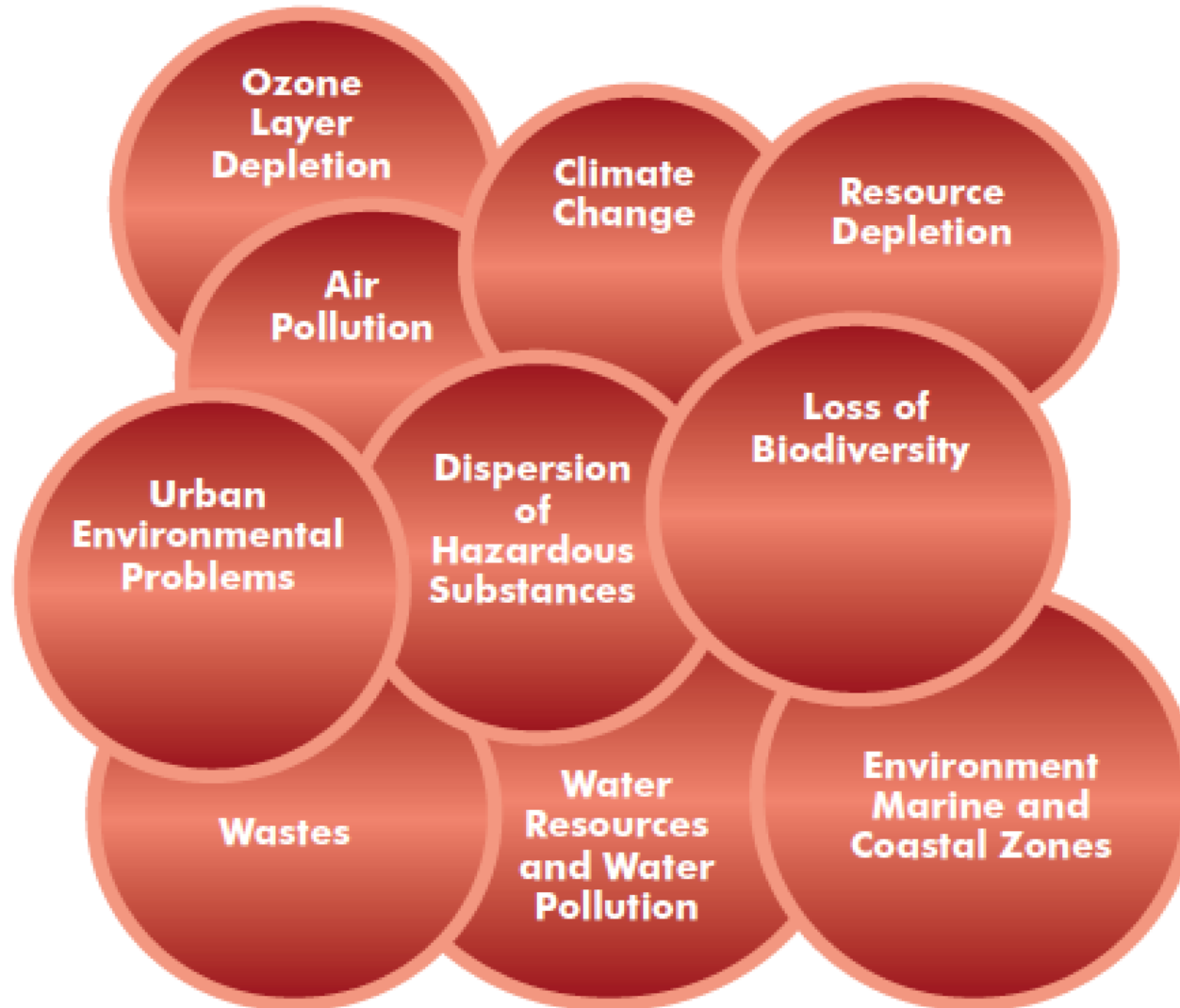
# Framework and approach

## A. Definition of environmental engineering

- It is multi-disciplinary engineering
- It predicts the health.
- It is carried out however, it is

## B. Classification of environmental engineering

- Efforts have
- The EUROS environmental



the basic sciences,  
and environmental  
issues in the Arab world

within its domain.  
this work to define

Source: Europäische Gemeinschaften, 1999

# Framework and approach (cont'd)

## C. Bibliometric analysis

Index	Description
Citation rate	the frequency and pattern by which a publication is cited in other publications. Citation rates are calculated by article, author, editor or journal, and are based upon online data mining and indexing of metadata within articles. Examples of online citation indexers are google scholar, web of science, and Crossref ("Crossref," 2017, "Google Scholar," 2017, "Web of Science," 2017).
Journal impact factor	Journal impact factor measures the average number of citations of articles published in a journal in the preceding two years of the reference year they are measured in. Articles with high citation frequencies distort a journal's impact factor. Statistically, this means that journal impact factor is a measure of journal performance rather than article performance, and consequently more research needing publication will be submitted to that journal. Such journals are not only responsible for scientific impact, but for delivering the research to a wider audience.
Hirsch index (H-index)	It is an author level index measuring both citation impact of researchers as well as the individual research paper published (Jones, Huggett, & Kamalski, 2011). It takes into account the number of times a researcher and their research has been referred to.
Research productivity	It is defined as the number of publications per author (Abramo & D'Angelo, 2014). It is used as a measure of output.

- Selecting Arab countries as representative samples of the Arab world has in itself a relative bias.

# State of research in the Arab world

Arab country ranks for general scientific research using Scopus database (1996-2015)

Country	Category (Arab rank)[International category rank]						Citations per document
	World Rank	Arab Rank	Documents	Citable documents	Citations	Self-citations	
Egypt	42	1	137350 (1)	133147 (1)	1009954 (1)	198941 (1)	7.35 (7)
Saudi Arabia	44	2	111117 (2)	106187 (2)	748069 (2)	122715 (2)	6.73 (12)
Tunisia	53	3	58769 (3)	55904 (3)	342429 (3)	73636 (3)	5.83 (17)
Algeria	55	4	42456 (4)	41544 (4)	215922 (5)	43297 (5)	5.09 (20)
Morocco	56	5	40737 (5)	38371 (5)	279731 (4)	51031 (4)	6.87 (9)
United Arab Emirates	61	6	31366 (6)	29259 (6)	210873 (6)	21957 (7)	6.72 (14)
Jordan	66	7	28234 (7)	27369 (7)	201400 (7)	24913 (6)	7.13 (8)
Lebanon	68	8	20815 (8)	19040 (8)	186558 (8)	18136 (8)	8.96 (3)
Kuwait	70	9	18468 (9)	17687 (9)	157888 (9)	18112 (9)	8.55 (5)
Qatar	77	10	13438 (10)	12524 (10)	71382 (11)	8900 (11)	5.31 (19)
Oman	80	11	12846 (11)	11919 (11)	87333 (10)	10379 (10)	6.8 (11)
Iraq	85	12	11605 (12)	11042 (12)	39145 (14)	5022 (14)	3.37 (22)
Sudan	99	13	6099 (13)	5792 (13)	50784 (13)	5797 (13)	8.33 (6)
Syrian Arab Republic	101	14	5744 (14)	5459 (14)	53601 (12)	5900 (12)	9.33 (2)
Bahrain	110	15	4657 (15)	4225 (15)	24769 (16)	2346 (16)	5.32 (18)
Palestine	111	16	4506 (16)	4224 (16)	30338 (15)	3884 (15)	6.73 (12)
Libya	113	17	4160 (17)	4020 (17)	18971 (17)	1158 (18)	4.56 (21)
Yemen	121	18	2776 (18)	2698 (18)	18951 (18)	2154 (17)	6.83 (10)
Mauritania	173	19	482 (19)	456 (19)	4762 (19)	300 (19)	9.88 (1)
Djibouti	195	20	190 (20)	178 (20)	1206 (20)	94 (20)	6.35 (15)
Somalia	203	21	115 (21)	97 (21)	685 (22)	33 (22)	5.96 (16)
Comoros	208	22	96 (22)	89 (22)	839 (21)	52 (21)	8.74 (4)

# State of research in the Arab world (cont'd)

## A. Environmental research in the Arab world

Arab country ranks for general environmental research between 1996-2015, numbers indicate quantity, followed by the country's rank within the Arab world. Square brackets indicate international ranking.

• Arab countries contribute by 1.7% to the world's citable documents vs. 26%

Country	Overall Rank	Documents	Citable documents	Citations	Self-citations	Citations / document	H index
Egypt	36 (1 )	8397 (1)	8212 (1)	72131 (1)	12470 (1)	8.59 (13)	83 (1) [42]
Saudi Arabia	43 (2 )	5849 (2)	5718 (2)	45445 (2)	7446 (2)	7.77 (15)	69 (2) [55]
Tunisia	52 (3 )	3412 (3)	3343 (3)	35249 (3)	7431 (3)	10.33 (6)	65 (3) [56]
Morocco	56 (4 )	2714 (4)	2679 (4)	25160 (4)	4298 (4)	9.27 (11)	61 (5) [63]
Algeria	59 (5 )	2460 (5)	2427 (5)	22367 (5)	3215 (5)	9.09 (12)	62 (4) [60]
Jordan	62 (6 )	2011 (6)	1984 (6)	22259 (6)	2735 (6)	11.07 (4)	60 (6) [65]
United Arab Emirates	65 (7 )	1784 (7)	1733 (7)	16725 (7)	1801 (8)	9.38 (10)	51 (7) [74]
Kuwait	71 (8 )	1282 (8)	1261 (8)	12360 (8)	1908 (7)	9.64 (9)	45 (8) [82]
Lebanon	76 (9 )	1013 (9)	995 (9)	10408 (9)	1183 (9)	10.27 (7)	44 (9) [85]
Oman	80 (10 )	946 (10)	925 (10)	9564 (10)	1152 (10)	10.11 (8)	42 (10) [89]
Iraq	86 (11 )	826 (11)	799 (11)	2834 (13)	396 (13)	3.43 (22)	22 (16) [137]
Syrian Arab Republic	91 (12 )	613 (12)	605 (12)	6852 (11)	705 (11)	11.18 (3)	36 (11) [96]
Qatar	96 (13 )	493 (13)	486 (13)	2730 (14)	286 (14)	5.54 (18)	26 (13) [122]
Palestine	97 (14 )	477 (14)	469 (14)	3712 (12)	469 (12)	7.78 (14)	31 (12) [106]
Sudan	107 (15 )	363 (15)	357 (15)	2473 (15)	195 (15)	6.81 (17)	25 (14) [125]
Libya	118 (16 )	296 (16)	295 (16)	1403 (18)	81 (18)	4.74 (19)	17 (18) [151]
Bahrain	121 (17 )	270 (17)	261 (17)	1940 (17)	171 (16)	7.19 (16)	22 (16) [137]
Yemen	126 (18 )	230 (18)	221 (18)	2412 (16)	169 (17)	10.49 (5)	23 (15) [133]
Mauritania	162 (19 )	61 (19)	61 (19)	901 (19)	46 (19)	14.77 (2)	17 (18) [151]
Djibouti	203 (20 )	14 (20)	14 (20)	62 (21)	6 (20)	4.43 (20)	4 (21) [208]
Comoros	207 (21 )	11 (21)	11 (21)	209 (20)	4 (21)	19 (1)	6 (20) [199]
Somalia	211 (22 )	6 (22)	5 (22)	25 (22)	1 (22)	4.17 (21)	3 (22) [212]



# State of research in the Arab world (cont'd)

## B. National research output by discipline popularity

Top three Arab countries leading in most of the most disciplines between 1996-2015 are Jordan, Egypt and Saudi Arabia. 40% of Arab publications are on health and pollution issues, 20% on general environmental research and 17% on water sciences and technology. Figures between brackets indicate the number of citations and percentages indicate each country's contribution.

Discipline	Citations Arab World	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Water Science and Technology	84585	Egypt (15085) [17.83%]	Saudi Arabia (11829) [13.98%]	Jordan (8568) [10.12%]
Environmental Chemistry	78422	Egypt (22980) [29.3%]	Saudi Arabia (13877) [17.69%]	Tunisia (8376) [10.68%]
Pollution	75846	Egypt (19666) [25.92%]	Saudi Arabia (13201) [17.4%]	Tunisia (8608) [11.34%]
Waste Management and Disposal	57116	Egypt (14582) [25.53%]	Tunisia (7694) [13.47%]	Saudi Arabia (6971) [12.2%]
Environmental Engineering	53797	Egypt (13965) [25.95%]	Tunisia (8902) [16.54%]	Saudi Arabia (6528) [12.13%]
Health toxicology and Mutagenesis	52853	Egypt (18303) [34.63%]	Tunisia (7652) [14.47%]	Saudi Arabia (7280) [13.77%]
Ecology	35821	Egypt (7427) [20.73%]	Saudi Arabia (6011) [16.78%]	Morocco (3809) [10.63%]
Environmental Science Misc	32464	Egypt (9391) [28.92%]	Tunisia (4574) [14.08%]	Saudi Arabia (4522) [13.92%]
Management Monitoring Policy and law	22338	Egypt (4363) [19.53%]	Saudi Arabia (3728) [16.68%]	Algeria (2290) [10.25%]
Ecological Modelling	10456	Saudi Arabia (2377) [22.73%]	Egypt (2036) [19.47%]	Algeria (1261) [12.06%]
Nature and Landscape Conservation	8615	Morocco (1795) [20.83%]	Algeria (1453) [16.86%]	Saudi Arabia (1251) [14.52%]
Global and Planetary change	7431	Morocco (1985) [26.71%]	Tunisia (1615) [21.73%]	Saudi Arabia (757) [10.18%]



# State of research in the Arab world (cont'd)

## C. The number of researchers in the Arab world

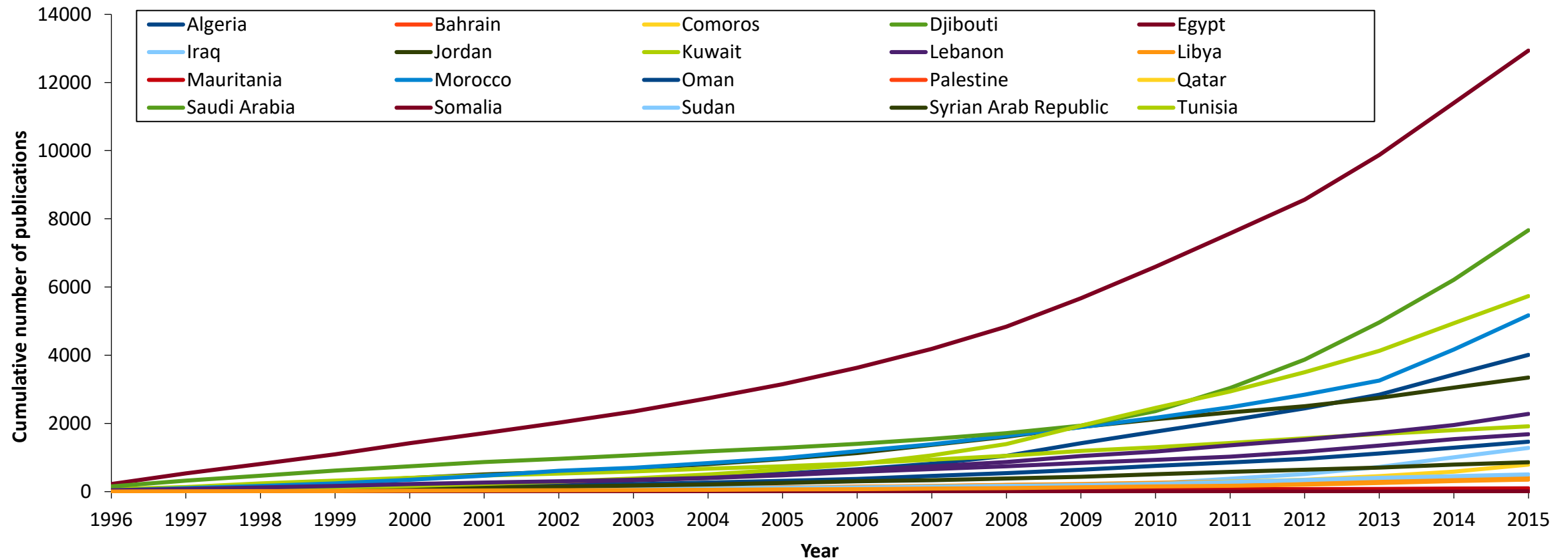
- Figures for natural sciences are provided as general indicators since reliable figures on environmental sciences could not be found.
- Researchers per million people for general research and natural sciences research. [Figures are adapted from UNESCO UIS database unless stated otherwise. \* 2005 figures for Head Counts (HC) of general research; \$ 2008 figures for Full time employed (FTE) researchers of general researchers both adapted from Hanafi et. al. 2013.]

Country	Data collection year	Total FTE researchers	FTE researchers /million	Natural sciences	
				Head counts	researchers /million
Egypt	2014	61058.55	681.6	14597	162.9
Saudi Arabia	2009	716*	26.1*	213	7.7
Tunisia	2014	20070	1783.3	..	..
Morocco	2012	28264.86	856.9	..	..
Algeria	2005	5593	168.1	3350	100.6
Jordan	2008	42151* [2223\$]	1952\$	927	154.2
Kuwait	2013	158* [634\$]	166\$	577	160.5
Lebanon	No Data	13316* [565\$]	178\$	..	..
Oman	2013	497.244	127.2	192	49.1
Iraq	2014	2394	67.8	867	24.5
Qatar	2012	1203.45	596.9	161	79.8
Sudan	2005	12615*	394.3*	2002	62.5
Libya	No Data	390*	61*	..	..
Bahrain	2014	493	361.9	138	101.3

# State of research in the Arab world (cont'd)

## D. Past and recent trends (1996 and 2015):

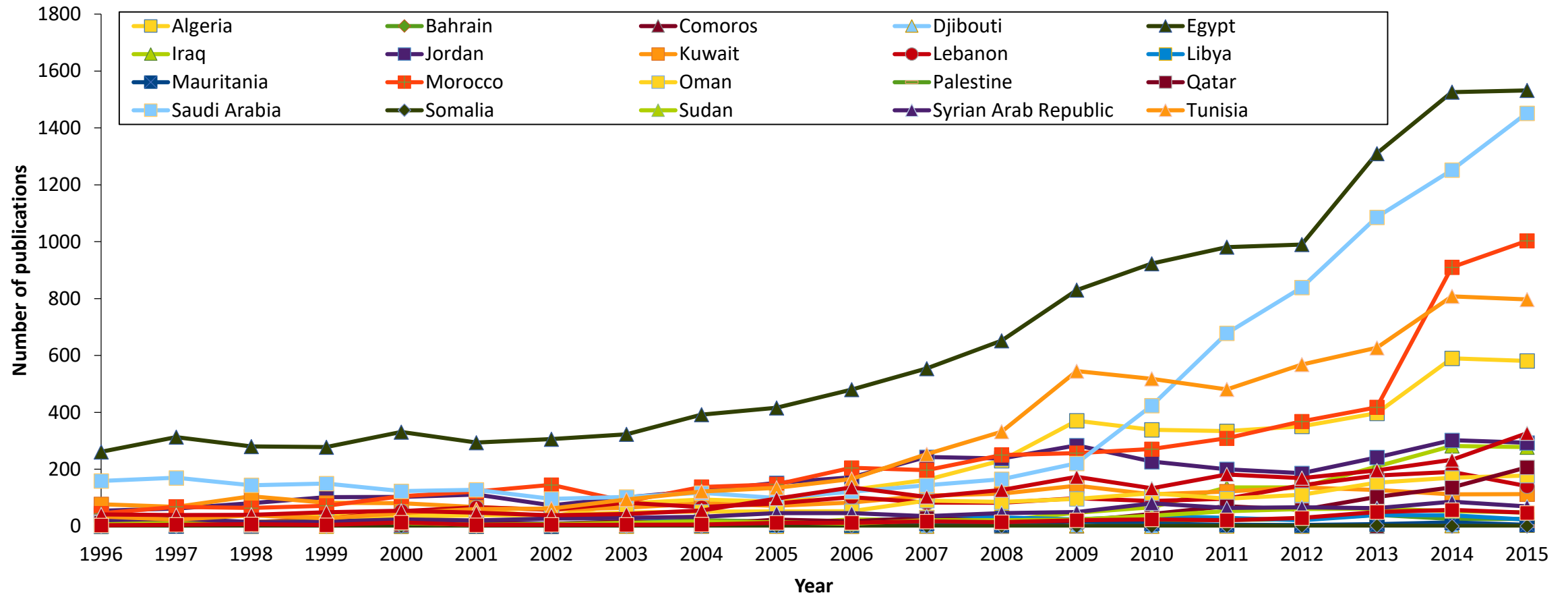
- Cumulative research in all fields of environmental science has increased:



# State of research in the Arab world (cont'd)

## D. Past and recent trends (1996 and 2015):

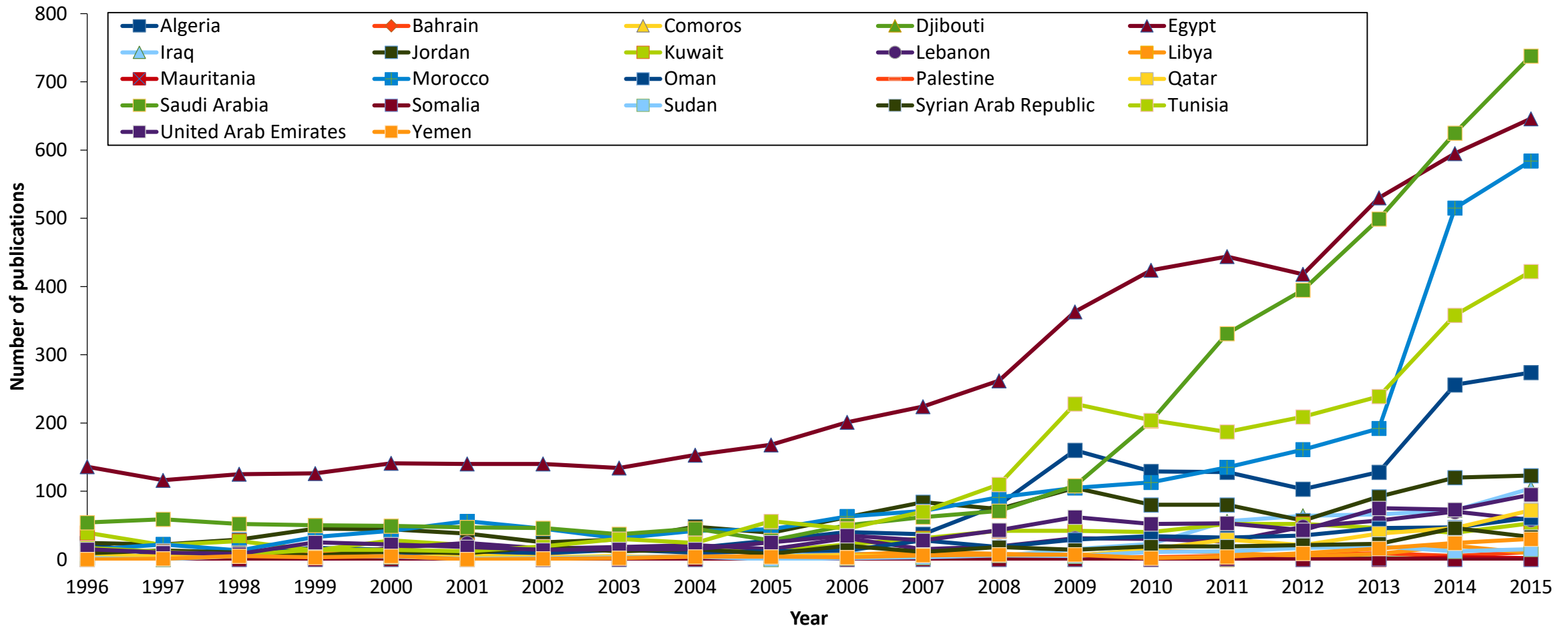
- Trends for publications on environmental research:



# State of research in the Arab world (cont'd)

## D. Past and recent trends (1996 to 2015):

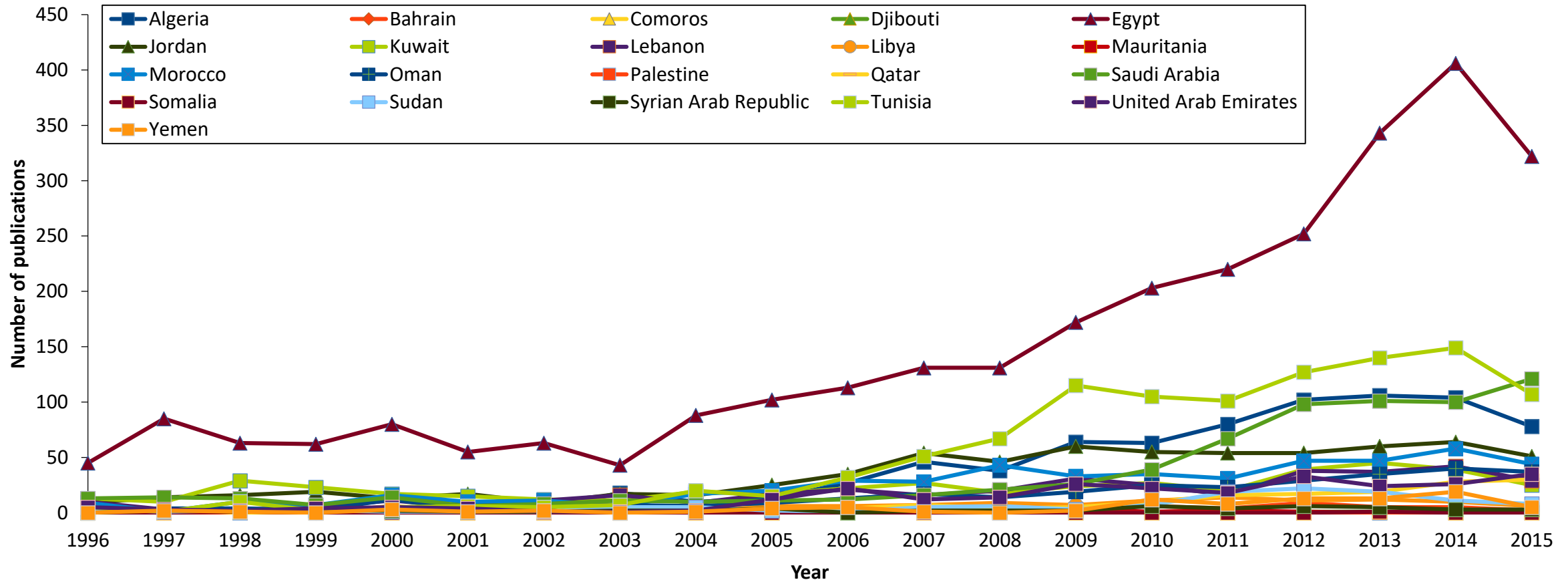
- Trends for publications on health and pollution:



# State of research in the Arab world (cont'd)

## D. Past and recent trends (1996 to 2015):

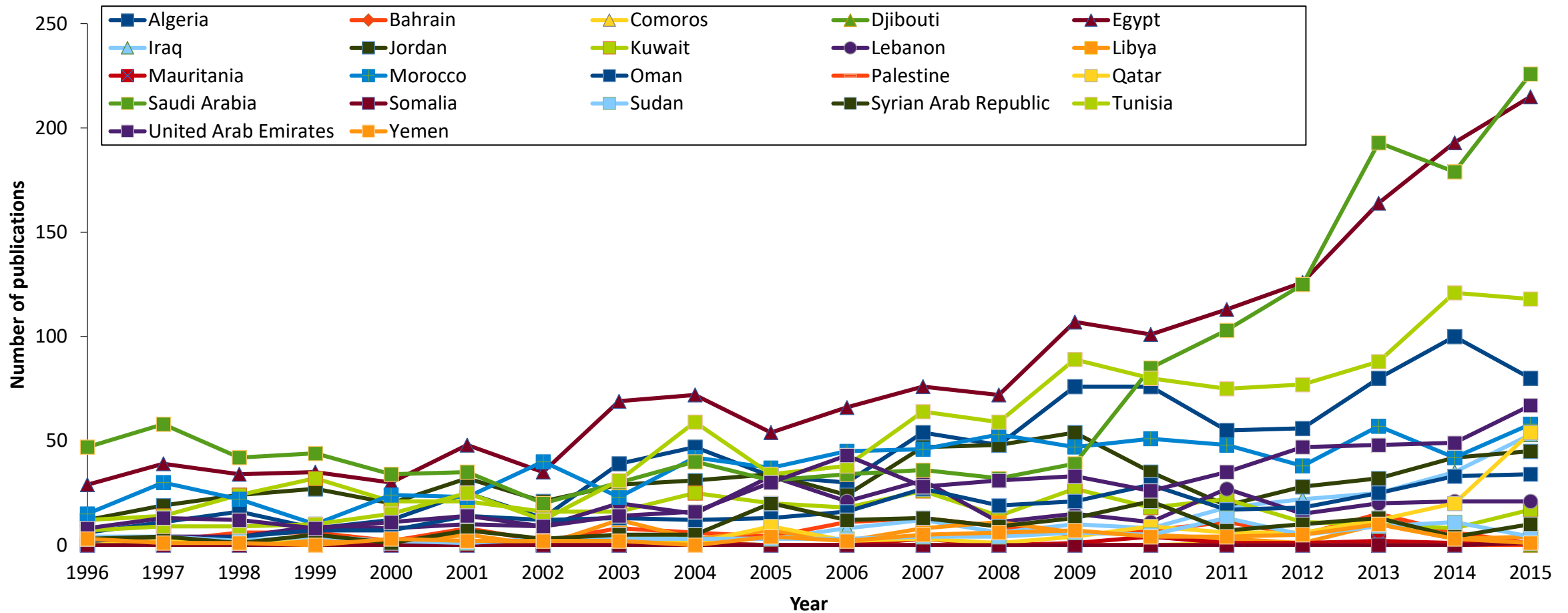
- Trends on publications in general and miscellaneous environmental research:



# State of research in the Arab world (cont'd)

## D. Past and recent trends (1996 to 2015):

- Trends on publications for data on water, science and technology:

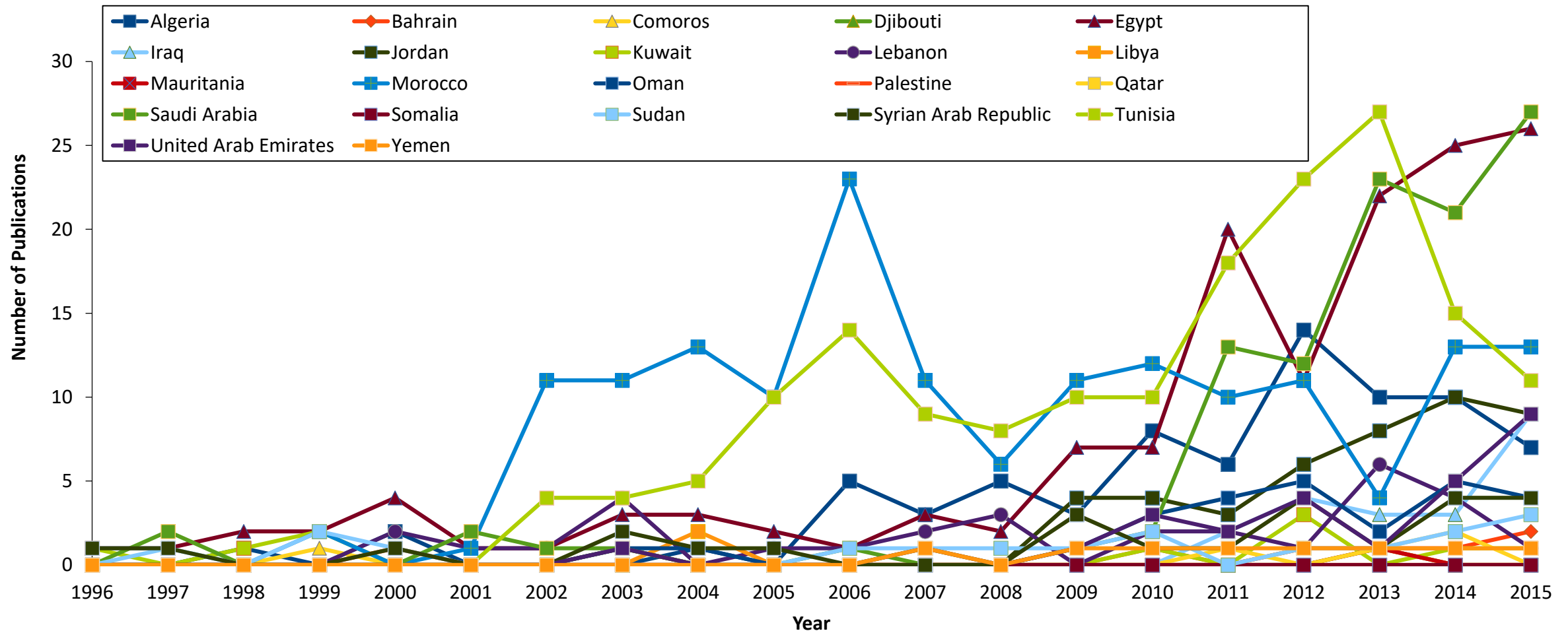




# State of research in the Arab world (cont'd)

## D. Past and recent trends (1996 to 2015):

- Remaining subjects show similar trends except for global and planetary change:



# State of research in the Arab world (cont'd)

## E. Arab power of publication

- Arab publishers' ability to compete with foreign publishers for article publication, within the Arab world and internationally, is an important factor in knowledge dissemination.
- In the 22 Arab nations only 12 publishers publish international scientific journals. Egypt leads with a total of 67 journals, The United Arab Emirates publishes 24 journals on general science and Saudi Arabia and Jordan each publish 11 journals on general science.
- When comparing Arab journals to others, the scale of performance differs with an order of magnitude e.g.

Indicator	Jordan's Advances in Environmental Biology	The Netherlands' Science of the Environment
Number of articles in the last 3 years	2,256	3,799
SJR impact factor	0.11	1.7
H-index	12	160

# State of research in the Arab world (cont'd)

## E. Arab power of publication (cont'd)

- Between 2012 to 2015, listed Arab publishers published 0.99% of the world's environmental research, compared to the US's 28%, and the UK's 27%.
- This leaves much room for expansion of the publication sector in the Arab world, both in English (as demonstrated by Egypt's international publication record for general science) and in Arabic for local and regional consumption purposes.

# Conclusion and recommendations (REVISED)

## Establishment of the Arab Environmental Research Program

# Conclusion and recommendations (REVISED)

## Program Objectives:

**O1:** Provision of science and technology products to enhance the shift towards green economy in Arab countries

**O2:** Achieving the highest level of integration, effectiveness and efficiency in conducting environmental research in the Arab countries

# Conclusion and recommendations (REVISED)

## Program Components:

- C1:** Establishment of an institutional set up to be responsible for the integration, coordination and dissemination of environmental research in the Arab Countries
- C2:** Development of a collaborative regional environmental research plan to address top 10 research problems facing Arab countries.



# Conclusion and recommendations (REVISED)

## Program components:

- C3:** Development of networking and collaboration mechanisms among research institutions and researchers in the Arab countries. A wider networking circle shall incorporate linkages with international research institutions and thinking tanks
- C4:** Development of networking and collaboration mechanisms between research institutions and the responsible sectorial-level agencies for the implementation of development programs

# Conclusion and recommendations (REVISED)

## **Program participants:**

Participating think tank

Participating research centres

Participating consulting firms

Participating Subject Matter Experts

Associated international development agencies

Associated international research centres



# Questions?

