

Global Map of Irrigated Areas

Version 2.1: Updates for Africa and Oceania

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<http://www.fao.org/ag/agl/aglw/aquastat/irrigationmap/index.stm>

Irrigation in Africa

In version one of the global map of irrigated areas, the geographical distribution of irrigated areas in Africa is mainly based on maps presented in Achtnich (1980). The quality of this information could be improved considerably by using a map published by FAO in 1987 as part of the publication "Irrigated areas in Africa", FAO's Geo-referenced Database on African Dams (2000) (available at: <http://www.fao.org/ag/agl/aglw/aquastat/damsafrica/index.stm>) and data available in FAO's AQUASTAT library.

In the AQUASTAT library, statistical information is gathered on the extent of irrigated areas on sub-country level. In practice this information is available either on the basis of sub-country administrative boundaries or on river basins. In most countries some information on sub-country basis can be found, however, for 15 African countries this information is not available.

If national maps of irrigated areas are available, they are used to geographically distribute sub-national statistics. Unfortunately, however, for most of the countries such maps are not available. Where these maps are available, they were 'on-screen'-digitised. For some arid countries information on the geographical distribution of irrigated areas can be deduced from Landsat TM Mosaics. Also this information is transferred to polygons by means of 'on-screen'-digitisation.

If no information was found on national level, the information per sub-national administrative unit is geographically distributed according to the map which is part of the publication "Irrigated areas in Africa" (FAO, 1987) and according to the Geo-referenced database on African dams (FAO, 2000). The map of "Irrigated areas in Africa" (FAO, 1987), contains point and polygon information indicating the location and areas of irrigation projects. Unfortunately, the Geo-referenced database on African dams does not contain any information on the irrigated area downstream of the dam. For the dams in the database that are being used for irrigation, an arbitrary irrigated area of two cells of 0.01° (about 240 ha, depending on the latitude of the dam) has been assigned.

The irrigated areas that were distributed by using the maps mentioned were compared to statistics per sub-national boundaries. If the sum of the distributed irrigated areas was higher than the figures mentioned in the statistics, the irrigated area on the map was down-scaled to match the sub-national statistics. If the irrigated area per sub-national unit was higher than the irrigated area geographically distributed, the difference was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map. If no suitable grid-cells could be found on this land cover map, the remaining area was equally distributed over the whole sub-national unit.

The way the map was generated for Africa is documented per country and presented in Annex A.

Irrigation in Oceania

Version one of the digital global map of irrigated areas was derived by combining large-scale maps with outlines of irrigated areas (Achtlich, 1980) and FAOSTAT data on total irrigated area per country around 1995. For Australia also information on the irrigated area in 7 sub-national units and a map of irrigated areas in the Murray-Darlin basin has been used. Irrigation density was modeled on a 5' raster and later aggregated to a 0.5° raster.

The quality of the irrigation map could be improved considerably by using information on the acreage of irrigation in sub-national administrative units (1 322 units for Australia and 14 units for New Zealand). To distribute irrigation within the administrative units of Australia a high resolution land use map and an irrigation map, both provided by the Australian Bureau of Rural Sciences has been used. The irrigation density was modelled on a 0.01° raster and later aggregated to a 5' (0.0833°) grid.

However, in some sub-national units the irrigated area according to the sub-national statistics was higher than the irrigated area distributed according to the irrigation maps. In these cases the difference was distributed equally to over the most suitable grid cells using the USGS landcover classification map. It was assumed, that irrigation may appear in grid cells classified as: "Dryland Cropland and Pasture", "Irrigated Cropland and Pasture", "Cropland / Grassland Mosaic", "Cropland / Woodland Mosaic", "Grassland", "Shrubland", "Mixed Shrubland / Grassland", "Savanna", "Herbaceous Wetland" and "Wooded Wetland".

The way the map was generated for Oceania is documented per country and presented in Annex B.

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Annex A: Irrigation in Africa per country

Algeria

Distribution of irrigated area by province (Wilaya) according to this table:

Wilaya	Irrigated area (ha)
Adrar	8773
Ain Dafla	46928
Ain Tamouchent	1531
Alger	14797
Annaba	1931
Batna	19355
Bechar	5793
Bejaia	7521
Biskra	43702
Blida	19272
Borjbouairej	6314
Bouira	7670
Boumerdes	22739
Chlef	31530
Constantine	2192
Djelfa	1334
El Bayadh	1072
El Oued	15762
El Tarf	18899
GhardaSa	4145
Guelma	235
Illizi	0
Jijel	976
Khenchela	2651
Laghouat	2806
Mascara	24723
Media	10096
Mila	4854
Mostaghanem	16573
Msila	32447
Naama	864
Oran	3755

Ouargla	8460
Oum El Bouaghi	14130
Relizane	18696
Saida	15392
Setif	12552
Sidi-Bel-Abbes	10409
Skikda	4502
Souk Ahras	5119
Tamanrasset	0
Tebessa	3200
Tendouf	3227
Tiaret	22149
Tipaza	18835
Tissemsilt	4220
Tizi-ouzou	4774
Tlemcen	28595
ALGERIA	555500

The figures refer to 1987. The figures for medium and small scale irrigation schemes were given by province and are stored in the AQUASTAT database. Figures for large scale irrigation were given per scheme. The location of the schemes are presented on the Map of irrigated areas in Africa. The irrigated areas were assigned to the provinces according to the information on this map. An area of 45 000 ha of oasis were distributed over the southern provinces. AQUASTAT gives an area of 110 000 ha equipped for spate irrigation, which has been distributed over the provinces covering the Saharan Atlas mountains. The total area equipped for irrigation added up to 510 709 ha. This figure has been scaled up to 555 500 ha to match the figure in AQUASTAT. The irrigated area is concentrated around 13 large scale irrigation projects digitised from the Map of irrigated areas in Africa and around 36 dams. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Angola

For Angola no information could be found on irrigated areas on sub-national level. In the whole of Angola 75 000 ha is equipped for irrigation. The figure refers to 1974 (AQUASTAT). The irrigated area has been concentrated on the map around 5 dams. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Benin

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Atakora	464
Atlantique	1270
Borgou	1292
Mono	267
Oueme	1215
Zou	5728
BENIN	10236

The figures originate from the AQUASTAT-library and refer to 1993. The irrigated area adds up to 10 236 ha and is concentrated around two schemes indicated on the Map of irrigated areas in Africa. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Botswana

Distribution of irrigated area by district according to this table:

District	Irrigated area (ha)
Gaborone	151
Masungu (NE & Francistown)	258
Ngamiland East (Okav.)	294
Ngwaketse South	37
Serowe	641
BOTSWANA	1381

The figures originate from the AQUASTAT-library and refer to 1992. The irrigated area adds up to 1 381 ha and is concentrated around three schemes indicated on the Map of irrigated areas in Africa. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Burkina Faso

Distribution of irrigated area by region (group of provinces) according to this table:

Region	Irrigated area (ha)
Centre	1582
Centre Est	540
Centre Ouest	587
Est	614
Hauts Bassin	15061
Nord Mossi	1317
Sahel	286
Sud Ouest	344
Volta Noire	3074
Yatenga	926
BURKINA FASO	24330

The figures originate from the AQUASTAT-library and refer to 1992. The irrigated area added up to 22 995 ha. This figure has been scaled up to 24 330 ha to match the figure in AQUASTAT. The irrigated area is concentrated around 21 irrigation projects digitised from the Map of irrigated areas in Africa and around 54 dams. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Burundi

Distribution of irrigated area by district according to this table:

District	Irrigated area (ha)
Bukemba	1425
Bukeye	50
Gihanga	9725
Mpanda	2000
Mubimbi	50
Mutimbuzi	700
Rugombo	450
BURUNDI	14400

The figures originate from the AQUASTAT-library and refer to 1985. The irrigated area adds up to 14 400 ha and is distributed per district over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Cameroon

Distribution of irrigated area per river basin according to this table:

River basin	Irrigated area (ha)
Benue	125
Chari	1880
Lake Chad	500
Logone	12690
Mayo Kebi	500
Mbam	2900
Nkam	1000
Sanaga	1375
CAMEROON	20970

The irrigated area adds up to 20 970 ha of which 3 950 is traditional irrigation. The figures originate from the Map of irrigated areas in Africa (1987). Of the irrigated area 17 720 ha is concentrated around 6 irrigation schemes indicated on this map. The area with traditional irrigation was distributed per river basin over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Cape Verde

For Cape Verde no information could be found on irrigated areas on sub-national level. In the whole of Cape Verde 2 779 ha is equipped for irrigation. The figure refers to 1988 (AQUASTAT). The irrigated area has been distributed equally over all the islands of the country.

Central African Republic

In the Central African Republic an area of 135 ha equipped for irrigation is located in the river basin of the Oubangui river. The figures originate from the Map of irrigated areas in Africa (1987). The irrigated area has been concentrated on the map around 5 very small irrigation schemes indicated on this map.

Chad

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Batha	400
Chari-Baguirmi	1000
Guera	100
Kanem	100
Lake	1650
Logone Orienta	545
Mayo-Kebbi	2800
Moyen-Chari	3525
Ouaddai	200
Tandjile	3700
CHAD	14020

The figures originate from the AQUASTAT-library and refer to 1988. The irrigated area adds up to 14 020 ha and is concentrated around six schemes indicated on the Map of irrigated areas in Africa. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Comoros

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Grand Comore	5
Mwali	85
Nzwani	40
COMOROS	130

The figures originate from the AQUASTAT-library and refer to 1987. The irrigated area adds up to 130 ha and is concentrated around four small irrigation schemes indicated on the Map of irrigated areas in Africa.

Congo, Democratic Republic of

For the Democratic Republic of Congo no information could be found on irrigated areas on sub-national level. In the whole of the country 10 500 ha is equipped for irrigation. The figure refers to 1995 (AQUASTAT). The irrigated area is concentrated around 3 irrigation projects digitised from the Map of irrigated areas in Africa and around 1 dam.

Congo, Republic of

In the Republic of Congo an area of only 217 ha is equipped for irrigation. The area is located in the district Ngamaba (Brazzaville). The figure refers to 1993 (AQUASTAT). The irrigated area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Côte d'Ivoire

For Côte d'Ivoire no information could be found on irrigated areas on sub-national level. In the whole of Côte d'Ivoire 72 750 ha is equipped for irrigation. The figure refers to 1994 (AQUASTAT). The irrigated area is concentrated around 36 irrigation projects digitised from the Map of irrigated areas in Africa and around 14 dams.

Djibouti

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Ali Sabieh	40
Dikhil	160
Djibouti	144
Obock	14
Tadjourah	49
DJIBOUTI	407

The figures originate from the AQUASTAT-library and refer to 1989. The irrigated area adds up to 407 ha and is distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Egypt

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Al Buhayrah (Behera)	500520
Al Daqahliyah (Dakahlia)	317340
Al Fayyum (Fayoum)	157270
Al Gharbiyah (Gharbia)	184980
Al Iskandariyah (Alexandria)	48040
Al Jizah (Giza)	89460
Al Minufiyah (Menoufia)	149620
Al Minya (Menia)	205070
Al Qahirah (Cairo)	2070
Al Qalyubiyah (Kalyoubia)	87410
Al Wadi/Al Jadid	18680
As Ismailiyah (Ismailia)	53190
As Suways (Suez)	3640
Ash Sharqiyah (Sharkia)	360510
Aswan	51570
Asyut	153150
Beni Suwayf (Beni-Suef)	120410
Bur Said (Port Said)	220
Dumyat (Damietta)	49650
Kafr-El-Sheikh	258450
Matruh	63200
Qina	158810
Shamal Sina (North Sinai)	63000
Suhaj	148720
Janub Sina (South Sinai)	670
EGYPT	3245650

The figures originate from the AQUASTAT-library and refer to 1993. The irrigated area adds up to 3 245 650 ha and is concentrated around the area indicated as irrigated on the Map of irrigated areas in Africa. The polygons originating from this map have been re-digitised using the USGS Global Land Cover Classification map as background material. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Equatorial Guinea

With the high level of rainfall and its relatively equal distribution throughout the year there is no real need for irrigation and no irrigated areas have yet been developed.

Eritrea

For Eritrea no information could be found on irrigated areas on sub-national level. In the whole of Eritrea 28 124 ha is equipped for irrigation. The figure refers to 1993 (AQUASTAT). The irrigated area is concentrated around one irrigation project and one polygon indicating irrigation on the Map of irrigated areas in Africa as well as around one dam.

Ethiopia

Distribution of irrigated area by river basins according to this table:

River basin	Irrigated area (ha)
Baro-Akobo	410
Genale-Dawa	2380
Omo-Ghibe	9220
Tekeze	10990
Rift Valley	13090
Wabi-Shebelli	15500
Abbay	20580
Awash	88615
ETHIOPIA	160785

The figures originate from the AQUASTAT-library and refer to 1989. The irrigated area adds up to 106 785 ha which is less than the 189 556 ha given by AQUASTAT. The irrigated area under construction in 1995 were not included in this figure as it remains doubtful if construction was ever completed. This explains the difference with AQUASTAT. The irrigated area is concentrated around 22 irrigation projects digitised from the Map of irrigated areas in Africa and around 1 dam. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Gabon

Distribution of irrigated area by river basins according to this table:

River basin	Irrigated area (ha)
Coastal area	400
Komo	150
Ogoue downstream	400
Ogoue upstream	3500
GABON	4450

The irrigated area adds up to 4 450 ha of which 1 300 is traditional irrigation. The figures originate from the Map of irrigated areas in Africa (1987). The irrigated area is concentrated around two irrigation schemes indicated on this map. One of these schemes is a large scale irrigation project in the upper reaches of the Ogoue river. The remaining area represents traditional irrigation located in the coastal basins which has been distributed over the most suitable grid-cells in the as indicated on the USGS Global Land Cover Classification map.

Gambia

In The Gambia 1670 ha is equipped for irrigation of which 1570 ha is pump irrigation in the eastern part of the country. Another 100 ha is located in the coastal area. The figures originate from the AQUASTAT-library and refer to 1991. In the eastern part of the country the irrigated area is concentrated around one irrigation project and one polygon indicating irrigation on the Map of irrigated areas in Africa. The area along the coast has been distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Ghana

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Ashanti	220
Brong Ahafo	120
Central	50
Eastern	120
Greater Accra	964
Northern	560
Upper East	3340
Volta	1000
GHANA	6374

The figures originate from the AQUASTAT-library and refer to 1994. The irrigated area adds up to 6 374 ha and is concentrated around 18 schemes indicated on the Map of irrigated areas in Africa and around two dams. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Guinea

Distribution of irrigated area per river basin according to this table:

River basin	Irrigated area (ha)
Bafing	680
Corubal	18000
Gambia	335
Konkoure	25050
Mafou	8210
Milo	6715
Niandan	4500
Niger	5950
Sankarani	2000
Scarcies	13850
Tinkisso	7590
GUINEA	92880

The figures originate from the AQUASTAT-library and refer to 1994. The irrigated area adds up to 92 880 ha and is concentrated around 14 irrigation projects digitised from the Map of irrigated areas in Africa. The remaining area was distributed per river basin over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map. Of this area 40 000 ha is located in the coastal river basins and area of another 32 210 ha has been distributed over the basins contributing to the upper reaches of the Niger.

Guinea Bissau

For Guinea Bissau no information could be found on irrigated areas on sub-national level. In the whole of Guinea Bissau 17 115 ha is equipped for irrigation. The figure refers to 1994 (AQUASTAT). No information could be found about the location of irrigated area. Therefore, the irrigated area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Kenya

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Central	25309
Coast	5844
Eastern	8715
North Eastern	1287
Nairobi	1564
Nyanza	6795
Rift Valley	16412
Western	684
KENYA	66610

The figures originate from the AQUASTAT-library and refer to 1992. The irrigated area adds up to 66 610 ha and is concentrated around 12 schemes indicated on the Map of irrigated areas in Africa and around one dam. The remaining area was distributed over several zones which were digitised from a map with irrigated areas available in the AQUASTAT-library and over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Lesotho

For Lesotho no information could be found on irrigated areas on sub-national level. In the whole of Lesotho 2 722 ha is equipped for irrigation. The figure refers to 1994 (AQUASTAT). The irrigated area is concentrated around six irrigation projects and two dams. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Liberia

For Liberia no information could be found on irrigated areas on sub-national level. In the whole of Liberia 2 100 ha is equipped for irrigation. The figure refers to 1987 (AQUASTAT). No information could be found about the location of irrigated area. Therefore, the irrigated area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Libya

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Ajdabiya (Agedabia)	30000
Al Aziziyah	40000
Al Fatah	10000
Al Jabal Al Akhdar	5000
Al Jufrah	10000
Al Khoms	5000
Al Kufrah	12000
Ash Shati	15000
Awbari (Ubari)	20000
Az Zawia (Azzawiya)	40000
Banghazi	20000
Darnah	5000
Ghadamis	5000
Gharyan	15000
Misurata	6000
Murzuq	15000
Nuqat Al Khams	2000
Sabha	5000
Sawfajjin (Sofuljeen)	15000
Surt (Sirte)	2000
Tarhunah	10000
Tripoli (Tarabulus)	70000
Tubruq (Tobruk)	500
Yafran (Yefren)	1000
Zeleitun (Zliten)	2000
LIBYA	360500

The irrigated area adds up to 360 500 ha which considerably lower than the 470 000 ha mentioned in AQUASTAT. The difference is due to the fact that quite a few irrigation schemes are not functioning anymore. The current figure of area under irrigation has been estimated by Philippe Pallas in 1999. The irrigated area is concentrated around five schemes indicated on the Map of irrigated areas in Africa and around eight dams. The remaining area was distributed over several zones which were digitised by using Landsat TM Mosaics and over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Madagascar

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Antananarivo	216319
Antsiranana	115139
Fianarantsoa	202457
Mahajanga	226674
Toamasina	183867
Toliary	142544
MADAGASCAR	1087000

The figures originate from the AQUASTAT-library and refer to 1992. The irrigated area is concentrated around 37 large and medium scale schemes indicated on the Map of irrigated areas in Africa and around seven dams. Traditional irrigation and small scale schemes have been distributed over polygons originating from the Map of irrigated areas in Africa. These polygons have been re-digitised using the USGS Global Land Cover Classification map as background material. The total area equipped for irrigation per province added up to 1 085 827 ha. This figure has been scaled up to 1 087 000 ha to match the figure in AQUASTAT.

Malawi

Distribution of irrigated area by district according to this table:

District	Irrigated area (ha)
Blantyre	614
Chikwawa	10741
Karonga	2058
Machinga	1482
Mulanje	1148
Nkata-Bay	908
Nkhotakota	8360
Salima	1223
Zomba	1466
MALAWI	28000

The figures originate from the AQUASTAT-library and refer to 1985. The irrigated area adds up to 14 400 ha and is distributed per district over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Mali

Distribution of irrigated area per river basin according to this table:

River basin	Irrigated area (ha)
Bagoé	2256
Bani	2308
Baoulé	2152
Fawara	874
Kankelaba	298
Ngora Laka	1270
Niger	181490
Senegal	822
MALI	191469

The figures originate from the AQUASTAT-library and refer to 1994. The irrigated area adds up to 191 469 ha. The area equipped for irrigation per river basin has been calculated by transferring the points indicating irrigation projects on the Map of irrigated areas in Africa to the map with river basins. The irrigated area is concentrated around 2 large scale schemes indicated as points on this map. Figures belonging to four other points have been transferred to three polygons which been digitised from the USGS Global Land Cover Classification map. The polygons originating from the Map of irrigated areas in Africa have been re-digitised using the USGS Global Land Cover Classification map as background material. The remaining irrigated area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Mauritania

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Adrar	1872
Assaba	1071
Brakna	5969
Gorgol	5687
Guidimaka	738
Hodh ech Chargui	184
Hodh el Gharbi	703
Tagant	911
Trarza	32065
MAURITANIA	49200

The figures originate from the AQUASTAT-library and refer to 1994. The irrigated area is concentrated around 2 large and medium scale schemes indicated on the Map of irrigated areas in Africa. Traditional irrigation and small scale schemes have been distributed over polygons originating from the Map of irrigated areas in Africa. These polygons have been re-digitised using the USGS Global Land Cover Classification map as background material. The total area equipped for irrigation per province added up to 49 309 ha. This figure has been scaled down to 49 200 ha to match the figure in AQUASTAT.

Mauritius

For Mauritius no information could be found on irrigated areas on sub-national level. In the whole of Mauritius 17 500 ha is equipped for irrigation. The figure refers to 1995 (AQUASTAT). The irrigated area is concentrated around 3 irrigation schemes as indicated on the Map of irrigated areas in Africa and six dams. The remaining irrigated area was distributed over the rest of the island.

Morocco

Distribution of irrigated area by river basin according to this table:

River basin	Irrigated area (ha)
Algerian west coast	20023
Bou Regreg	50058
Dra	104321
Guir	60070
Loukkos	25749
Moulouya	57827
Noun	12014
Oum er Rbia	194296
Rif	15586
Sebou	175154
Souss - Massa	121041
Tensift	316939
Ziz	105122
MOROCCO	1258200

The figures originate from the AQUASTAT-library and refer to 1989. The area equipped for irrigation per river basin has been calculated by transferring the points indicating irrigation projects on the Map of irrigated areas in Africa to the map with river basins. An area of 165 000 ha spate irrigation was distributed among the southern and south-eastern basins. The area equipped for irrigated was distributed over zones which were digitised from a map available in the AQUASTAT-library. The total area equipped for irrigation per river basin added up to 1 256 737 ha, this figure has been scaled up to 1 258 200 ha to match the figure in AQUASTAT.

Mozambique

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Cabo Delgado	3700
Gaza	47755
Inhambane	900
Manica	2000
Maputo	22300
Nampula	2100
Nassa	1050
Sofala	15300
Tete	9800
Zambezia	11810
MOZAMBIQUE	116715

The figures originate from the AQUASTAT-library and refer to 1987. The irrigated area adds up to 116 715 ha and is concentrated around 44 irrigation schemes indicated on the Map of irrigated areas in Africa and around 5 dams. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Namibia

Distribution of irrigated area by region according to this table:

Region	Irrigated area (ha)
Caprivi	116
Erongo	198
Hardap	2228
Karas	1943
Khomas	15
Kunene	50
Okavango	817
Omusati	172
Otjozondjupa	603
NAMIBIA	6142

The figures originate from the AQUASTAT-library and refer to 1992. The irrigated area adds up to 6 142 ha. The irrigated area is concentrated around 5 irrigation projects digitised from the Map of irrigated areas in Africa and around 5 dams. The remaining area was distributed over a few zones which were digitised by using Landsat TM Mosaics and over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Niger

Distribution of irrigated area by region according to this table:

Region	Irrigated area (ha)
Diffa	5250
Dosso	1280
Maradi	5210
Niamey	16170
Tahoua	31490
Zinder	3710
NIGER	66480

The figures originate from the AQUASTAT-library and refer to 1989. The irrigated area adds up to 66 480 ha. The irrigated area is concentrated around 29 irrigation projects digitised from the Map of irrigated areas in Africa. The remaining area was distributed over a zone along the Niger river and over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Nigeria

Distribution of irrigated area by river basins according to this table:

River basin	Irrigated area (ha)
Coast East	1820
Coast West	4220
Niger South	9860
Lower Benue	20410
Upper Benue	31370
Niger Central	32760
Niger North	56970
Lake Chad	142940
NIGERIA	300350

The figures originate from the AQUASTAT-library and refer to 1993. The irrigated area in large and medium scale schemes adds up to 119 350 ha. Areas indicated as "Fadama type irrigation" account for 181 000 ha, which brings the total to 300 350 ha. This figure is substantially higher than the 232 821 ha given by AQUASTAT. The irrigated area is concentrated around 28 irrigation projects digitised from the Map of irrigated areas in Africa and around 43 dams. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Reunion

For Reunion no information could be found on irrigated areas on sub-national level. In the whole of Reunion 12 000 ha is equipped for irrigation. The figure refers to 1998 (AQUASTAT). On the Map of irrigated areas in Africa there are no irrigation projects indicated for Reunion. The irrigated area has been equally distributed over the whole island.

Rwanda

For Rwanda no information could be found on irrigated areas on sub-national level. In the whole of Rwanda 4 000 ha is equipped for irrigation. The figure refers to 1993 (AQUASTAT). The irrigated area is concentrated around six irrigation schemes as indicated on the Map of irrigated areas in Africa.

Sao Tome and Principe

For Sao Tome and Principe no information could be found on irrigated areas on sub-national level. In the whole of the country 9 700 ha is equipped for irrigation. The figure refers to 1991 (AQUASTAT). On the Map of irrigated areas in Africa there are no irrigation projects indicated for Sao Tome and Principe. Therefore, irrigated area has been distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Senegal

Distribution of irrigated area by region according to this table:

Region	Irrigated area (ha)
Kolda	725
Saint Louis	66875
Tambacound	3800
SENEGAL	71400

The figures originate from the AQUASTAT-library and refer to 1994. The irrigated area adds up to 71 400 ha. The irrigated area is concentrated in polygons along the Senegal river. These polygons originated from the Map of irrigated areas in Africa but have been re-digitised using the USGS Global Land Cover Classification map as background material. The remaining irrigated area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Sierra Leone

Distribution of irrigated area by river basin according to this table:

River basin	Irrigated area (ha)
Moa	4050
Scarcies	7080
Sewa	18230
SIERRA LEONE	29360

The figures originate from the Map of irrigated areas in Africa (1987) and add up to 29 360 ha. The irrigated area is concentrated around 14 irrigation schemes indicated as points on the Map of irrigated areas in Africa. The remaining irrigated area was distributed over polygons originating from the same map. These polygons have been re-digitised using the USGS Global Land Cover Classification map as background material.

Somalia

Distribution of irrigated area by river basin according to this table:

River basin	Irrigated area (ha)
Juba	168715
Shebelli	31285
SOMALIA	200000

The area equipped for irrigation per river basin has been calculated by transferring the points indicating irrigation projects on the Map of irrigated areas in Africa to the map with river basins. The irrigated area indicated on this map adds up to 159 735 ha. This figure has been scaled up to 200 000 ha to match the figure from AQUASTAT which refers to 1984. The irrigated area is concentrated around 14 irrigation schemes indicated as points on the Map of irrigated areas in Africa. The remaining irrigated area was distributed over polygons originating from the same map. These polygons have been re-digitised using the USGS Global Land Cover Classification map as background material.

South Africa

Distribution of irrigated area by river basin according to this table:

River basin	Irrigated area (ha)
Brak	15000
Breede	100000
Caledon	5000
Elefantes	103000
Gamtoos	15000
Gouritz	60000
Groot Berg	85000
Groot Kei	20000
Groot Vis	35000
Hartbees	10000
Incomati	85000
Krokodil	85000
Limpopo	40000
Mfolzi / Mkuze	35000
Mgeni	25000
Mogalakwena	30000
Molopo	20000
Mzimkulu	5000
Olifants	60000
Orange	132000
Riet	40000
Sondags	35000
Tugela	60000
Vaal	170000
SOUTH AFRICA	1270000

Figures of irrigated areas per river basin referring to 1986 were found in the AQUASTAT-library (source: "Management of Water resources of South Africa"). According to this source a total of 966 000 ha would be equipped for irrigation, which is considerably lower than the 1 270 000 ha mentioned in AQUASTAT (1994). The figures from 1986 have been updated to the AQUASTAT figure of 1994 with indications given in "Management of Water resources of South Africa". The irrigated area is concentrated around 170 dams and over several zones which were digitised from the USGS Global Land Cover Classification map and Landsat TM Mosaics. The remaining irrigated area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Sudan

Distribution of irrigated area by river basin according to this table:

River basin	Irrigated area (ha)
Blue Nile	1109565
Mereb Wenz	39950
Nahr Atbarah	192700
Nahr ad Dindar	170775
Nile	190820
Sudanese east coast	15900
Sue	3500
White Nile	222990
SUDAN	1946200

The information on the Map of irrigated areas in Africa has been transformed to the river basins resulting in an area equipped for irrigation of 1 847 540 ha, which is lower than the 1 946 200 ha mentioned in AQUASTAT (1995). The remaining area (98 660 ha) has been distributed over those river basins where irrigation is present. The irrigated area is concentrated around 20 irrigation schemes indicated as points on the Map of irrigated areas in Africa. The area equipped for irrigated was distributed over zones which were digitised from a map that was available in the AQUASTAT-library.

Swaziland

For Swaziland no information could be found on irrigated areas on sub-national level. In the whole of the country 67 400 ha is equipped for irrigation. The figure refers to 1990 (AQUASTAT). On the Map of irrigated areas in Africa there are no irrigation projects indicated for Swaziland. Therefore, the irrigated area is concentrated around 5 dams. The remaining area is distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Tanzania

For Tanzania no information could be found on irrigated areas on sub-national level. In the whole of the country 150 000 ha is equipped for irrigation. The figure refers to 1993 (AQUASTAT). The irrigated area is concentrated around 24 irrigation schemes as indicated on the Map of irrigated areas in Africa. The remaining area is distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Togo

For Togo no information could be found on irrigated areas on sub-national level. In the whole of the country 7 008 ha is equipped for irrigation. The figure refers to 1990 (AQUASTAT). The irrigated area is concentrated around six irrigation schemes as indicated on the Map of irrigated areas in Africa and around one dam. The remaining area is distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Tunisia

Distribution of irrigated area by district according to this table:

District	Irrigated area (ha)
Al-Kaf	9799
Ariana	34150
Beja	15870
Ben Arous (Tunis Sud)	10732
Bizerte	24050
Dschunduba	30070
Gabes	9300
Gafsa	38500
Kairouwan	45844
Kasserine	14950
Kebili	8100
Mahdia	1937
Medenine	2105
Monastir	4582
Nabul	40000
Saghuan	4800
Sfax	6240
Sidi Bu Said	40395
Siliana	24070
Susa	9234
Tataouine	2124
Tozeur	7224
Tunis	867
TUNISIA	384943

The figures originate from the AQUASTAT-library and refer to 1991. The irrigated area adds up to 384 943 ha which is slightly less than the AQUASTAT figure of 385 000 ha. The irrigated area is concentrated around 37 irrigation schemes indicated as points on the Map of irrigated areas in Africa and around 21 dams. The remaining area is distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map. In the southern district of Tataouine not enough suitable grid-cells could be found, so the rest of the irrigated area had to be distributed equally over the rest of the district.

Uganda

Distribution of irrigated area by river basin according to this table:

River basin	Irrigated area (ha)
Kagera	2000
Semliki	970
Victoria Nile	6110
White Nile	40
UGANDA	9120

In the whole of the country 9 120 ha is equipped for irrigation. The figures originate from the Map of irrigated areas in Africa (1987). The irrigated area is concentrated around 15 irrigation schemes indicated on this map and around one dam.

Zambia

Distribution of irrigated area by province according to this table:

Province	Irrigated area (ha)
Central	5295
Copperbelt	14610
Luapula	584
Lusaka	11583
Northern	652
Southern	13676
ZAMBIA	46400

The figures originate from the AQUASTAT-library and refer to 1994. The total area equipped for irrigation per province added up to 47 670 ha. This figure has been scaled down to 46 400 ha to match the figure in AQUASTAT. The irrigated area is concentrated around 12 irrigation schemes indicated on the Map of irrigated areas in Africa. The remaining area was distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Zimbabwe

For Zimbabwe no information could be found on irrigated areas on sub-national level. In the whole of the country 116 577 ha is equipped for irrigation. The figure refers to 1993 (AQUASTAT). The irrigated area is concentrated around 34 irrigation schemes as indicated on the Map of irrigated areas in Africa and around 69 dams. The remaining area is distributed over the most suitable grid-cells as indicated on the USGS Global Land Cover Classification map.

Annex B: Irrigation in Africa per country

Australia

Distribution of irrigated areas by Statistical Local Areas (Australian Bureau of Statistics (ABS), 1996) according to a database of agricultural statistics (ABS, 1998). The statistics refer to the area **actually** irrigated in the cropping season 1996/97. The total irrigated area added up to 2 056 581 ha. The distribution of irrigated area per federal state is presented in this table:

Administrative unit	Irrigated area (ha)
Western Australia	30444
South Australia	115479
Northern Territory	1953
Australian Capital Territory	75
New South Wales	907050
Queensland	403775
Victoria	546067
Tasmania	51738
AUSTRALIA	2056581

The irrigated area was distributed within the 1 322 statistical local areas using a digital map showing the outlines of irrigated areas (BRS, 2001a) and a land use map on a 0.01 degree resolution (BRS, 2001b). The land use map refers to cropping season 1996/97 and it also indicates, whether a grid cell is irrigated or not. The land use map is based on vegetation indices which were derived from satellite images. An affinity theme indicates the affinity of the cell to the allocated control site and thus it is an indicator for the reliability of the match. This information and the attributes of the irrigation map have been used to find the cells within the statistical local areas, which are most probable irrigated (see priorities in Tab. 1). Irrigated area was first distributed only to cells having priority 9, then to cells having priority 8 and so on until the sum of the distributed irrigated area was equal to the irrigated area of the specific statistical local area as derived from the agricultural database.

Table 1: criteria for assigning priorities to grid cells to distribute irrigated areas within statistical local areas

attribute value irrigation map (BRS, 2001a)	affinity attribute of cells which are irrigated according to the land use map (BRS, 2001b)	both maps indicate that the specific cell is irrigated	priority
"actually", "designated", or "designated(?)"	1 (most reliable match)	YES	9
"actually"		NO	8
	1 (most reliable match)	NO	8
"actually", "designated", or "designated(?)"	2 (intermediate reliability)	YES	8
"designated"		NO	7
	2 (intermediate reliability)	NO	7
"actually", "designated", or "designated(?)"	3 (least reliable matches)	YES	7
"designated(?)"		NO	6
	3 (least reliable matches)	NO	6
"void(?)"		NO	5

Fiji

For the Fiji Islands no information could be found on irrigated areas on sub-national level. According to FAOSTAT there are about 3 000 ha equipped for irrigation. The figure refers to 1997. The irrigated area has been distributed to three irrigated areas as indicated on a irrigation map published in Achtnich (1980).

New Zealand

Distribution of irrigated area by region according to this table:

Administrative unit	Irrigated area (ha)
Auckland	6833
Bay of Plenty	9435
Canterbury	400091
East Cape	5000
Nelson-Marlborough	19415
Northland	4000
Otago	84593
Wellington	9273
Wanganui-Manawatu	8000
Hawke's Bay	23242
Southland	1500
Taranaki	2000
Waikato	4500
Westland	0
NEW ZEALAND	577882

In 2000 the total area equipped for irrigation added up to 577 882 ha (MAF, 2001). More than 80% of the total irrigated area is concentrated in the regions Canterbury and Otago and belongs mainly to irrigated pasture. The irrigated area has been distributed within the regions using an irrigation map published in Achtnich (1980) and the USGS land cover classification map.