Genesis II

4E invent

The Vision

- New Living Space for Billions of People
- The End of Poverty And Hunger
- The End of Deserts
- Abundant Water

The Blue Planet

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Water at abundance: Worldwide there are 1360 million km^3

However Water Deficiency Is The Human Problem Nr.1

- 2,6 billion people lack a basic sanitary infrastructure.

- 1 billion people have no access to clean freshwater.
  They drink polluted water and are therefore
  permanently ill, about a quarter of them will hence die.

- 5 million people die every year because of polluted water.

How is this possible?

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What Water Can You Drink?

WATER	SALINITY
• Drinking water (WHO-Guideline for EU, USA, Japan)	max. 0,25 - 0,5g/litre
• Drinking water (WHO-Guideline for the rest of the world)	max. 1,0g/litre
• Brackish water (seawater/freshwater mix in coastal areas)	on average 7,5g/litre
• Seawater	on average 35,0g/litre

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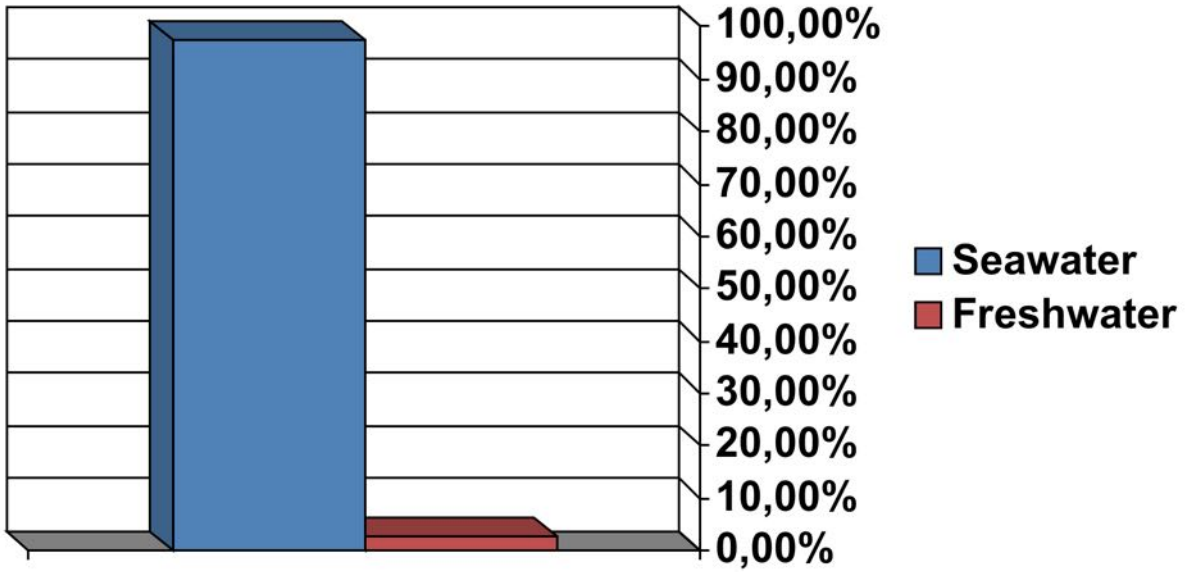
Almost All Water Is Seawater



97,4 % of the worldwide water resources is seawater, only 2,6% is freshwater

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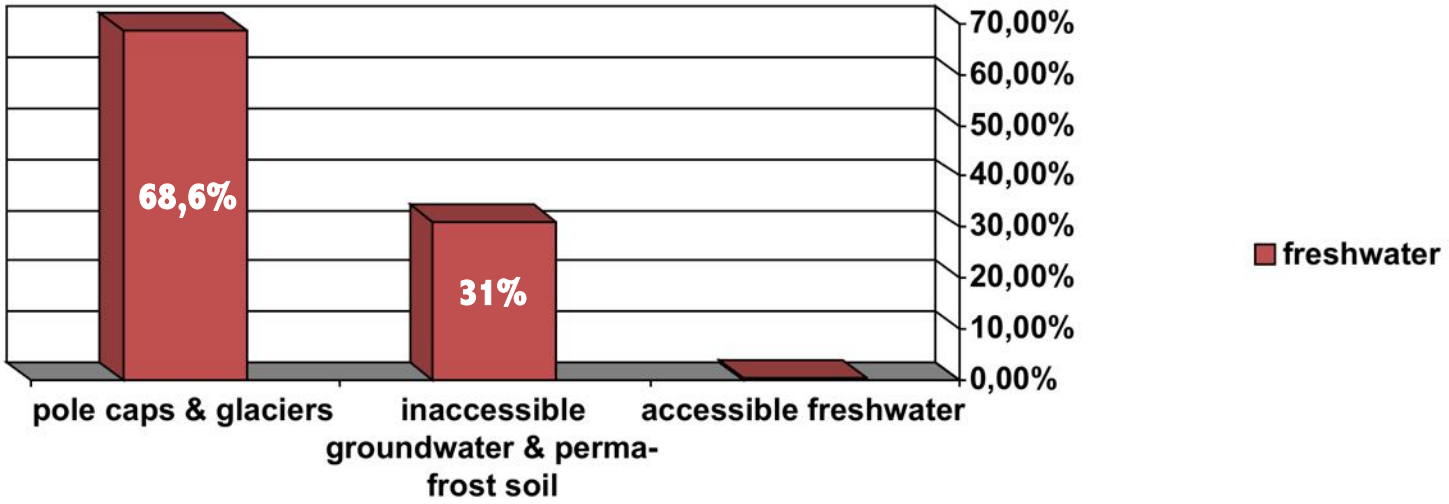
Also Freshwater Is Hardly Available



- 68,6% of the freshwater is bound in pole caps and glaciers.
- 31% of the freshwater is bound in inaccessible underground water reservoirs and perm-frost soil.
- 0,34% of the freshwater, i.e. 0,01% of the worldwide water resources is directly accessible on the surface of Earth in creeks, rivers, lakes and swamps. The drinkable share of it is constantly decreasing due to ongoing pollution.

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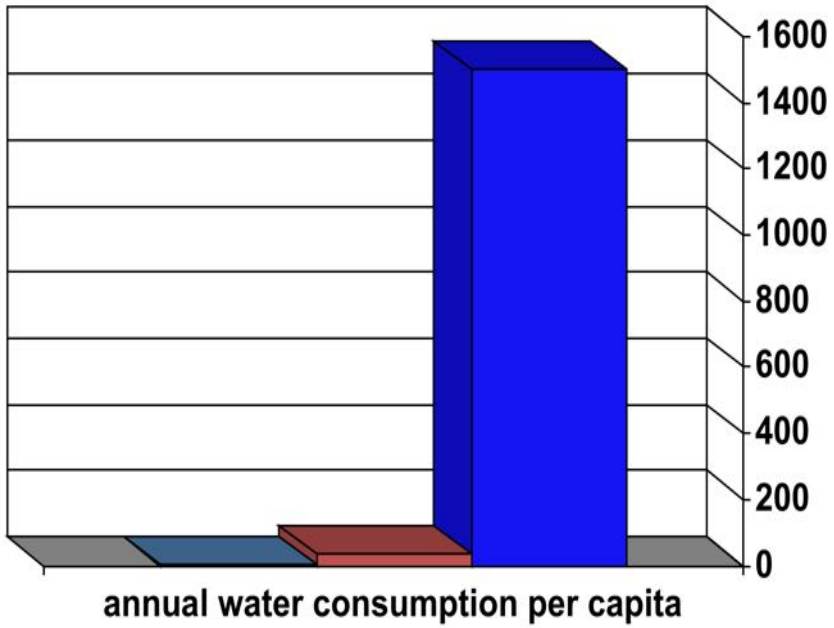
How Much Water A Person Consumes?



Annual Global Water Consumption On Average Per Capita

drinking water	0,7 – 3m³
household water	20 – 50m³
water for food production	1000 – 2000m³

A person consumes per capita for household twenty times and for food production thousand times his drinking water consumption.

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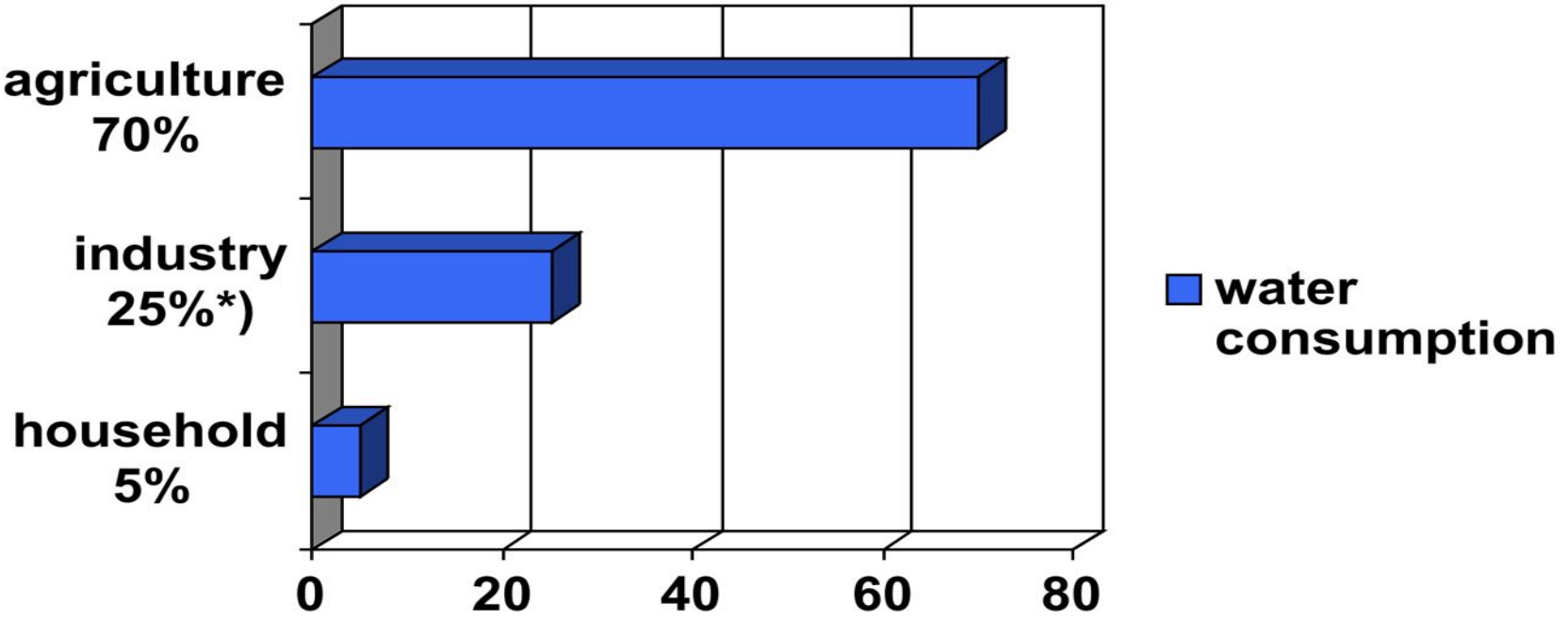
What Is Water Used For?



*) in industrialized states 60%, in Germany 87%

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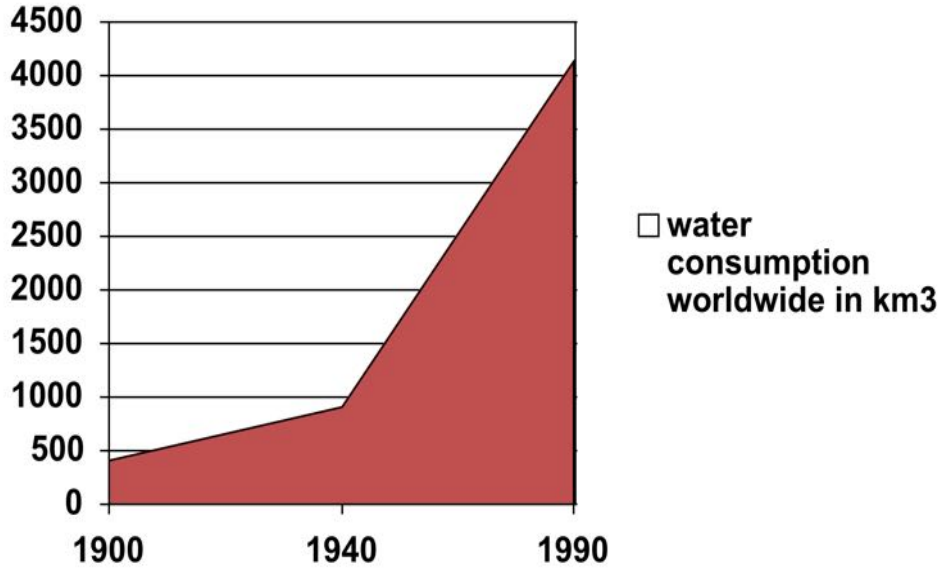
Total Worldwide Water Consumption Is Rising

For more than hundred years the total worldwide water consumption is rising intensively, from 400 km^3 in the year 1900 to 4130 km^3 in 1990. The reasons for this development were mainly industrialization, growth of population and rising demands. A further increase is without going new ways for gaining water hardly possible.



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The Available Water Reserves Are Declining

- The expansion of agricultural space with irrigation withdraws water from rivers and lakes (most prominent victim: the Aral-Sea).
- Due to population growth more and more woods are cut without reforestation.
- In arid environment the few green space is increasingly destroyed by overgrazing.
- The consequences: erosion, drought, floods and the rapid growth of deserts.

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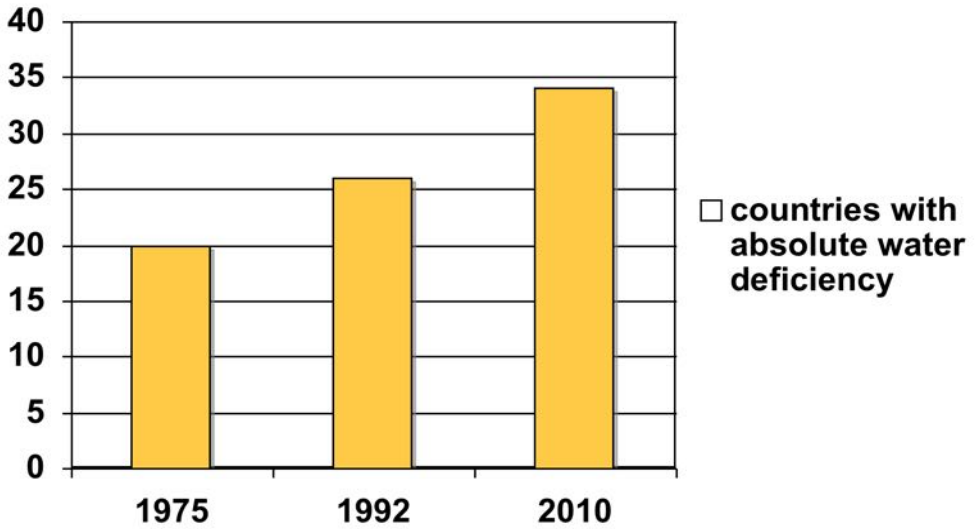
The Deserts Grow

The number of countries with absolute water deficiency (less than 500m^3 per capita p.a.) has almost doubled in the last 35 years



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The Continent of Deserts

- All deserts of Earth cover about one fifth of the global land area, about 30 million km^2.
- Together with the semi-deserts they cover one third of the global land area, almost 50 million km^2.
- All deserts and semi-deserts together cover more land than North and South America together.

The Deserts Will Grow Further

Threatened by further growth of deserts according to UN estimates:

- **more than one billion people and**
- **one third of all present space for agricultural use on Earth**

2050 up to 7 billion people will suffer from lack of water

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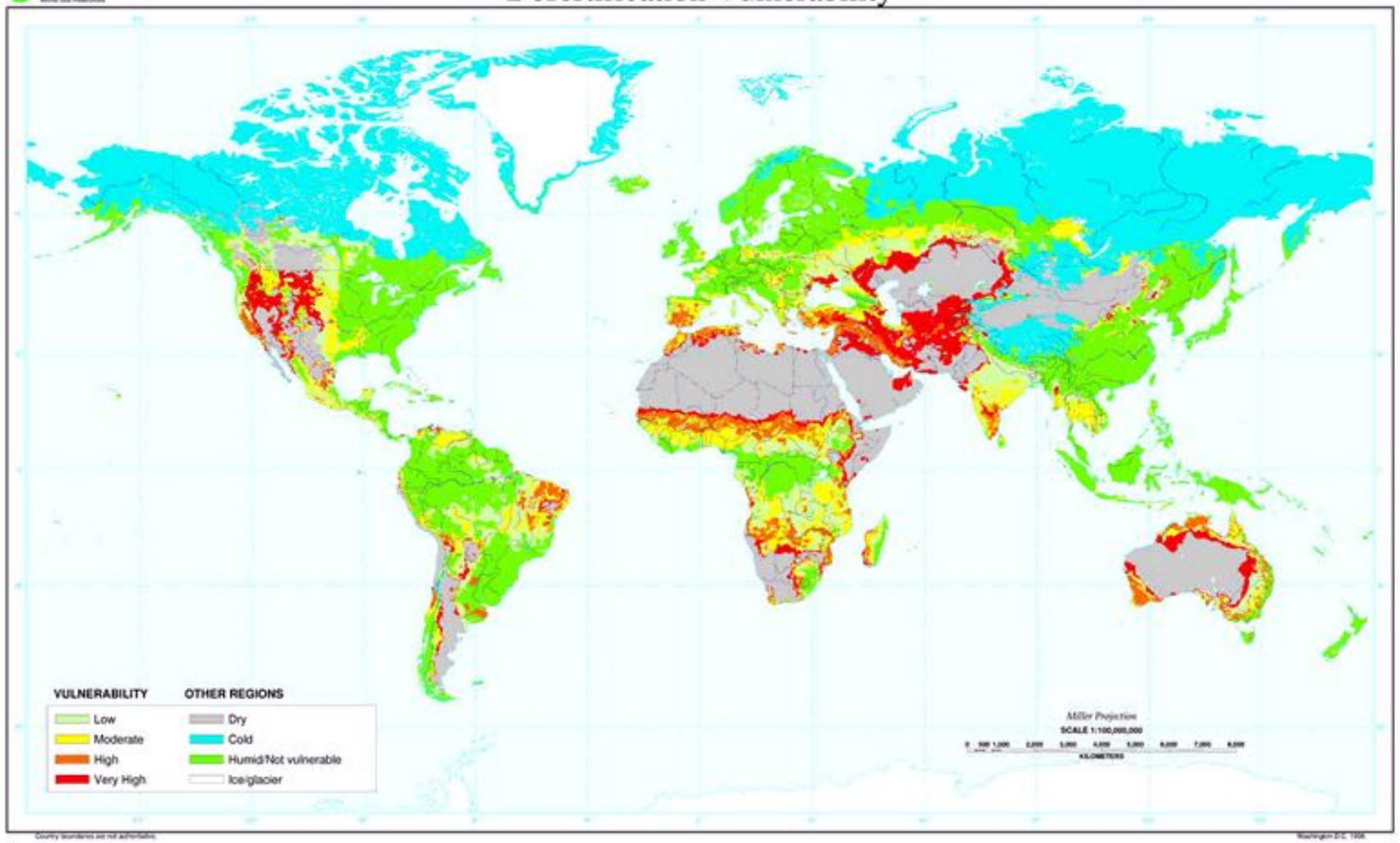
U.S. Department of Agriculture
Natural Resources Conservation Service
Soil Survey Division
World Soil Resources

Desertification Vulnerability

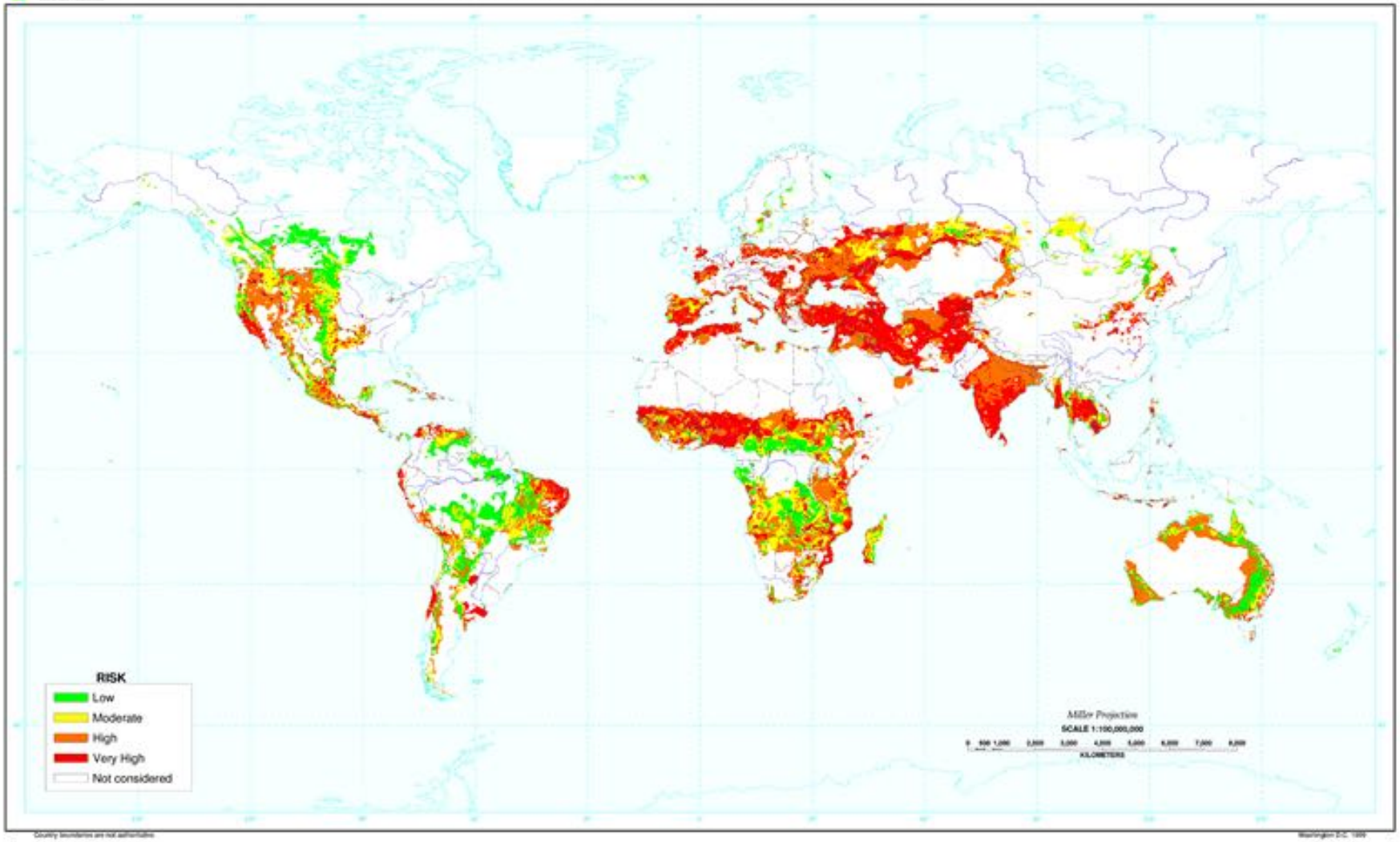


Country boundaries are not authoritative.

Washington D.C. 1998

U.S. Department of Agriculture
Natural Resources Conservation Service
Soil Survey Division
World Soil Resources

Risk of Human Induced Desertification



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Washington D.C. 1999

Large Cities In Water Need:
Mexico City

- With 17 million inhabitants second largest city of the world
- 70% of water supply is taken from groundwater
- Groundwater is withdrawn 50 to 80% more than rain can restore.
- For the last 30 years groundwater level is sinking by 30cm/year.

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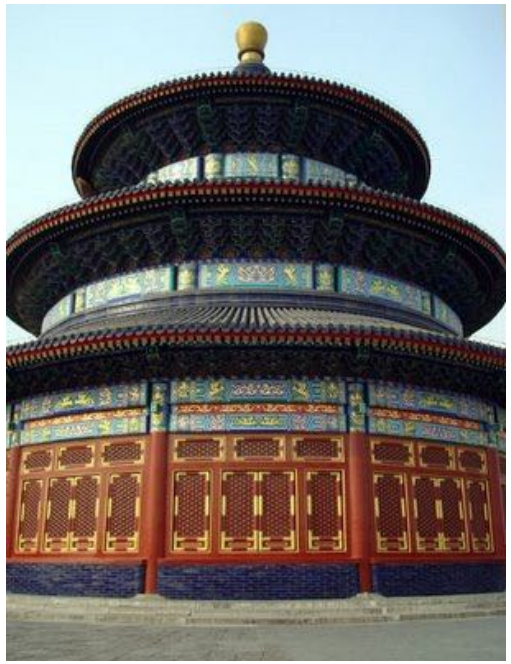
Large Cities In Water Need:
Peking

- Two thirds of water supply from groundwater.
- In the last 30 years 7 billion m^3 withdrawn, drilling down already 1000m deep
- In 20 years all groundwater is exhausted
- One third taken from ambient province Hebei
- Desertification in Province Hebei around Peking, rice production there reduced by 100.000 acres
- By ongoing development Peking might not exist any more in 20 years



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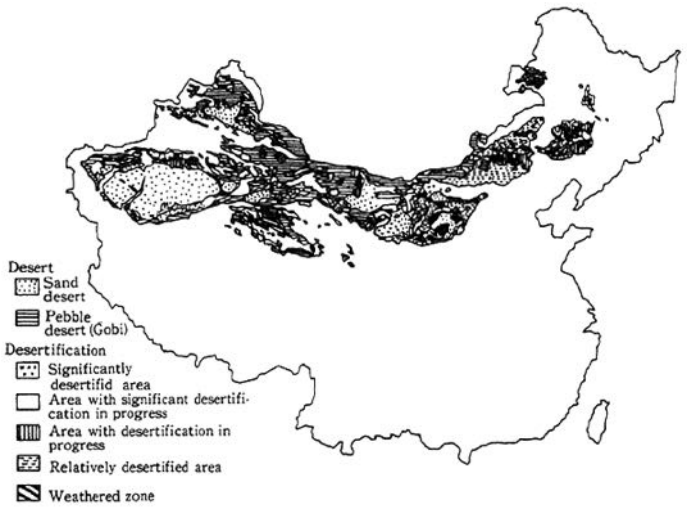
Will Complete Northern China Become A Desert?

*The inhabitants live with only 500m^3 water per capita.

*70-75% are withdrawn from groundwater.

*In 30 years all groundwater reserves of Northern Chinas will be consumed



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No Water Means Hunger

- Rice is the basic food for three billion people.
- But for the production of 1 kg of rice you need 5000 litres of water.
- In the next 20 years the areas for rice production have to be reduced by 25% because of water deficiency.
- So for 800 million of the poorest people the supply with their basic food will collapse.

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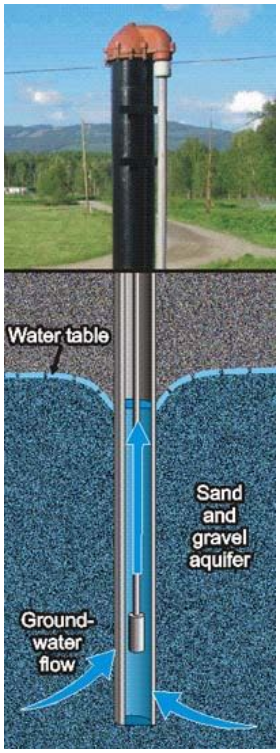
Not Only The Deserts, Also The Seas Grow

- In coastal regions of arid countries after intensive withdrawal of groundwater seawater fills the gap.
- In Israel 20% of the wells in coastal regions are so brackish, that they are useless for agriculture.
- In such a case restoring of groundwater needs 1400 years.

The Fossil Groundwater Reserves Are Running Low

- Fossil abysmal groundwater reserves are not restored at all.
- The water supply of Libya, Saudi-Arabia and parts of the USA relies up to 80 % on such reserves.
- By ongoing demand these fossil reserves are consumed in 100 years.
- In many regions of India and Indochina already in 5 to 10 years.



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Worldwide More And More Freshwater Is Polluted

Groundwater is burdened more and more with pesticides, nitrates und phosphates

While in Western Europe and USA many rivers were remediate, in the rest of the world about 450 billion m^3 wastewater run unfiltered into rivers every year. Tendency upwards.

4E invent

Will There Be Wars for Water?

- More than 40% of mankind live in river-basins of border-crossing rivers.
- Even now there are strong tensions between single states because of deduction or damming of rivers at the expense of the neighbouring countries downstream.
- This concerns rivers like Nile, Jordan, Euphrates, Tigris, Danube, Ganges, Mekong, Amur and Colorado River.

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Fatal Long-Term Consequences of Irrigation

- Rainwater is free from minerals and salts. Groundwater and water from rivers contains minerals and salts.
- Irrigation with such water in the long run leads to salinization of the soil.
- In Californian Central Valley 100.000 acres irrigated for the last ninety years are now salty dry desert land.
- The USA lost 20-25% of irrigated fields that way, Egypt 30-40%, the Iraq 50%. In Asia 50% of the fields are damaged. Half of human agricultural production will get lost within the 21st century.

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Water Deficiency Is Worldwide The Main Reason for Diseases

- 80% of all diseases in developing countries can be traced back to contaminated drinking water.
- Worldwide more than 1 billion people are sick due to polluted water, about a quarter of them will die from that.
- Every year about 5 million people die of cholera, typhus, diarrhoea, dysentery and other diseases caused by pathogens transmitted through polluted water.
- Every day 6000 children die, 250 in the next hour.

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Water Deficiency Is Worldwide
The Main Reason for Poverty

If there is not enough water for drinking (0,2% of the global human water consumption), there is for sure not enough water for food production (70% of the global consumption) and industry (25% of the global consumption, 60% of consumption in developed countries).

So water deficiency is the main reason for malnutrition and poverty.

Only in Africa every year 40 billion working hours get lost for carrying water.

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Where Can New Water Come From?

- By saving water
- By complete reconditioning of wastewater
- By increase of seawater desalination

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Seawater Desalination

- Seawater-desalination plants are not only expensive in acquisition price, but also expensive in working process because of high energy costs (0,5 - 2,5 US$/$m^3$)
- So they are almost only suitable for production of drinking water and household water, which is mostly subsidized.
- For agriculture, which needs thousand times the amount of drinking water, the costs are not competitive, because the agricultural products raised that way can not compete with world market prices.
- So up till now only 0,2 percent of global human water consumption is gained from seawater.

4E invent

The PAO-SolStick

- **The PAO Sol Stick system (Pat. pending) changes wastewater and seawater to freshwater.**
- **This can be used mineral-free for agriculture or mineralized as drinking water.**
- **Only sunlight is necessary, no other energy.**
- **One unit for 100 € produces 100-120 litres a day, so about 40 m^3 per year. It covers about 20 m^2 and can be installed in unlimited numbers together.**

4E invent

Portabel Aqua Optimizer
& Sol-Stick & Sol-Wing

4E
invent


4E
invent
Portabel Aqua Optimizer
PAO-Sol Stick is a mobile device for the cleaning of polluted water and especially for the extraction of fresh water from sea water.
PAO-Sol Stick is almost exclusively made by soft plastic foil. The load-bearing part is build from fabric-reinforced plastic foil (like Zodiac rubber boats) or from PVC hard plastic foil tubes.
The Sol Stick reflector is made by soft plastic foil. The upper half is transparent and the lower half is plastic covered upside with reflecting foil.
Portabel Aqua Optimizer
mit SolWing

PAO SolStick: structure for patent, licence, production and distribution