Seawater Greenhouse

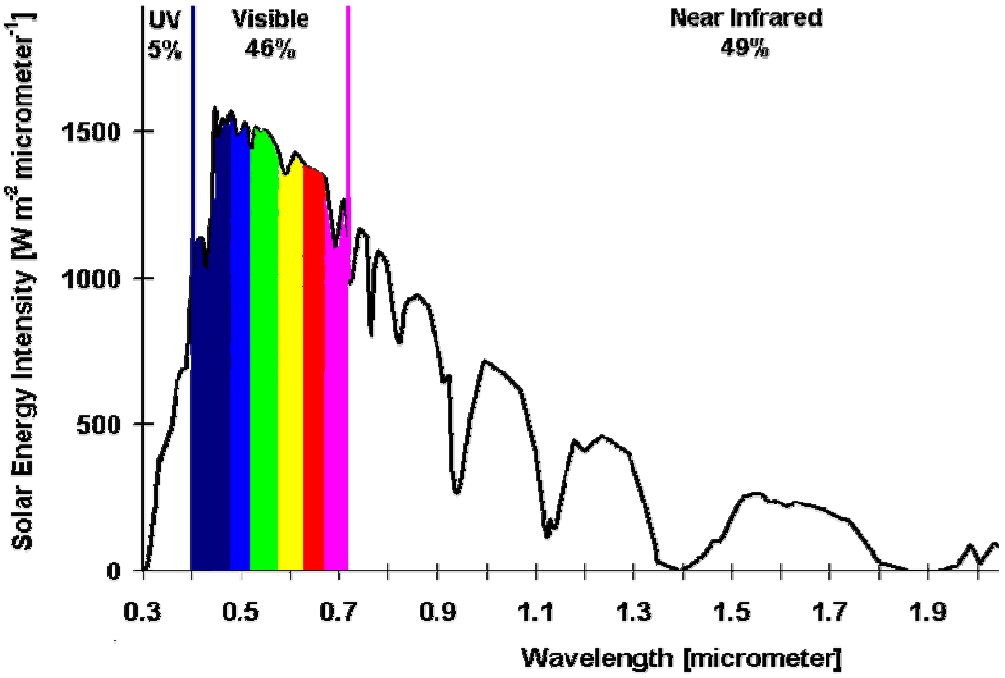
Charlie Paton

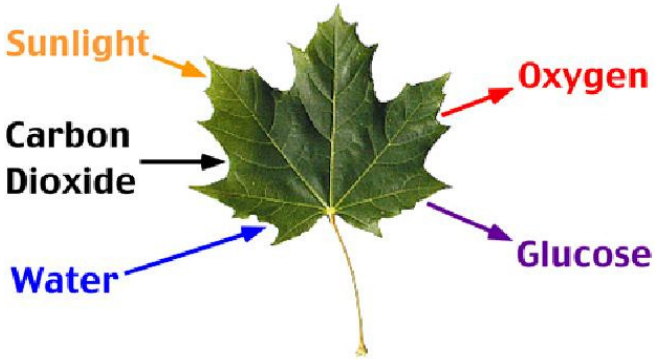
www.seawatergreenhouse.com

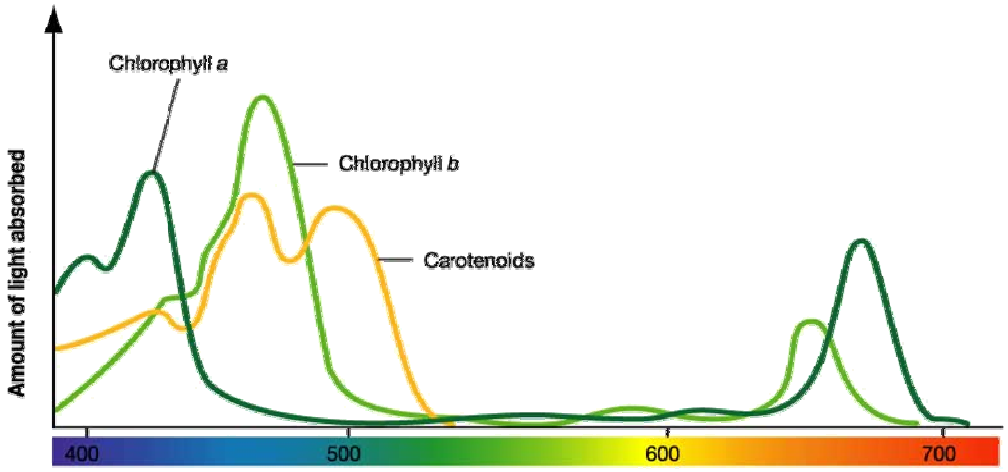
The Sahara Forest

A proposal for ameliorating both the effects and causes of climate change

THE FOUNTAIN TREE.



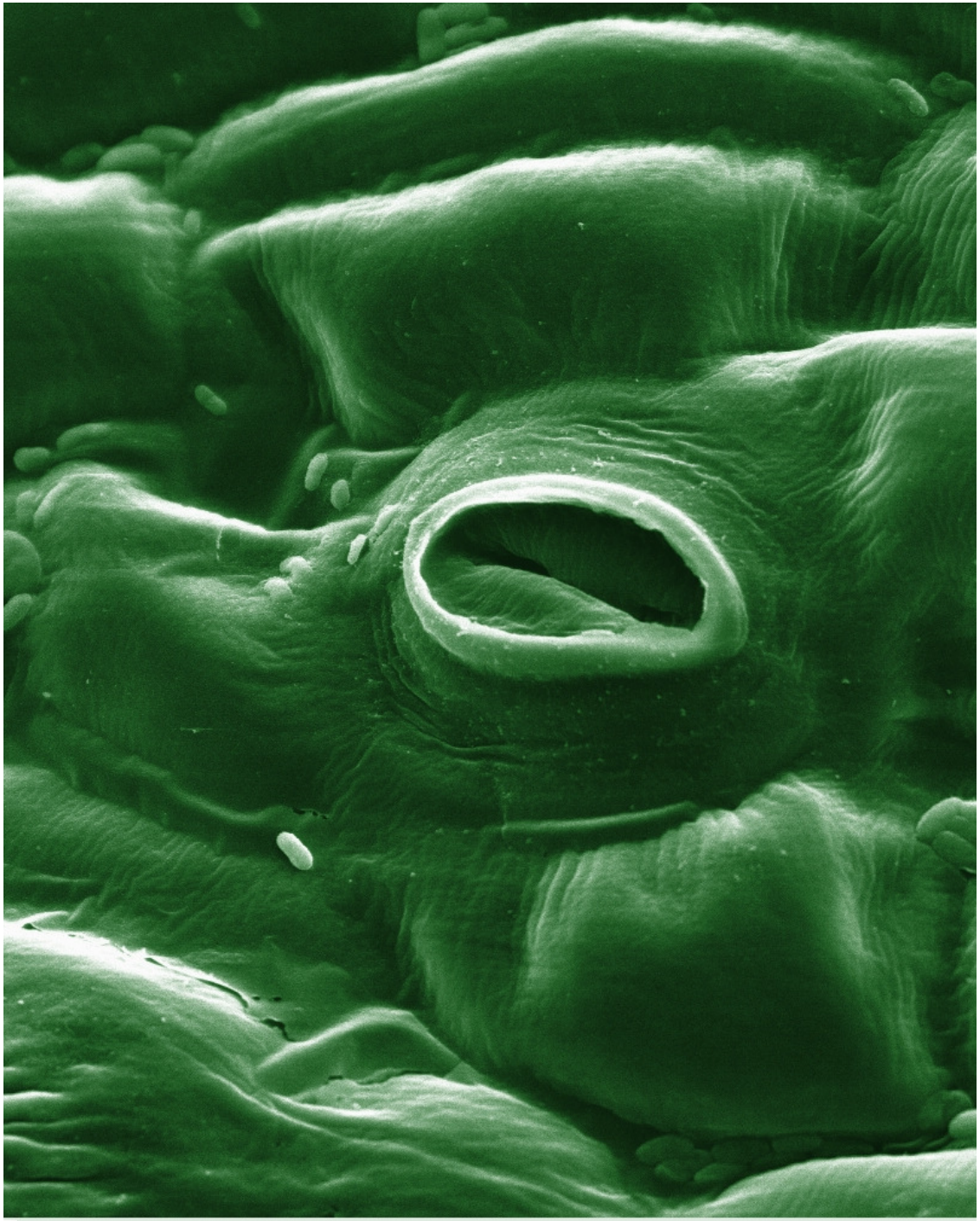


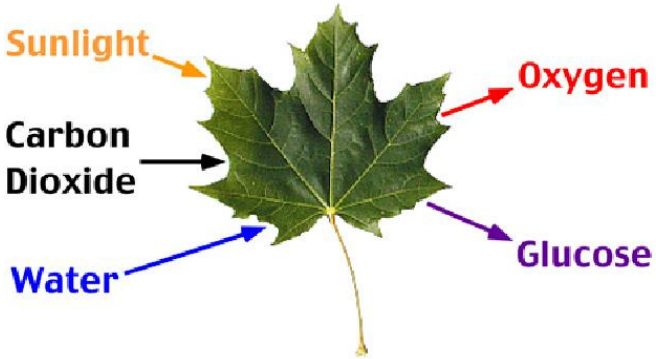


Photosynthesis Action Spectrum

$CO_2 + H_2O + Sunlight$

$= (CHOH) + O_2$





$CO_2 + H_2O + \text{Sunlight}$

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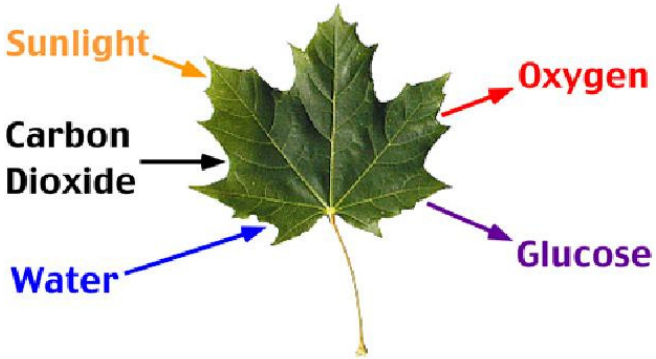
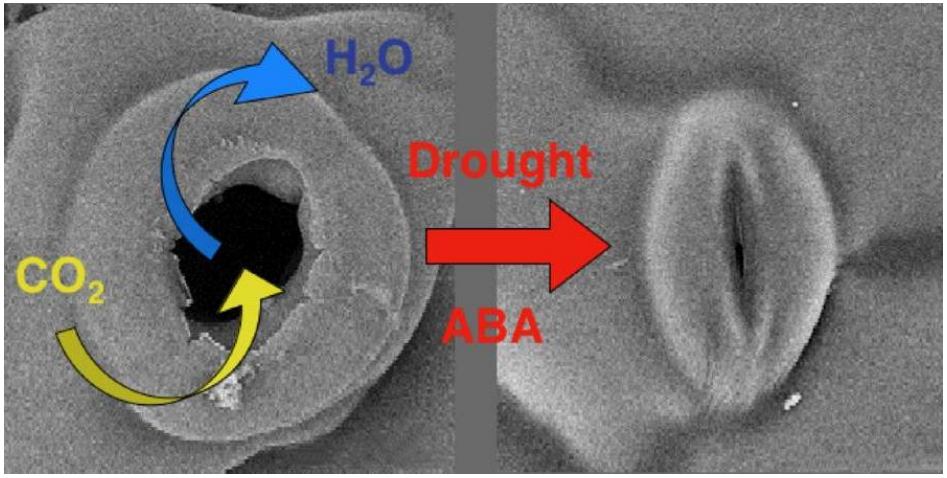
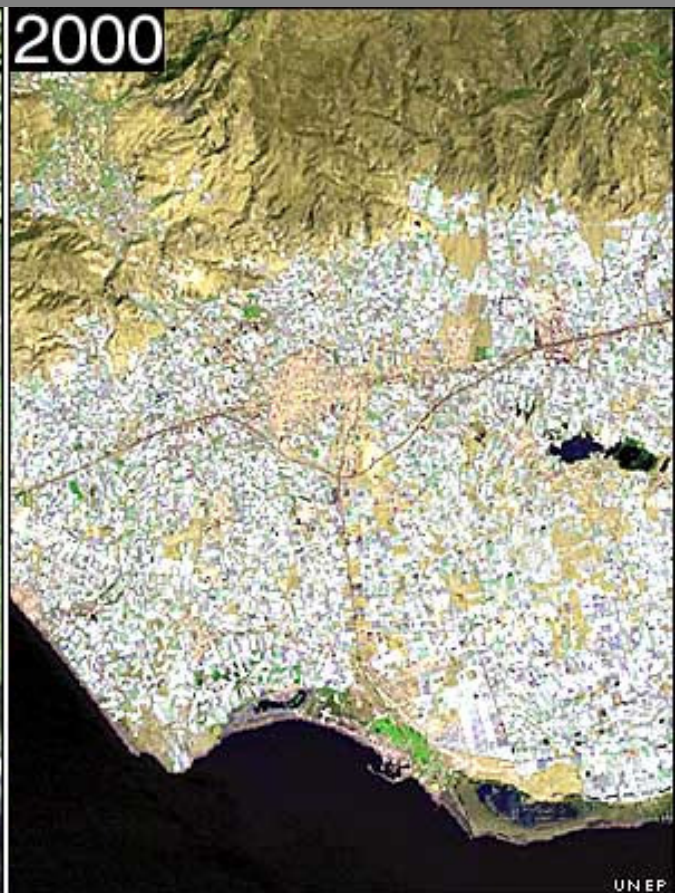


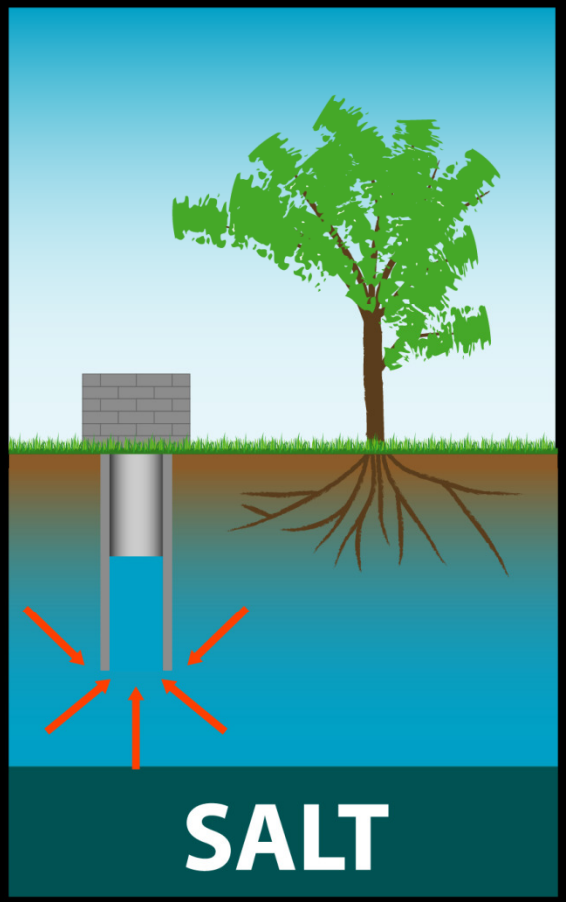


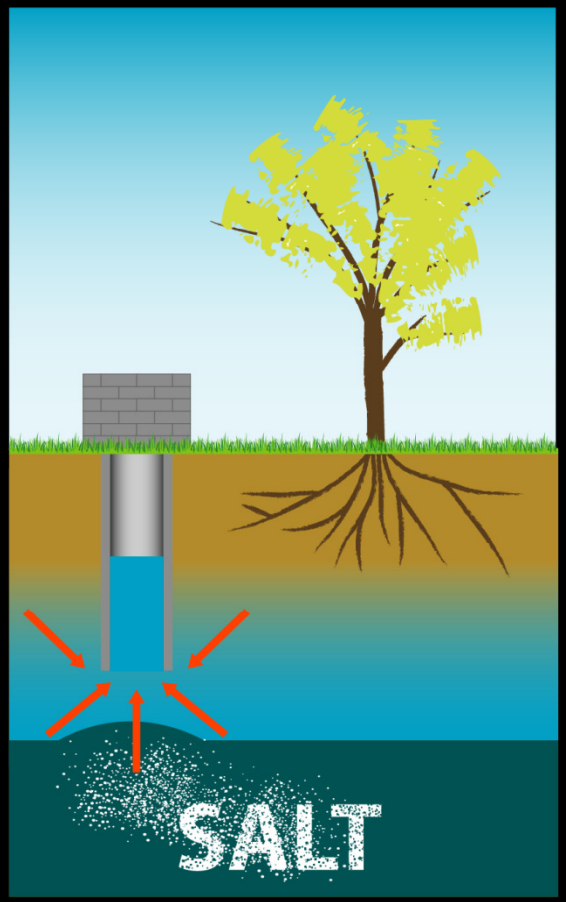
$CO_2 + H_2O + \text{Sunlight}$

$= (CHOH) + O_2$

1974
UNEP


2000
UNEP


SALT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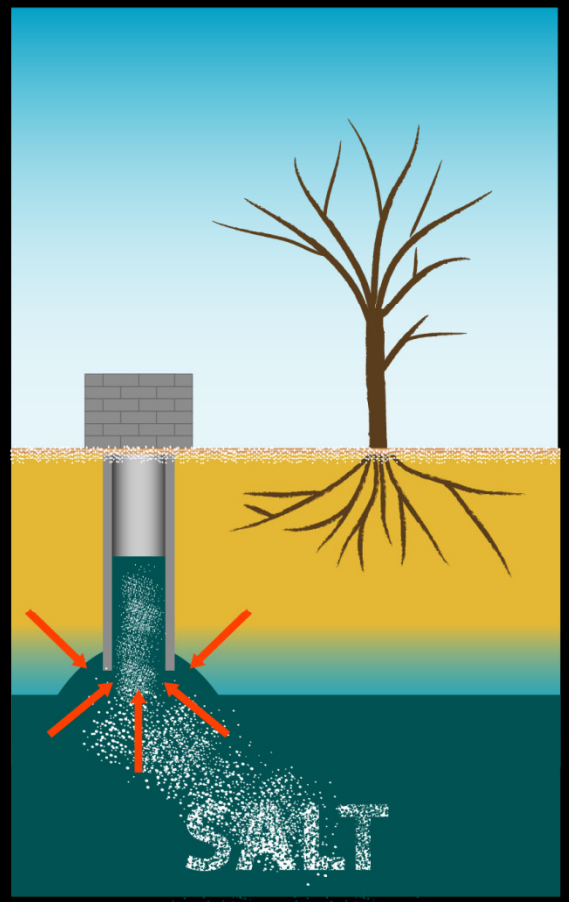
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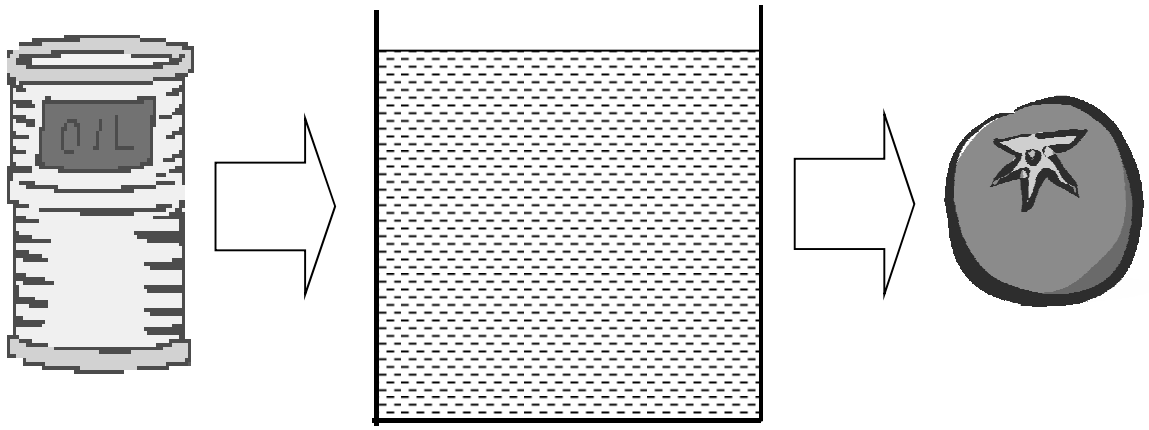
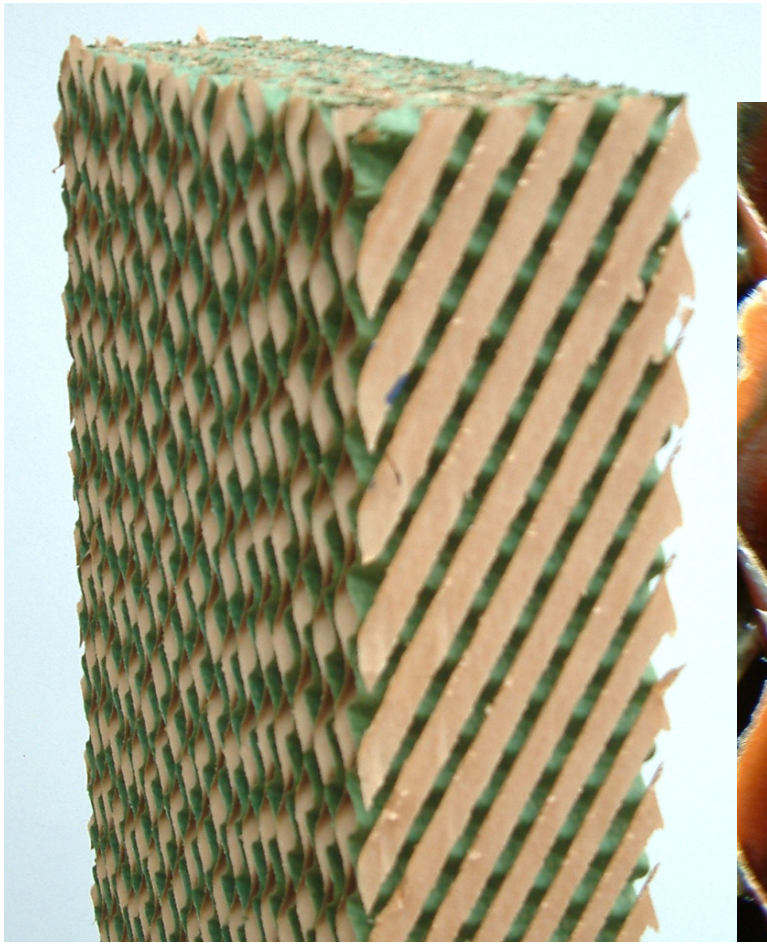
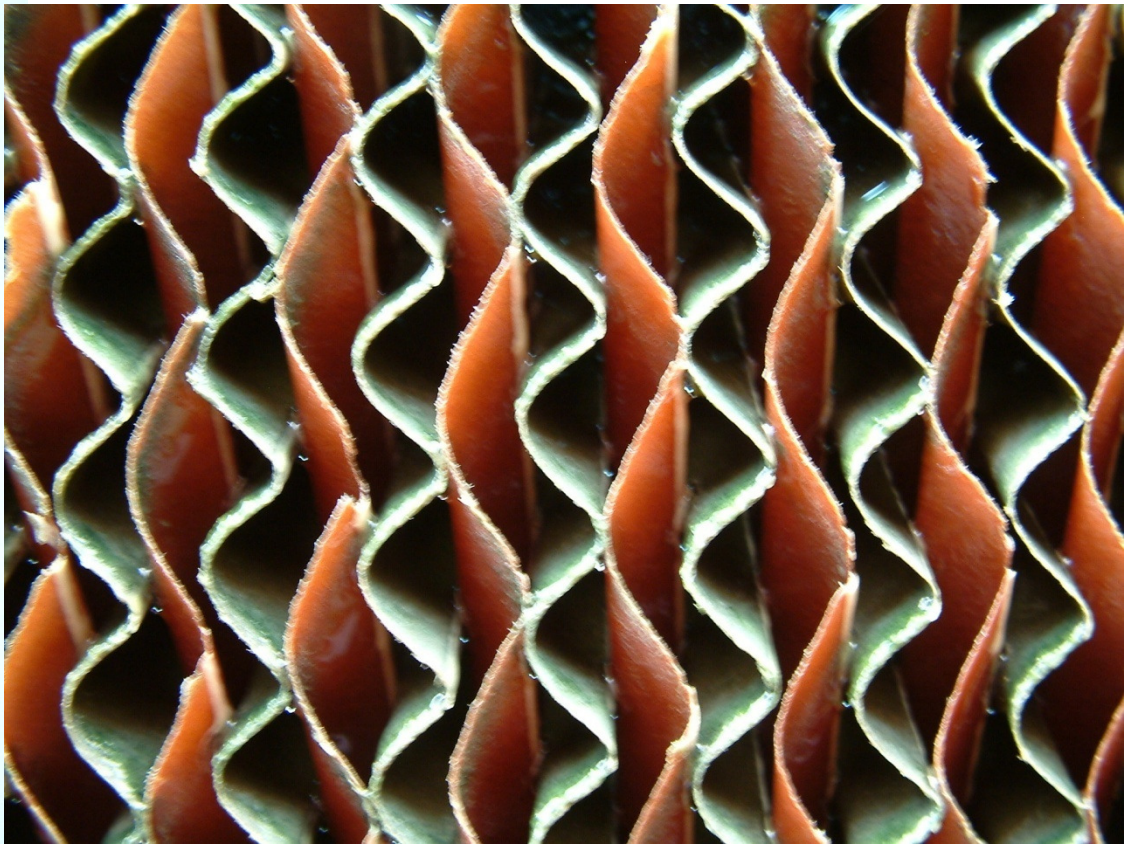
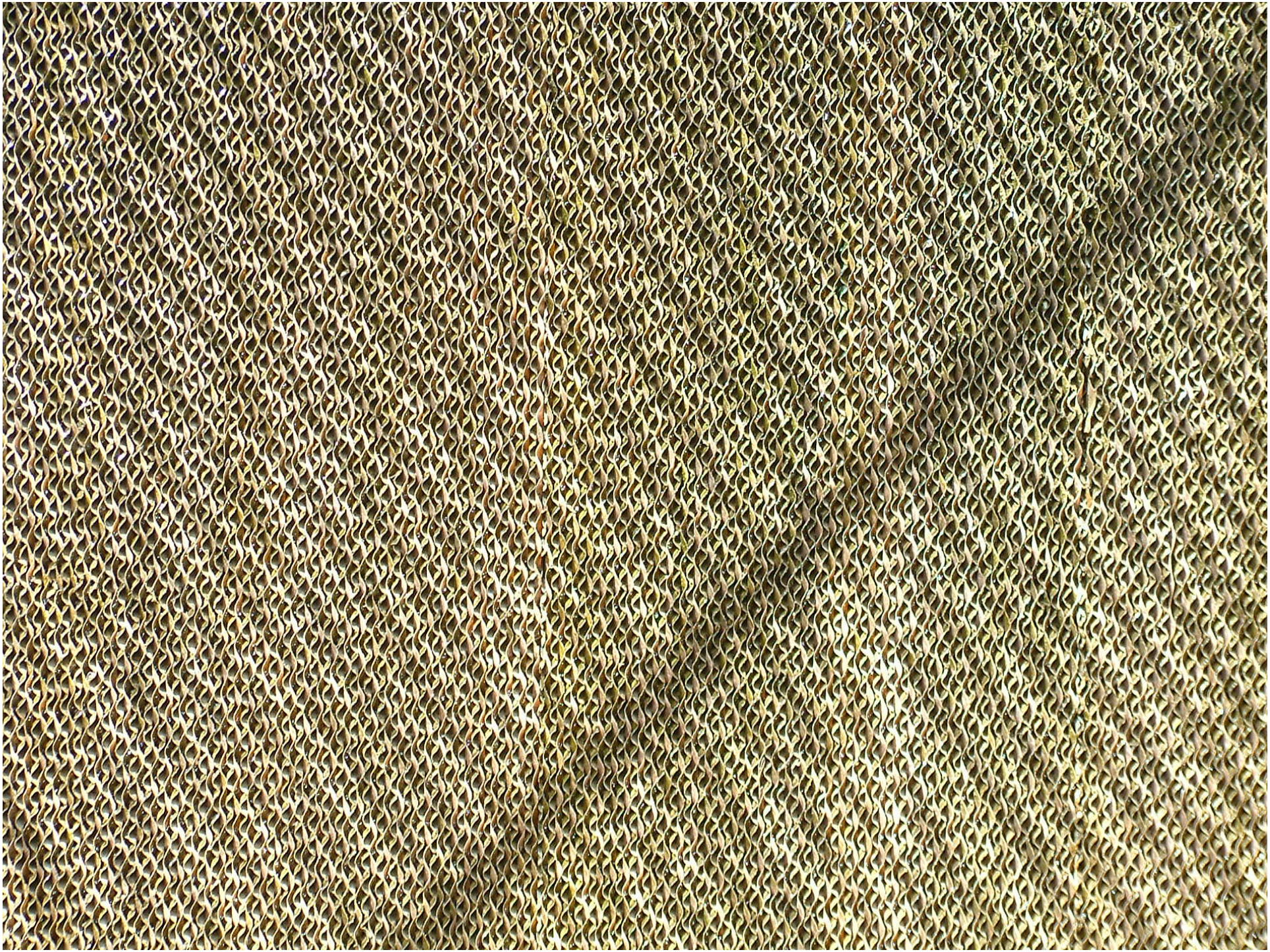


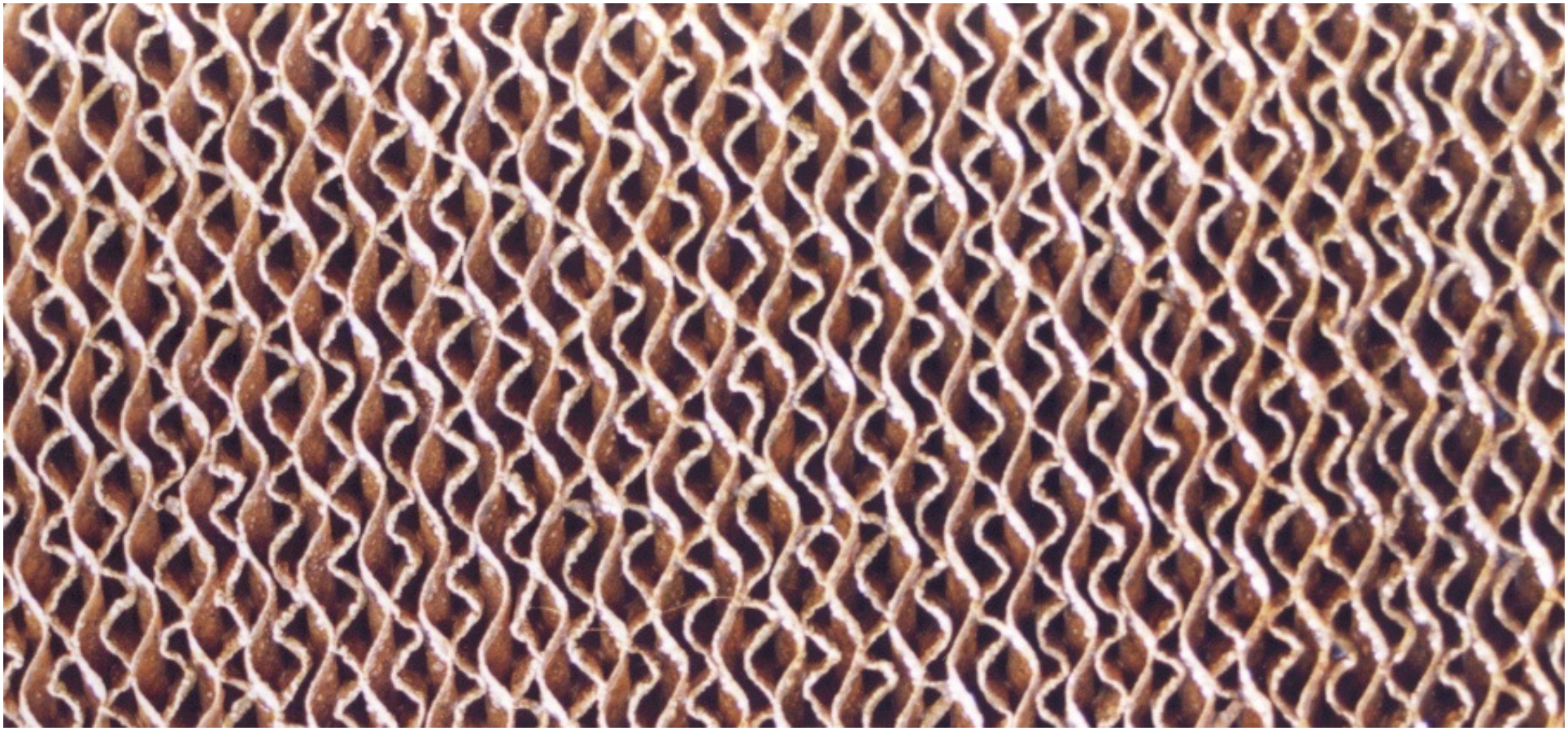
1-3 kg oil **1000 kg water** **1 kg crop**

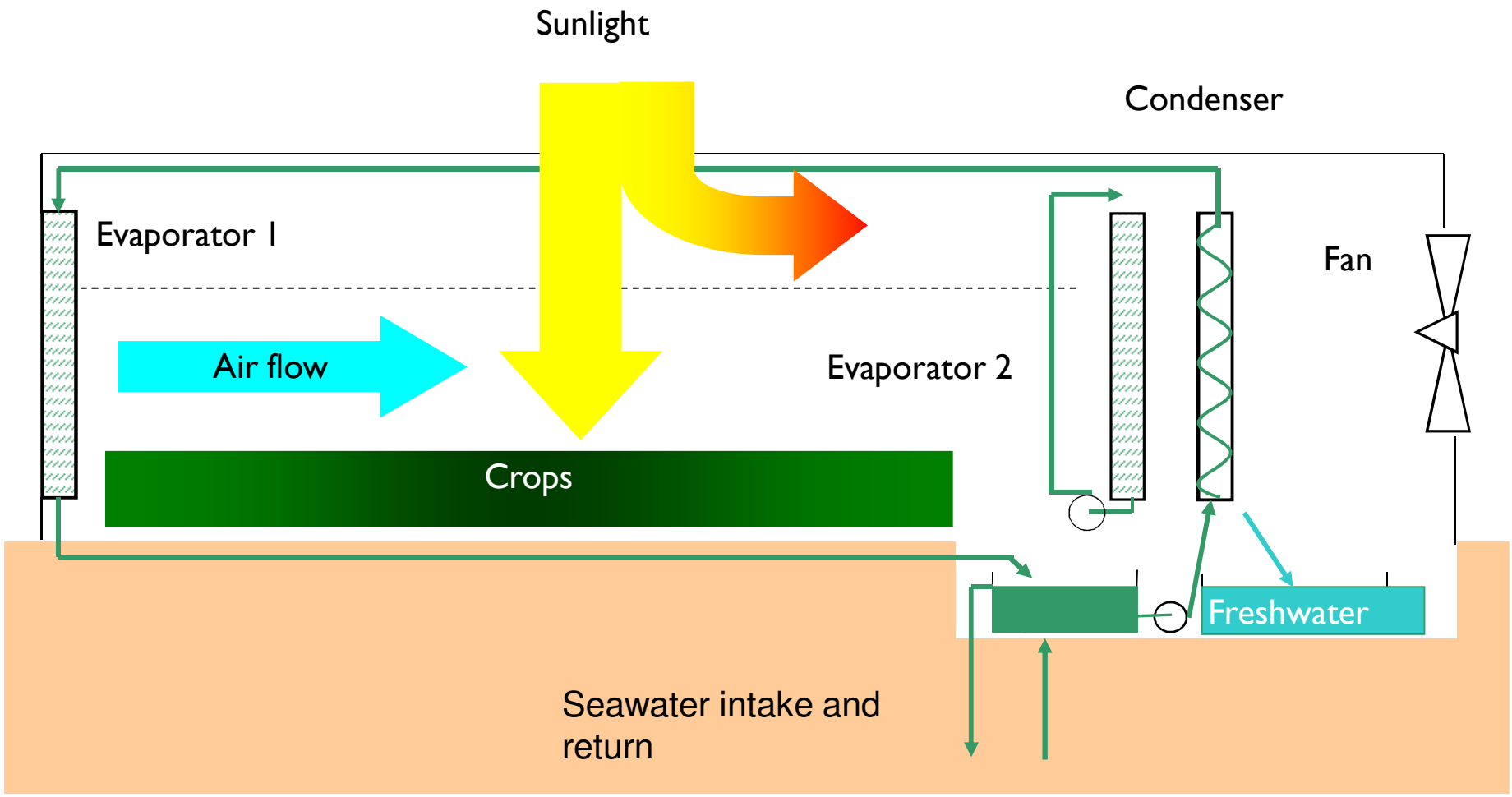
Economy of conventional desalination for agricultural use

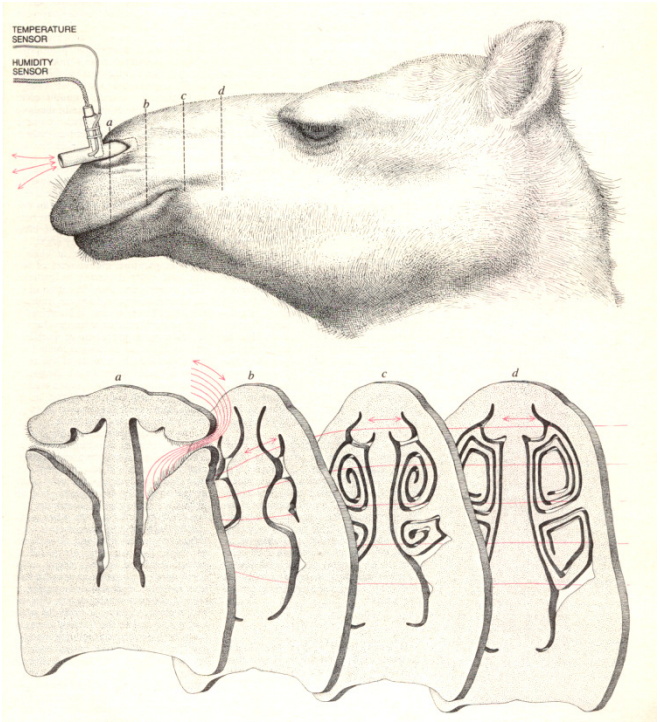


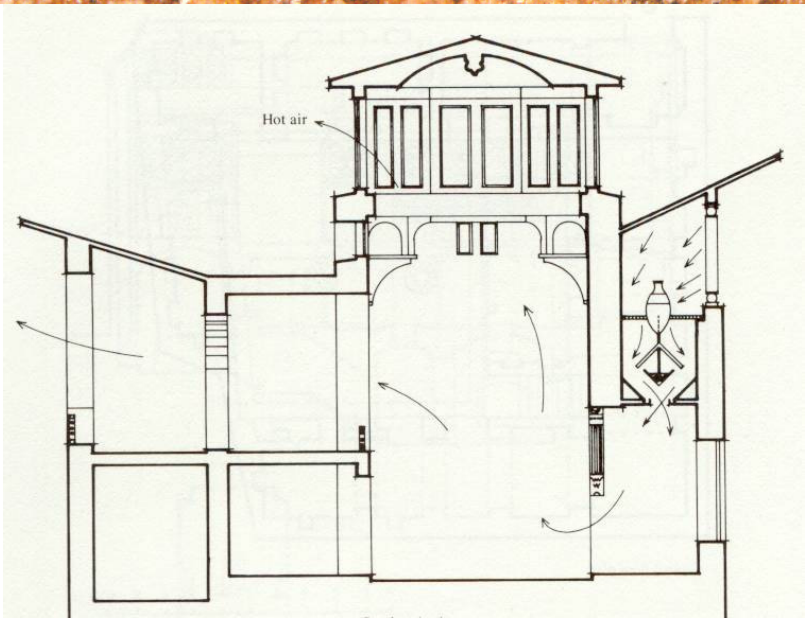


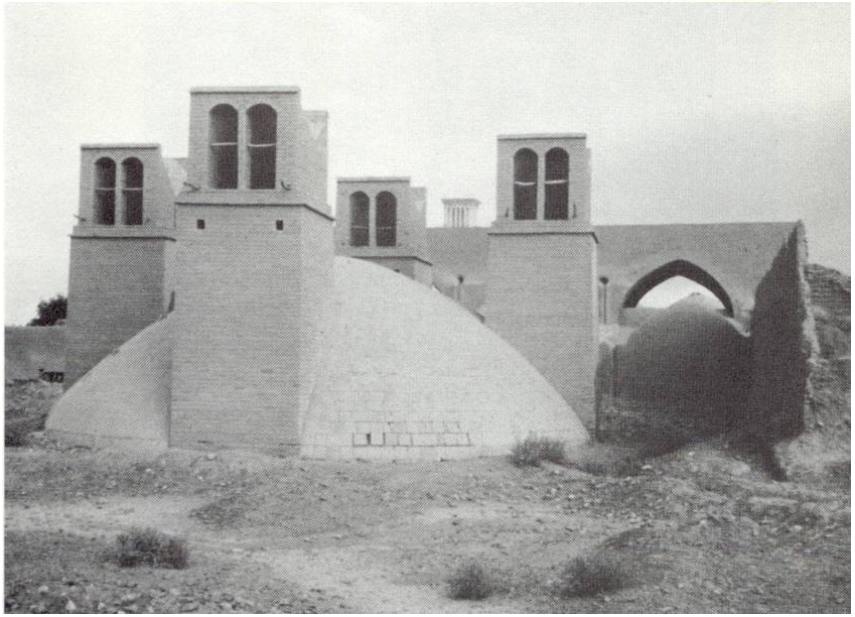





Sunlight
Condenser
Evaporator 1
Fan
Air flow
Evaporator 2
Crops
Freshwater
Seawater intake and
return


TEMPERATURE SENSOR
HUMIDITY SENSOR
a
b
c
d
a
b
c
d


Hot air



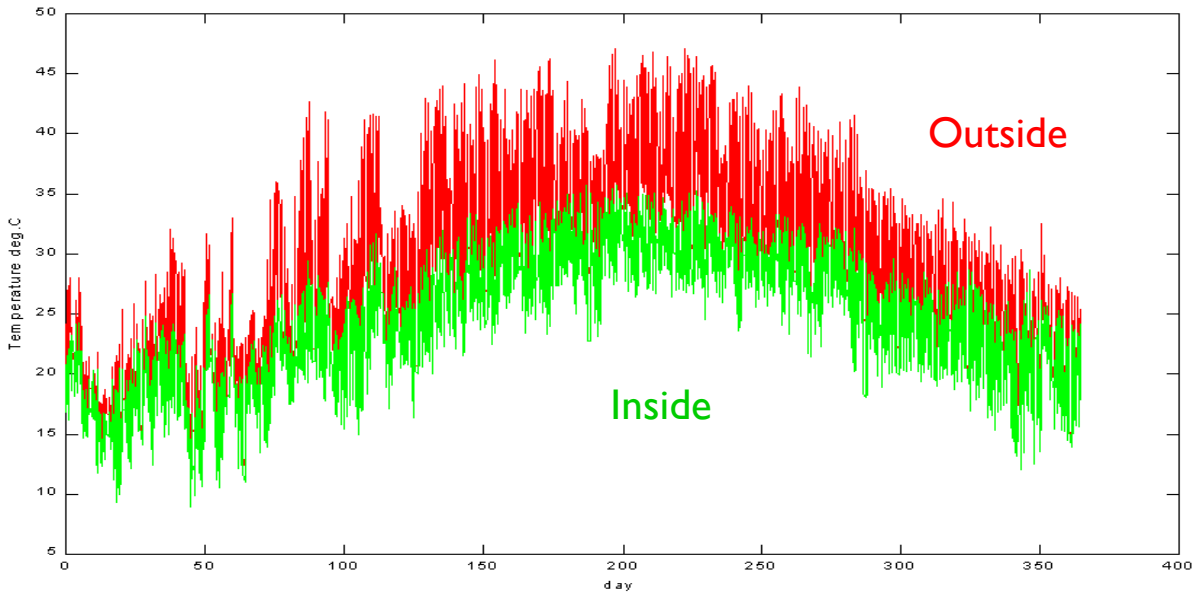
Outside

8 litres / m^2 / day

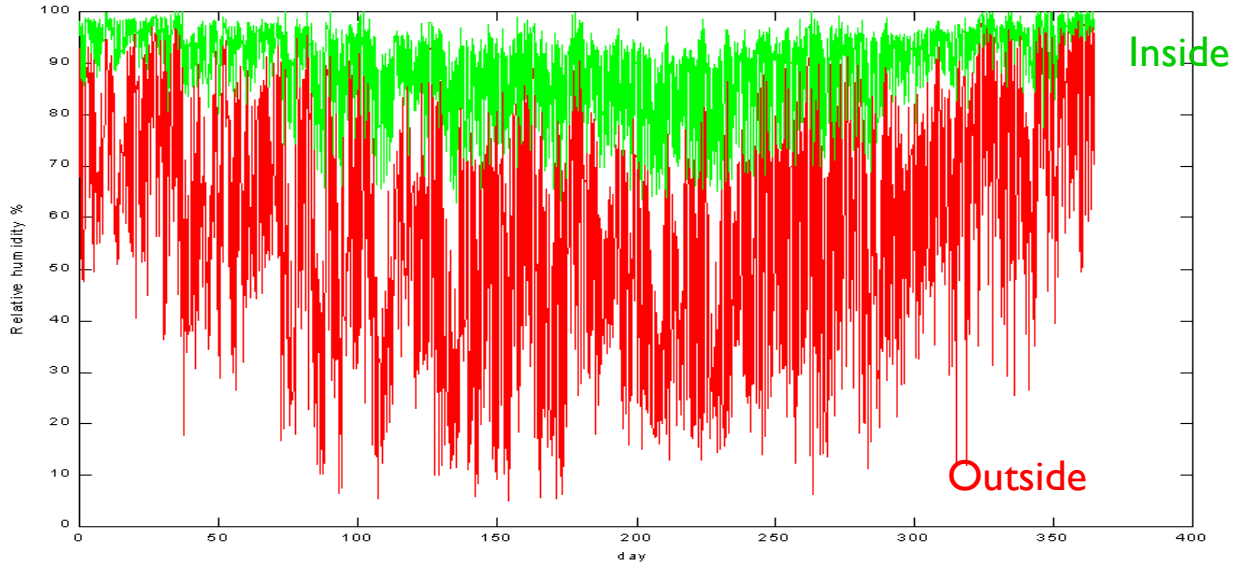
Inside

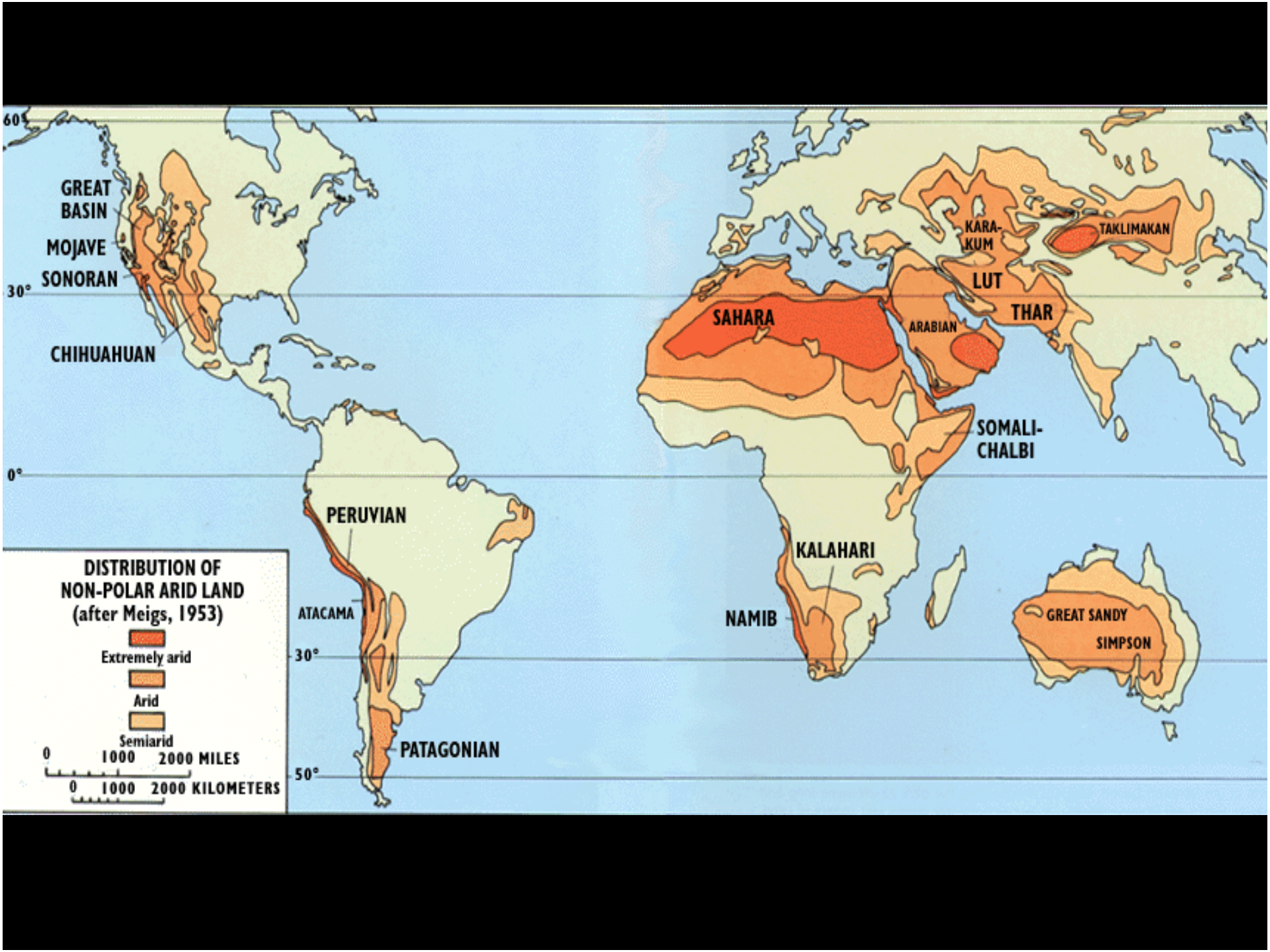
1.2 litres / m^2 / day

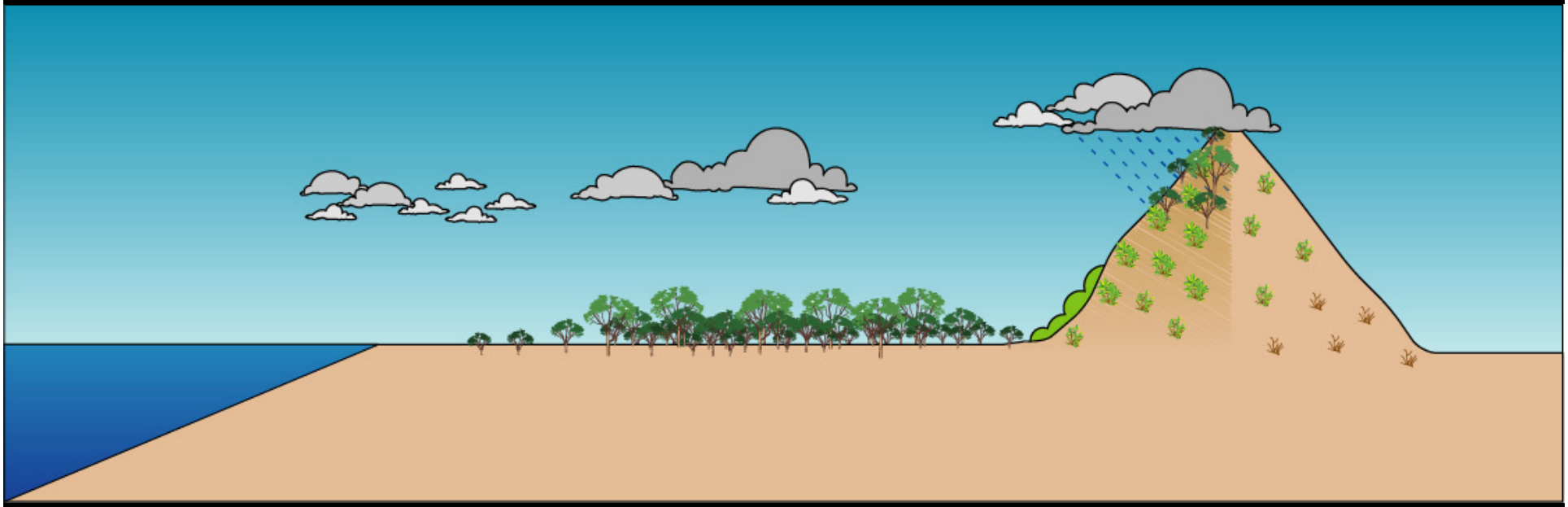
Temperature

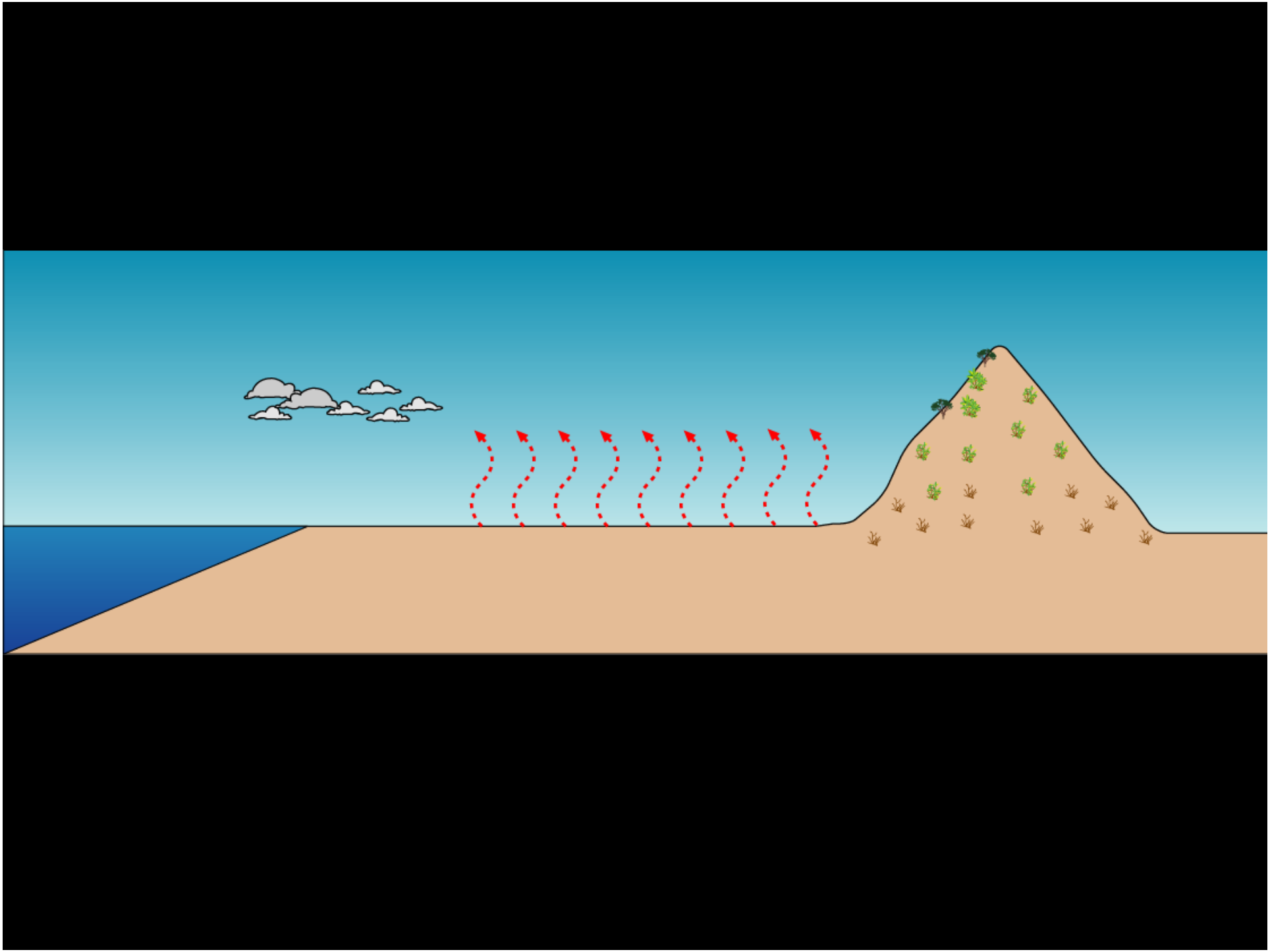


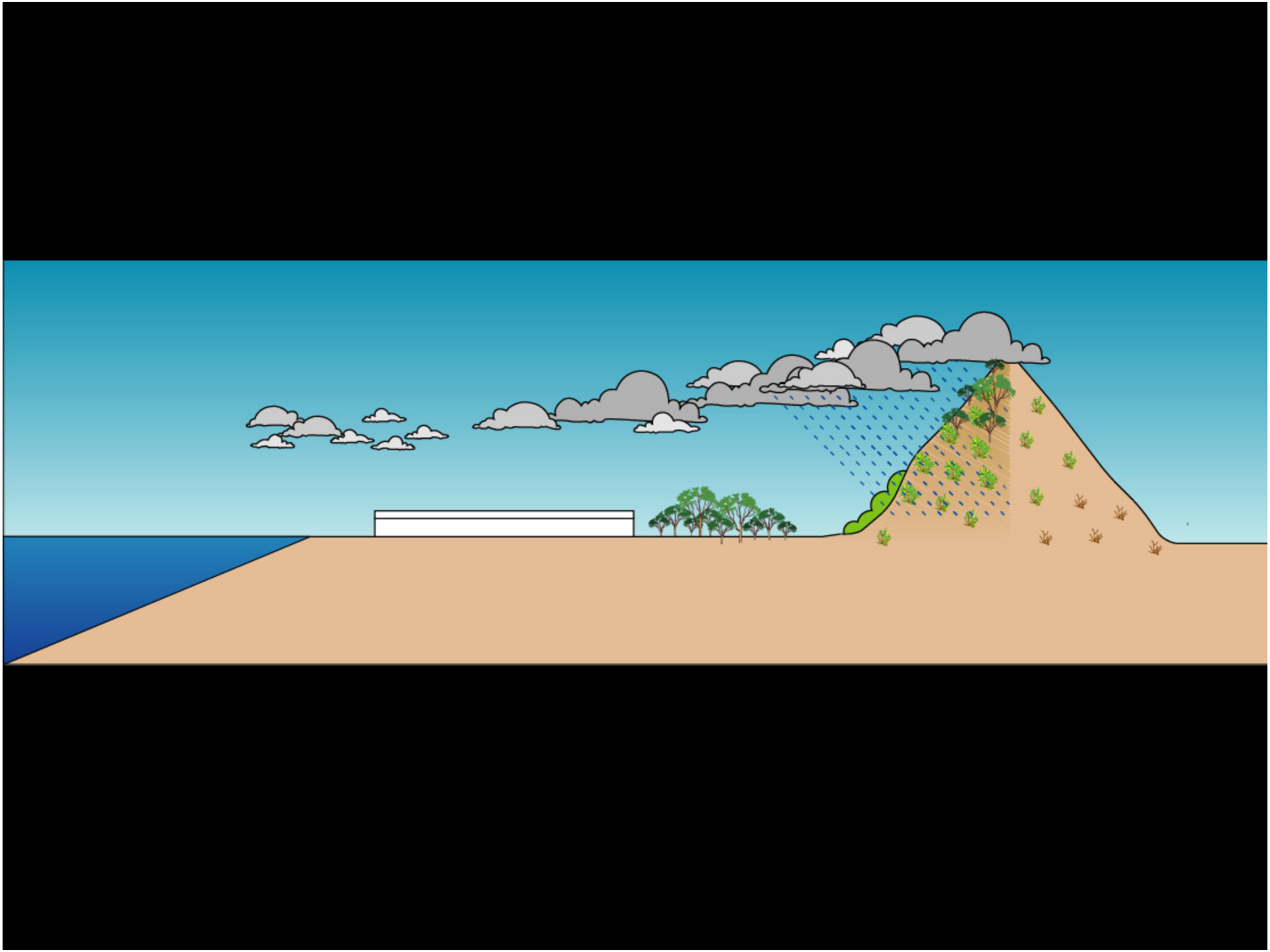
Relative Humidity

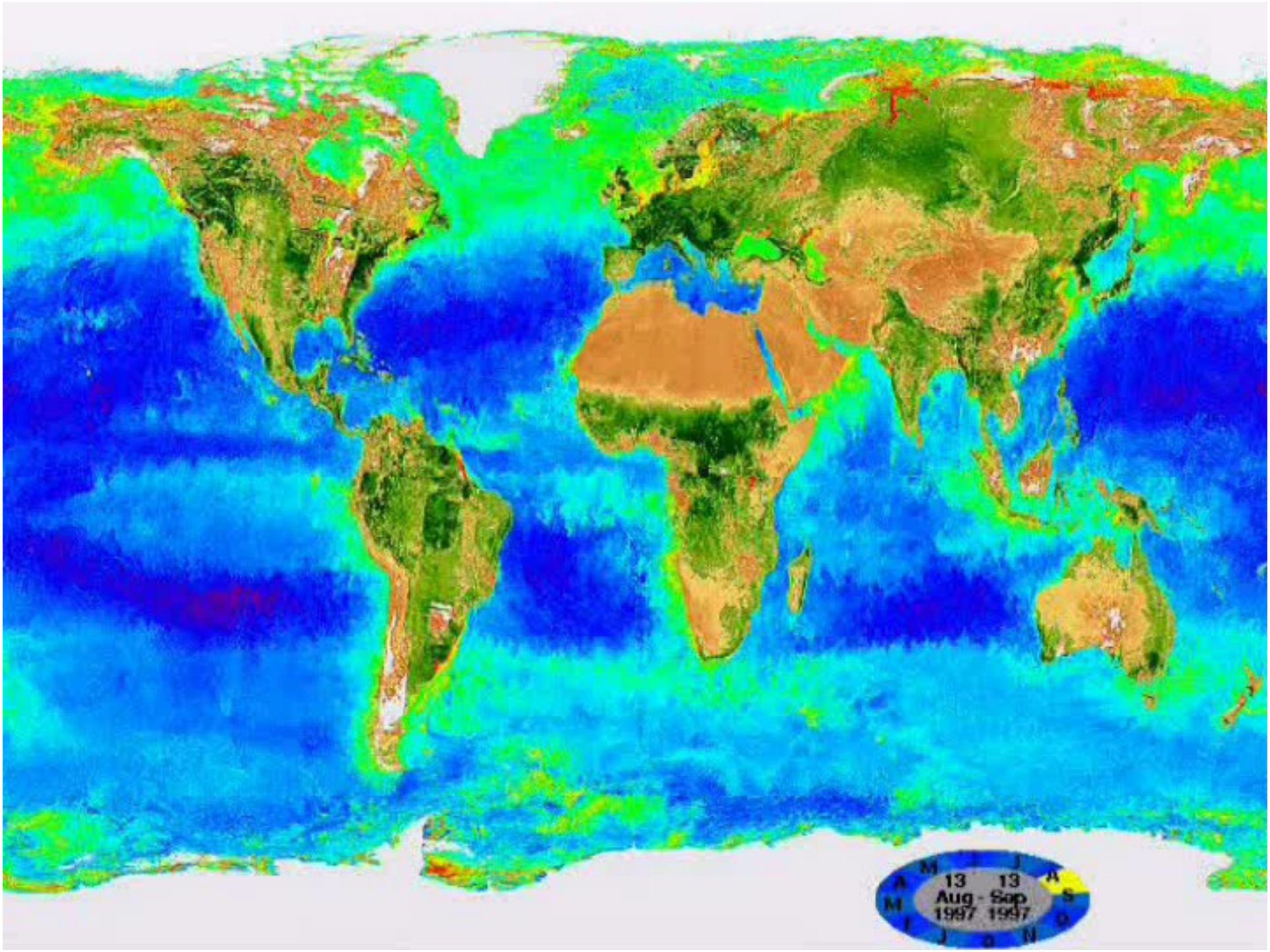


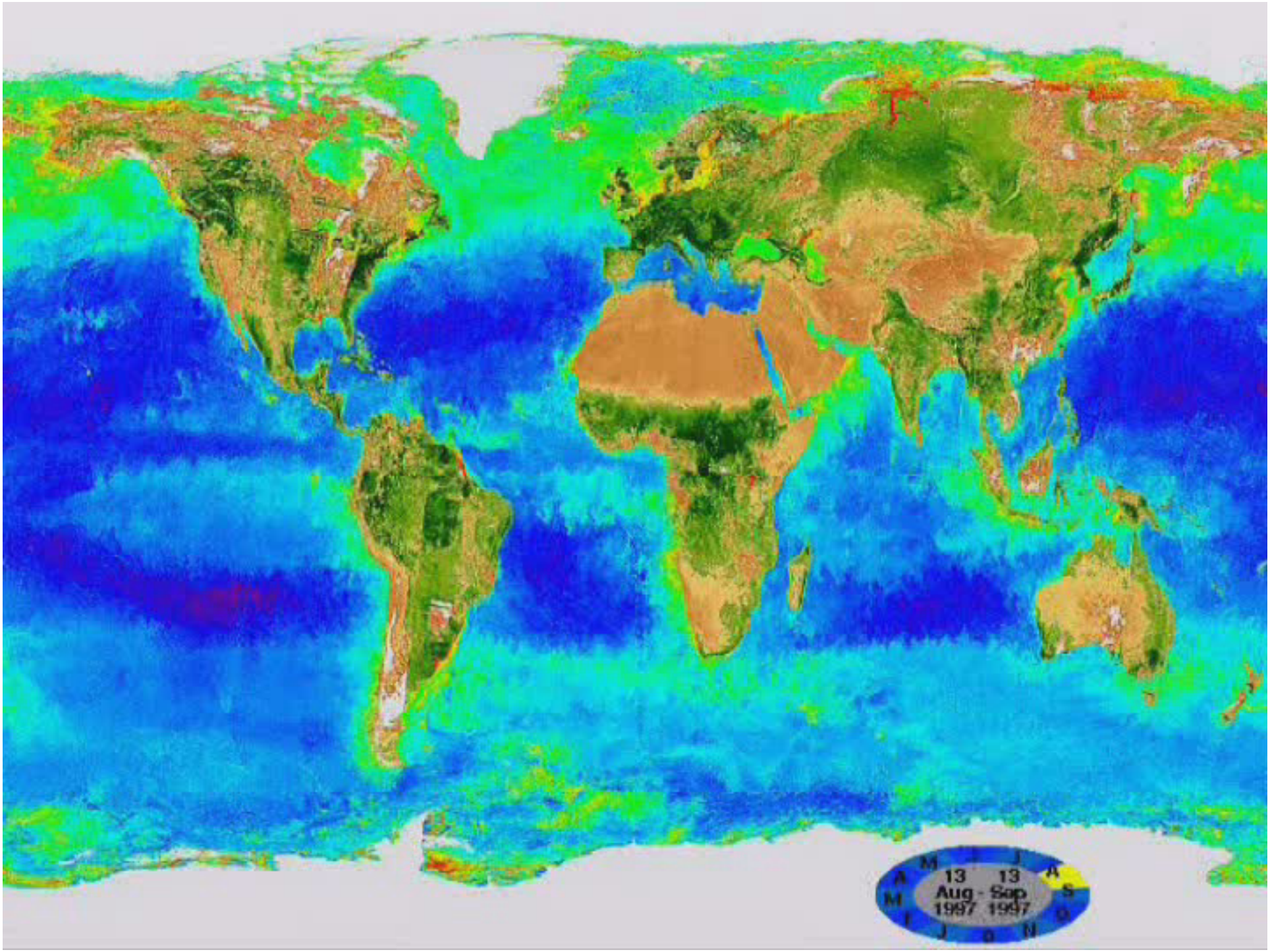

60°
30°
0°
30°
50°
GREAT BASIN
MOJAVE
SONORAN
CHIHUAHUAN
PERUVIAN
ATACAMA
PATAGONIAN
SAHARA
ARABIAN
KARA-KUM
TAKLIMAKAN
LUT
THAR
SOMALI-CHALBI
KALAHARI
NAMIB
GREAT SANDY
SIMPSON
DISTRIBUTION OF NON-POLAR ARID LAND (after Meigs, 1953)
Extremely arid
Arid
Semiarid
0 1000 2000 MILES
0 1000 2000 KILOMETERS

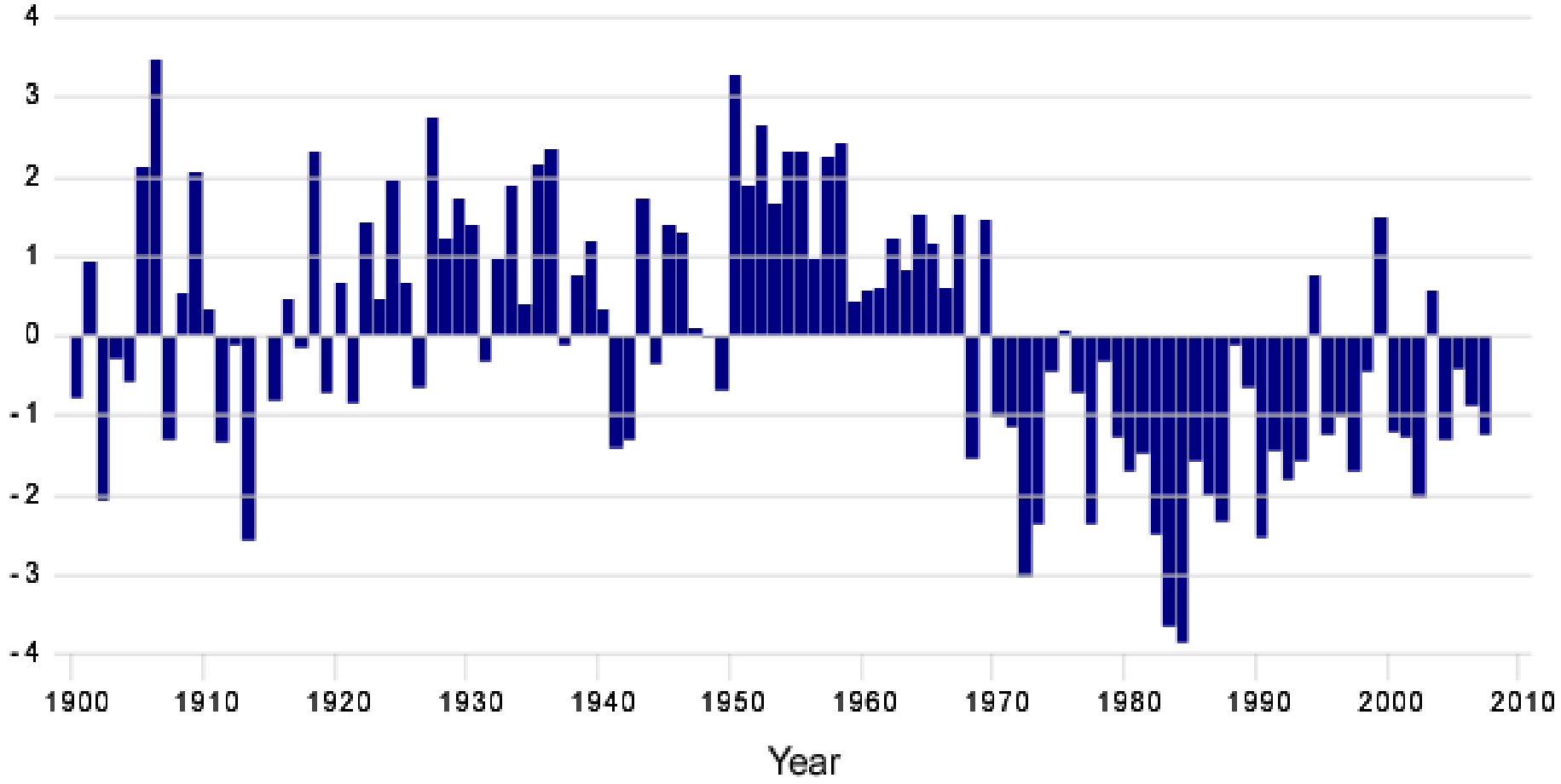







13
Aug -
1997
13
Sep
1997

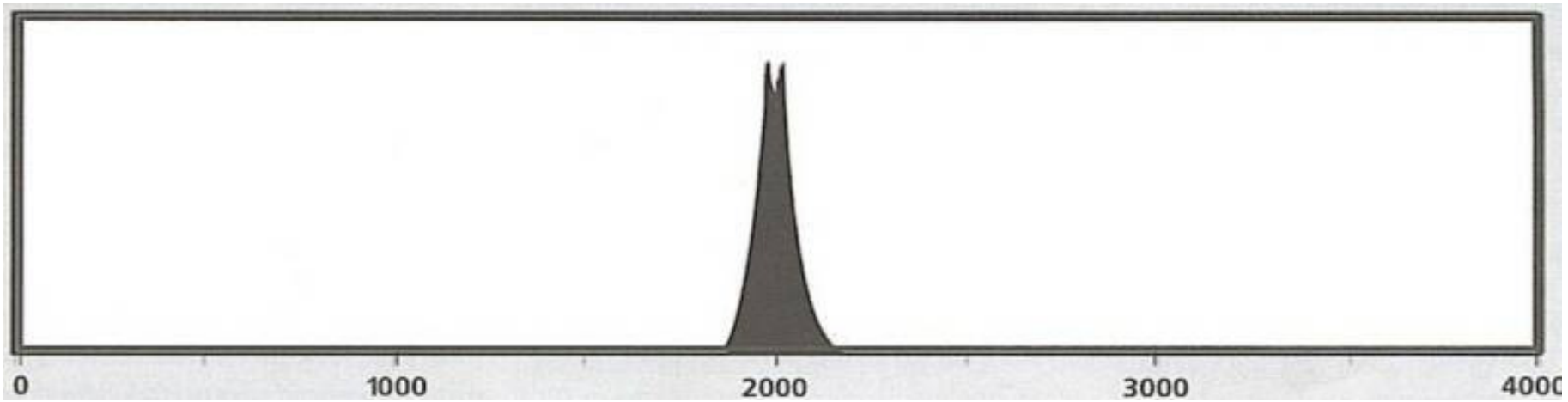

13
Aug -
1997
13
Sep
1997

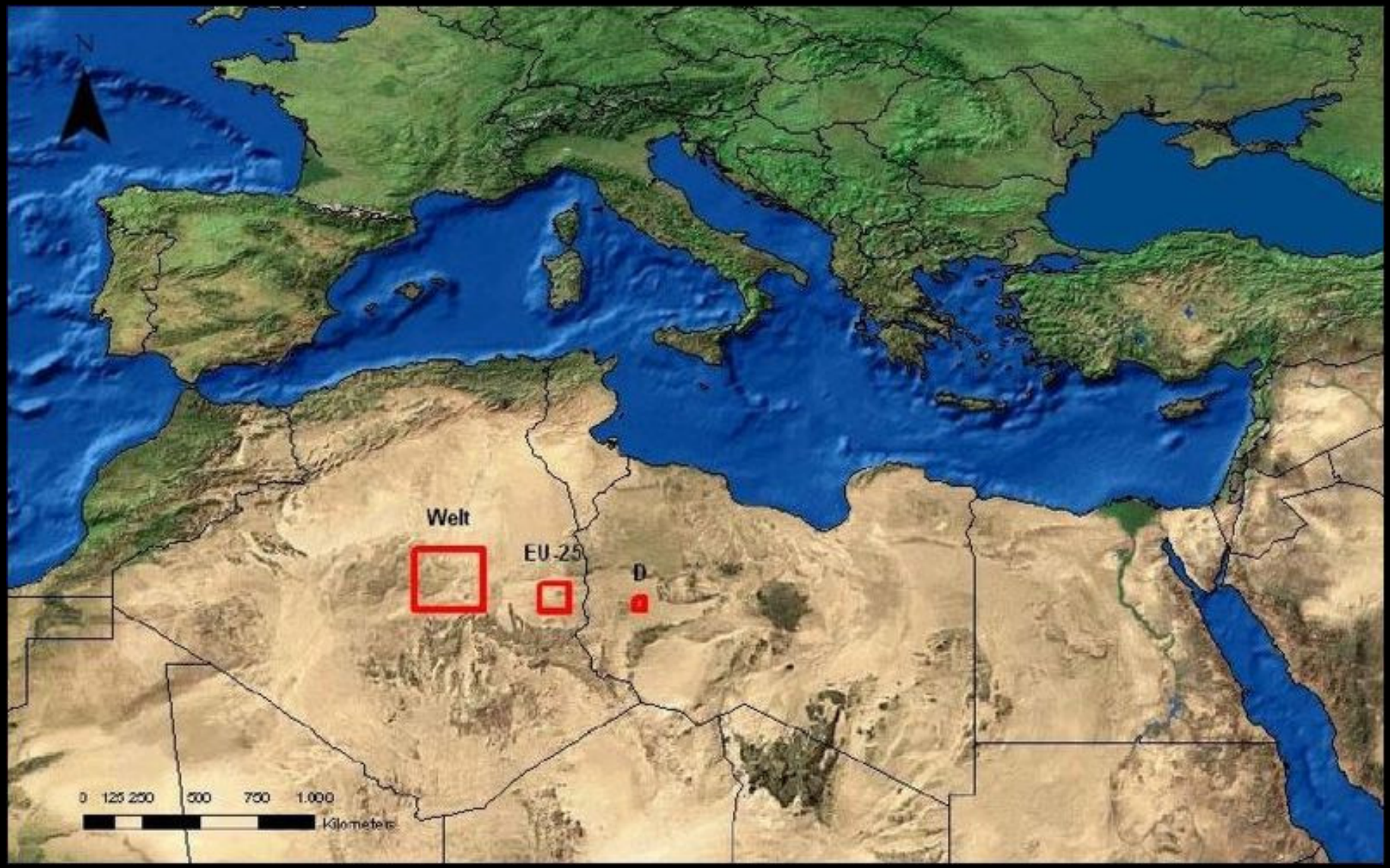


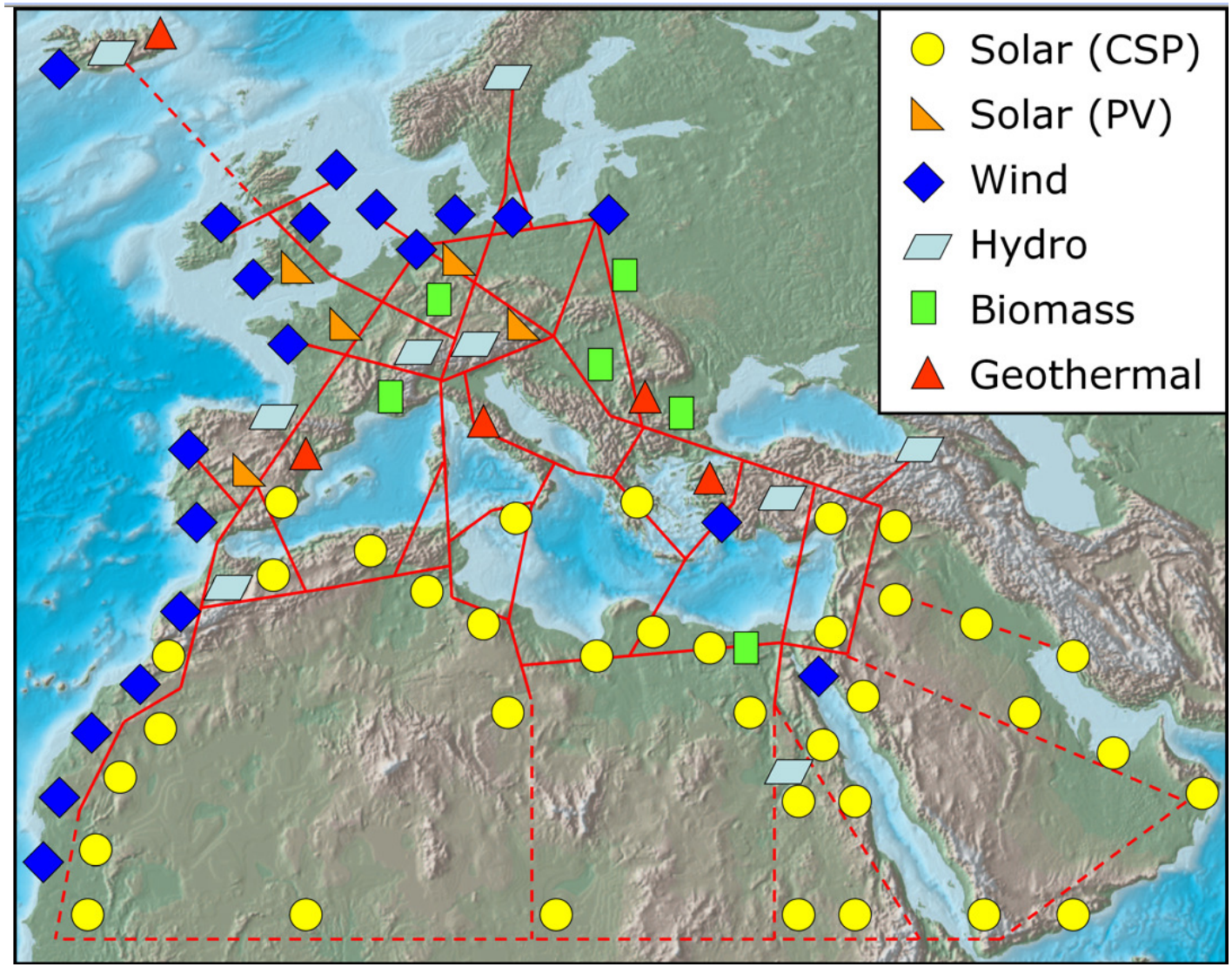
Sahel Rainfall Index - wikipedia.org

Joint Institute for the Study of the Atmosphere and Ocean

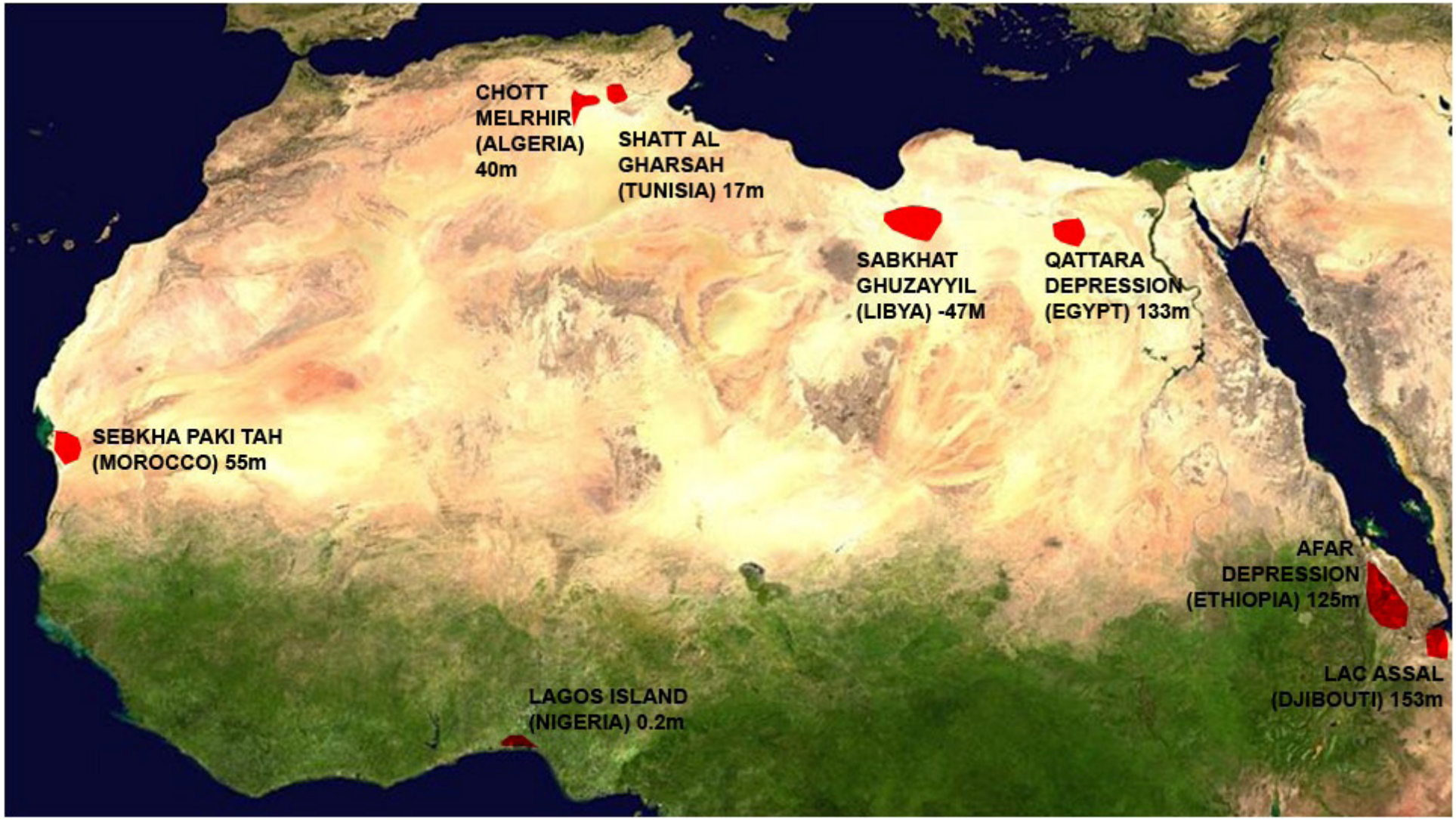
Peak oil

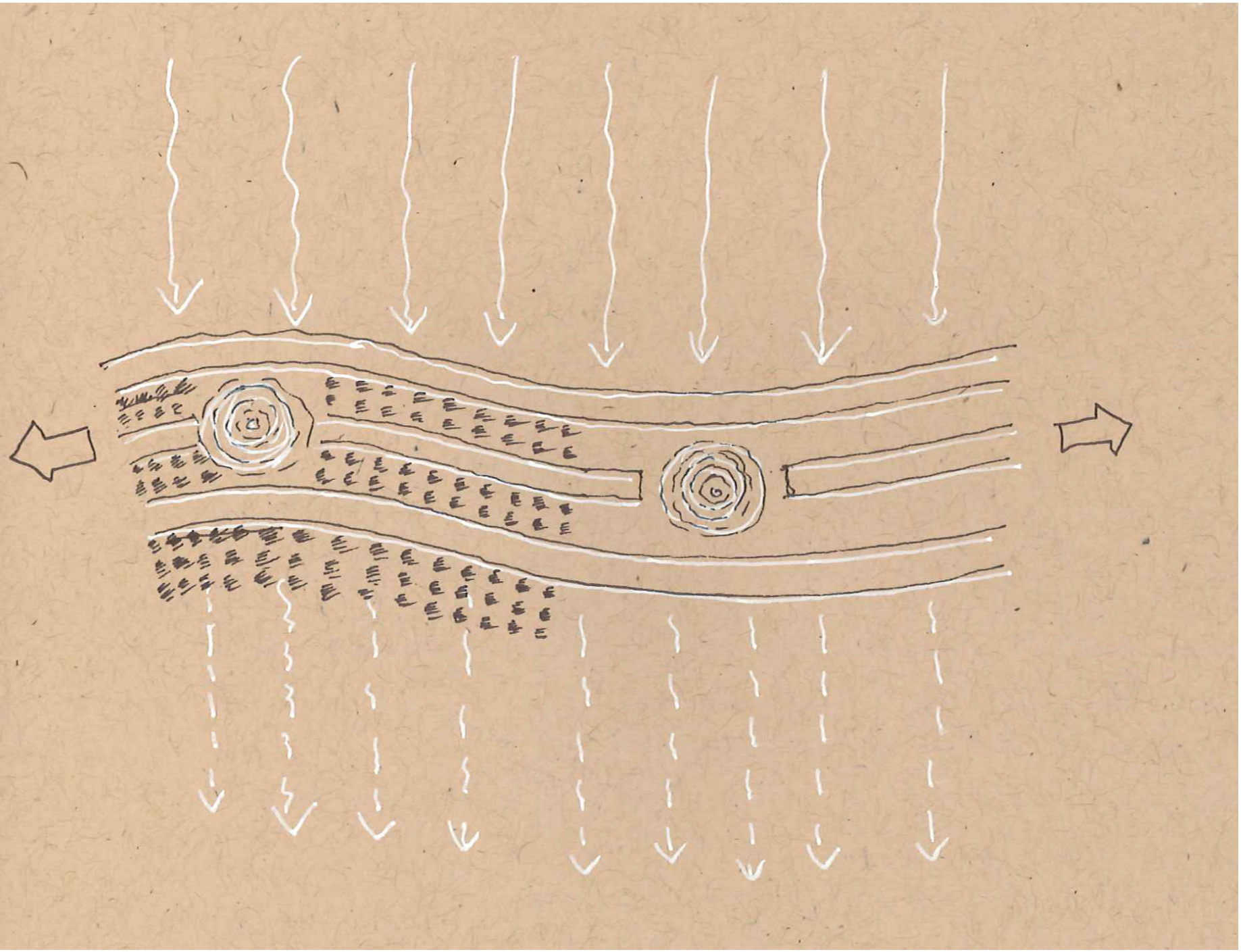


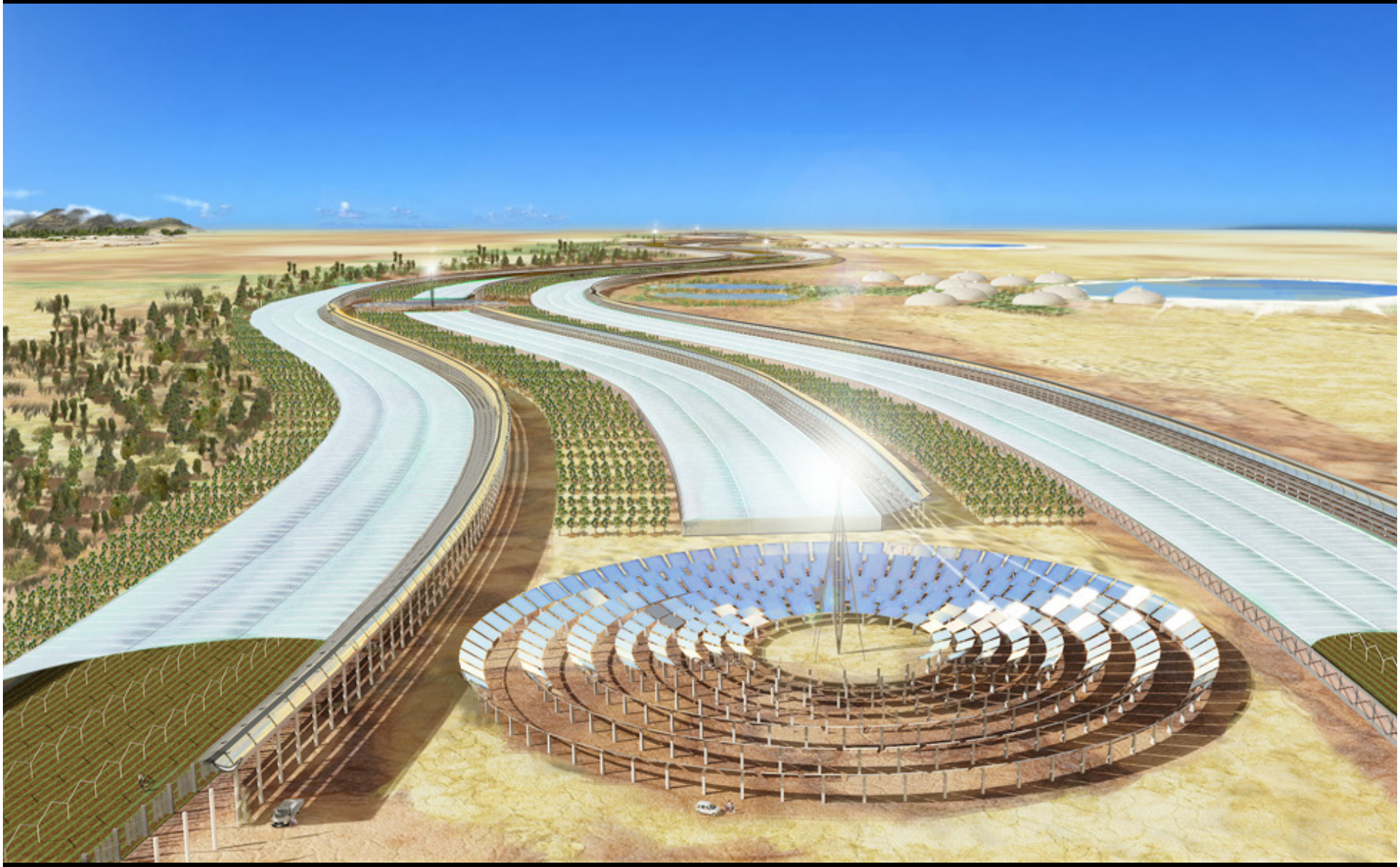

N
Welt
EU-25
D
0 125 250 500 750 1.000
Kilometers



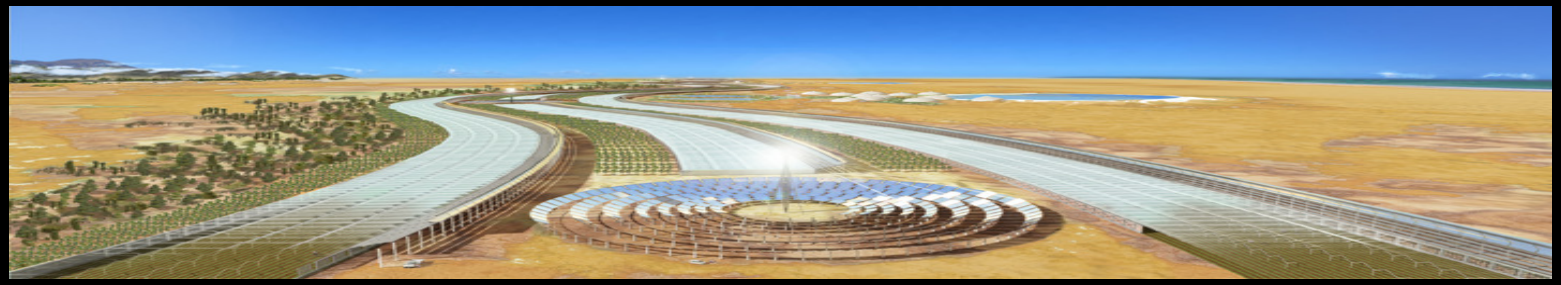
The **T**rans-Mediterranean **R**enewable **E**nergy **C**ooperation (**TREC**)
Club of Rome Initiative


CHOTT
MELRHIR
(ALGERIA)
40m
SHATT AL
GHARSAH
(TUNISIA) 17m
SABKHAT
GHUZAYYIL
(LIBYA) -47M
QATTARA
DEPRESSION
(EGYPT) 133m
SEBKHA PAKI TAH
(MOROCCO) 55m
AFAR
DEPRESSION
(ETHIOPIA) 125m
LAC ASSAL
(DJIBOUTI) 153m
LAGOS ISLAND
(NIGERIA) 0.2m





Seawater Greenhouse / CSP Synergies



- *Shared ideal conditions – hot, sunny remote desert*
- *Distilled water for turbines*
- *Distilled water for cleaning mirrors*
- *Dust suppression from plants and evaporators*
- *Use of waste heat for increased water production*
- *Biomass – Jatropha 'diesel' For night time operation*

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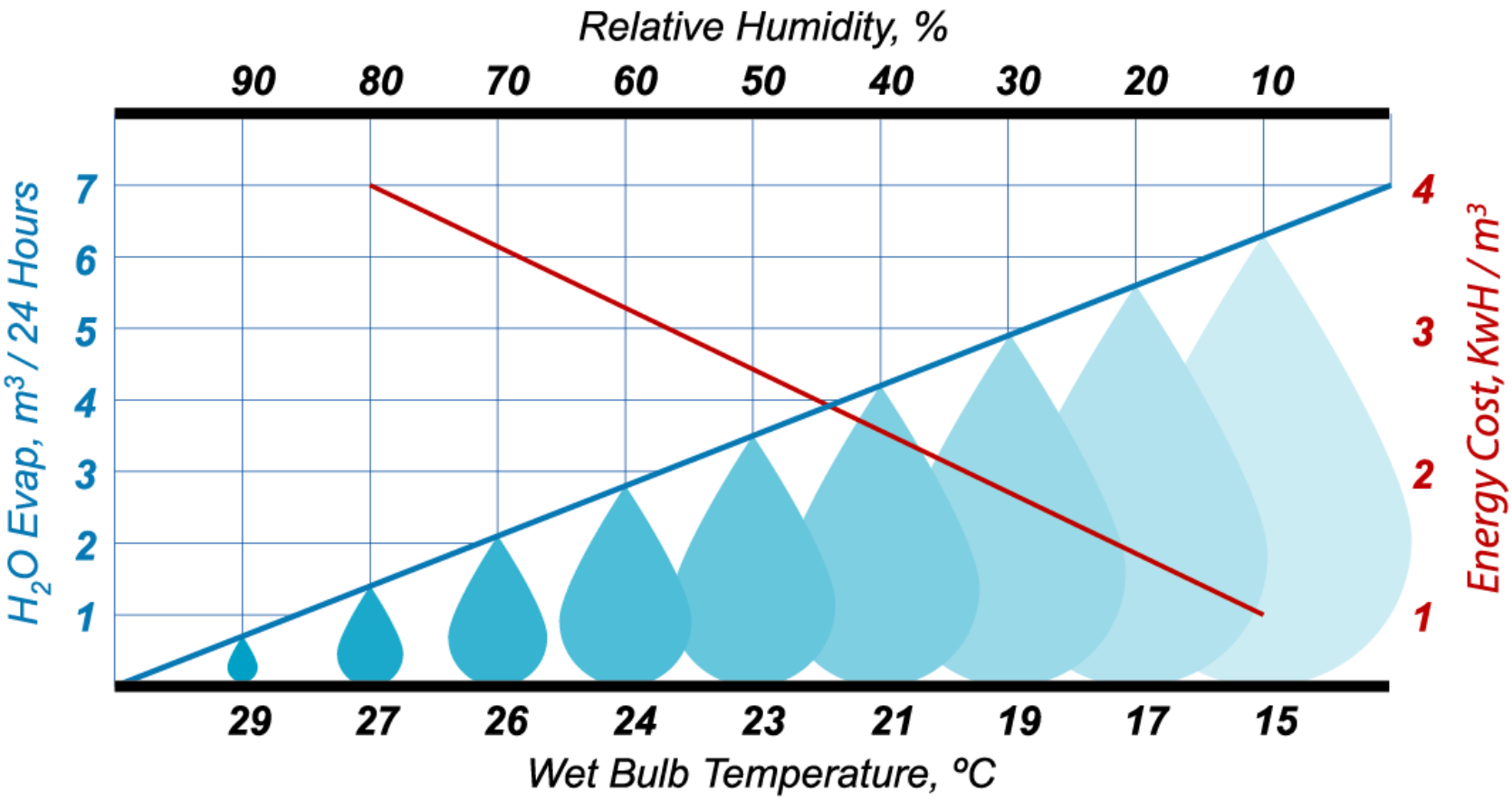
Cooling potential of Air at 30ºC



Greenhouse - Spain, Morocco, SG comparison

1 m2 Tomato crop over 1 year		UK	Spain	Morocco	SG+PV in Morocco
Energy use	kWh/m2	480-560	0	0	0
Energy cost	€ /m2	11	0	0	0
Greenhouse capital cost	€/m2	100	46	46	100
Finance cost @15%	€/m2	15	7	7	15
Yield	Kg/m2/year	60	36	36	60
Labour	€/m2	16	8.5	4	10
Shipping to UK*	€/kg		4.5	9	15
Total fixed costs	€/m2	42	20	20	40
Overheads @ 20% of fixed costs	€/m2	8.4	4	4	8
Total expenses	€/m2	50	24	24	48
Crop Value @ €0.9/kg	€/m2	54.00	25	25	54
Profit	€/m2	4	1	1	6

* Shipping to UK - €0.124/kg from Spain, €0.25/kg from Morocco

(organic cherry vine tomatoes - £11/kg = 13.6€ retail)