«Climate Change Risk Assessment»

BUILT ENVIRONMENT - INFRASTRUCTURE - TOURISM

Ε. ΓΚΟΥΒΑΤΣΟΥ ΟΜΑΔΑ ΣΥΜΒΟΥΛΩΝ, ADENS S.A

ΥΠΟΥΡΓΕΙΟ ΓΕΩΡΓΙΑΣ, ΑΓΡΟΤΙΚΗΣ ΑΝΑΠΤΥΞΗΣ ΚΑΙ ΠΕΡΙΒΑΛΛΟΝΤΟΣ

ΤΜΗΜΑ ΠΕΡΙΒΑΛΛΟΝΤΟΣ

ADVANCED ENVIRONMENTAL STUDIES S.A.

G. KARAVOKYRIS & PARTNERS CONSULTING ENGINEERS S.A.

DION. TOUMAZIS & ASSOCIATES

AGRICULTURAL UNIVERSITY OF ATHENS

6/10/2016

- **Buildings and transport, energy, water and Information and Communications Technology (ICT) systems are vulnerable to flooding, extreme heat and other climate risks, such as landslides and potential water shortages during major droughts.**
- **Extremely hot conditions can cause poor health and fatalities. They may also cause problems for energy transmission and increase the demand for water and energy.**
- **Buildings and the main infrastructure sectors (energy, transport, water and ICT) are interdependent.**

- **Climate and weather are important factors in tourist destination choice, and the tourist sector is susceptible to extreme weather.**
- **Coastal tourism is highly vulnerable to weather, climate extremes, and rising sea levels.**

CC impacts related to flooding, water supply and marine works will be presented by Mr Karavokiris and Mr Toumazis

Built Environment - Energy

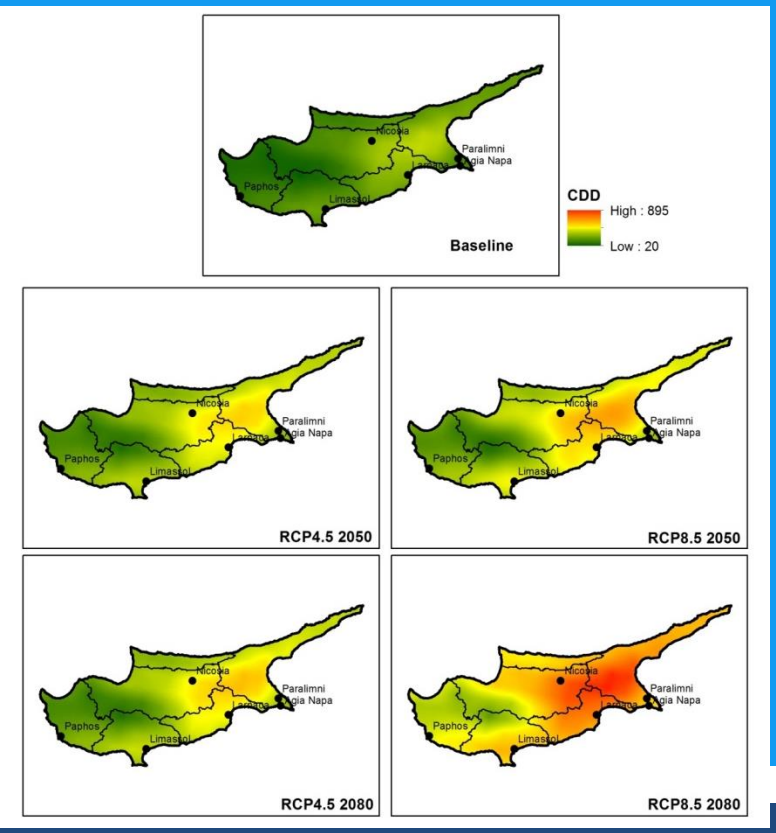
The TIER 2 List of impacts

Built Environment	Energy
1. Energy demand for Cooling	1. Demand for Cooling
2. Demand for Water (in buildings)	2. Energy Demand by Water Suppliers
3. Urban Heat Island	3. Demand for Heating (opportunity)
4. Water Availability	4. Electricity Turbine Efficiency
5. Energy demand for Heating	5. Flooding of Power Stations
6. Effectiveness of Green Spaces	6. Power Station Cooling Processes
7. Overheating of Buildings	7. Transmission Capacity - overhead
8. Soil Drying, Heave & Subsidence	8. Transmission Capacity - underground
9. Soil Erosion & Landslides	9. Heat Related Damage/Disruption
10. Flood Damage	

Selected metrics

BE1 - Energy demand for cooling	*BE1 - Energy demand for cooling*
BE2 - Urban Heat Island (UHI)	EN1 - Energy Demand by Water Suppliers
BE3 - Energy demand for Heating	*BE3 - Energy demand for Heating*
BE4 - Effectiveness of Green Spaces	EN2 - Electricity Turbine Efficiency
BE5 - Overheating of Buildings	EN3 - Flooding of Power Stations
BE6 - Subsidence	EN4 - Power Station Cooling Processes
	EN5,6 - Transmission Capacity
	EN7 - Heat Related Damage/Disruption

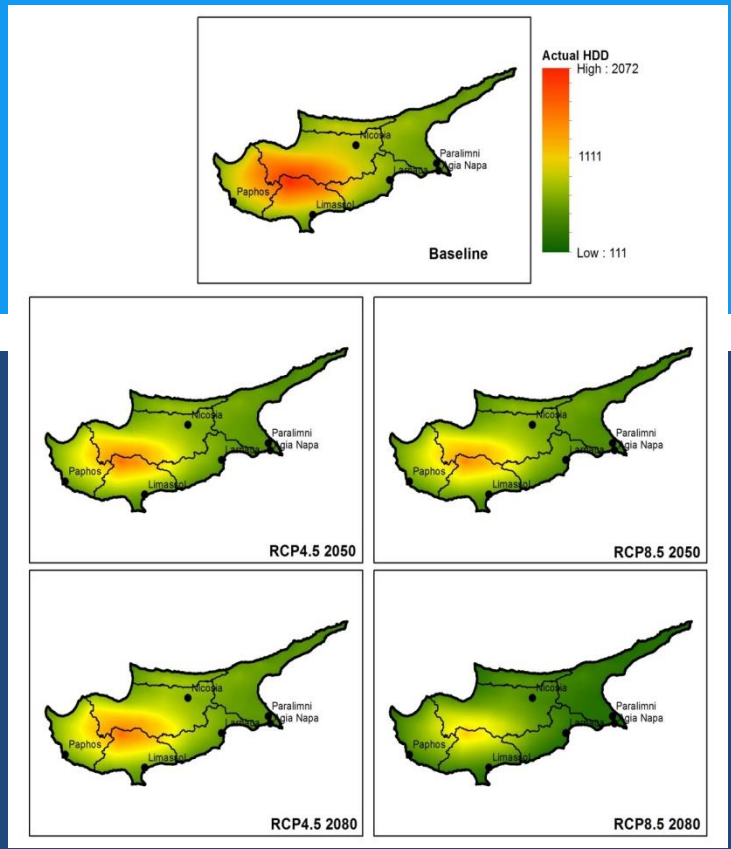
BE1 - Energy demand for cooling



	Reference period	2050s		2080s	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
Actual HDDs (Household weighted average)	862	670	620	693	407
CDDs (Household weighted average)	215	368	442	391	641

CDD = max (T – T, 0)*
where T is the base temperature (25°C) and T is the mean daily temperature*

BE3 - Energy demand for heating



Actual HHD = (18 °C - Tm) x d if Tm is lower than or equal to 15 °C (heating threshold) and are nil if Tm is greater than 15 °C.

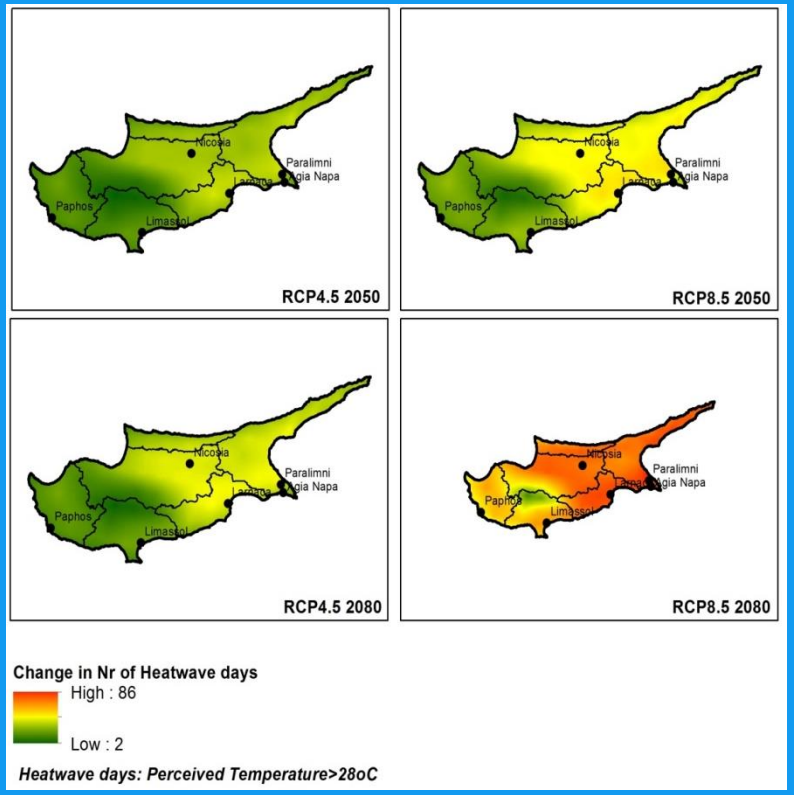
BE2 - Urban Heat Island (UHI)

The Urban heat island (UHI) is a phenomenon whereby an urban area experiences elevated air temperatures due to anthropogenic modification of the environment and is usually more evident at night. During heat waves the local effect of an UHI is superimposed on the regional temperature field and as a result heat stress is enhanced.

Although UHI intensity does not necessarily increases under climate change, the UHI does exacerbate the frequency of extreme heat events as experienced by urban dwellers

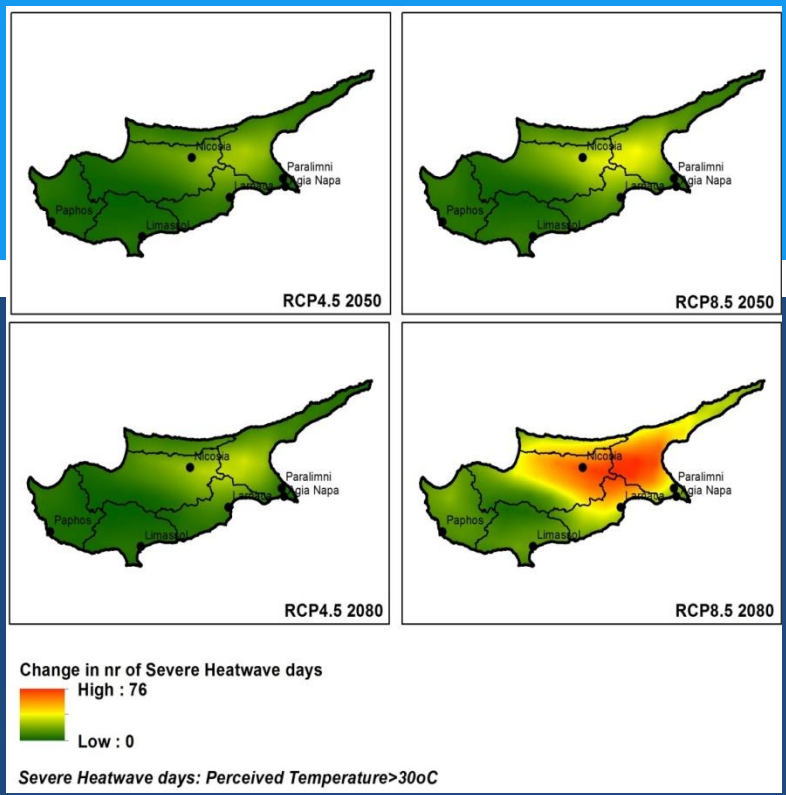
According to *Hadjimitsis et al. (2013)*, **Nicosia** is most the vulnerable to UHI during the warm period, where the UHI intensity was recorded above 4 degrees. On the contrary, the other urban areas (Larnaca, Limassol and Paphos), which are close to the coastline, are less affected by UHI during the warm period, with intensities recorded around 1,5 to 3,5°C. These areas also demonstrated high UHI intensities during the cold period.

Regulatory Administrative Act 291/2014
Heat Waves and the perceived temperature:
≥28°C heatwave
≥ 30°C severe heatwave



Number of days with Severe Heatwave

		2050		2080	
City	Baseline	RCP4.5	RCP8.5	RCP4.5	RCP8.5
Nicosia	7	26	37	31	75
Larnaca	2	11	16	12	40
Limassol	1	5	7	6	16
Paphos	1	3	5	4	12



The most vulnerable cities are Nicosia and Larnaca.
The thresholds of perceived temperature for heat wave events will be exceeded more frequently in the future and the UHI effects will further contribute to the impacts of heatwaves.

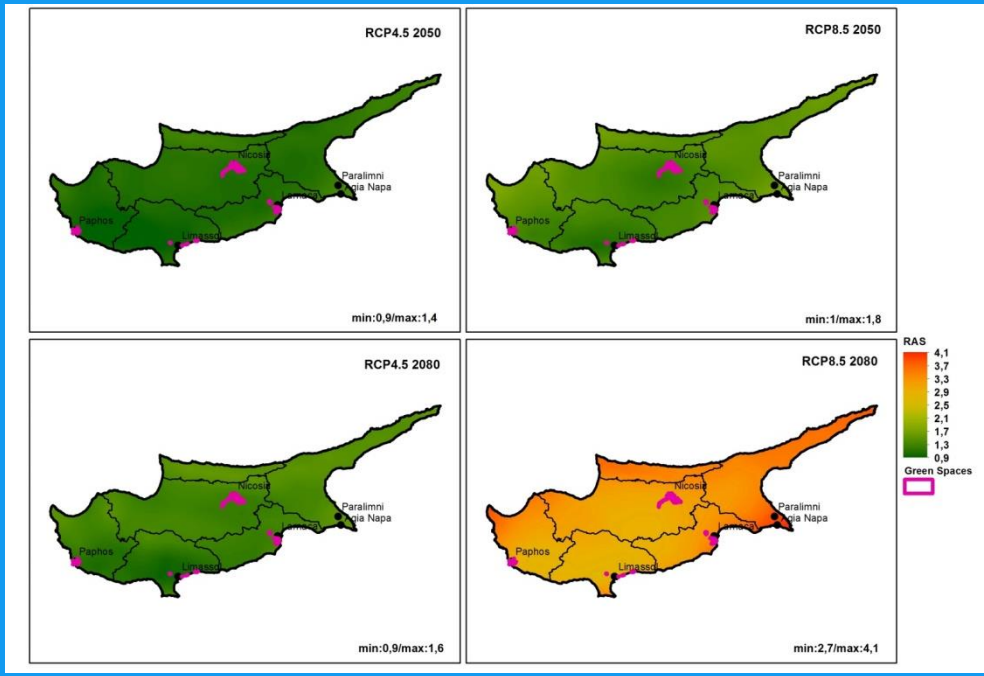
BE4 - Effectiveness of Green Spaces

This metric estimates the reduction in cooling capacity of green spaces due to CC in terms of green space loss.

Green infrastructure

- inherent cooling and shading capacity
- reduces the heat vulnerability of the surrounding area
- temporary respite from extreme heat
- better mental and physical health

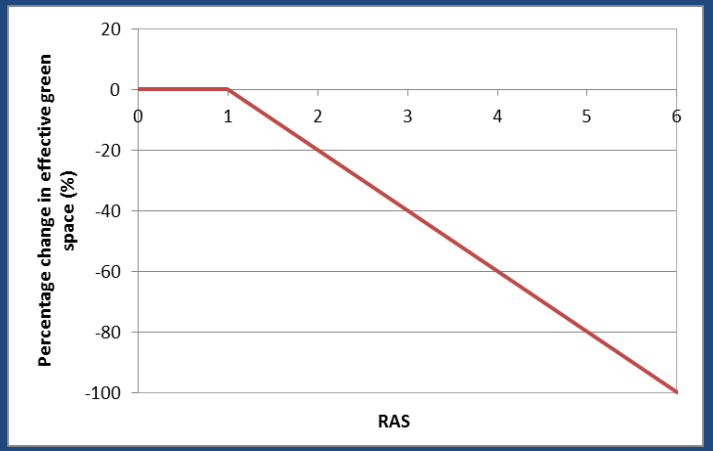
Green infrastructure can take many forms from domestic gardens and street trees ➔large open spaces such as parks



18 urban and suburban Green Spaces≥2ha

Relative Aridity Score (RAS) => changes in average annual temperatures and rainfall will affect the likelihood of dry periods. RAS>2 : extremely arid conditions in comparison with the baseline

$$Relative\ Aridity\ Score = 0,4 * \frac{T\ future - T\ baseline}{SD\ Tbaseline} - 0,6 * \frac{Prec\ future - Prec\ baseline}{SD\ Precbaseline}$$



N	Site	District	Area (ha)	RCP4.5, 20	RCP8.5, 20	RCP4.5, 20	RCP8.5, 20
1	Pattichion Park, Park of ELDYK fallen soldiers, Tekke Park	Larnaca	195	1,10	1,43	1,26	3,41
2	National Forest Park of Rizoelia	Larnaca	91	1,04	1,37	1,25	3,25
3	Archaeological site of Amathous	Limassol	91	1,00	1,16	1,02	2,87
4	Kale Vounari Municipal Park	Limassol	20	0,92	1,07	0,95	2,78
5	Dasoudi Municipal Park	Limassol	9	0,96	1,12	0,99	2,84
6	Public Garden - Limassol Zoo	Limassol	7	0,95	1,08	0,97	2,82
7	National Forest Park of Athalassa	Nicossia	523	1,05	1,20	1,21	3,04
8	Presidential Palace park, Prodromos park and Linear Park of Pedieos	Nicossia	163	1,05	1,18	1,22	3,01
9	Academy Park	Nicossia	42	1,07	1,24	1,25	3,08
10	Kykkos glebe	Nicossia	10	1,06	1,21	1,24	3,04
11	Athens Park	Nicossia	10	1,07	1,24	1,26	3,09
12	Acropolis park	Nicossia	4	1,05	1,20	1,22	3,04
13	Part of the Archaeological site "Forty Columns"	Paphos	29	0,97	1,36	1,10	3,00
14	Europe Park	Paphos	13	0,94	1,33	1,08	2,91
15	Part of the Archaeological site "Tombs of the Kings"	Paphos	8	0,96	1,37	1,11	3,00
16	Paphos Public Gardens	Paphos	2	0,95	1,35	1,10	2,93
17	Dasoudi Paphos Municipal Park	Paphos	2	0,95	1,37	1,13	2,95
18	Paphos Municipal Park	Paphos	2	0,95	1,36	1,12	2,95

Reduction in effective green space (% change in total area)

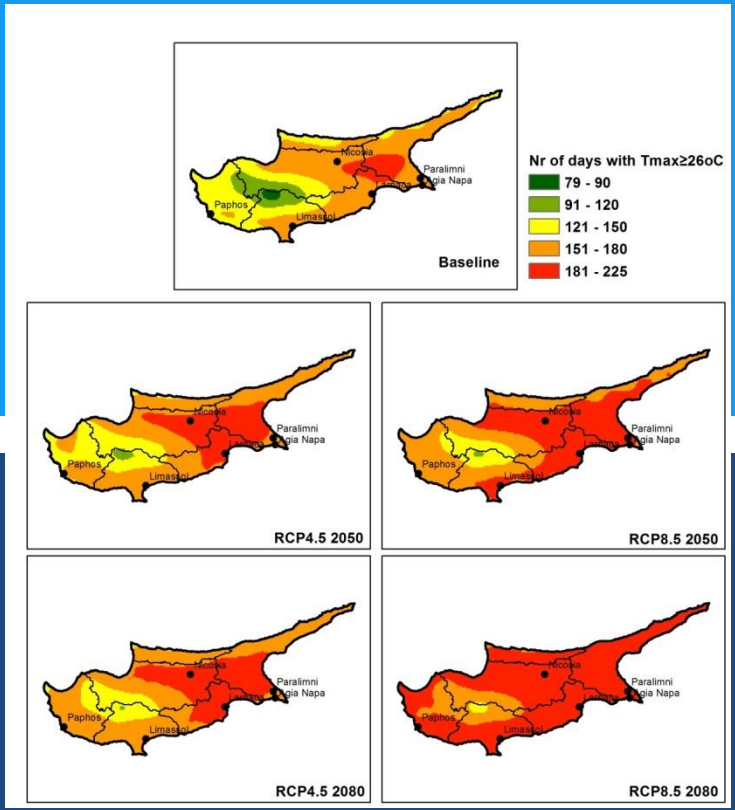
	2050s		2080s	
Reference period	RCP4.5	RCP8.5	RCP4.5	RCP8.5
0	-1%	-5%	-4%	-42%

BE5 - Overheating of Buildings

- This metric evaluates the impacts of CC on the function of buildings as places to live and work.
- Thermal comfort in the domestic environment is important for both health and productivity.

District	Total Living Quarters 2011 Census	Number of days with Tmax≥26°C for the reference period*	Change in number of days with Tmax≥26°C between the reference period and the future period			
			RCP4.5, 2050	RCP8.5, 2050	RCP4.5, 2080	RCP8.5, 2080
Ammochostos	34.150	164	10	20	13	44
Larnaka	73.676	173	10	19	12	42
Lefkosia	144.527	170	13	19	15	41
Lemesos	114.662	155	11	23	15	44
Pafos	**66.168**	**136**	**14**	**29**	**18**	**48**
Total	433.183	161	12	22	15	43

** Living Quarters weighted average*



2011 Census:

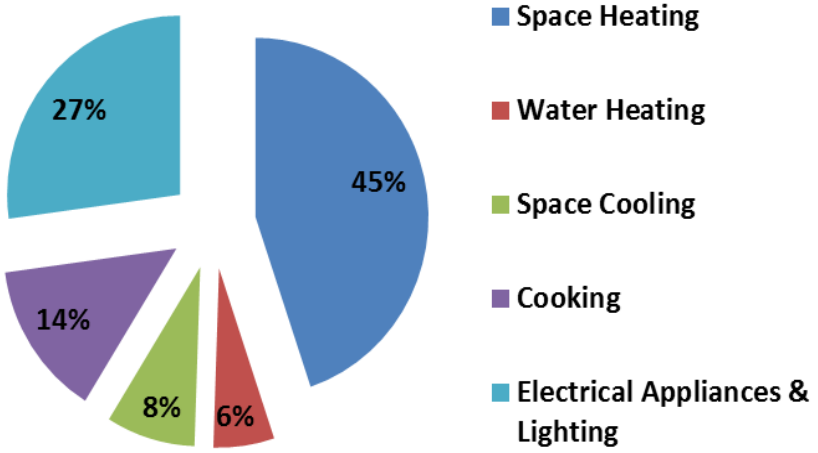
- Total population: **840.407**
- **303.242** households and 211 institutions
- **433.212** living quarters (299.275 of usual residence & 133.937 Vacant/ of temporary residence)
- **431.059** conventional dwellings
- **67,4%** of the population resides in urban areas
- Lemesos has the highest percentage of urban population (**77%**), followed by Lefkosia (73%), Pafos (70%) and Larnaka (59%)
- The population in Pafos and Larnaka grew faster than the other Districts during the past decade.

2013 Construction & Housing Statistics

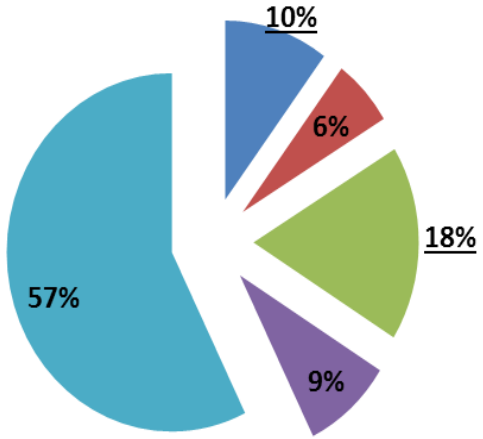
- the dwelling stock at the end of 2013 reached the **441.251** units
- 61% in the urban areas
- approximately 82% of the 2013 dwelling stock was constructed before 2008, year after which the thermal insulation of buildings became compulsory

The replacement rate of the existing building stock remains slow.
The largest percentage (~82%) of the building stock of Cyprus has no basic insulation and as a result the power consumption is high while no thermal comfort conditions are achieved
The number of non-residential buildings (public buildings, shops, hotels, industries etc.) is estimated to 115.000.

Final Energy Consumption in Households. CYSTAT, 2009

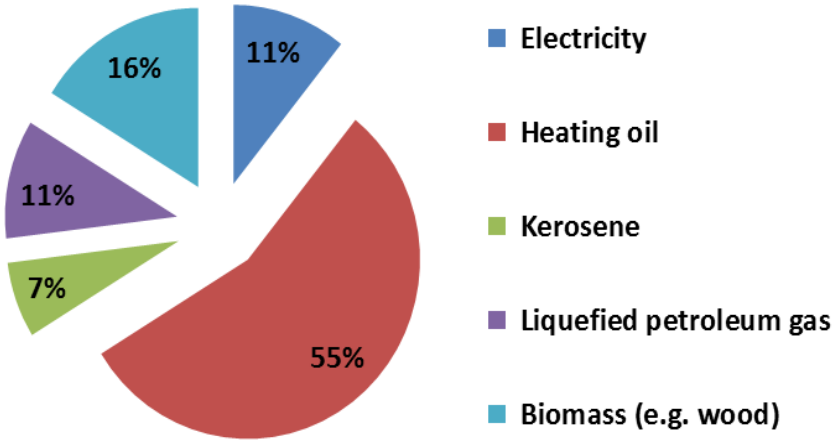


Annual Energy Consumption in Households (Kgoe)



Annual electricity consumption, KWh

Space Heating	Water Heating	Space Cooling	Cooking	Electrical Appliances & Lighting	Total (KWh)
642	382	1.107	554	3.603	6.288



Energy products used for space heating (kgoe)

- Nearly all households (98%) use some kind of equipment/system for space heating
- 81% of the households use air conditioning for space cooling during the hot period
- households heat only 54% of their surface area
- households cool only 30% of their surface area
- household mean surface area = 168 sqm

Energy demand for cooling

Gross energy consumption (Ec) for **cooling**

$$Ec = \frac{PbxCDDx24}{1000}$$

Where

Pb is the average U-value of the building multiplied by the area of the thermal envelope of the building in Watts per Kelvin (W/K).

CDD is the Cooling Degree Days

Pb = AxU where

A = surface area (m^2)

U = thermal transmittance (W/m^2K) – assumed as as 1 W/m^2K.

CDDs were calculated at Municipality/Community Level

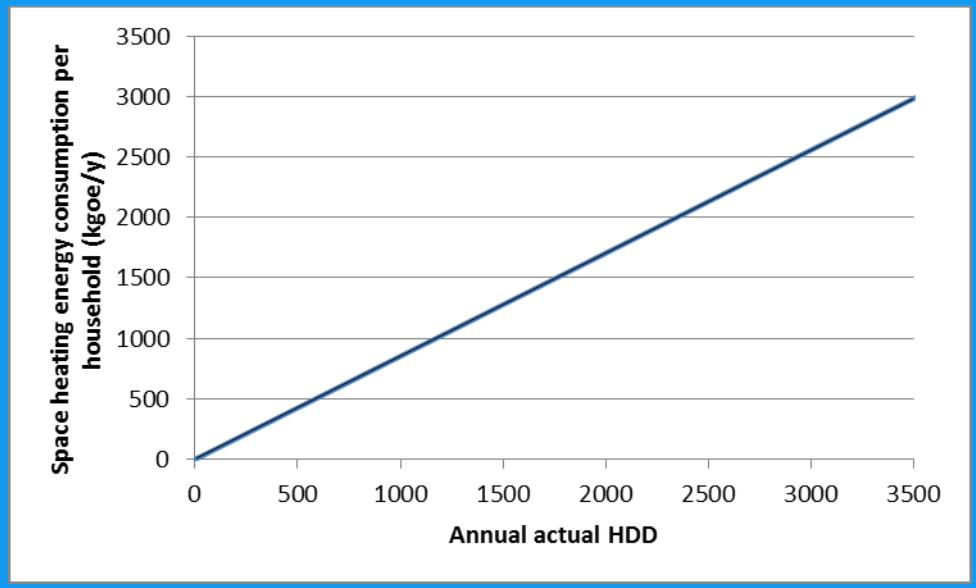
Spatial data of households and Star Hotels, Hotel Apartments, Tourist Apartments and Tourist Villages at Municipality/Community Level

The total area of the residential buildings was calculated from the number of households of each Municipality/Community (2011 census) assuming an average area of **168** sq. metres (typical household).

Mean room surface for hotels wad based on Renewable Energy Roadmap for the Republic of Cyprus, 2015.

Energy demand for heating

Assumed linear relation between
- actual annual HDDs &
- consumption of energy for heating (kgoe)



Actual HDDs were calculated at Municipality/Community Level
Spatial data of households at Municipality/Community Level

Electricity consumption for space cooling, GWh/year

	Reference period	2050s		2080s	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
Residential buildings	**263**	450	540	478	783
Star Hotels, Tourist Apartments Tourist Villages, Hotel Apartments	4,2	8,2	9,5	8,6	14,9

Energy demand for space heating, ktoe/year

Reference period	2050s		2080s	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5
223	173	160	179	105

BE1 - Energy demand for cooling
BE2 - Urban Heat Island (UHI)
BE3 - Energy demand for Heating
BE4 - Effectiveness of Green Spaces
BE5 - Overheating of Buildings
BE6 – Subsidence

BE1 - Energy demand for cooling
EN1 - Energy Demand by Water Suppliers
BE3 - Energy demand for Heating
EN2 - Electricity Turbine Efficiency
EN3 - Flooding of Power Stations
EN4 - Power Station Cooling Processes
EN5,6 - Transmission Capacity
EN7 - Heat Related Damage/Disruption

Metric Code	Metric Name	Confidence	2050s		2080s	
			L	U	L	U
			RCP4.5	RCP8.5	RCP4.5	RCP8.5
BE1	Energy demand for cooling	M	2	2	2	3
BE2	Urban Heat Island	H	No data	No data	No data	No data
BE3	Energy demand for Heating	M	2	2	2	3
BE4	Effectiveness of Green Spaces	M	1	2	2	3
BE5	Overheating of Buildings	H	1	2	1	3
BE6	Subsidence	L	No data	No data	No data	No data
EN2	Electricity Turbine Efficiency	L	No data	No data	No data	No data
EN3	Flooding of Power Stations	L	0	0	0	1
EN4	Power Station Cooling Processes	L	No data	No data	No data	No data
EN5, 6	Transmission Capacity	L	No data	No data	No data	No data
EN7	Heat Related Damage/Disruption	L	No data	No data	No data	No data

there are no impacts on the main power stations, however infrastructure for the discharge of cooling water might be affected in the distant future

Tourism

The TIER 2 List of impacts

- Extension of summer season (Opportunity due to the increase of average temperature)
- Increased energy usage for cooling systems. (Threat due to the increase in summer temperatures and heatwaves)
- Increase in monetary losses as a result of an increasing proportion of tourist assets (natural and built) at risk from flooding due to Sea Level Rise
- Increase in conference tourism (majority of winter tourism), golf tourism, sports tourism, cycling tourism (Opportunity due to the increase of winter temperature)
- Decrease in Tourism arrivals (Threat due to increase in summer temperatures and heatwaves)
- Decrease in water availability (Threat due to decrease in average rainfall)

Selected metrics

BU1	**Extension of summer season**
BU3	**Tourist assets at risk from flooding due to Sea Level Rise**
BU4	**Tourism product diversification**
BU5	**Decrease in Tourism arrivals**

BU1 - Extension of summer season/ BU5 - Decrease in Tourism arrivals

- Beach tourism is very important for Cyprus economy.
- The increased average temperatures could result in an extension of “summer” season, attracting more coastal tourists.
- Coastal tourists are largely motivated by climatic considerations to select their holiday destinations and resort areas.

Beach Climate Index (BCI) has been used in several studies in order to explore the consequences of climate change for coastal tourism in Europe (Morgan *et al*., 2000). The BCI index is made up of 4 smaller components (sub-indices) that, after weighting, add up to a maximum score of 100 (ideal conditions). These values are the beach users’ evaluation of the underlying weather conditions.

$$BCI = 0{,}18 \times TS + 0{,}29 \times P + 0{,}26 \times W + 0{,}27 \times S$$

- TS is the thermal sensation,
- P is the precipitation,
- W is the wind and
- S is the sunshine

Morgan *et al*. related thermal comfort to skin temperature that is calculated using the following formula:

$$Ts = Ta + \frac{hM}{7} + \frac{M - 15 + 120s(1 - A)}{2 + 9 * \sqrt{0{,}1 + W}}$$

where

Ts = skin temperature (°C);

Ta = effective air temperature, taking account of relative humidity (°C);

h = mean thickness of clothing (cm);

M = metabolic rate (cal/s);

s = proportion of daylight hours in which there is sunshine;

A = albedo of clothing/skin;

W = wind speed (m/s).

Thermal sensation, skin temperature (Ts) and scoring

Thermal Sensation	Ts Skin Temperature	Scoring
Very cold/Extremely hot	<21 or >36,5	0
Cold	21,0 – 25,9	2
Cool	26,0 – 28,9	21
Neither cold nor warm	29,0 – 32,4	39
Warm	32,5 – 34,4	100
Hot	34,5 – 35,4	77
Very hot	35,5 – 36,4	24

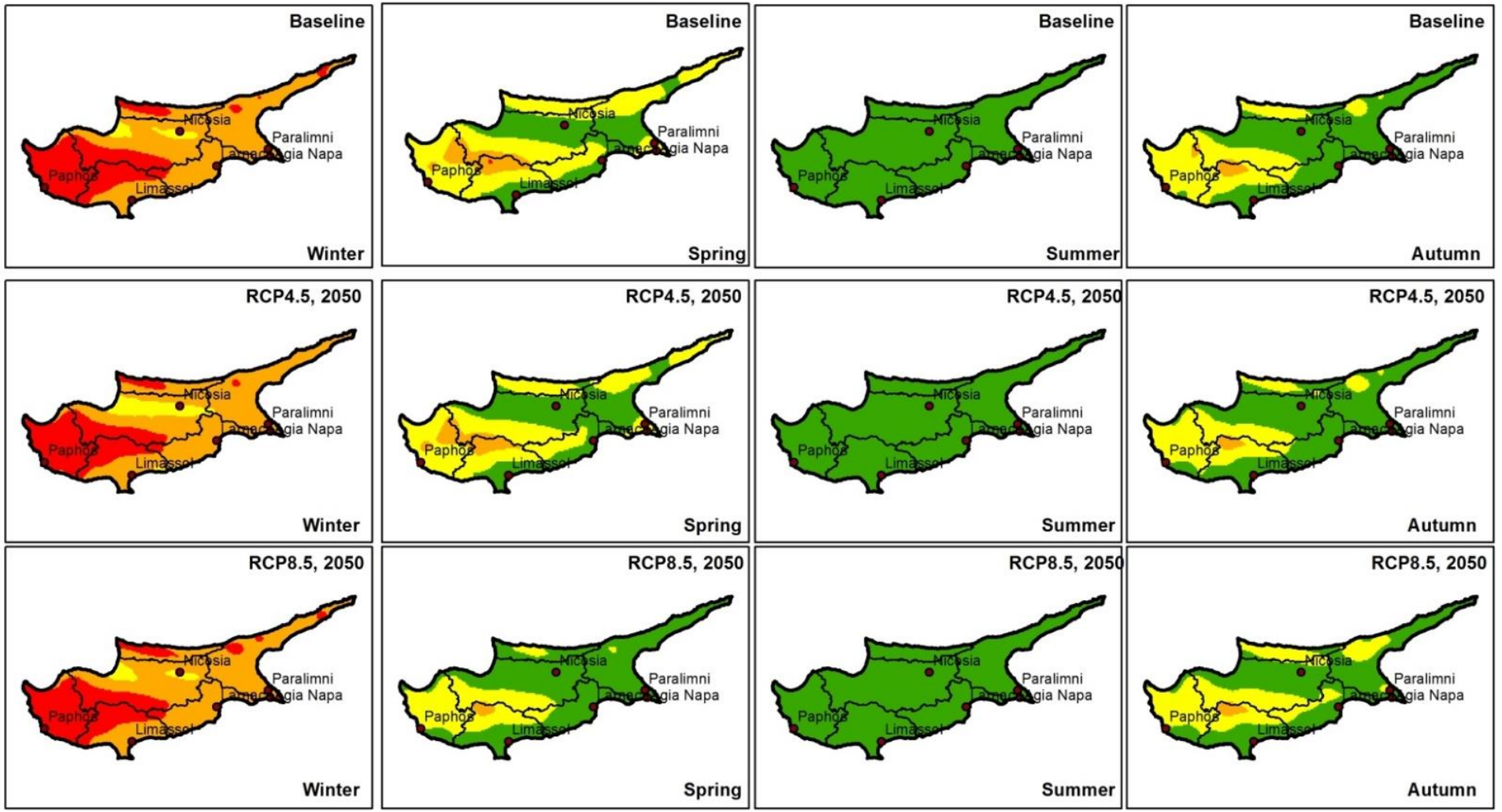
Precipitation (mm)	Sunshine (hours)	Scoring
0,0-14,9	≥10	100
15,0-29,9	[9 – 10)	90
30,0-44,9	[8-9)	80
45,0-59,9	[7-8)	70
60,0-74,9	[6-7)	60
75,0-89,9	[5 -6)	50
90-104,9	[4 – 5)	40
105,0-119,9	[3 – 4)	30
120,0-134,9	[2 – 3)	20
135,0-149,9	[1 -2)	10
>150,0	<1	0

Wind speed (m/s)	Scoring
<4	100
4-6	50
>6	0

BCI value	Description of Condition for Beach Tourism
>80	Excellent for beach tourism
70-80	Very Good
60-70	Good
40-60	Acceptable
<40	Unfavourable

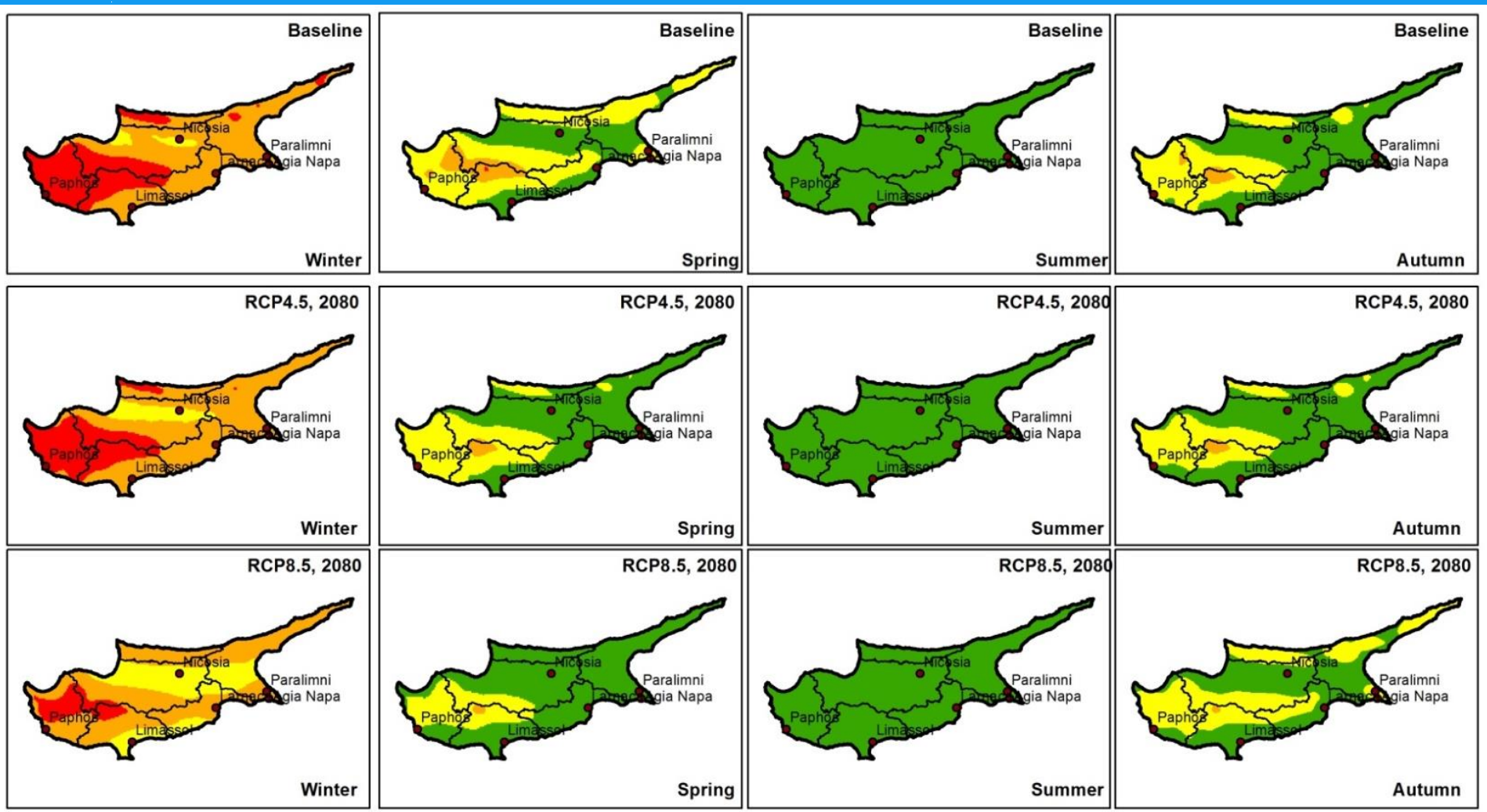
Seasonal BCI was evaluated in a Community/Municipality Level focussing on the existing infrastructure in communities/municipalities with a coastal front (**578 units with 76.985 beds**)

Seasonal BCI. Baseline and short term future scenarios (2050s)



- BCI remains excellent for the summer season under all scenarios
- Spring BCI, RCP8.8 ➔ 70% of beds improving from VG to EXC
- Autumn BCI, RCP8.8 ➔ 27% of beds improving from VG to EXC

Seasonal BCI. Baseline and long term future scenarios (2080s)



- BCI remains excellent for the summer season under all scenarios
- Spring BCI, RCP8.8 ➔ 78% of beds improving from VG to EXC
- Autumn BCI, RCP8.8 ➔ 27% of beds improving from VG to EXC
- Winter BCI, RCP8.8 ➔ 34% of beds improving from ACC to GD

BCI

- Acceptable
- Good
- Very Good
- Excellent for beach tourism

Monthly BCI values

Month	Baseline	2050s		2080s	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
M01	54	56	58	58	64
M02	62	64	63	62	68
M03	70	72	76	70	73
M04	78	77	80	79	83
M05	85	84	86	87	89
M06	91	95	99	99	95
M07	98	94	91	95	84
M08	99	91	92	91	84
M09	91	97	98	98	95
M10	82	83	83	83	82
M11	66	63	65	63	67
M12	54	55	52	57	61

Paphos Municipality area

Month	Baseline	2050s		2080s	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
M01	68	69	69	68	73
M02	74	73	74	74	76
M03	81	81	82	79	82
M04	82	83	85	84	86
M05	88	88	90	89	93
M06	93	98	98	98	91
M07	97	92	88	93	83
M08	97	88	87	87	83
M09	96	98	98	99	91
M10	84	86	88	87	89
M11	75	74	72	75	75
M12	64	68	62	67	71

Limassol Municipality area

BCI
- Acceptable
- Good
- Very Good
- Excellent for beach tourism

Month	Baseline	2050s		2080s	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
M01	61	65	65	64	69
M02	70	68	72	71	72
M03	76	77	79	75	79
M04	81	82	84	83	85
M05	88	86	90	90	94
M06	97	96	94	96	85
M07	93	84	83	84	82
M08	92	84	83	83	82
M09	100	97	95	95	86
M10	84	86	86	87	90
M11	72	72	69	70	72
M12	61	63	58	64	68

Larnaka Municipality area

Month	Baseline	2050s		2080s	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
M01	57	61	60	60	67
M02	67	65	68	67	71
M03	73	75	77	74	77
M04	78	79	82	80	83
M05	86	85	88	88	91
M06	93	98	99	99	91
M07	97	90	85	89	82
M08	96	87	85	85	82
M09	97	98	97	98	88
M10	81	83	84	84	85
M11	69	65	63	66	65
M12	56	58	52	56	63

Ayia Napa- Paralimni Larnaka Municipalities area

Excellent whether conditions for beach tourism will prevail for the summer season (June – August) under all scenarios.
In Paphos area under the RCP8.5 scenario both in the short term and long term period the weather conditions will be excellent for beach tourism for one additional month (April).
In Limassol area under the RCP8.5 scenario in long term period the weather conditions will be very good for beach tourism for two additional months (January and December).
In Larnaka area there is a deterioration in November and December BCI in the short term period under the RCP8.5 scenario, however this pattern is not repeated in the distant future.
In Ayia Napa and Paralimni in the long term BCI values suggest one additional month with excellent weather conditions for beach tourism (April).

BU4 - Tourism product diversification/BU5 - Decrease in Tourism arrivals

Tourism Climate Index (TCI) (Mieczkowski, Z., 1985)
is commonly used for evaluating climatic conditions for light outdoor activities

TCI = 2 x (4 xCID + CIA + 2 x Sun +2x Prec + Wind)

It consists of 5 sub-indices, each represented by one or two climate variables.

CID = daytime comfort index,
CIA = daily comfort index,
PREC = precipitation,
SUN = sunshine, and
Wind = wind speed.
With an optimal rating for each variable of 5, the maximum value of the index is 100. All sub-indices are calculated with mean monthly values.

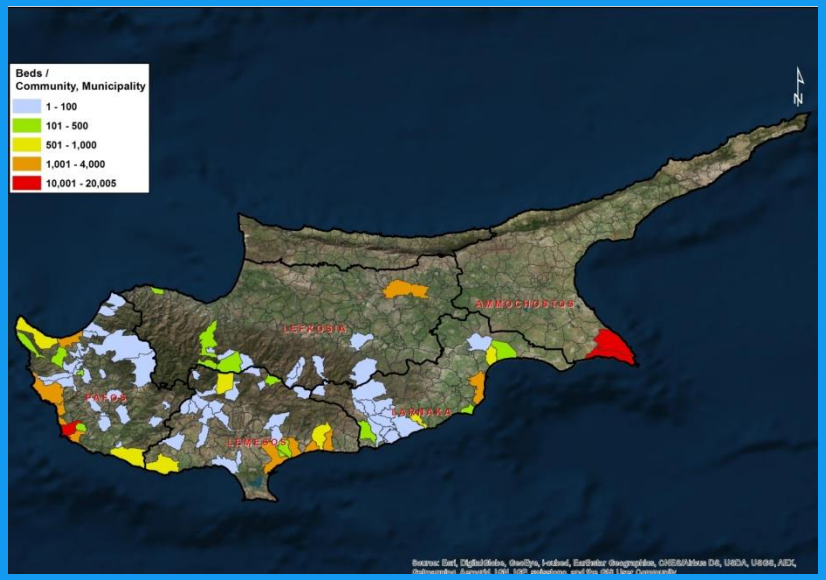
TCI score	Descriptive category
90 -100	Ideal
80 - 89	Excellent
70 - 79	Very good
60 - 69	Good
50 - 59	Acceptable
40 - 49	Marginal
30 - 39	Unfavourable
20 - 29	Very unfavourable
10 - 19	Extremely unfavourable
9 - -30	Impossible

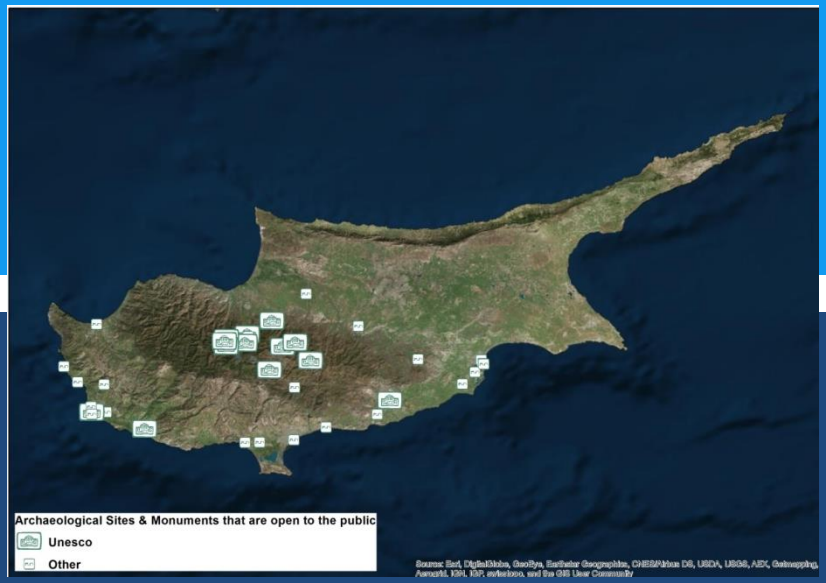
Rating	Effective Temperature (ºC)	Mean Monthly Precipitation (mm)	Mean Monthly Sunshine (hrs/day)	Wind Speed (km/h) - Normal
5,0	20 - 27	0,0-14,9	≥10	<2,88
4,5	19 - 20 27 - 29	15,0-29,9	[9 – 10)	2,88-5,75
4,0	18 - 19 28 - 29	30,0-44,9	[8-9)	5,76-9,03
3,5	17-18 29-30	45,0-59,9	[7-8)	9,04-12,23
3,0	15 - 17 30 - 31	60,0-74,9	[6-7)	12,24-19,79
2,5	10 - 15 31 - 32	75,0-89,9	[5 -6)	19,80-24,29
2,0	5 - 10 32 - 33	90,0-104,9	[4 – 5)	24,30-28,79
1,5	0 - 5 33 - 34	105,0-119,9	[3 – 4)	
1,0	-5 - 0 34 - 35	120,0-134,9	[2 – 3)	28,80-38,52
0,5	35 - 36	135,0-149,9	[1 -2)	
0,0	-10 - -5	>150,0	<1	>38,52
-1,0	-15 - -10			
-2,0	-20 - -15			
-3,0	<-20			

- **Impacts on existing tourism infrastructure**
  - 777 accommodation (84.008 beds)
  - TCI values at Community/Municipality
- **Impacts on cultural tourism**
  - 35 sites and monuments that are open to the public
  - Site values of TCI

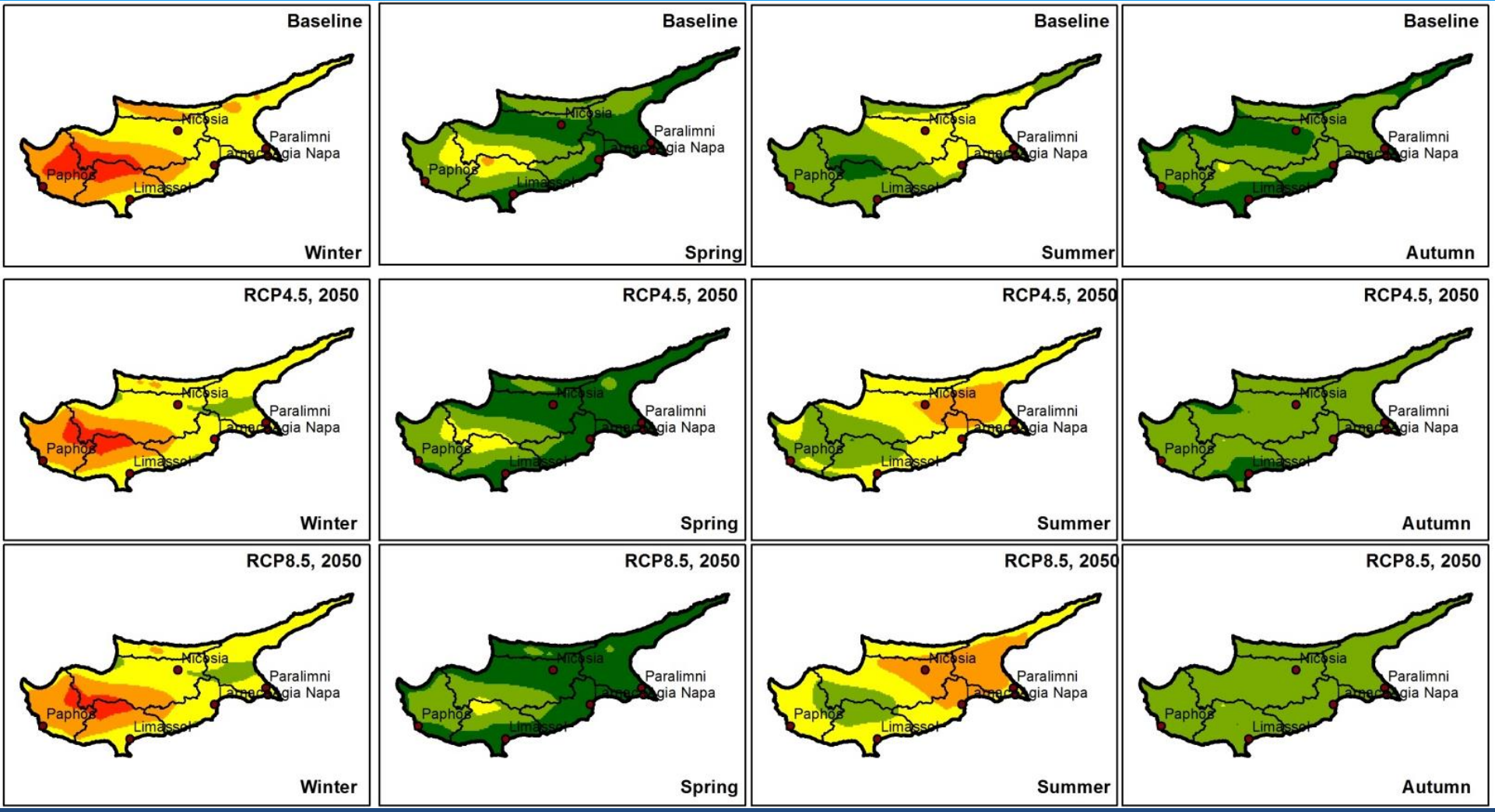
Impacts on selected protected areas and national Forests

- Vounokorfes Madaris-Papoutsas (Natura 2000 Site)
- Kavo Gkreko (Natura 2000 Site)
- Troodos National Forest Park (Also a Natura 2000 Site)
- Pafos forest (Natura 2000 Site)
- Akrotirio Aspro - Petra Romiou (Natura 2000 Site)
- Akamas (Natura 2000 Site)
- Machairas National Forest Park (also a Natura 2000 Site)
- Lemesos forest (Natura 2000 Site)
- Rizoelia National Forest Park (Also a Natura 2000 Site)
- Athalassa National Forest Park
- Site values of TCI



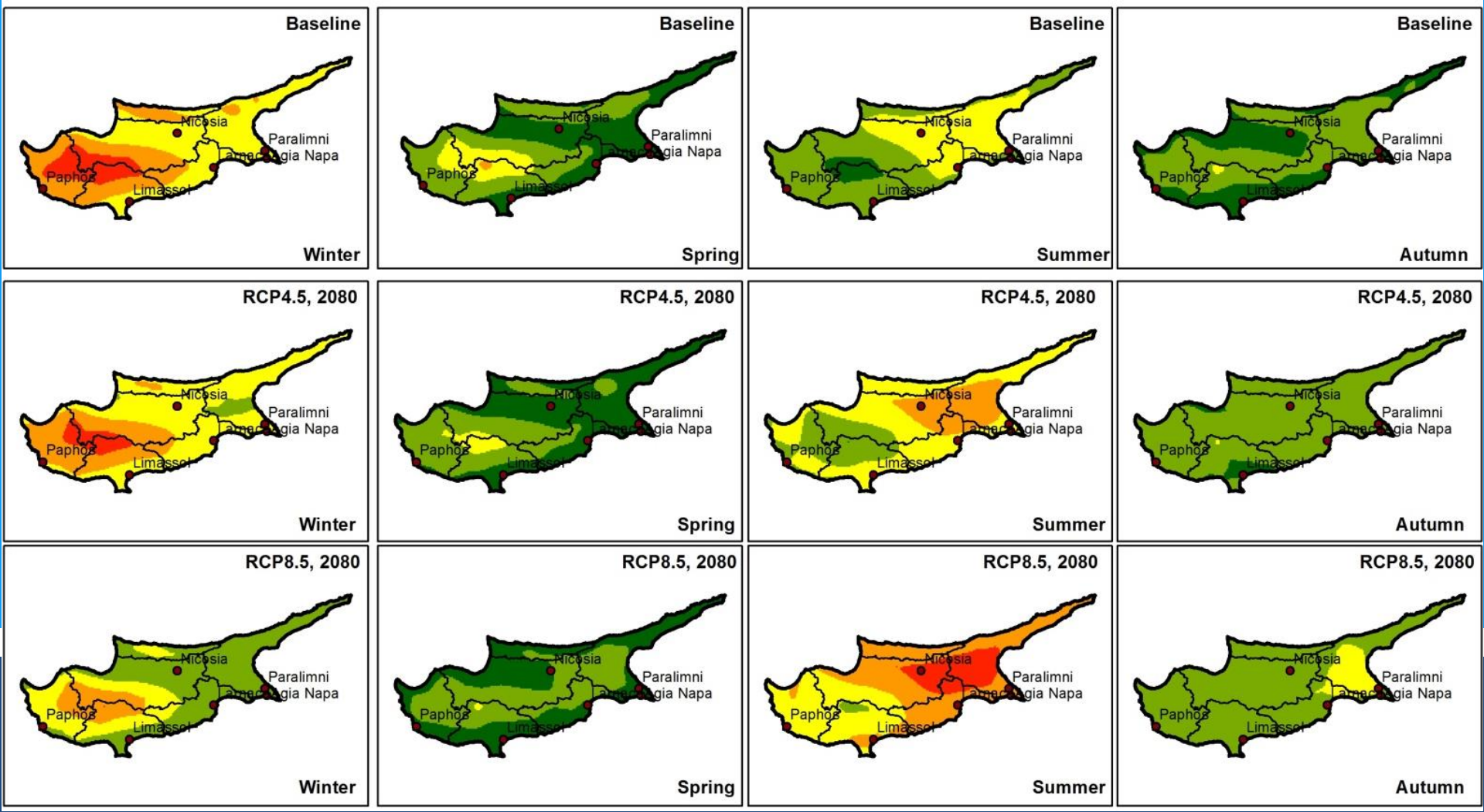


Seasonal TCI. Baseline and short term future scenarios (2050s)



- Conditions for sightseeing tourism are improved in Winter & Spring for all scenarios
- Winter TCI, RCP8.5 is improved for 24% of the beds and Spring TCI for 34% of the beds
- TCI. RCP8.5 95% of the beds are affected in Summer & Autumn (though conditions still GD or better)

Seasonal TCI. Baseline and long term future scenarios (2080s)



- Conditions for sightseeing tourism are improved in Winter & Spring for all scenarios
- Winter TCI, RCP8.5 is improved for 100% of the beds and Spring TCI for 35% of the beds
- Summer TCI. RCP8.5 downgrades for 100% of the beds. Acceptable conditions in Nicosia area (3% of the total beds)
- Autumn TCI. RCP8.5 downgrades for 96% of the beds

Impacts on cultural tourism

- The climate attractiveness is improved in winter and spring season.
- Autumn's climate attractiveness is generally unaffected whilst summer climate attractiveness is generally deteriorating.

Impacts on selected protected areas and national Forests

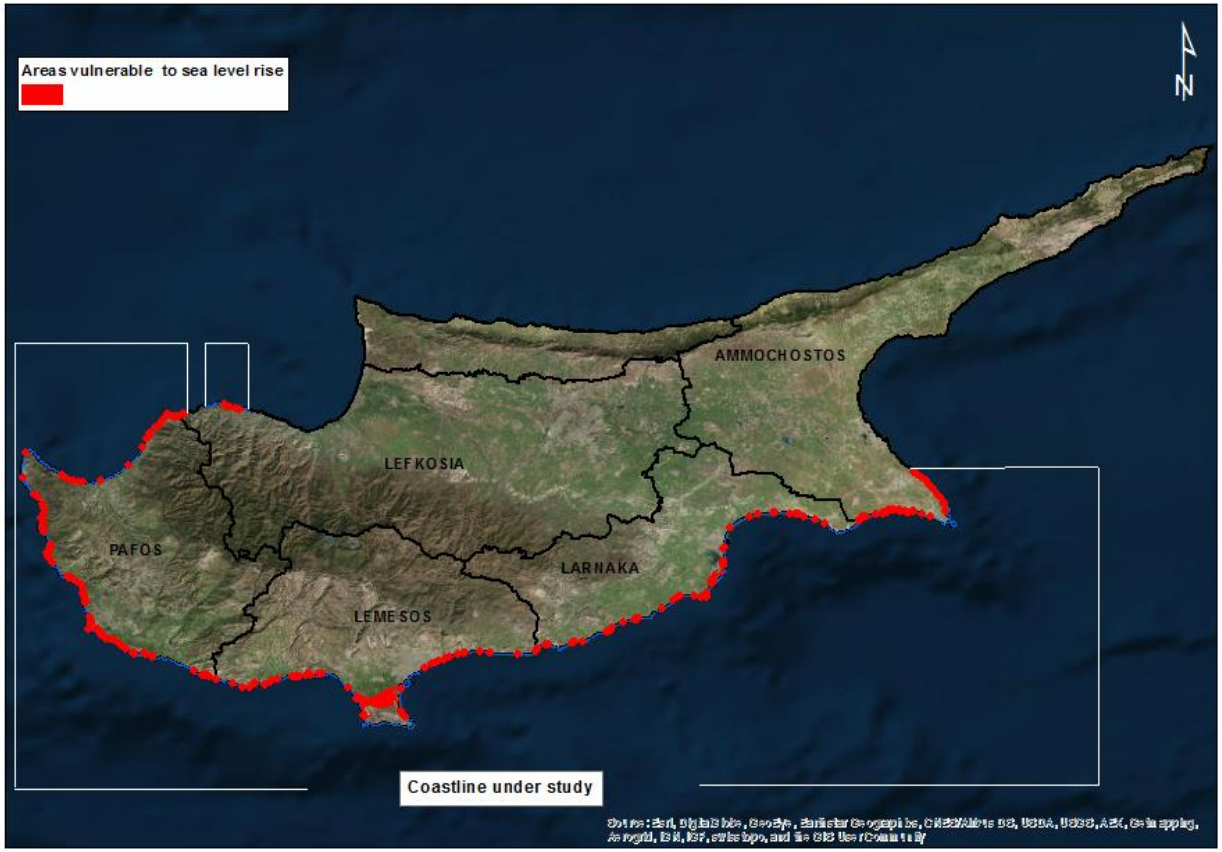
- CC change will not change dramatically the climate attractiveness of the studied areas. The most pronounced negative impacts are expected in the long term future and under the RCP8.5 scenario in Athalassa National Forest Park in the summer season where TCI suggests acceptable conditions (Baseline TCI suggests Very good conditions).
- Additionally, Troodos, a typical winter destination, in the long-term future will be negatively affected by climate change as winter TCI suggests good conditions for outdoor activities (TCI is not calibrated for winter sports).

BU3 - Tourist assets at risk from flooding due to SLR

Beaches are one of the key tourism assets in the Cyprus and any change in their extent would clearly have a major impact on tourism.
In Cyprus there are 113 bathing water areas of excellent quality.

In the current project, 2 scenarios of SLR were examined:
0,5 for the 2050s and
1m for the 2080s

- Low altitude and mild morphology sandy beaches were considered as vulnerable zones.
- An average slope of 2,5% of the sandy beaches was assumed
- This translates to a mean 20m retreat by 2050 and 40m retreat by 2080.



- Due to the narrow width of most of the sandy beaches, a significant area loss is expected.
- Coastal erosion is expected to exaggerate the CC impacts.
- Increased pressure for space in most of the beaches
- Beaches particularly exposed to loss of area could experience reduced popularity
- Akrotiri salt lake is the most vulnerable to SLR

District	Total coastline segment (km)	Affected coastline segment (km)	% of affected coastline
Famagusta	57	9	15,8%
Larnaca	85	28	32,9%
Limassol	98	39	**39,8%**
Nicosia	13	4	30,8%
Paphos	139	41	29,5%
Total	392	121	30,9%

District	Area loss (km^2)	
	2050s	2080s
Famagusta	0,2	0,3 (0,1)
Larnaca	0,6	1,0 (0,4
Limassol	0,8	1,4 (0,6)
Nicosia	0,1	0,1 (0)
Paphos	0,8	1,3 (0,5)
Total	2,5	4,1 (1,6)

Ευχαριστώ για την προσοχή σας!!!