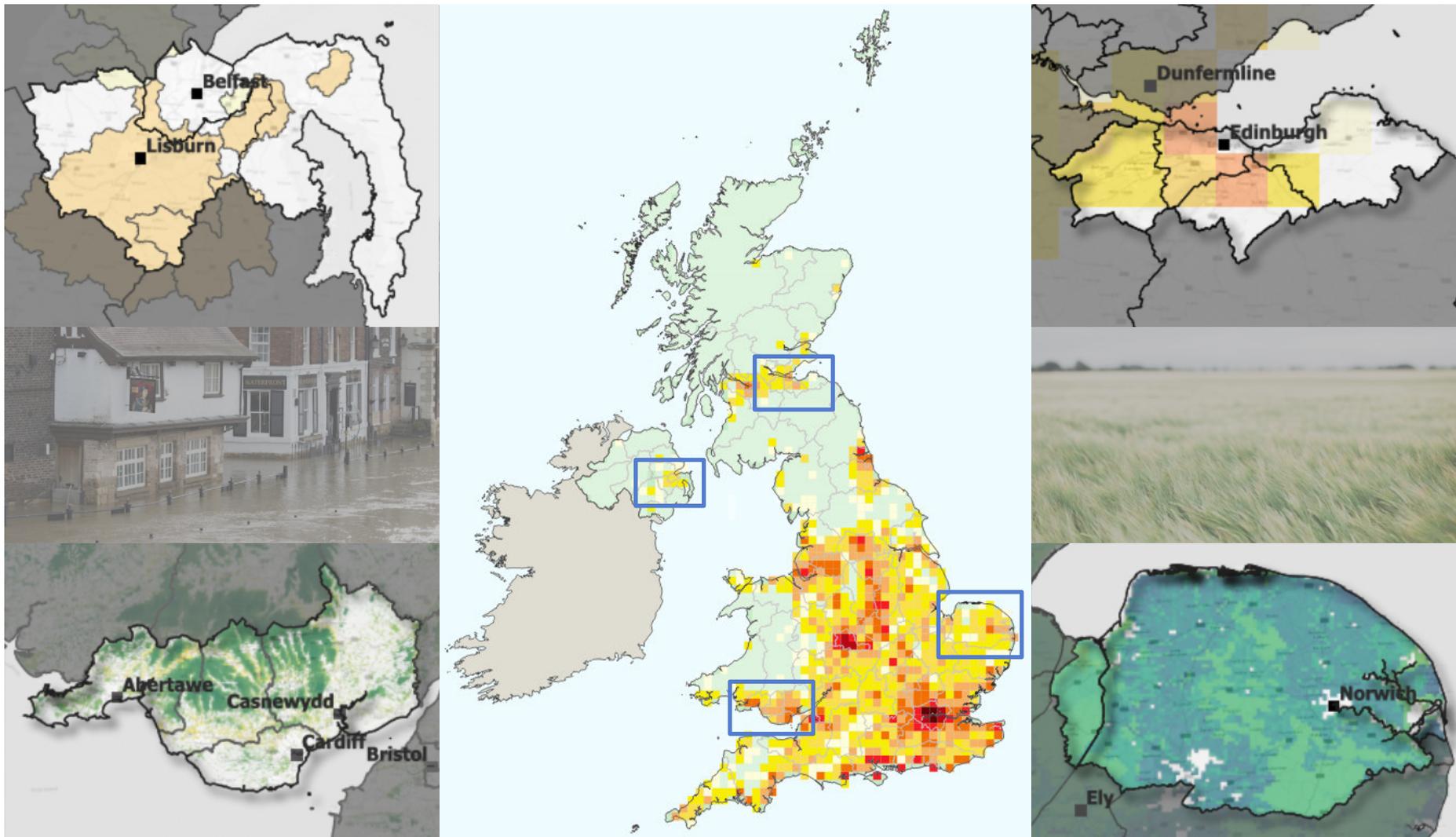# OpenCLIM Local Climate Risk Reports
Local insights from national analysis

Background

For further information visit openclim.science where you will find an outline of the OpenCLIM project, links to local climate risk reports for other counties, and a **user-guide** outlining the risk metrics shown and what they mean.

Agriculture

• Oil seed rape potential yield (units = tonnes per hectare, t/ha)

• Grass potential yield (t/ha)

• Wheat potential yield (t/ha)

These metrics indicate areas where a crop is likely to increase/decrease in yield due to climate-forced changes in temperature and water availability. 1 km grids.

Biodiversity

• Conservation potential (relative units)

• Restoration potential (relative units)

• Urban green space potential (relative units)

These metrics indicate the relative biodiversity impact in a location based on the richness of species remaining. 100 m grids (resampled from 20 m original analysis).

Heat Stress

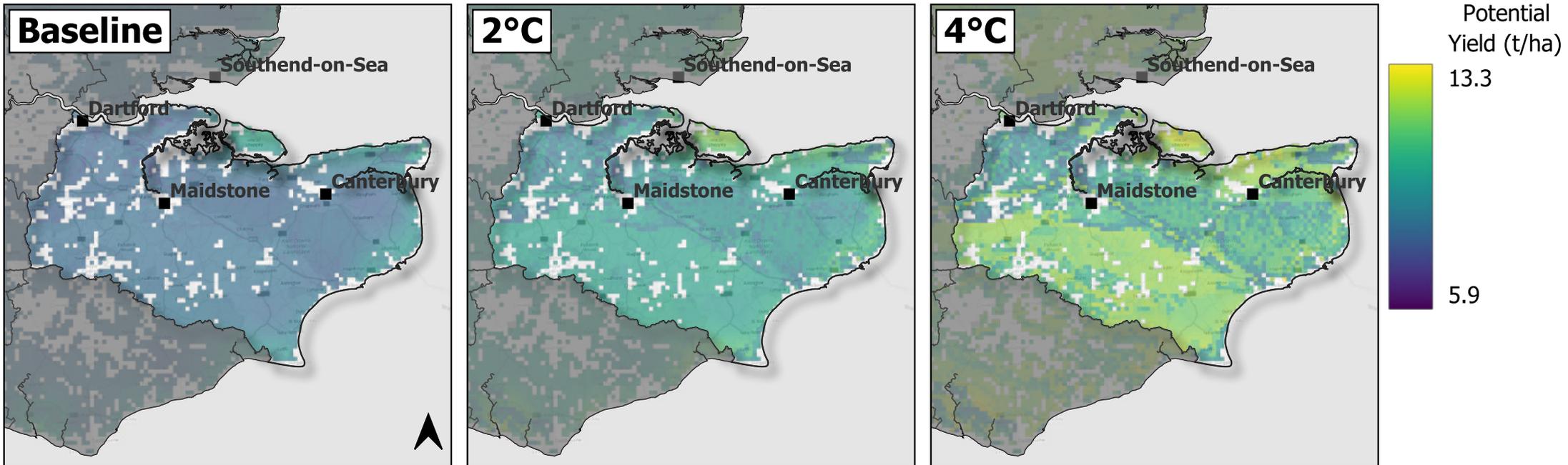• Heat-related mortality (units = mean deaths, cumulative deaths)

This metric projects the total number of heat-related deaths that could occur in a warmer future. 12 km grid (inherited from UKCP18 regional climate model).

Hydrology

• Drought duration (units = cumulative months per 30 year period)

• 1-in-10-year return period flow (units = flow rate in metres cubed per second, m³/s; difference, %)

• 1-in-100-year return period flow (units = flow rate , m³/s; difference, %)

These river flow-rate metrics are shown as a proxy for drought or flooding and should be used alongside e.g. Environment Agency flood indicators. Tidally-influenced and coastal catchments were not modelled. 1km grids for whole catchments.

Kent | Potential Yield | Oil Seed Rape

Baseline — Southend-on-Sea, Dartford, Maidstone, Canterbury

2°C — Southend-on-Sea, Dartford, Maidstone, Canterbury

4°C — Southend-on-Sea, Dartford, Maidstone, Canterbury

Potential Yield (t/ha)
13.3
5.9

Key Points

Potential yield (tonnes per hectare) shows change in potential oil seed rape yield at 1km resolution, due to heat limitation and water limitation under baseline, 2°C, and 4°C warming scenarios.

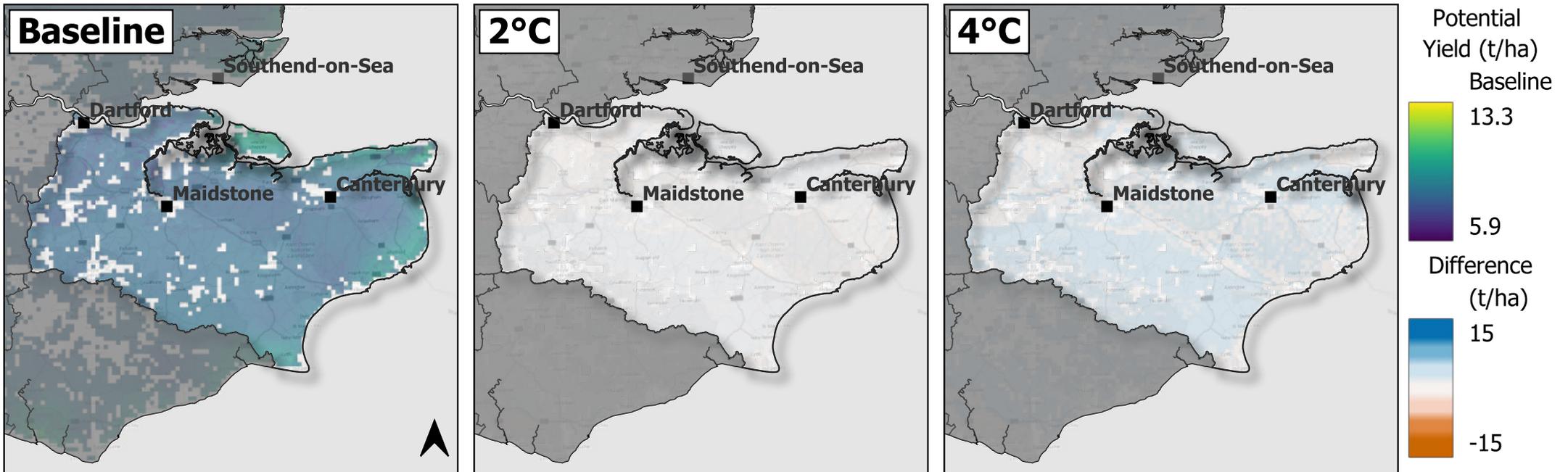Scenarios shown include the CO2 fertilisation effect (enhanced plant productivity).

A modest increase in potential yield is projected at 2°C and 4°C for most of the Kent area.

Local Summary

Minimum, mean and maximum potential yield (t/ha) for the Kent region at baseline, 2°C and 4°C warming scenarios.

County	Mean			Minimum			Maximum		
	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C
Kent	8.5	9.9	10.9	7.4	7.8	7.6	10.6	12.3	11.8

OPEN CLIMATE IMPACT FRAMEWORK

Kent | Potential Yield - difference | Oil Seed Rape

Baseline / **2°C** / **4°C** maps of Kent showing potential oil seed rape yield. Legend: Potential Yield (t/ha) Baseline 13.3 – 5.9; Difference (t/ha) 15 to -15.

Key Points

Potential yield (tonnes per hectare) shows change in potential oil seed rape yield at 1km resolution, due to heat limitation and water limitation under baseline scenarios with the difference from baseline at 2°C and 4°C warming level scenarios.

Scenarios shown include the CO2 fertilisation effect (enhanced plant productivity).
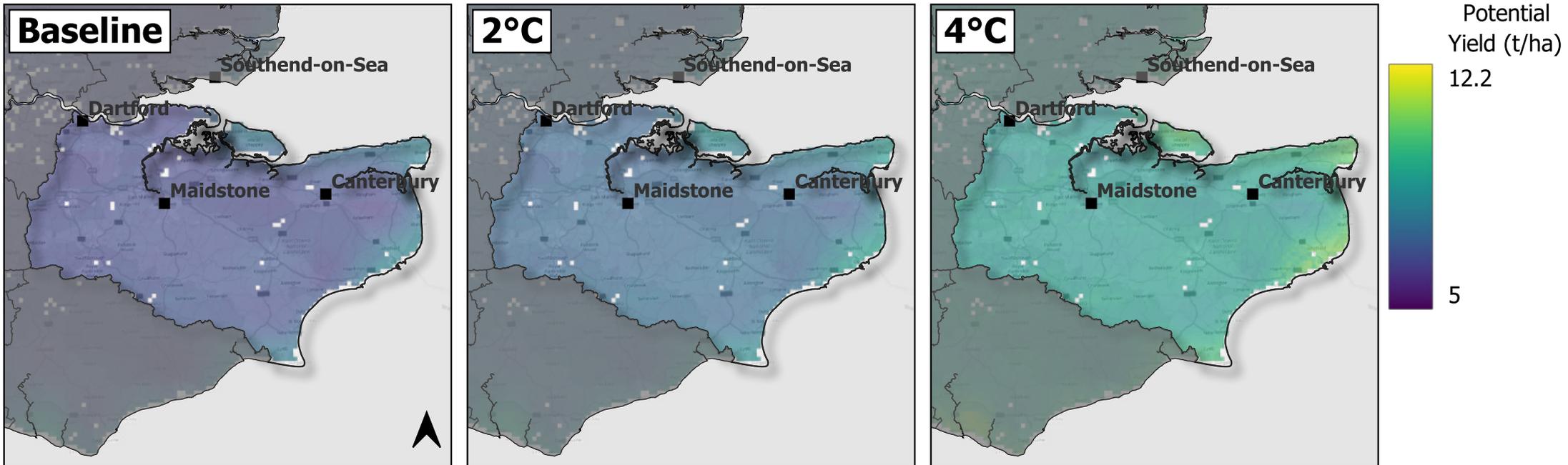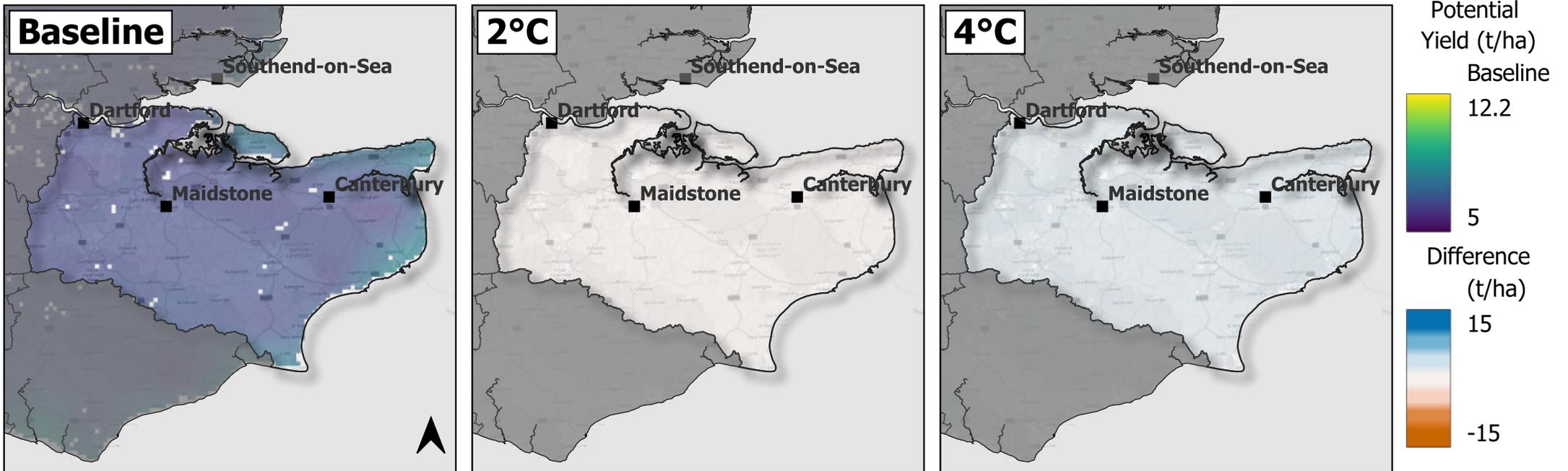
A modest increase in potential yield is projected at 2°C and 4°C for most of the Kent area.

Local Summary

Minimum, mean and maximum potential yield (t/ha) for the Kent region at baseline, 2°C and 4°C warming scenarios, with the difference from the baseline mean for 2°C and 4°C warming scenarios.

County	Mean			Minimum			Maximum			Difference	
	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C	2°C	4°C
Kent	8.5	9.9	10.9	7.4	7.8	7.6	10.6	12.3	11.8	1.3	2.4

OPEN CLIMATE IMPACT FRAMEWORK

Kent | Potential Yield | Grass

Baseline   2°C   4°C maps of Kent showing potential yield (t/ha) with cities Southend-on-Sea, Dartford, Maidstone, Canterbury labelled. Potential Yield (t/ha) scale from 5 to 12.2.

Key Points

Potential yield (tonnes per hectare) shows change in potential grass yield at 1km resolution, due to heat limitation and water limitation under baseline, 2°C, and 4°C warming scenarios.

Scenarios shown include the CO_2 fertilisation effect (enhanced plant productivity).
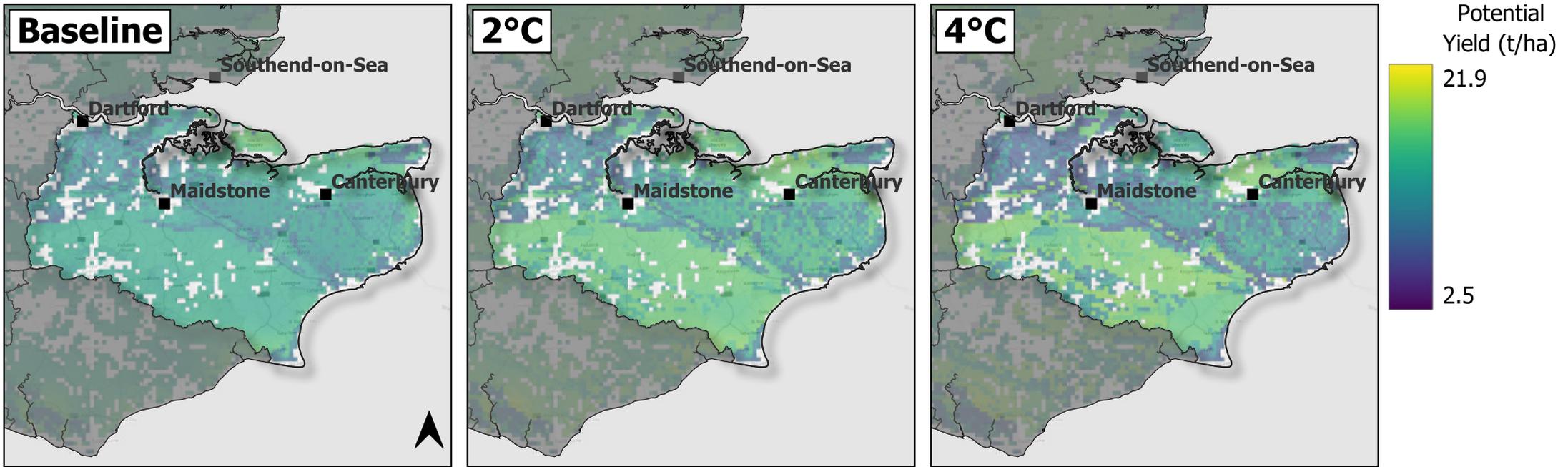
A modest increase in potential yield is projected at 2°C and 4°C for most of the Kent area.

Local Summary

Minimum, mean and maximum potential yield (t/ha) for the Kent region at baseline, 2°C and 4°C warming scenarios.

County	Mean			Minimum			Maximum		
	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C
Kent	6.7	7.5	9	6.2	6.9	8.3	8.5	9.3	11

OPEN CLIMATE IMPACT FRAMEWORK

Kent | Potential Yield - difference | Grass

Baseline

Southend-on-Sea
Dartford
Maidstone
Canterbury

2°C

Southend-on-Sea
Dartford
Maidstone
Canterbury

4°C

Southend-on-Sea
Dartford
Maidstone
Canterbury

Potential Yield (t/ha)
Baseline
12.2
5

Difference (t/ha)
15
-15

Key Points

Potential yield (tonnes per hectare) shows change in potential grass yield at 1km resolution, due to heat limitation and water limitation under baseline scenarios with the difference from baseline at 2°C and 4°C warming level scenarios.

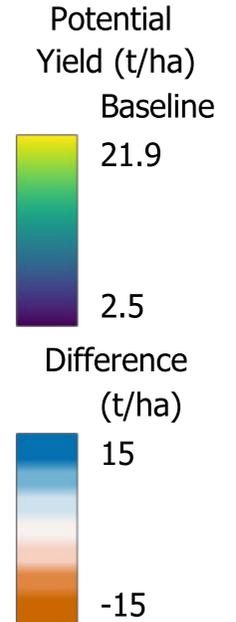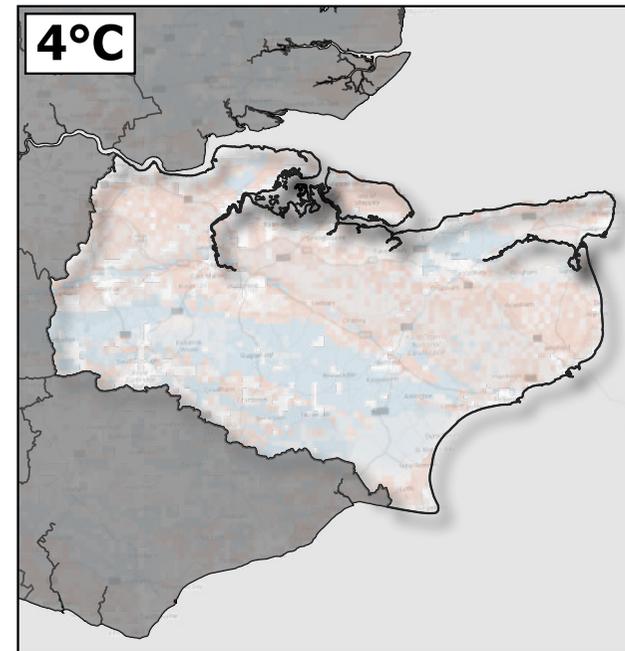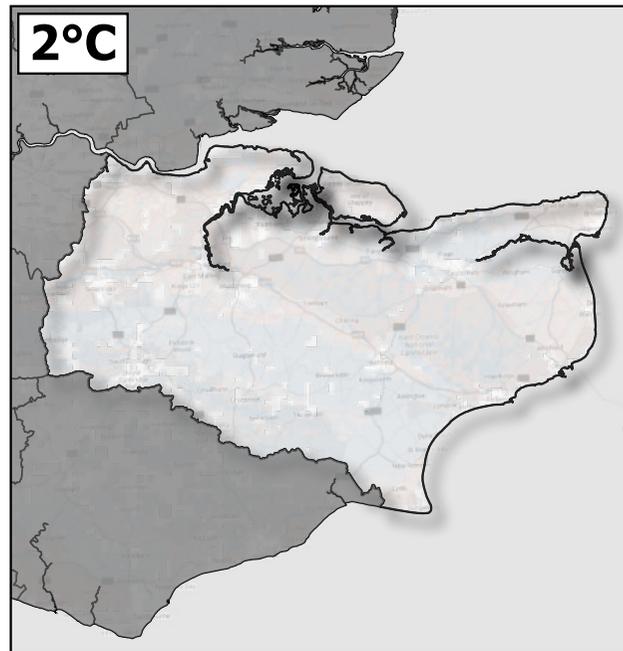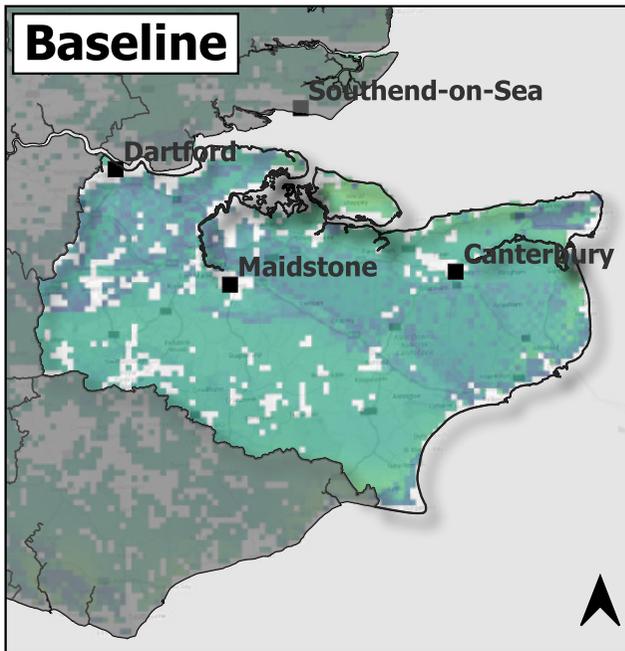Scenarios shown include the CO2 fertilisation effect (enhanced plant productivity).

A modest increase in potential yield is projected at 2°C and 4°C for most of the Kent area.

Local Summary

Minimum, mean and maximum potential yield (t/ha) for the Kent region at baseline, 2°C and 4°C warming scenarios, with the difference from the baseline mean for 2°C and 4°C warming scenarios.

	Mean			Minimum			Maximum			Difference	
County	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C	2°C	4°C
Kent	6.7	7.5	9	6.2	6.9	8.3	8.5	9.3	11	0.7	2.3

OPEN CLIMATE IMPACT FRAMEWORK

Kent | Potential Yield | Wheat

Baseline
Southend-on-Sea
Dartford
Maidstone
Canterbury

2°C
Southend-on-Sea
Dartford
Maidstone
Canterbury

4°C
Southend-on-Sea
Dartford
Maidstone
Canterbury

Potential Yield (t/ha)
21.9
2.5

Key Points

Potential yield (tonnes per hectare) shows change in potential wheat yield at 1km resolution, due to heat limitation and water limitation under baseline, 2°C, and 4°C warming scenarios.

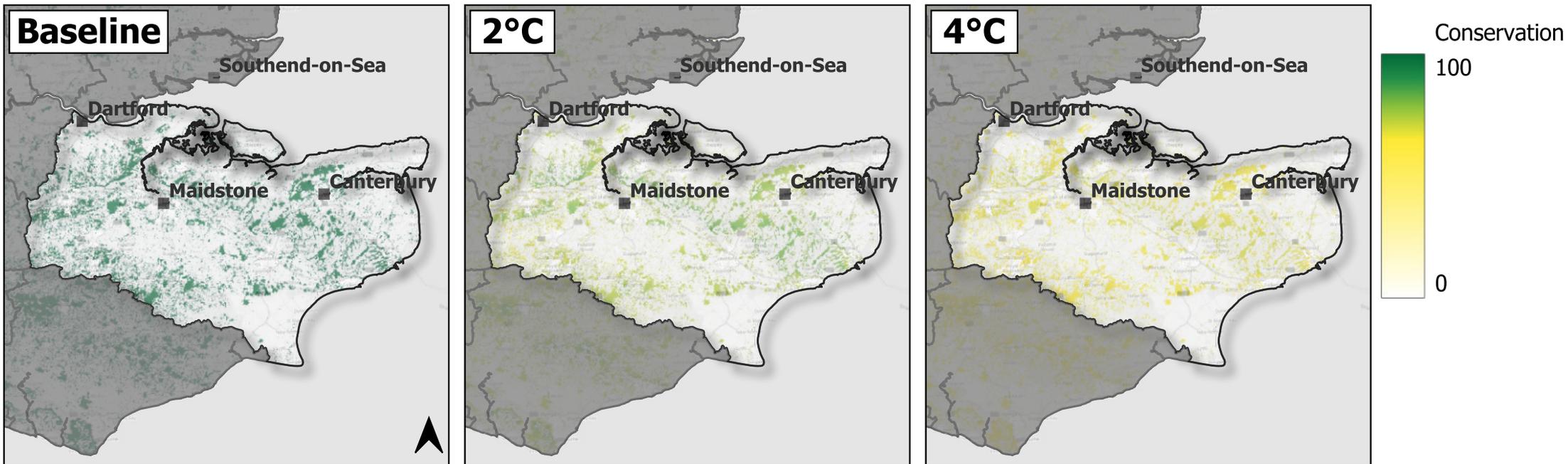Scenarios shown include the CO2 fertilisation effect (enhanced plant productivity).

There is a slight increase in potential yield projected at 2°C and 4°C for most of the Kent area.

Local Summary

Minimum, mean and maximum potential yield (t/ha) for the Kent region at baseline, 2°C and 4°C warming scenarios.

	Mean			Minimum			Maximum		
County	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C
Kent	13.8	14.2	13	7.2	7.1	6.4	17.2	19.1	19.7

Kent | Potential Yield - difference | Wheat

Baseline — Southend-on-Sea, Dartford, Maidstone, Canterbury

2°C

4°C

Potential Yield (t/ha)
Baseline
21.9
2.5

Difference (t/ha)
15
-15

Key Points

Potential yield (tonnes per hectare) shows change in potential wheat yield at 1km resolution, due to heat limitation and water limitation under baseline scenarios with the difference from baseline at 2°C and 4°C warming level scenarios.

Scenarios shown include the CO2 fertilisation effect (enhanced plant productivity).

There is slight increase in potential yield projected at 2°C and 4°C for most of the Kent area.

Local Summary

Minimum, mean and maximum potential yield (t/ha) for the Kent region at baseline, 2°C and 4°C warming scenarios, with the difference from the baseline mean for 2°C and 4°C warming scenarios.

	Mean			Minimum			Maximum			Difference	
County	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C	2°C	4°C
Kent	13.8	14.2	13	7.2	7.1	6.4	17.2	19.1	19.7	0.4	-0.7

OPEN CLIMATE IMPACT FRAMEWORK

Kent | Conservation | Warming Levels

Baseline

Southend-on-Sea
Dartford
Maidstone   Canterbury

2°C

Southend-on-Sea
Dartford
Maidstone   Canterbury

4°C

Southend-on-Sea
Dartford
Maidstone   Canterbury

Conservation
100

0

Key Points

A relative scoring is shown for an area's suitability for Conservation, based on a metric of species richness remaining.

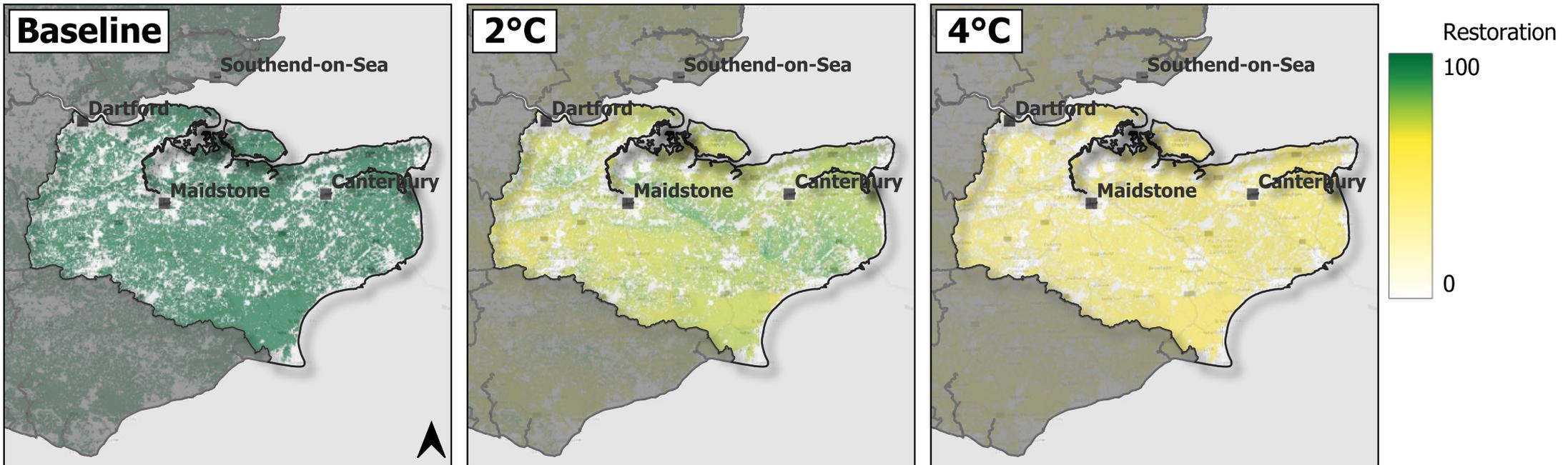Under 2°C and 4°C warming scenarios, a decline in suitability is projected, with mean values shown in the Table (right).
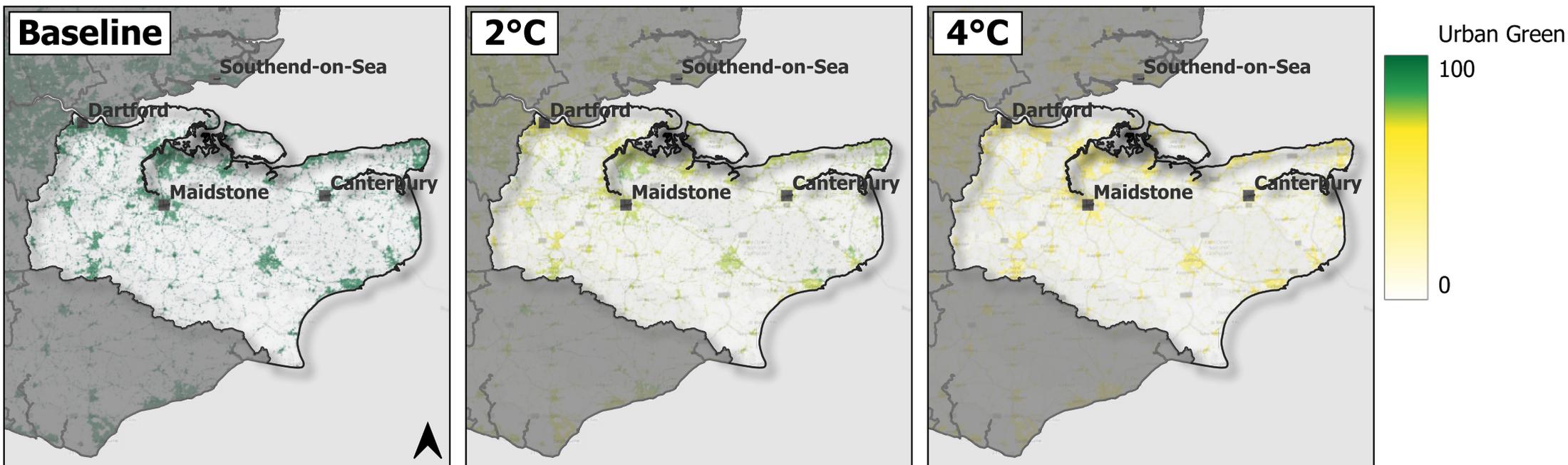
Under 4°C of warming, only one area is projected to retain a maximum suitability of 100 (range = 60 to 100), while the mean rarely exceeds 50, showing the importance of limiting warming to 2°C or less.

Local Summary

Minimum, mean and maximum conservation potential (%) for Kent at baseline, 2°C and 4°C warming scenarios.

	Mean			Minimum			Maximum		
County	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C
Kent	21	15.9	12.7	0	0	0	100	86	67

OPEN CLIMATE IMPACT FRAMEWORK

Kent | Restoration | Warming Levels

Baseline

Southend-on-Sea
Dartford
Maidstone
Canterbury

2°C

Southend-on-Sea
Dartford
Maidstone
Canterbury

4°C

Southend-on-Sea
Dartford
Maidstone
Canterbury

Restoration
100

0

Key Points

A relative scoring is shown for an area's suitability for Restoration, based on a metric of species richness remaining.

Under 2°C and 4°C warming scenarios, a decline in suitability is projected, with mean values shown in the Table (right).

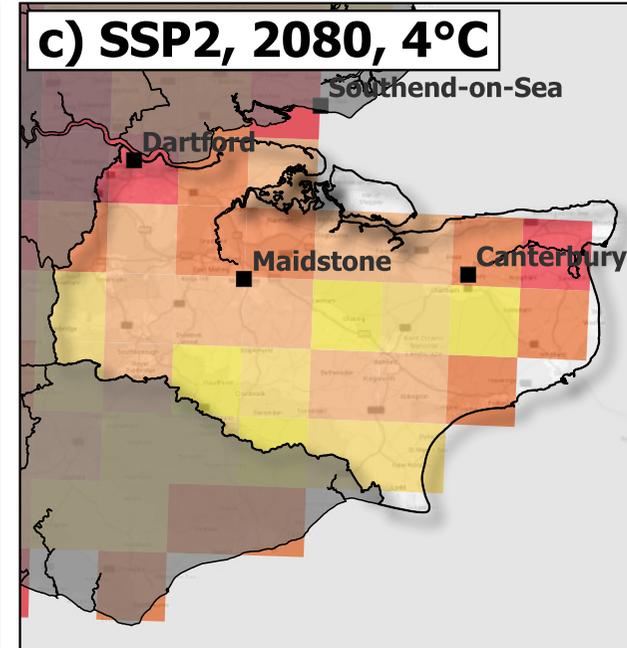Under 4°C of warming no areas remain with a projected maximum suitability of 100 (range = 60 to 95), showing the importance of limiting warming to 2°C or less.
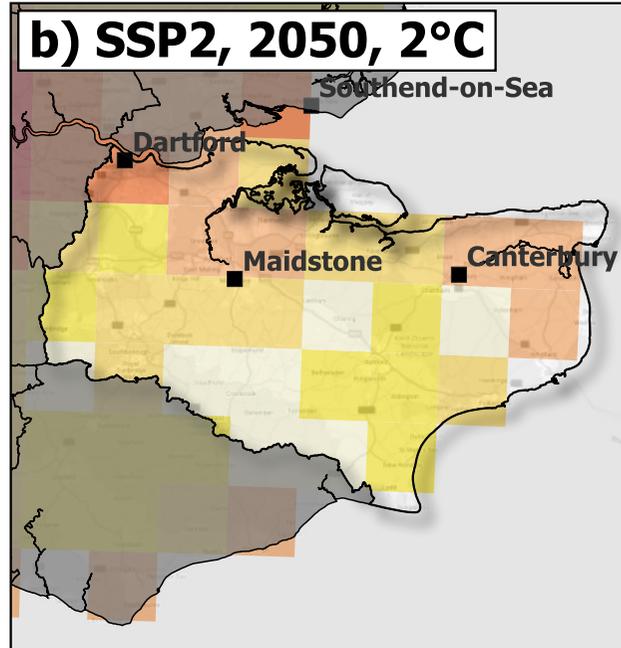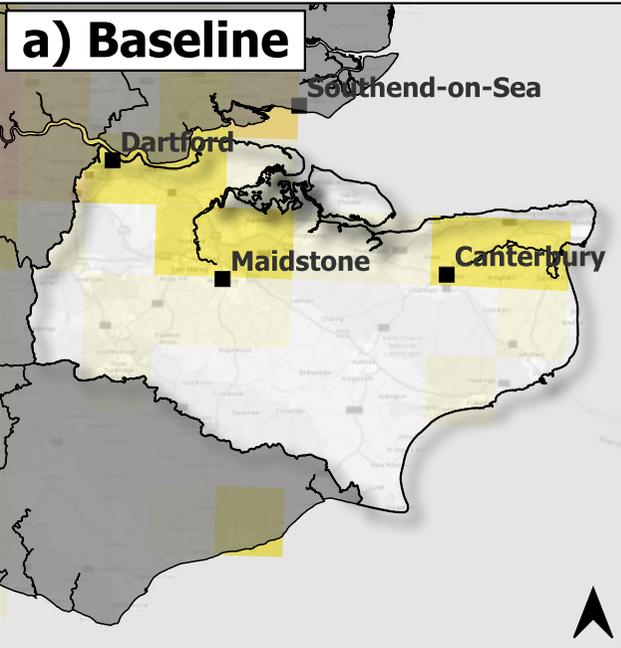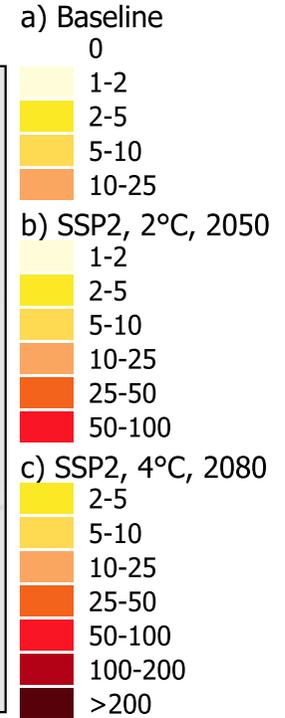
Local Summary

Minimum, mean and maximum restoration potential (%) for Kent at baseline, 2°C and 4°C warming scenarios.

	Mean			Minimum			Maximum		
County	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C
Kent	79		47.6	0	0	0	100	86	67

OPEN CLIMATE IMPACT FRAMEWORK

Kent | Urban Green | Warming Levels

Baseline / 2°C / 4°C maps of Kent showing Urban Green (0–100 scale) for Southend-on-Sea, Dartford, Maidstone and Canterbury.

Key Points

A relative scoring is shown for an area's suitability for Urban Green Space, based on a metric of species richness remaining.

Under 2°C and 4°C warming scenarios, a decline in suitability is projected, with mean values shown in the Table (right).

Under 4°C of warming there are no areas remaining with a maximum suitability of 100 (range = 60 to 95), showing the importance of limiting warming to 2°C or less.

Local Summary

Minimum, mean and maximum urban greenspace potential (%) for Kent at baseline, 2°C and 4°C warming scenarios.

	Mean			Minimum			Maximum		
County	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C
Kent	15.6	11.4	9.1	0	0	0	100	86	67

OPEN CLIMATE IMPACT FRAMEWORK

Kent | Heat Mortality | Combined Future Scenarios

a) Baseline — Southend-on-Sea, Dartford, Maidstone, Canterbury

b) SSP2, 2050, 2°C — Southend-on-Sea, Dartford, Maidstone, Canterbury

c) SSP2, 2080, 4°C — Southend-on-Sea, Dartford, Maidstone, Canterbury

Number of Deaths

a) Baseline
- 0
- 1-2
- 2-5
- 5-10
- 10-25

b) SSP2, 2°C, 2050
- 1-2
- 2-5
- 5-10
- 10-25
- 25-50
- 50-100

c) SSP2, 4°C, 2080
- 2-5
- 5-10
- 10-25
- 25-50
- 50-100
- 100-200
- >200

Key Points

Heat mortality shows average deaths per year at 12km resolution, under future scenarios combining warming (2°C, 4°C), socioeconomics (SSP2, SSP4), and population (2050, 2080).

An increase in heat mortality is projected under 2°C and 4°C scenarios under SSP2. Additional population in 2050 and 2080 also increase mortality.

The climate model ensemble shows a range of outcomes, summarised by the 10th to 90th percentile range (bottom Table, right).

Local Summary

Mean deaths per year and cumulative deaths in Kent for baseline and future scenarios.
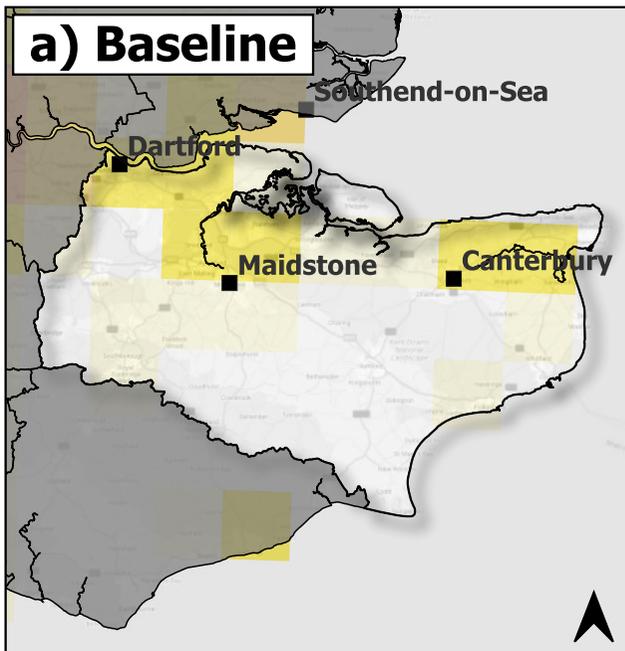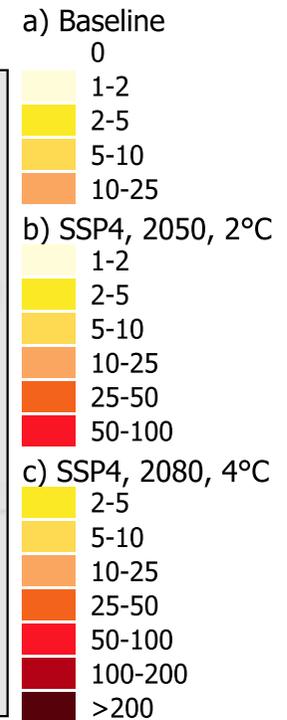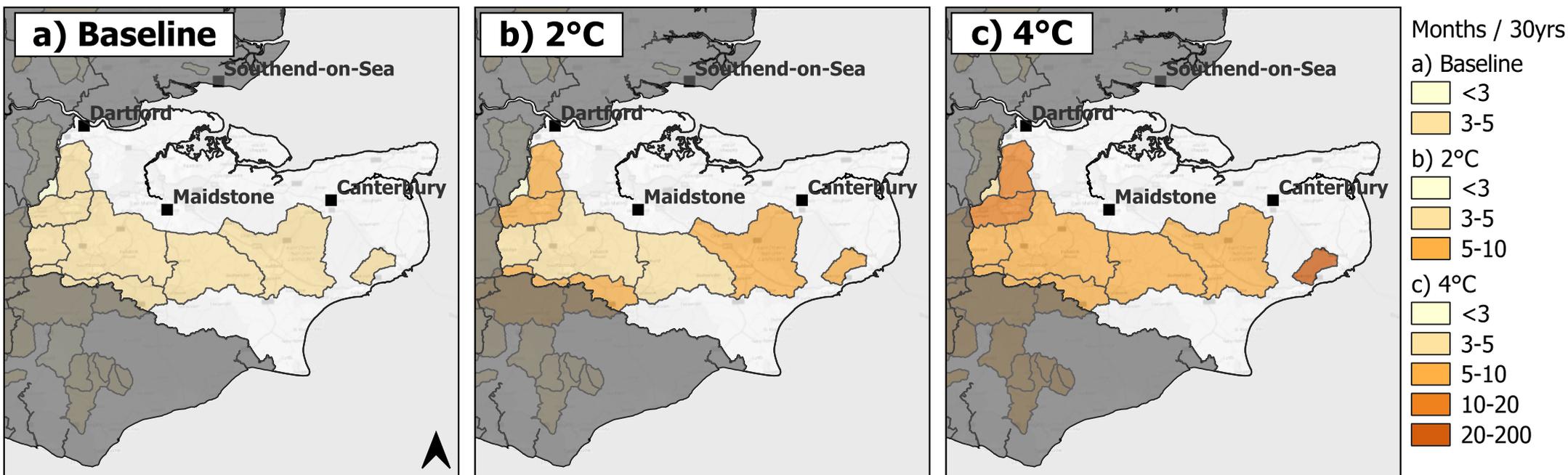
County	Baseline		SSP2 2050 2°C			SSP2 2080 4°C		
	Mean	Cumulatiave	Mean	Cumulatiave	Difference	Mean	Cumulatiave	Difference
Kent	1.4	44.5	7.5	232.9	6.1	24	620.8	22.6

Mean deaths (death/yr) for each future scenario and the climate model ensemble range between 10th and 90th percentile.

County	Baseline Mean	10th - 90th percentile	SSP2 2050 2°C Mean	10th - 90th percentile	SSP2 2080 4°C Mean	10th - 90th percentile
Kent	1.4	0.2 - 9.2	8.1	0.9 - 54.9	24	2.9 - 174.7
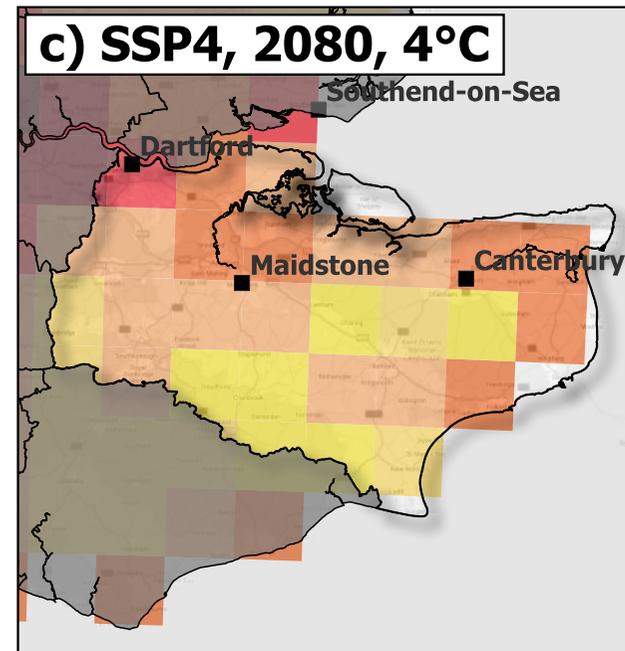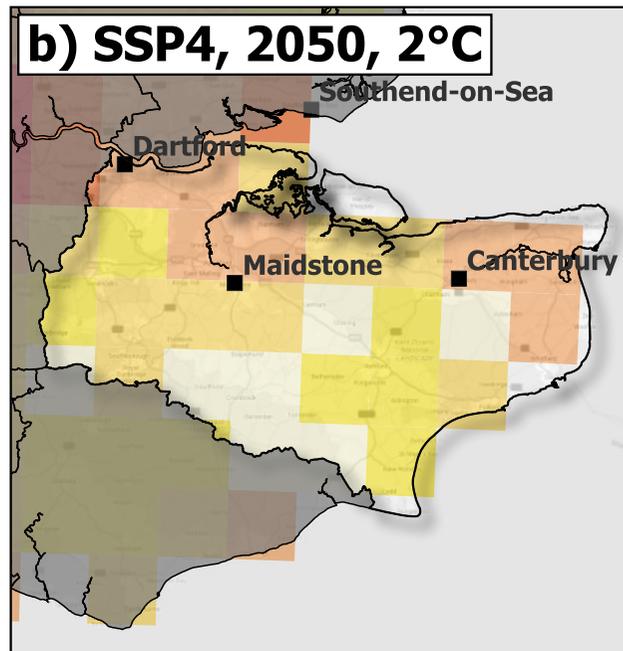
The OpenCLIM project was funded by the UK Climate Resilience Program. For more information visit openclim.science

Kent | Heat Mortality | Combined Future Scenarios

a) Baseline

Southend-on-Sea
Dartford
Maidstone
Canterbury

b) SSP4, 2050, 2°C

Southend-on-Sea
Dartford
Maidstone
Canterbury

c) SSP4, 2080, 4°C

Southend-on-Sea
Dartford
Maidstone
Canterbury

Number of Deaths

a) Baseline
- 0
- 1-2
- 2-5
- 5-10
- 10-25

b) SSP4, 2050, 2°C
- 1-2
- 2-5
- 5-10
- 10-25
- 25-50
- 50-100

c) SSP4, 2080, 4°C
- 2-5
- 5-10
- 10-25
- 25-50
- 50-100
- 100-200
- >200

Key Points

Heat mortality shows average deaths per year at 12km resolution, under future scenarios combining warming (2°C, 4°C), socioeconomics (SSP2, SSP4), and population (2050, 2080).

An increase in heat mortality is projected under 2°C and 4°C scenarios under SSP4. Additional population in 2050 and 2080 also increase mortality.

The climate model ensemble shows a range of outcomes, summarised by the 10th to 90th percentile range (bottom Table, right).
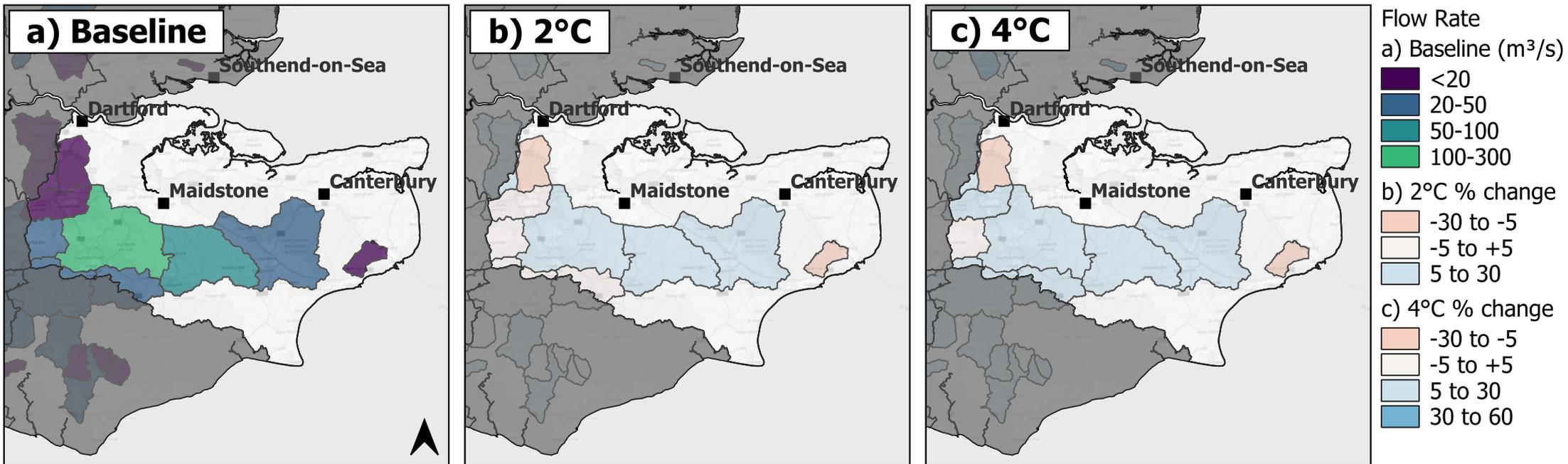
Local Summary

Mean deaths per year and cumulative deaths in Kent for baseline and future scenarios.

	Baseline		SSP4 2050 2°C			SSP4 2080 4°C		
County	Mean	Cumulatiave	Mean	Cumulatiave	Difference	Mean	Cumulatiave	Difference
Kent	1.4	44.5	7.5	232.9	6.1	20	620.8	18.6

Mean deaths (death/yr) for each future scenario and the climate model ensemble range between 10th and 90th percentile.

County	Baseline Mean	10th - 90th percentile	SSP4 2050 2°C Mean	10th - 90th percentile	SSP4 2080 4°C Mean	10th - 90th percentile
Kent	7.3	1 - 46.9	7.5	0.9 - 49.6	20	2.7 - 138.2

OPEN CLIMATE IMPACT FRAMEWORK

Kent | Drought Duration | Warming Levels

a) Baseline

b) 2°C

c) 4°C

Months / 30yrs

a) Baseline
- <3
- 3-5

b) 2°C
- <3
- 3-5
- 5-10

c) 4°C
- <3
- 3-5
- 5-10
- 10-20
- 20-200

Key Points

Drought duration is a low-flow metric representing the average cumulative duration of drought projected within a future 30-year period. Gridded 1km results are modelled at catchment scale. Coastal or tidally influenced catchments are not modelled.

Nationally for 2°C and 4°C warming scenarios, most catchments are projected to experience an increase in drought duration, particularly in southern and eastern areas.

The climate model ensemble shows a range of possible future outcomes, summarised by the 10th to 90th percentile range (bottom table).
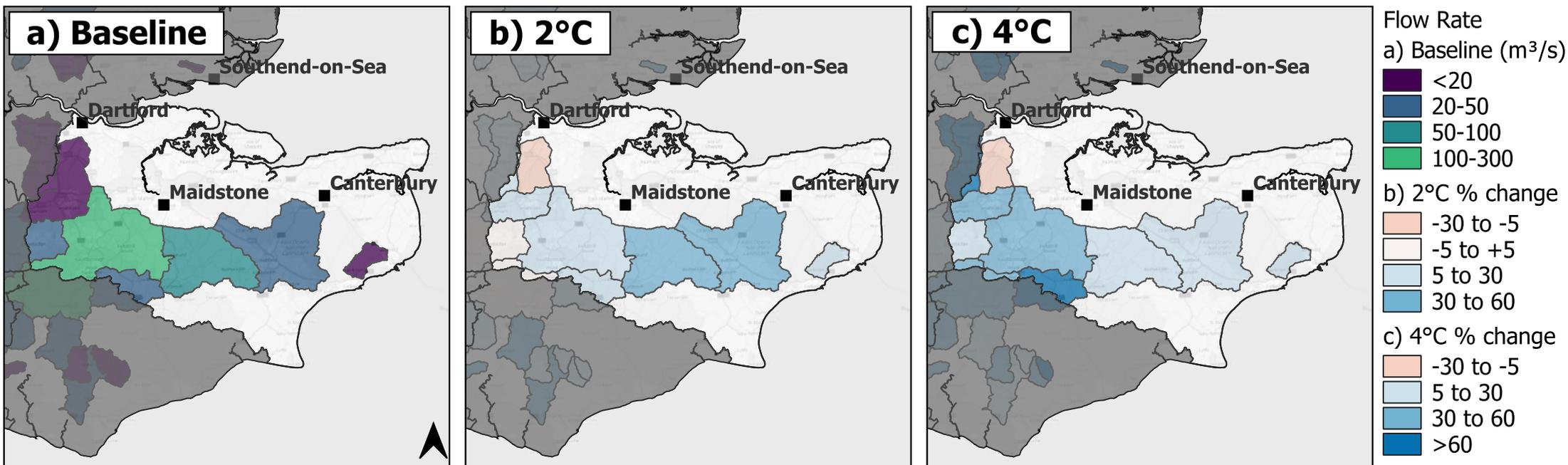
Local Summary

Median, minimum, and maximum drought duration (months/30-yr) for baseline scenario in Kent, and the percentage change from baseline for a 2°C and 4°C warming scenario.

	Median			Minimum			Maximum		
County	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C
Kent	3.3	5.3	7.7	2.3	2.8	3.3	3.8	8.6	21.5

Median drought duration (months/30-yr) for baseline scenario in Kent, the climate model ensemble range between 10th and 90th percentile, and the percentage change from baseline for a 2°C and 4°C warming scenario.

County	Baseline Median	10th - 90th percentile	2°C Median	10th - 90th percentile	4°C Median	10th - 90th percentile
Kent	3.3	1.9 - 7	5.3	2.5 - 28.7	7.7	2.7 - 70.8

OPEN CLIMATE IMPACT FRAMEWORK

Kent | 10 year Return Period Flow | Warming Levels

a) Baseline

b) 2°C

c) 4°C

Flow Rate
a) Baseline (m³/s)
- ■ <20
- ■ 20-50
- ■ 50-100
- ■ 100-300

b) 2°C % change
- ■ -30 to -5
- ■ -5 to +5
- ■ 5 to 30

c) 4°C % change
- ■ -30 to -5
- ■ -5 to +5
- ■ 5 to 30
- ■ 30 to 60

Key Points

The 1-in-10-year return period flow is a high-flow rate metric with a 10% annual probability of occurring. It is a proxy for a low probability, low magnitude flood event.

Nationally for 2°C of warming, most catchments are projected to experience 5% to 30% increase in flows, with little additional increase for most catchments at 4°C. Flow is projected to decrease for some central & eastern catchments.

The climate model ensemble shows a range of outcomes which is summarised by the 10th to 90th percentile range (bottom table).

Local Summary

Median, minimum, and maximum flow rate (m³/s) for baseline scenario in Kent, and the percentage change from baseline for a 2°C and 4°C warming scenario.

	Median	% change		Minimum			Maximum		
County	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C
Kent	23.5	1.8	9	2.4	-15.4	-27.3	142.8	13.9	25.6

Median flow rate (m3/s) for baseline scenario in Kent, the climate model ensemble range between 10th and 90th percentile, and the percentage change from baseline for a 2°C and 4°C warming scenario.

County	Baseline Median	10th - 90th percentile	2°C % change	4°C % change
Kent	23.5	2.2 - 171	1.8	9

OPEN CLIMATE IMPACT FRAMEWORK

Kent | 100 year Return Period Flow | Warming Levels

a) Baseline

b) 2°C

c) 4°C

Flow Rate
a) Baseline (m³/s)
- <20
- 20-50
- 50-100
- 100-300

b) 2°C % change
- -30 to -5
- -5 to +5
- 5 to 30
- 30 to 60

c) 4°C % change
- -30 to -5
- 5 to 30
- 30 to 60
- >60

Key Points

The 1-in-100-year return period flow is a high-flow rate metric with a 1% annual probability of occurring. It is a proxy for a low probability, high magnitude flood event.

Nationally for 2°C warming, most catchments are projected to experience 5% to 30% increase in flows, while at 4°C more catchments are projected to increase flow >60%. Flow is projected to decrease for some catchments in the East.

The climate model ensemble shows a range of outcomes which is summarised by the 10th to 90th percentile range (bottom table).

Local Summary

Median, minimum, and maximum flow rate (m³/s) for baseline scenario in Kent, and the percentage change from baseline for a 2°C and 4°C warming scenario.

County	Median			Minimum			Maximum		
	Baseline	2°C	4°C	Baseline	2°C	4°C	Baseline	2°C	4°C
Kent	31.6	20.2	29.4	1.5	-19	-16.3	282.6	50.7	68.2

Median flow rate (m3/s) for baseline scenario in Kent, the climate model ensemble range between 10th and 90th percentile, and the percentage change from baseline for a 2°C and 4°C warming scenario.

County	Baseline Median	10th - 90th percentile	2°C % change	4°C % change
Kent	31.6	2.6 - 295.3	20.2	29.4

OPEN CLIMATE IMPACT FRAMEWORK

Disclaimer and Intended Use

Intended-Use

The OpenCLIM framework is a national-scale set of workflows and datasets for describing climate change risks/opportunities and for assessing adaptation needs. Data are at resolutions appropriate for investigating climate risks at national and subnational scales. OpenCLIM is not intended to provide information about climate risks at the scale of individual properties or streets and should not be used for such micro analysis.

Limitations

Data, model results and other information or related records have been produced for a specific purpose, and that may affect the type and completeness of the data and interpretation. The nature and purpose of data collection and model simulation may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.

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