

Climate Change Risk and Impact Assessment for Kent and Medway

Part 2: Agriculture Sector Summary

November 2019



A. Agriculture Sector Summary

A.1 Key characteristics

Kent and Medway's agricultural sector is nationally important to the United Kingdom and a major producer of fruit. In total, the agriculture sector accounts for two thirds of national tree grown fruit and one third of all strawberry production in the country.

Although Kent and Medway have a significantly higher proportion of land devoted to fruit production than the rest of England, its rural economy is a mix of arable farming, animal husbandry, horticulture, viticulture, forestry, top (fruit grown on trees) and soft fruit production. For example, the best and most versatile land (ALC Grades 1, 2, and 3a) farmed in Swale is worth approximately £360 million at the current average market price for good quality arable land in England. It is estimated to support £105m– £255m of agricultural output each year¹.

Landowners also benefit from diversification initiatives, such as catchment sensitive farming (CSF), a national scheme to reduce water and air pollution from agriculture. The CSF initiatives cover most water management catchments in Kent and Medway including the Stour, Rother, Medway, and Darent catchments. Across the South East, CSF priority areas cover 528,600ha – 27% of total land area and 45% of agricultural land.

The rural economy in Kent and Medway employs 46,000 people. With 12,957 farm workers, Kent has the fourth largest agricultural workforce in the country after Devon, North Yorkshire, and Lincolnshire. 40% of agricultural workers in Kent and Medway are employed as casual workers or employed for seasonal work, much higher than the national average of 14.6%². Swale and Maidstone are within the top 20% of local authorities in England with the highest numbers of agricultural workers - Swale had 2,494 workers in 2016. In Swale, the agricultural workforce has increased in recent years, however seven districts have seen a decrease in their agricultural workforce since 2013. The largest decreases have been in Dartford and Gravesham, down 62.1% since 2013. The wages and seasonality of the work, particularly picking soft fruit and top fruit, means that employers find it hard to recruit the resources within the UK and regularly rely on seasonal labour from the EU.

More than half the agricultural holdings in Kent (52.6%) are involved in growing of plants and vegetables (cereals, cropping, and horticulture) and 39.2% with animal production. A significant number of crops produced in Kent (e.g. oilseeds and cereals) are destined to be consumed as animal feed. As of June 2016, there were 2,714 agricultural holdings in Kent. The Ashford district has the largest number of agricultural holdings in the county (537), covering 44,737 ha and employing 1,739 workers. A large proportion of these holdings are arable and cereal crops, but Ashford also contains the largest numbers of cattle, sheep and pigs in Kent and Medway. Tunbridge Wells has the highest number of poultry farms, with at least six times as many as any other local authority in England.

¹ Eftec. 2015. Value of Best and Most Versatile Agricultural Land in Swale. <https://archive.swale.gov.uk/assets/Planning-General/Planning-Policy/Evidence-Base/Local-Plan-2014/Further-evidence-2015/Agricultural-Land-Value-SBCPS0888.pdf>

² Kent County Council. 2019. Statistical Bulletin Food and Drink Production Industries in Kent.

https://www.kent.gov.uk/__data/assets/pdf_file/0014/90410/Food-and-drink-production-industries-in-Kent.pdf

Table A-1 shows the number of agricultural holdings in Kent and Medway compared to regional and national figures.

Table A-1: Count of agricultural holdings³

	Kent	Medway	South East	England
Cereals	554	17	2,628	19,118
General Cropping	495	-	2,358	17,728
Horticulture	378	11	914	4,259
Specialist Pigs	35	0	170	1,953
Specialist Poultry	49	0	262	2,495
Dairy	48	0	321	6,470
Grazing Livestock	0	0	0	12,559
Grazing Livestock (Lowland)	933	13	5,322	32,369
Mixed	197	-	1,161	8,833
Unclassified	25	0	116	1,069
Total holdings	2,714	52	13,252	106,853

A.2 Key projected changes to Kent's climate

The UK Climate Projections from UKCP18 model identifies these potential changes for Kent:

- **Hotter summers** with an increase in average summer temperature of 2 – 3°C by 2040 and 5 – 6°C by 2080.
- **Warmer winters** with an increase in average winter temperature of 1 – 2°C by 2040 and 3 – 4°C by 2080.
- **Drier summers** with a reduction in average precipitation of 20 – 30% by 2040 and 30 – 50% by 2080.
- **Wetter winters** with an increase in average precipitation of 10 – 20% by 2040 and 20 – 30% by 2080.
- **Increases in sea-level rise** by up to 0.3m by 2040 and 0.8m by 2080.

More details on the projected climate impacts for Kent can be found in Part 1 of the CCRIA.

A.3 Climate risks and impacts for Kent

The agriculture sector in Kent and Medway is nationally important and reliant on the climate to provide enough water and warmth to be productive for both crops and livestock. Understanding how climate change impacts both the annual water cycle and daily temperatures is key to understanding its impacts on the agriculture sector. Water availability and temperature can have a range of impacts on agricultural

³ Kent County Council. 2019. Statistical Bulletin Food and Drink Production Industries in Kent. https://www.kent.gov.uk/__data/assets/pdf_file/0014/90410/Food-and-drink-production-industries-in-Kent.pdf

outputs including determining the size, establishment and profitability of crops and quantity of silage produced.

The county faces both risks and opportunities from climate change. The agricultural land is variable with different soil types, microclimates, and landscape features which provide diverse, productive, profitable environments. Consequently, a range of impacts will be felt, and some changes to land management activities will be required. For example, in parts of Thanet, irrigation of crops is routinely carried out in dry periods on freely draining soils. However, in areas of the High Weald, a combination of relatively high winter rains and impermeable soils requires investment in field drainage to maintain productivity.

The UK CCRA 2017 found that parts of southern, eastern and central England are likely to become unviable for some current agricultural activity due to intensive water requirements. In addition, the risks to soils and agricultural production from changes in rainfall were identified as an area for further action.

The research priority identified in the UK CCRA 2017 is relevant to agriculture in Kent due to the limited amount of information available on the potential likelihood and impacts that new and emerging pests and diseases may have on current and future farming practices in the county.

A.3.1 Increasing temperatures

Changes in the seasonal weather patterns, particularly in recent years, have been identified as one of the driving factors which have caused some farmers to diversify from traditional crops into other areas, such as sheep farming or viticulture. Higher temperatures, increased CO₂ concentration and longer growing seasons will bring many opportunities in the agricultural sector, including the growing of new crops such as grain, maize, grapes, nectarines and peaches as well as aiding native species due to fewer frosts and longer sunny spells⁴. Providing there is significant investment to balance future supply and demand of water in Kent, increasing temperatures will present new opportunities for the agricultural sector to increase crop yields and produce higher crop growth.

The growing season has already lengthened by approximately 1 month in central England since the 1990s, and Spring now begins an estimated 2-3 weeks earlier than it did in the 1970s. Viticulture in Kent and across the UK is a growing sector and is likely to continue to rise as temperatures increase. Cider producers in Kent may initially see bumper harvests from warmer summers. French Champagne producers are already turning their attention to South East England as climate change affects vineyards in France⁵. Opportunities for growing new crops are already being realised in Kent – winemakers such as Biddenden Vineyards, Chapel Down and Gusbourne Estates have already seen profits increase and are regularly gaining international recognition and awards. Although increases in temperature have provided opportunities to expand vineyards in Kent and improve wine quality, it is uncertain if, and how, further increases in temperature may affect wine production in the future.

⁴ Butler, S. 2018. Heatwave pushes up UK fruit and vegetable prices and yields fall. <https://www.theguardian.com/business/2018/jul/27/heatwave-pushes-up-uk-fruit-and-vegetables-prices-as-yields-fall>

⁵ Tomorrows England. Our Changing Climate Our Changing Lives: The South East. <http://publications.naturalengland.org.uk/file/6524842442489856>

Changes in the growing season can increase the yield outputs for certain crop types and allow for double cropping. Realising the opportunities that these changes bring (e.g. production of winter wheat) will only be possible if crops are managed effectively. This may include taking steps to control and minimise the risks from pests, diseases and increasing levels of diffuse pollution (agricultural runoff). Current support for policies of eliminating pesticides in the UK may need a directional policy change to support essential pesticide usage to manage pests and diseases effectively to ensure Kent can benefit.

As a result of agricultural and crop changes, pressure on the natural environment could be exacerbated which may add to the pressure on soils, water and habitats⁶. There may be changes to the landscape including field patterns, and the potential removal of field margins and existing hedgerows and woodlands (currently subject to strict regulation). This could alter local ecosystems and affect biodiversity, with overwintering and migratory birds being particularly affected.

Although higher temperatures may have a positive impact on agriculture in Kent, increasing temperatures can reduce the yields of some crops above a certain threshold. For example, when the ambient temperature exceeds 35°C, seed germination, seedling vegetative growth, flowering, fruit set and fruit ripening are adversely affected in tomatoes. This causes irreversible damage to plant growth and development leading to lower yields, crop failure, and inedible crops⁷. Temperatures above 35°C are already occurring in Kent, with the second highest temperature on record for the UK, 38.5°C, reached in Faversham in August 2003. The heatwave in 2018, where temperatures again reached 35.5°C in Kent, resulted in a reduction of the lettuce crop of 25% while demand increased by 40%. Lettuce had stopped growing as a result of higher temperatures, and the heads were damaged in heat⁸.

High summer temperatures in Kent, like those of 2003 and 2018, have not yet been recorded during the seed germination period for salad crops, therefore germination and seedling growth of salad crops in Kent is unlikely to be adversely affected by increases in summer temperatures. However, as the impacts of climate change continue, salad germination and growth may be affected by changes in temperature.

Increasing summer temperatures in Kent may impact the health and welfare of agricultural workers, especially within the polytunnel horticulture industry. Agricultural workers that spend long periods of time outside and those working in under cover cropping systems, such as polytunnels and cravo-greenhouses, may suffer negative health impacts and a drop in productivity due to the higher temperatures of their working conditions in summer months.

Higher winter temperatures may lead to increased pest survival (e.g. red spider mite, ladybird, killer shrimp) and crop and livestock diseases (e.g. brown rust and bluetongue), requiring greater use of pesticides. Some pests, such as cereal aphids,

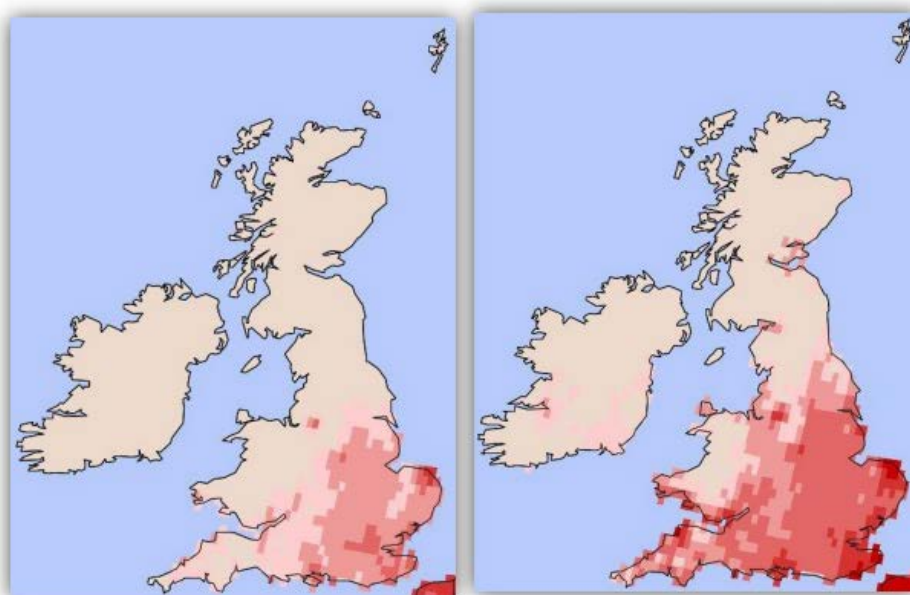
⁶ Natural England. 2013. Assessing the potential consequences of climate change for England's landscapes: North Kent <http://publications.naturalengland.org.uk/file/6524842442489856>

⁷ Wahid, A., Gelani, S., Ashraf, M. and Foolad, M. 2007. Heat tolerance in plants: An overview. *Environmental and Experimental Botany*. 61(3), pp.199–223. https://www.academia.edu/4952754/Heat_tolerance_in_plants_An_overview

⁸Butler, S. 2018. Heatwave pushes up UK fruit and vegetable prices and yields fall. <https://www.theguardian.com/business/2018/jul/27/heatwave-pushes-up-uk-fruit-and-vegetables-prices-as-yields-fall>

may reproduce more rapidly in a higher CO₂ environment, such as that forecasted for 2050. Warmer winters lessen the impact of the “winter kill”, increasing aphid survival rate over winter and leading to earlier infestation of crops in Spring. The Colorado beetle, native to America, is now widely established in continental Europe and climate change is increasing its range into Britain, where it was previously too cold. This invasive beetle is resistant to all major insecticide classes used in the UK and poses a significant threat to potato production⁹.

Figure A-1: Potential distribution of Colorado beetle under average climate for last 30 years (left) and predicted climate in 2050 (right). The darker the shade of red, the more suitable the climate is for Colorado beetle survival and reproduction¹⁰.



Warmer winters may reduce over winter heating costs for livestock; however, warmer summers may lead to livestock suffering from heat stress, resulting in a shift towards indoor production that is linked to higher feed costs, increased medical bills, and other implications, such as the costs associated with cooling buildings. Heat stress can impact livestock and may cause a reduced growth rate, milk yield, reproductive performance, and even death in extreme cases. Certain types of dairy animals, such as cows, are more prone to heat stress than meat producing breeds as they generate more metabolic heat¹¹.

Notably, little is known about the impacts of low temperature events in Kent and Medway on the agriculture sector, as response efforts and media coverage generally focus on transport and human impacts. However, the ‘Beast from the East’ low temperature event in 2018 saw temperatures of -12°C in some rural areas, and

⁹SAC Consulting. 2013. Climate Change Pests and Disease. http://tweedforum.org/wp-content/uploads/2018/09/Pests_Diseases_Report_2013_Final_Report.pdf

¹⁰ SAC Consulting. 2013. Climate Change Pests and Disease. http://tweedforum.org/wp-content/uploads/2018/09/Pests_Diseases_Report_2013_Final_Report.pdf

¹¹ Vet World. 2016. Impact of heat stress on health and performance of dairy animals: A review <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4823286/>

farmers reported livestock losses as animals became lost or stuck in the snow. It is likely that there are similar impacts on the natural environment and biodiversity during prolonged periods of cold weather.

A.3.2 Drought

Unless additional water supply is obtained (for example via reservoirs or transfers from other areas), increased temperatures and drought could exacerbate the threat of water scarcity for soft and top fruit and salad crops (approximately 80% of Kent's main irrigated crops) in summer months, particularly where areas rely on high levels of irrigation from river abstraction (40%), reservoirs (26%), and groundwater (18%).

Decreased summer rainfall is likely to impact the recharge period of the water cycle, and Kent is likely to become increasingly reliant on winter rainfall for its water supply. Winter flows in the Rivers Medway & Stour are expected to increase by 2050 – 13% and 10% respectively. This provides increased potential to fill winter storage reservoirs; however, flashy flow can cause flooding, high silt loads and reduce flows quickly before abstraction.

With increasing temperatures and a longer growing season, farmers could potentially face more frequent and greater 'hands-off' flow restrictions that limit or prevent direct abstraction when river flows drop below certain levels, often implemented in the summer months to ensure continuation of water supply. While double cropping has economic benefits, increased use of fertilizers may increase nitrate pollution. Currently, nitrate vulnerable zones cover a significant proportion of agricultural land in Kent. There is also a risk of eutrophication in rivers from increased runoff during winter rainfall, and an increased concentration of nutrients in rivers during times of low flow. This may cause increased algal growth, reducing invertebrate diversity and cause large, diurnal fluctuations in dissolved oxygen concentrations, resulting in ecological stress and fish kills.

In 2018, parts of England had no rain for more than 50 days, the Agricultural and Horticultural Development Board stated that it was the driest run-up to harvest in 80 years. A stakeholder consulted as part of this assessment noted that the potato harvest was severely affected in 2018 due to reduced rainfall in summer months.

A.3.3 Increased rainfall, flooding, and sea-level rise

Key areas where agricultural land is at risk of flooding now and where risk is likely to increase in the future include:

- Ashford (by Royal Military Canal)
- Canterbury (by Marshside and the North Stream)
- Dover (Lower Stour floodplain, north east of Finglesham, land between Deal and Sandwich)
- Sevenoaks (Vale of Kent, land between Westerham and Farningham, Swanley)
- Folkestone and Hythe (Elham Valley, Romney Marsh)
- Thanet (western areas around Sarre, the Chislet marshes and the Wantsum channel)
- Tonbridge and Malling (Hildenborough and areas near the River Bourne)
- Tunbridge Wells (Cranbrook)

Storm events or flooding can further reduce agricultural incomes due to increased costs from housing livestock, food and farm equipment during these events, along with higher medical bills, loss of livestock and other associated costs. In the 2014 Severe Weather Impacts Monitoring System Report, at least five farmers' markets were cancelled across Kent due to stormy conditions flooding agricultural areas for two months. This resulted in no income from farmers' markets for 100 farmers and producers. In Swale alone, closure of the Faversham market in 2014 resulted in a loss of takings of £7,600. Faversham farmers' market was again reduced in size and scale as a result of severe weather in February 2016.

Approximately a quarter of Kent's land area is less than 5m above mean sea-level, including some areas of the most productive agricultural land. There are several areas of high-grade agricultural land at risk of flooding in Kent including land in the River Stour floodplain (ALC Grades 1-3) and at Swanley (ALC grade 2), Deal and Sandwich (ALC grade 1). In addition, agricultural land on Romney Marsh is estimated to be worth around £290m; this area is very low lying and some areas have a 20% chance of being flooded by the sea in any year¹². Intrusion of saltwater into coastal freshwater aquifers on agricultural land may also reduce land and river water quality (e.g. River Stour which is used for irrigation).

An increase in the frequency and intensity of rainfall events can also impact upon agricultural yields. Heavy rainfall can damage crops directly, especially soft fruit, or damage crop growth by saturating the soil, restricting oxygen uptake. Decrease in yields can also lead to food shortages and increasing crop prices that are likely to have the greatest impact on people with lower incomes. In addition, increased temperatures and drier summers can increase the risk of surface water flooding during heavy rainfall events. As soils dry out, a hard crust can form on the surface, known as capping. This cap makes it more difficult for water to infiltrate into the soil below which may increase the risk of surface water flooding.

Flooding of agricultural land can also impact water quality due to increased nitrate leaching. Nitrate leaching is exacerbated by flooding and can be caused by use of agricultural fertilizers and presence of livestock manure. For areas in Nitrate Vulnerable Zones, flooding, and the subsequent nitrate leaching from soils as rainwater drains through to groundwater aquifers can exacerbate pollution issues. This can cause decreasing water quality and increasing nitrate levels in water bodies and watercourses, which may affect the water system through issues such as eutrophication, increased algal growth and decreased biodiversity. Similarly, increased soil erosion due to flooding of agricultural land can cause higher levels of phosphate pollution in surface water systems.

UKCP18 data identifies a trend towards wetter winters in Kent. This may increase issues such as soil compaction and erosion on agricultural land unless good management practices are adopted. Coastal farms were mentioned as an area of high risk and vulnerability because of their reliance on access to soils of appropriate quality.

¹² Folkestone and Hythe District Council. 2012. Romney Marsh – Flood Risk Update. https://theromneymarsh.net/assets/fileman/Uploads/Documents/Flood_Risk_in_the_Romney_Marsh.pdf

A.4 Management of climate risks and impacts

The agricultural sector has always been affected by, and had to manage, changing climatic and socio-economic conditions, and research into adaptation for our changing climate is a long-established field of Kent's agricultural sector. Farmers across Kent have been making business decisions to plant different crops or change their land use from arable to grazing land, enabling them to adjust to the climate, minimise risk, and maximise business opportunities.

The National Institute of Agricultural Botany: East Malling Research (NIAB EMR) was established in 1913 by the fruit growing sector to address the many challenges faced by growers, particularly the growing water stress and increasing pressure to improve production. The Institute conducts research projects to support the agricultural sector on water-use efficiency, plant nutrition, plant pathogens, and other variables that affect agriculture. NIAB EMR are currently leading the WATERR project (Water Advisory Team for Efficient Resource Recovery) to support rural business across the South East. The aim of the project is to improve water availability and irrigation efficiency for growers, to enhance profitability and competitiveness¹³. How to maximise water resources and maintain competitiveness will become more important as the climate changes. There are also plans to support improvement in water efficiency and availability for Kent's horticultural and agricultural sectors, through the delivery of the Kent Rural Board Water Task Group programme.

The 'Apples in a Warmer World' project, led by the National Fruit Collection Trust at Brogdale, is assessing how apple orchards could respond to changes in climate by maintaining three polytunnels at different temperatures and subjecting them to different amounts of rainfall to understand how the crops respond to identify those crops that may be more suited to future climate scenarios.

The costs to certain crops and livestock from climate change already being experienced by the agricultural sector have led to some adaptation taking place as farmers move towards more drought tolerant arable and root crops. While this is a positive step for management of climate impacts, it could result in a loss of competitive advantage to other regions.

Some areas of farmland in Kent and Medway are already protected by large scale flood defences, such as the farmland around the River Medway north of Maidstone. Farmland in this area is protected by floodwalls, weirs and sluices that are scheduled to be improved over the next 3 years. Natural Flood Management (NFM) is also being piloted in the catchment, using measures such as leaky dams and temporary water storage areas to reduce the speed of runoff into main rivers and improve soil infiltration.

Small-scale changes are already being made by some farms to minimise the impact of intense rainfall on the growth of soft fruits (such as strawberries, blackberries and raspberries) through increased use of polytunnel horticulture. The River Medway catchment is known in the UK as 'the soft fruit basket' due to its production of high value soft fruits¹⁴. Over the last 10 years, there has been a significant expansion of

¹³ NIAB EMR. WATERR – Water Advisory Team for Efficient Resource Recovery.
<http://www.emr.ac.uk/projects/waterr-water-advisory-team-efficient-resource-recovery/>

¹⁴ South East Rivers Trust. 2019. Holistic approaches to Water Management in Polytunnel Fruit Growing.
<https://www.southeastriverstrust.org/hwh/>

polytunnel soft fruit production in this area to meet demand for a reliable, year-round supply of high-quality produce in the face of climate change impacts, particularly intense rainfall and flooding.

Increased polytunnel horticulture in Kent may cause increased rainwater run-off and a higher demand for water for irrigation as climate change is causing increases in temperature, drought and stricter abstraction licencing. The Holistic Water for Horticulture Project, developed in 2019 by Kent County Council, the South East Rivers Trust and NIAB EMR, aims to provide a whole system approach to sustainable polytunnel horticulture based on rainwater runoff recapture, recycling water for irrigation within polytunnels and returning excess water to the environment using nature-based techniques to prevent flooding¹⁵. The pilot area in the Medway Catchment is one of six pilot areas in the UK for signatories of the Courtauld Commitment 2025 to deliver collective action to improve the quality and availability of water.

The fishing lakes created on the River Beult have been helping to store and slow water, reducing the impact of flash storm events, and cover cropping is being used widely across Kent to help retain soil and prevent erosion. Cover crops are plants that contribute to soil health, reduce soil erosion, maintain soil fertility, control weeds and pests and prevent nitrate leaching. As a longer growing season and more intensive farming begin to threaten nitrate levels in the soil of many areas of Kent, farmers are increasingly growing cover crops to protect and preserve the quality of their soil and to reduce the costs associated with buying nitrate fertiliser.

The risks associated with sea-level rise are being managed through Shoreline Management Plans (SMPs). These large-scale assessments of the risks associated with coastal processes (erosion and flooding) identify policies to address the identified risks. One of the policy options available to Shoreline managers in a SMP is a Hold the Line policy, which aims to preserve the existing defence line by either maintaining or improving the current standard of protection (e.g. maintaining or improving a sea wall already in place)¹⁶. Another is managed retreat, which involves allowing the shoreline to move backwards or forwards, with management to control or limit movement (e.g. reducing erosion rate)¹⁷. Hold the Line policies for coastal defences in Kent have guaranteed the presence of agricultural land in many areas for the next 100 years. However, with the impact of climate change, the long-term future of current policies is uncertain, and change may result in the loss of a significant area of valuable agricultural land.

There are a range of tools and agri-environment grant aid available to the agricultural sector in Kent to support farm diversification, improve the environmental and economic performance of farms and manage the impacts of climate risks. The Farm Diversification Toolkit, produced by the Kent Downs Rural Advice Service, can assist

¹⁵ South East Rivers Trust. 2019. Holistic approaches to Water Management in Polytunnel Fruit Growing. <https://www.southeastriverstrust.org/hwh/>

¹⁶ DEFRA, 2006. Shoreline management plan guidance Volume 1: Aims and requirements. Department for Environment, Food and Rural Affairs, London. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69206/pb11726-smpg-vol1-060308.pdf

¹⁷ DEFRA, 2006. Shoreline management plan guidance Volume 1: Aims and requirements. Department for Environment, Food and Rural Affairs, London. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69206/pb11726-smpg-vol1-060308.pdf

farms to identify opportunities for improving the long-term economic viability of farm holdings, to maintain rural employment levels and continue conservation and enhancement of the environment¹⁸. Farm diversification, support tools and grant aid may be used more frequently in the future as the agriculture sector is increasingly affected by changing climatic and socio-economic conditions.

Agriculture and land management are expected to significantly change and develop in the future. The Committee on Climate Change (CCC) suggest that, to meet 2050 Net Zero targets, consumption of livestock across the UK will have to fall by 20%¹⁹ and 22% of agricultural land should come out of agriculture and crop production, as a result grazing on the remaining land will intensify. There are likely to be significant changes to agricultural policy, and land use more generally, if the recommendations of the CCC in their UK Net Zero 2050 report are adopted nationally²⁰.

If the CCC recommendations are adopted by government, Kent may play a significant part in the land reallocation and new management. How this is undertaken will be important as these recommendations are designed to limit the impacts from climate change, however their success will depend on a range of factors including if the policies are implemented in Kent and if they are taken up by other counties.

A.5 Urgency Scoring and Recommendations

Using available evidence, urgency scoring was undertaken based on risk magnitude, interdependencies, and adaptation shortfall. This urgency scoring can be used to help prioritise and manage the climate risks and opportunities to Kent and Medway. Further information on the methodology can be found in the CCRIA Part 1.

¹⁸ Kent Downs Rural Advice Service. 2010. Farm Diversification Toolkit.

<https://s3-eu-west-1.amazonaws.com/explore-kent-bucket/uploads/sites/7/2018/04/18112817/Farm-Diversification-Toolkit.pdf>

¹⁹ Committee on Climate Change. 2019. Reducing UK emissions: 2019 Progress report to parliament.

<https://www.theccc.org.uk/wp-content/uploads/2019/07/CCC-2019-Progress-in-reducing-UK-emissions.pdf>

²⁰ Committee on Climate Change. 2019. Net Zero: The UK's contribution to stopping global warming.

<https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf>

Table A-2: Urgency Scoring for the agriculture sector

Risk	Magnitude	Explanation	Adaptation Shortfall	Explanation	Inter-dependencies	Explanation	Urgency score	Recommendation
Storm events/intense rainfall could lead to a loss of productivity due to flooding of agriculture land	Medium	A lot of agriculture land in Kent is low lying and is at risk of flooding during intense rainfall or storm events.	High	Lack of evidence to suggest how the agriculture sector is adapting to risk of increased storms.	High	Agriculture could be impacted if storm events were to disrupt transport routes such as road/port closures. In 2013/14 Faversham farmers market reported a loss of £7,600 due to closure from flood events.	High	More research is needed into economic and social impact of flooding on farmers. More action is needed to reduce pressures of increasing storms and floods.
Increasing temperatures and drought will cause changes to crop yields	Medium	Reduction in yield of the crops currently grown, and a need to change to more continental crops suitable for the changing climate.	Medium	New crops can be grown in higher temperatures- beginning to diversify. The water storage areas that some farmers use is uncertain in terms of their reliability. A water efficient technologies centre has been established.	High	Changes to agriculture practices could lead to changes in field patterns and could have significant impacts on the natural environment, changing habitats and species.	Medium	More research is needed into the types of new crops that could be produced.
Sea-level rise and coastal erosion could lead to a loss of agricultural land	High	The potential loss of agricultural land on Romney Marsh due to sea-	Medium	Limited evidence of adaptation to sea-level rise and saline intrusion.	Medium	Loss of productivity could limit the food crops available which could impact people and health, and the loss of land could lead	Medium	More action is needed to adapt agricultural practices in coastal areas.

Risk	Magnitude	Explanation	Adaptation Shortfall	Explanation	Inter-dependencies	Explanation	Urgency score	Recommendation
		level rise is valued at £290m. Saline intrusion could cause long-term damage to low-lying agriculture land.		Hold the Line policies to protect agricultural land have been established in some SMPs for Kent. Research on the impact of salination on soils, crop yields, and grazing is well understood by the sector.		to impacts on well-being and health for farmers as well as the economy.		
Increase in pests and diseases from increasing temperatures	Medium	Increasing temperatures may cause increased pest survival and increases in crop and livestock disease.	High	Lack of evidence that there is adaptation in place to prevent increases in pests and diseases.	Medium	Increased pests and diseases could impact the profitability of crops due to reduced yields. A previous outbreak of foot and mouth caused the closure of all PRow, impacting tourism and the natural environment.	Medium	More research is needed into crop and animal disease that could occur due to increasing temperatures.
Soil erosion and destabilisation as a result of flooding and drought causes a reduction of quality of agriculture land	High	Flooding could cause increased erosion, which may cause higher levels of phosphate pollution in surface water systems.	Medium	There are some flood defences in place. Planting of cover crops helps to reduce erosion. Planting of grass strips around headlands can prevent soil run off.	Medium	Increases in erosion and increases in pollution will impact rivers and watercourses and wider areas of the natural environment.	Medium	More action is needed to control soil erosion on farms. Research and methods of controlling soil erosion are well established and understood by the sector but require more uptake to be effective.

Risk	Magnitude	Explanation	Adaptation Shortfall	Explanation	Inter-dependencies	Explanation	Urgency score	Recommendation
Increased nitrate leaching as a result of flooding causes a reduction in quality of agricultural land	High	Flooding could cause increased nitrate leaching and in nitrate vulnerable zones this could affect groundwater aquifers and exacerbate pollution problems.	Medium	<p>Planting of cover crops helps soils to retain nutrients such as nitrate over the winter period.</p> <p>Since December 2002, all farmers in NVZs have been required to implement measures to protect aquifers, such as limiting the application of inorganic nitrogen fertilisers and organic manure.</p>	Medium	<p>Increases in flooding and in turn, nitrate leaching, may cause an impact on groundwater aquifers and cause pollution issues to wider areas of the natural environment and watercourses.</p> <p>People and utilities may be affected if nitrate leaching increases into groundwater aquifers used for extracting water for human consumption.</p>	Medium	More action is needed to increase sustainable farming practices to reduce nitrate leaching in soils.