



# The role of cities in climate resilient food systems

## A Foodprint Melbourne briefing

### Introduction

Melbourne, Australia's second largest city, is situated in a region already feeling the impacts of climate change, including increasing temperatures and decreasing water availability<sup>1</sup>. Like many world cities, Melbourne has historically produced a significant amount of fresh food on its urban fringe<sup>2</sup>. This peri-urban food production has the potential to contribute to a more resilient and sustainable food supply for Melbourne in the context of rapid population growth and increasing climate pressures, but food production on Melbourne's fringe is under threat from urban development.

### Sustainable and resilient city region food systems

There is increasing international policy attention on the role of cities in contributing to more sustainable and resilient food systems, particularly in the context of climate change adaptation. Recent policy initiatives and declarations such as the 2014 Medellin Call for Action<sup>3</sup>, the 2015 Seoul Declaration<sup>4</sup> and the Milan Urban Food Policy Pact<sup>5</sup> have all highlighted an important role for city region food systems in increasing the sustainability and resilience of food systems.

One of the things emphasised by these policy initiatives is the

importance of urban and peri-urban food production in increasing the *resilience* of food systems; that is, increasing the capacity of food systems to withstand and recover from the effects of crises or shocks, such as natural disasters (e.g. droughts, storms and floods) or socio-economic shocks, such as a rapid rise in food prices.

For a city such as Melbourne, which is geographically isolated and faces climate threats such as drought, bushfires, storms and floods, urban and peri-urban food production has the potential to increase food system resilience in multiple ways. This includes reducing the dependence of the city population on distant sources of food and maximising the use of the limited natural resources available for food production, particularly fertile soils and water. South-East Australia is a water-scarce region<sup>6</sup>, and less than 10% of its soils are arable and suitable for agricultural production. Some of the best soils and most secure sources of water are located on the coastal fringe around its major cities<sup>7</sup>.

Melbourne is not unusual in having access to fertile soils and reliable water sources close to the city. Many world cities were founded in fertile areas with good access to water to provide a secure source of fresh food for their growing populations. Some world cities still produce significant amounts of fresh food on their peri-urban fringes, particularly vegetables, but also fresh milk, eggs, poultry, pork and fruit<sup>8</sup>. Shanghai produces enough

### Foodprint Melbourne

This briefing draws on emerging findings from the Foodprint Melbourne research project to explore the importance of Melbourne's peri-urban food production for the sustainability and resilience of the city's food supply in the face of increasing climate pressures.

Foodprint Melbourne is a joint research project from the Victorian Eco-Innovation Laboratory at the University of Melbourne and Deakin University. The project is funded by the Lord Mayor's Charitable Foundation.

vegetables to meet around 60% of the needs of its urban population, while Hong Kong produces enough vegetables to meet around 45% of its needs<sup>9</sup>.

As the availability of natural resources for food production becomes more constrained, the significance of urban and peri-urban areas of food production is likely to increase because of their access to urban waste streams. Recycled water from city water treatment plants, desalination plants and stormwater run off could provide an increasingly secure source of water for food production in a warming and drying climate. Cities also have an abundant and under-utilised supply of organic waste that could provide an alternate source of nutrients for food production, as pressures on supplies of conventional fertilisers increase.

As cities expand to accommodate rapidly urbanising populations, areas of peri-urban food production with access to fertile soils, water and valuable waste streams could be lost to urban development. However, these regions of city fringe food production have the potential to play an increasingly important role in creating sustainable and resilient city region food systems in the context of increasing climate and natural resource pressures.

## Melbourne's city region food system

Melbourne is a sprawling city of around 4.3 million people in the state of Victoria in South-East Australia. Its city region food system includes multiple relatively small areas of food production scattered around the city fringe. The significance of these areas for food production is under-recognised. However, peri-urban Melbourne is one of the most productive agricultural regions in this part of Australia,<sup>10</sup> and it produces a wide variety of foods.

Early findings from the Foodprint Melbourne project suggest that Melbourne's peri-urban region currently produces enough food to meet 41% of the food needs of

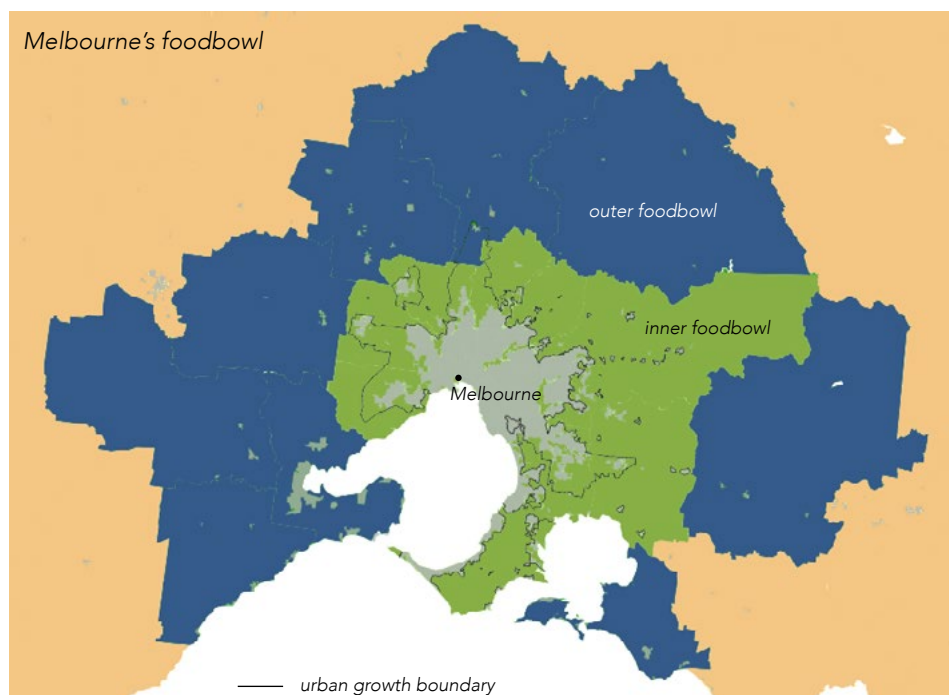
metropolitan Melbourne's current population, including 82% of vegetables, 100% of eggs and poultry, 39% of dairy and 13% of fruit. Some areas of peri-urban Melbourne are highly significant for the supply of particular types of foods, such as Koo Wee Rup, an area around 60 km to the South-East of the city, which produces over 90% of Australia's asparagus<sup>11</sup>.

The areas of food production close to Melbourne's two main water treatment plants are relatively water-secure areas with access to recycled water to produce vegetables during drought. The Werribee Irrigation District, situated next to one of the city's water treatment plants, grows around 10% of the vegetables produced in the state of Victoria. Towards the end of Australia's Millenium Drought (which lasted from 1996 to mid-2010), vegetable production in this region became dependent on recycled water as river flows dropped to unsustainable levels.

Melbourne is Australia's fastest growing city and the population is projected to rise to over 7 million in 2050, increasing the city's demand for fresh food by around 60%. However, Australia's cities have historically accommodated population growth by sprawling outwards, and if Melbourne continues to sprawl at its current rate, loss of farmland could reduce the

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capacity of Melbourne's city region food system to support the food needs of the city's growing population to 18% of food needs by 2050 (from 41% in 2015). The capacity of the peri-urban region to meet the city population's need for fresh vegetables could reduce to 21% (from 82% in 2015).

However, if Melbourne is able to accommodate the predicted population increase in a way that contains urban sprawl and retains the city's capacity for peri-urban food production, particularly in areas with access to recycled water, this city region food system could contribute to a more resilient city food supply in the face of increasing climate pressures on food production elsewhere in Southern Australia.

## Impacts of climate change on food production in Southern Australia

Climate change is likely to reduce the capacity for food production across Australia, with strong drying and warming expected in Southern and Eastern Australia<sup>12</sup>. Figure 1 shows the significant drying that has already occurred across Southern Australia and how severely the state of Victoria has already been affected.

The impact of climate change is likely to be particularly significant in the irrigation districts of the Murray-

Darling Basin, Australia's main region of food production<sup>14</sup>. Estimates of the potential loss of food production capacity range from an overall 17% decline in Australian production<sup>15</sup> to a 92% drop in irrigated agricultural production in the Murray-Darling Basin by 2100, in the context of a high emissions scenario and no global adaptation<sup>16</sup>.

In addition to the impacts of gradual warming and drying, increasing extreme temperatures and weather events are likely to affect food production. Crops such as fruit and vegetables are particularly vulnerable to these changes, especially plants that are sensitive to the impacts of extreme weather events, a reduction in winter chilling or the effects of heat stress<sup>17</sup>. In 2009, a heatwave in Victoria resulted in the loss of 20-25% of the apple crop and 60-80% of the strawberry crop in the Port Philip region<sup>18</sup>. Declines in dairy production of up to 7% are also expected in Victoria<sup>19</sup>.

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Climate change is likely to reduce the capacity for food production across Australia.

If Melbourne continues to sprawl at its current rate, the city's peri-urban region may only be able to meet 18% of the city's food needs by 2050.

Figure 1: Drying Trends Across Southern Australia

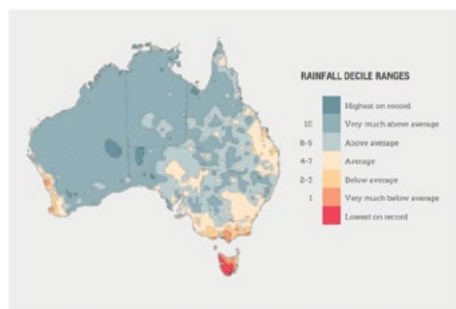


Figure 12a: Rainfall deciles for October to April (the northern wet season) from 1997 to 2013, relative to the reference period 1950-2013, based on ANAP data. Source: BOM (2014).

Summer Rainfall (October to April)

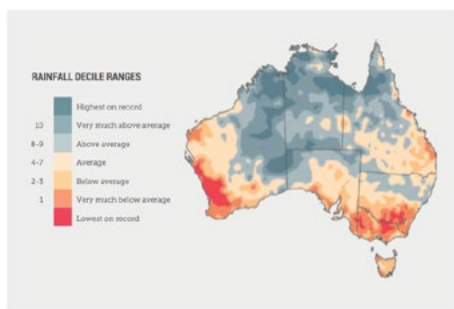
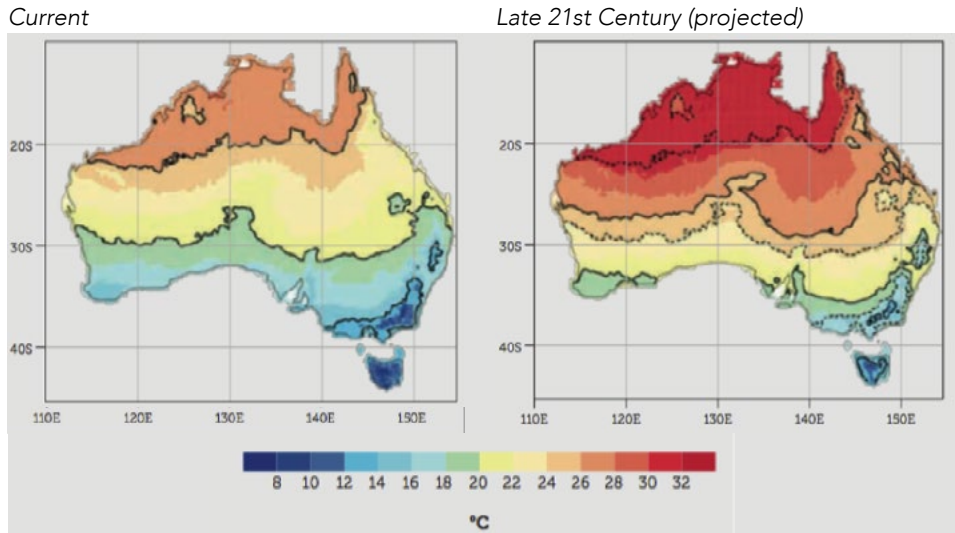


Figure 12b: Rainfall deciles for April to September 1997-2013, relative to the reference period 1950-2013, based on ANAP data. Source: BOM (2014).

Winter Rainfall (April to September)

Source: Bureau of Meteorology 2014<sup>13</sup>, in Hughes et al. 2015<sup>17</sup>.

Figure 2: Annual Mean Temperature (C)



The cooler average conditions of Southern Victoria (relative to the rest of Australia) will be part of a shrinking area capable of conducting cooler climate agriculture the kind of agriculture that has been possible over most of the southern part of Australia up till now.

Source: CSIRO and Bureau of Meteorology 2015<sup>20</sup>, in Hughes et al. 2015<sup>17</sup>.

## Cities can contribute to sustainable and resilient food systems

In the context of growing climate pressures and decreasing availability of natural resources, city region food systems create opportunities for resilient and sustainable food production under increasingly challenging conditions. Cities are not always regarded as obvious sites of food production, but they have good access to the necessary resources.

Sustainable and resilient food systems need...	Cities have ...
Fertile land	Areas of highly fertile land - cities were often founded in places with highly fertile land to provide a secure food source for their growing populations
Water	Access to secure sources of recycled water from city water treatment plants and desalination plants, as well as storm water from urban water catchments
Fertilisers	Abundant supplies of under-utilised organic waste that can be converted to compost and utilized for food production
Labour	Access to sources of labour that may be scarcer in more remote and regional areas
Food processing infrastructure	Good access to infrastructure for secondary food processing and manufacturing
Transport infrastructure	Good road systems and transport links to move fresh foods quickly and efficiently to population centres
Proximity to markets	Close proximity to key markets for fresh foods in major population centres

City region food systems create opportunities for resilient and sustainable food production under increasingly challenging conditions.

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- 3 City region food systems: sustainable food systems and urbanization – a call for action. On the occasion of the World Urban Forum 7, Medellin, Colombia – revised for the CFS October 2014.
- 4 ICLEI Seoul Declaration for Sustainable Cities: Building a world of local action for a sustainable urban future. ICLEI World Congress, 9 April 2015.
- 5 Milan Urban Food Policy Pact, 15 October 2015. The City of Melbourne is a signatory to the Milan Urban Food Policy Pact, and developed a city food policy in 2012.
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- 15 Cline (2007), cited in Hughes, L., Steffen, W. Rice, M. and Pearce, A. (2015) Feeding a Hungry Nation: Climate Change, Food and Farming in Australia. Climate Council of Australia.
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- 17 Hughes, L., Steffen, W. Rice, M. and Pearce, A. (2015) Feeding a Hungry Nation: Climate Change, Food and Farming in Australia. Climate Council of Australia.
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## More information

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