

# Evolving Climate Adaptation Planning across South Australia



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# The aim of this document is to

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Provide the background to the development of the Regional Adaptation Planning process and outline the respective roles and responsibilities of the Regional Adaptation Planning partners

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Present a timeline of key milestones in the development of the Regional Adaptation Planning process

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Represent eleven case studies from every region that showcase the range and depth of activities being undertaken in the planning regions

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## Photo Credits

- The Local Government Association of South Australia
- SA Murray Darling Basin NRM Board
- Resilient South Group of Councils

## Further Information

For further information, go to the LGA website: [www.lga.sa.gov.au](http://www.lga.sa.gov.au) or contact Victoria Brown, Senior Policy Officer on 08 8224 2053 or [victoria.brown@lga.sa.gov.au](mailto:victoria.brown@lga.sa.gov.au).

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# Development of the Regional Adaptation Planning process

South Australia is committed to building resilience to the likely impacts of climate change. The State Government and the Local Government Association (LGA) have jointly developed an integrated and strategic approach to driving adaptation action at individual, regional and local levels.

Since 2008, the two levels of government have worked together to develop a climate change adaptation planning program for the state which is designed to help each of South Australia's planning regions to develop a climate adaptation plan specific to its needs.

The **Regional Climate Adaptation Planning Program** is guided by *Prospering in a Changing Climate: a Climate Change Adaptation Framework*, which the State Government formally adopted in 2012, and the *Climate Change Adaptation Planning Guidelines*.

In line with the State Strategic Plan Target 62, all regions completed their Regional Adaptation Plans (RAPs) by the end of 2016.



## Responsibilities

The main partners in the RAP process are the State Government (Department of Environment, Water and Natural Resources (DEWNR) and Natural Resource Management (NRM) Boards), the LGA, South Australian Councils and Regional Development Australia (RDA) Boards.

All partners play an important role in working with business, non-government organisations and local communities to develop state-wide and regional responses.

The broad roles for these partners are shown in figure 1 on the next page.

## Broad Responsibilities of the Partners

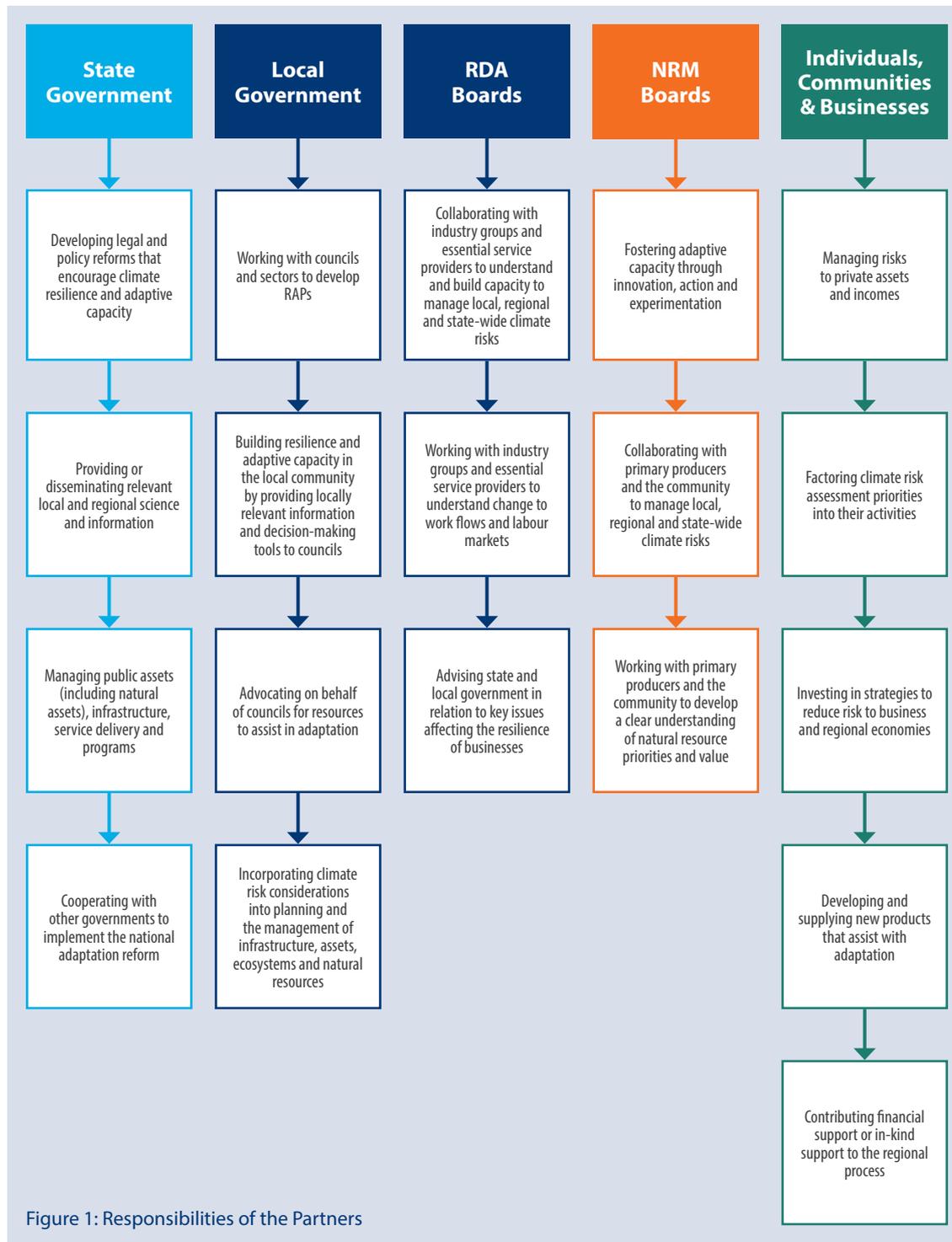


Figure 1: Responsibilities of the Partners

# Timeline of achievements

The following graphic outlines key events in the development of the partnership between state and local government and the framework under which the RAPs have been implemented.

2008



**Developing partnerships**

The State Government and the LGA developed the State and Local Government Climate Change Sector Agreement to provide the foundation for a partnership between the two tiers of government. This was renewed until the end of 2017 and discussions are ongoing to sign a new sector agreement.

2009



**Identifying a clear focus**

The LGA Mutual Liability Scheme\* highlighted the potential for civil liability risks if councils failed to consider climate impacts, and developed Climate Adaptation Plans for integration into each council's strategic plan, and a 'Climate Risk Profile' for the sector. Outcomes from these council level plans were incorporated into the Regional Adaptation Planning process.

\* footnote re: MLS  
 \*\* footnote re IVA  
 \*\*\* footnote re CLGR now Legatus

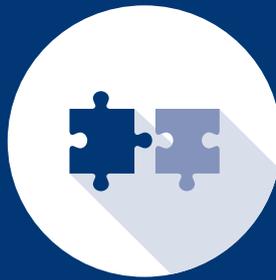
2010



**Identifying vulnerabilities**

The State Government developed a climate adaptation framework, **'Prospering in a Changing Climate'** which encouraged development of regional partnerships and required the use of an IVA\*\* to identify impacts to inform the development of an adaptation planning process.

2011



**Integrating an approach**

An integrated IVA tool was developed and piloted by the CLGR\*\*\*. The pilot was successful and 'Climate Change Adaptation Planning Guidelines' were developed by the LGA. The Guidelines offer a robust methodology for developing consistent RAPs.

2012

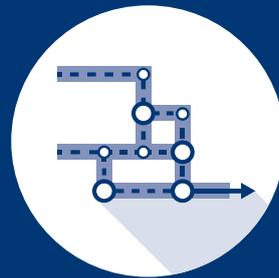


**Overcoming barriers**

The State Government and the LGA jointly developed the Science to Solutions (StoS) Program to identify and address a range of governance, institutional and capacity building barriers that could hinder effective implementation of RAPs. Outcomes of StoS include 5 function specific climate adaptation notes with associated training sessions.

## Timeline of Achievements (cont.)

2013



**Adaptation pathways**

The Eyre Peninsula pioneered the use of the Adaptation Pathways approach, which highlights the distinction between making decisions now (when evidence is readily available and impacts are known) and plotting a pathway to finding answers where evidence is unclear, that will facilitate future decision making.

2014



**Considering values**

A values based approach was developed and trialled in the SA Murray Darling Basin Region. The approach was framed in the context that climate impacts will affect vulnerable communities most, and was successful in obtaining support from CALD community members and the aged and youth groups.

2015



**Prioritising actions**

The Resilient South was the first region to enter into a priority and action planning process to guide implementation of their plan. They re-engaged 150 program champions who were instrumental in gaining stakeholder support assisted in developing the priorities.

2016



**Completing planning stage**

SA's Strategic Plan, Target 62: 'Develop regional climate change adaptation plans in all state government regions by 2016' was met in 2016 as all eleven regions completed their plans by December 2016. This was a huge achievement, which we will build on in the future implementation of the RAPs.

2017



**Towards implementation**

All of the regions now have implementation plans which they are working through. The approach to implementation varies from region to region, but all remain committed to working towards achieving their climate adaptation outcomes (the case studies will provide information on achievements).

# Case study 1: Identifying vulnerabilities and creating an integrated approach

## Central Local Government Region (Legatus)

### Key partners

Key partners of the Yorke and Mid North Alliance are the Central Local Government Region (now known as the Legatus Group), Northern and Yorke NRM Board, and RDA Yorke and Mid North.



### Related information

The process for developing the RAP evolved from the development of an Integrated Vulnerability Assessment tool ('IVA') into a seven step strategic methodology for preparing a RAP.

The method shares many elements of a standard strategic planning approach, but has been tailored to:

- Respond to the climate impacts projected specifically for South Australia; and
- To fully incorporate climate risk data and vulnerability assessment in decision making.

The methodology is supported by South Australia's Strategic Plan, and 'Prospering in a Changing Climate' which was developed in 2010–11 and formally adopted in 2012.

*The method has constantly evolved as regions across the state pioneered ground-breaking techniques to overcome local barriers and achieve outcomes for all elements of the process*

*The LGA is custodian of the Climate Adaptation Guidelines ('CAPG'), which describe the seven steps and provide a range of tools and resources to assist the regions in undertaking their planning processes*

The LGA periodically refines the CAPG based on trialling of successful techniques across the state, and in line with emerging national and international best practice.

### Drivers

The driver for developing the IVA tool came from the Yorke and Mid North Alliance. The Alliance worked with the State Government and the LGA to analyse, consolidate and refine vulnerability assessments that were being trialled internationally for use in the region.

The IVA tool was piloted successfully and stimulated the development of other aspects of the RAP process.

### Achievements

The IVA methodology was designed to ensure that regional vulnerabilities were identified based on rigorous use of science, and that the outcomes considered the 'triple bottom line' (environmental, social and economic) equitably. The process was designed to incorporate strong collaboration between the key project partners, and engagement across other agencies and with all sectors of the community.



The development of other aspects of the planning process provided a robust, comprehensive and tested means for developing RAPs that were consistent and comparable to other plans being developed across the state. The method ensures quality, avoids duplication and boosts alignment between planning and on-the-ground activities.

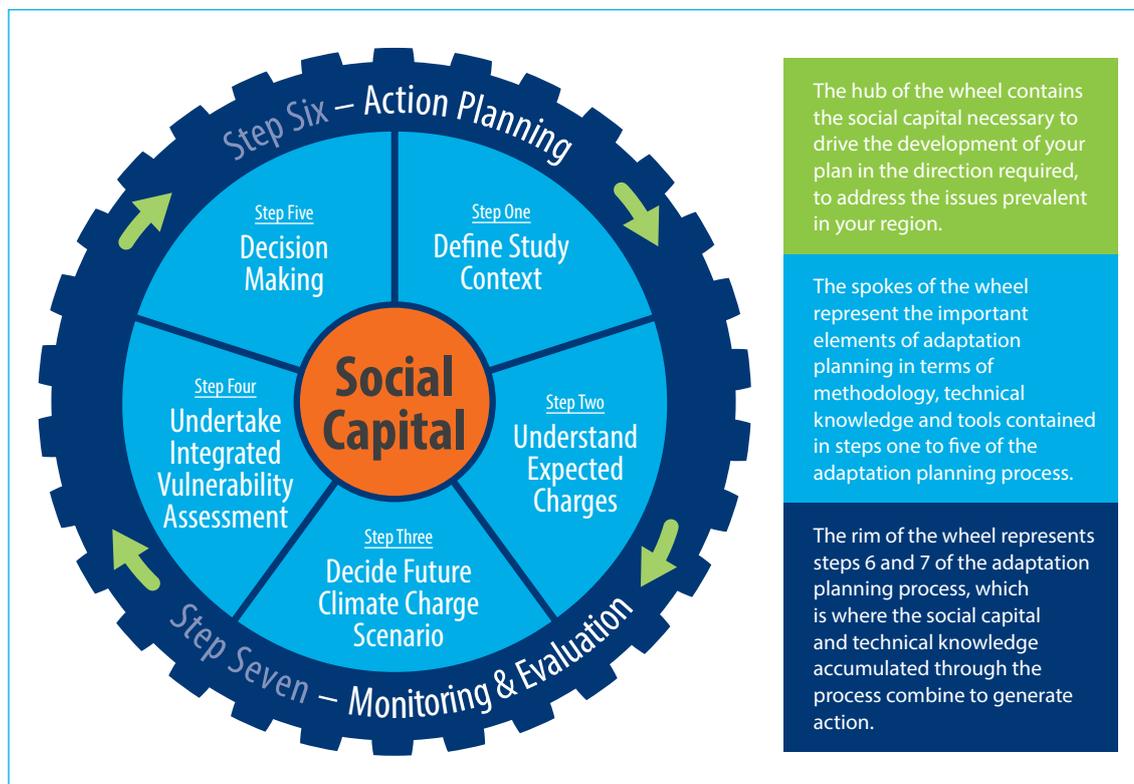
The Yorke and Mid North Alliance played a pivotal role in the development of the CAPG, an important constituent element of the state's climate adaptation planning program.

The Legatus Group has progressed three priority projects identified in their RAP:

- Regional Sustainability Centre;
- Coastal Digital Elevation Modelling; and
- Low Carbon Transition Prospectus.

The region has also refined its decision pathways for priority natural coastal resources and is currently working towards implementation of actions identified through that process into local natural resource programs.

Figure 2: Regional Adaptation Planning steps



# Case study 2: Adaptation Pathways

## Eyre Peninsula Region

### Key partners

The Eyre Peninsula Integrated Climate Change Agreement ('EPICCA') is a collaborative partnership between the Eyre Peninsula NRM Board, RDA Whyalla and Eyre Peninsula, and the Eyre Peninsula LGA. Together, they were responsible for overseeing the development of the Eyre Peninsula RAP.



### Related information

This RAP was innovative for its approach to decision making, as a 'decision pathways' methodology was trialled during the planning process. This introduced the concept of decision timelines that identify decision points based on when critical thresholds have been met.

It is believed to be the first time that a decision pathways approach had been pioneered in Australia, and the first adaptation planning process that recognised the benefits of building flexibility into decision making.

The approach was adapted from a decision pathways process that was successfully undertaken through delivery of the Thames Estuary 2100 project (2002–09). That approach was grounded in the 'adaptive management' process outlined in the 'Risk, Uncertainty and Decision Making' guidelines of the United Kingdom Climate Impact Program ('UKCIP'), which is well recognised for its rigour.

The approach is based on developing a 'route-map' of adaptation options to be considered at particular decision points triggered by climate variables reaching certain (defined) benchmarks. The approach highlights the distinction between decisions that need to be made now (when impacts are already being felt or are pending) and those that need to be made in the future.

This is undertaken by plotting a pathway to finding answers that will facilitate effective future decision making (to avoid impacts into the future).

The RAP includes a series of adaptation pathways for key sectors in the region. It sets out the range and timing of adaptation options for each sector and assists in identifying region-wide and sector specific adaptation priorities for now and into the future.

The region is currently working towards refining the pathways and developing a monitoring framework to ensure proper application of an adaptive management approach, and to measure the success of delivery of priority projects.

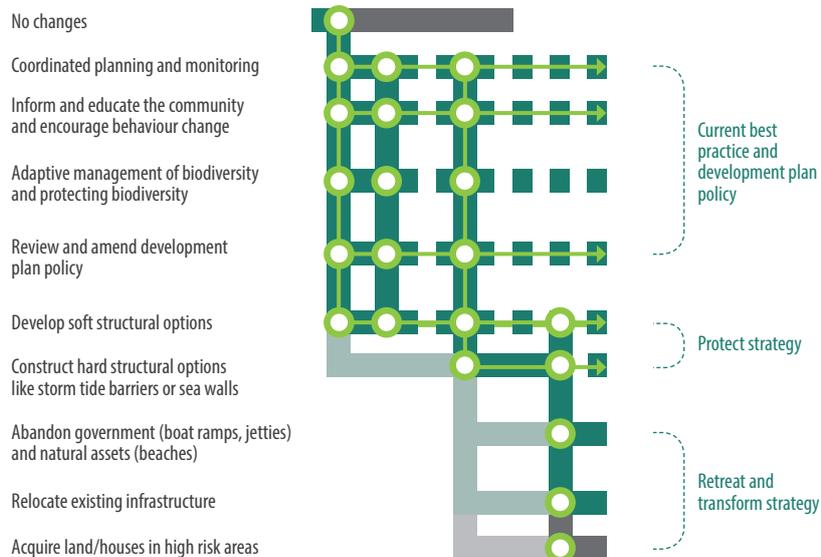
In addition, a range of adaptation initiatives were delivered on the Eyre Peninsula that were funded through the 'Adapt NRM Grants' program. The program was designed to encourage the community and the industrial sector to progress priority adaptation actions highlighted in the plan.

These initiatives included:

- Investigating the economic benefits of healthy coast, marine and land assets;
- Protecting the threatened Malleefowl to ensure survival as the climate changes;
- Improving access to soil moisture to build resilience into agricultural practices;
- Cummins Flood Mitigation Strategy;
- Mortlock Oval Reclaimed Water Irrigation Project; and
- Environmental monitoring to improve understanding of oyster performance.

The regional partners are currently actively seeking funding for the acquisition of Light Detection and Ranging ('LiDAR') data of the whole coastline of Eyre Peninsula.

**Figure 3:**  
Example of  
an Adaptation  
Pathway



Sea-level rise is a major risk for many coastal areas of Eyre Peninsula. Decision-makers (both public and private sector) on Eyre Peninsula, faced with the problem of adapting to sea-level rise, will need appropriate information to make informed decisions. A LiDAR survey and sea-level rise model will be required to identify accurately which areas will be affected by inundation.

To date LiDAR surveys have not been undertaken on Eyre Peninsula, as it is too costly for any one party to acquire. This lack of essential data is an ongoing challenge for the region and its many industries, which is affecting coastal development in the region. This became particularly evident in 2016 with the impact of storm surges on important coastal areas.

**Drivers**

Decision makers have long called on scientists to provide more quantitative information on the uncertainties of climate projections, which is something that science is not always able to provide. This has often led to reluctance to act and confusion in determining the best way forward.

There were a number of sectors on the Eyre Peninsula that were not ready to determine a definitive course of action because of these uncertainties. The decision pathway approach allows decision makers to plot an effective course through an uncertain future.

Other adaptation methods often focus on developing criteria to make decisions now about the one or two 'best' adaptation options to tackle future climate impacts, which can lead to maladaptation if the climate scenarios planned for do not emerge.

The decision pathway approach requires decision makers and stakeholders to make an assumption about the most

likely projection and then develop a map of options to navigate the likely impacts. These options are developed on a timeline to allow flexibility and sequencing of actions. The options developed are intended to be reviewed as new information comes to light.

**Achievements**

This adaptation planning methodology provides for greater levels of flexibility in decision making. The approach aims to ensure that whatever short to medium term plan is adopted, it is set in a framework that will not be maladaptive if climate change progresses at a rate that is different from what is predicted to be 'the most probable' today.

*All but two of the eleven state government planning regions used adaptation pathways as their prime method for decision making for climate adaptation*

It is obvious that the majority of decision makers are more comfortable with this approach, although it must be noted that pathways have to be accompanied by a strong monitoring and evaluation process to ensure critical deadlines are not missed.

As such, particular emphasis is now being placed on evolving the approach to include monitoring and evaluation (step 7 in the CAPG) to ensure deadlines are not missed, and effective decisions can be made at the appropriate time with the appropriate knowledge and support.

# Case study 3: Putting values at the core of the process

## Murray and Mallee Region

### Key partners

Key partners of the Murray-Darling Basin RAP were Renmark Paringa Council, Rural City of Murray Bridge, District Council of Loxton Waikerie, Berri Barmera Council, Mid Murray Council, District Council of Karoonda East Murray, Southern Mallee District Council, Coorong District Council, Ngarrindgeri Regional Authority, Murray-Darling Basin NRM Board, RDA Murray and Riverlands, Murray and Mallee Zone Emergency Management Committee, and the South Australian Fire and Emergency Services Commission.



### Related information

A decision was made early on in the planning process to base the approach primarily on a values exercise that identified:

- The core beliefs of the communities living in the region;
- How they will be impacted by climate change; and
- How to fully include communities in developing equitable, fair and inclusive adaptation outcomes.

An engagement strategy was developed that identified all community groups in the region and considered the barriers to involvement. The community engagement process involved identifying 'Project Champions' from among influential community members and resulted in 22 Champions being identified across 12 sectors.

Champions were interviewed as part of the initial consultation to gather information about their particular sector / enterprises, but also with the intention that they would feed information back into their communities. The RDA also played a key role in engaging businesses.

The project team trialled a values based approach where the engagement undertaken with each group was tailored to their connection to the region, and to the

specific impacts that they would be affected by.

The feedback from a number of sessions was then incorporated into the IVA by the project team. This was an efficient way of gaining detailed feedback and information.

### Drivers

In many ways, the communities living in the region practice adaptation planning on a daily basis. However, much of the research and engagement undertaken in the region was focused on primary production, water security, business and industry, rather than on community impacts.

It was recognised that all societal groups should be included in this adaptation planning process so that social issues could be fully analysed and that flexibility would be required to achieve this.

*Over 150 stakeholders participated in the process from key sectors across the region, including agriculture, tourism, natural resources management, emergency services, and health care and community services, which demonstrates community interest in climate issues*



### Achievements

The ultimate reason for the success of the plan was the engagement strategy and the development of new ways to get local communities involved. The adaptation actions that were developed benefited from the input of a diverse set of community groups, along with the business and agricultural sectors.

The engagement strategy resulted in many community groups being involved in the process that had not previously contributed to adaptation planning processes.

It was realised through this process, that the only way to ensure that stakeholder/ community values were fully incorporated into the development of adaptation actions was to adopt a tailored approach to communication and engagement.

A good example of a tailored approach to engagement was the partnership that was developed with the Ngarrindjeri people, represented through the Ngarrindjeri Regional Authority. The Ngarrindjeri have

a close connection to the land, a strong social fabric, and have been recognised as providing a significant contribution to overcoming some of the worse impacts of the millennium drought.

The **'Kungun Ngarrindjeri Yunnan Agreement'** was brokered to enable active participation of the Ngarrindjeri people, and ensured that their cultural values were integral to the development of the adaptation options, along with values that they share with other members of the community.

As such, over half of the priorities of the plan include actions that take account of specific issues being faced by the Ngarrindjeri people, although it must be recognised that many of these issues are shared across Murray and Mallee communities. These include:

- Protection of native vegetation;
- Pest, plant and animal management;
- Coorong and lower lakes management; and
- Assisting vulnerable members of the community.



# Case study 4: Driving implementation

## Metropolitan Southern Adelaide Region

### Key partners

The Resilient South Partnership of Councils was initiated in 2009 and is made up of the Cities of Onkaparinga, Holdfast Bay, Mitcham and Marion. This partnership, together with the Adelaide and Mount Lofty Ranges NRM Board and RDA Adelaide Metropolitan, developed the Resilient South RAP.



### Related information

The RAP was delivered in 2014, and incorporated many innovative elements. These included utilising models of receptivity to incorporate social science considerations into the IVA and considerable input from 150 Program Champions.

Engagement continued with the Champions after the RAP was delivered to aid the development of a local government regional implementation plan. During 2015, the Champions were invited to be part of further consultation that was aimed at prioritisation of the RAP's preferred adaptation actions.

*The main focus of the prioritisation process was councils' roles and responsibilities, common regional issues, and priorities for action. The criteria also highlighted adaptation actions that delivered multiple benefits for councils.*

The outcome was the development of the RAP that describes four foundation projects designed to facilitate the implementation of the priority adaptation actions identified.

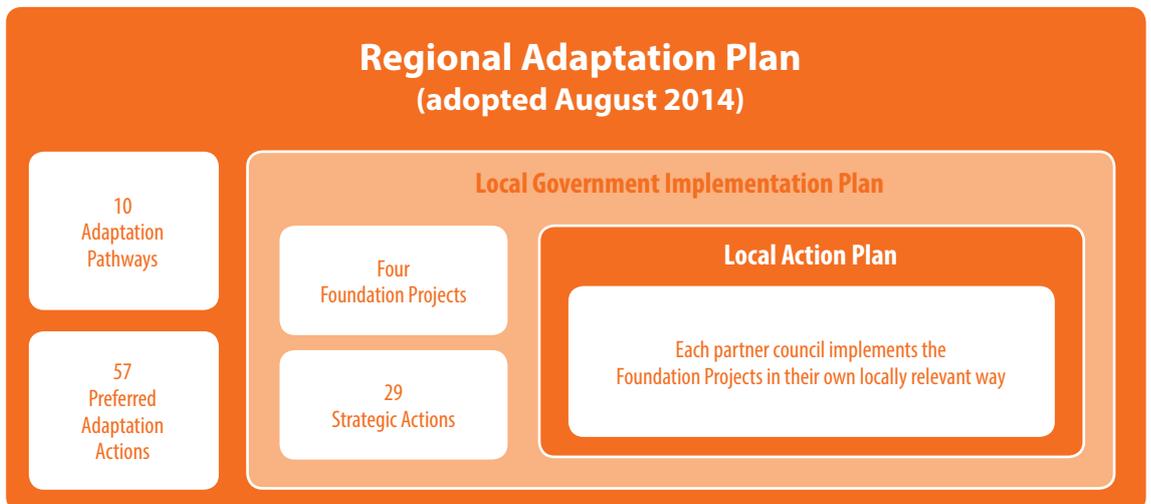


Figure 4: Resilient South Hierarchy of Plans



Each council has since committed to continue to work together regionally on the foundation projects as well as implementing adaptation in their own locally relevant way either through a local action plan, or a climate change policy.

Activities will focus around the region’s four foundation projects, these being: Equip; Aware; Cool Places and Source to Sea (see below).

**Drivers**

After completing their adaptation planning process in 2014, partner councils were motivated to begin implementation of their RAP.

It was recognised that the approach aimed to:

- a. Refine priorities identified in the plan;
- b. Secure their delivery; and
- c. Monitor progress towards reducing the identified vulnerability, needed to evolve.

The Resilient South Partnership of Councils were in a good position to work towards evolving these key aspects of the process.

**Achievements**

Through their adaptation planning process, the Resilient South Partnership of Councils developed a process that successfully overcame a number of identified barriers to the implementation of adaptation responses.

The method for prioritisation and action planning that was developed by the Resilient South Partners has been disseminated and utilised by some of the later RAPs.

Preparations are underway to consult with other regions on a model process for prioritisation and action planning of regional priority actions. This will assist in updating the CAPG in relation to action planning and monitoring and evaluation.

In addition, Resilient South has developed the ‘Southern Region Local Government Implementation Plan’. In support of the plan, three councils have Local Action Plans (‘LAPs’), while a fourth has developed a climate change policy.

Execution of these LAPs will result in many of the priority adaptation actions identified in the RAP being implemented.

**1. Equip**

Integrating adaptive thinking into everyday council operations and long-term decision making. An example of how this is being facilitated is through the review of design specifications for storm water infrastructure.

**2. Aware**

Influencing the region’s willingness and ability to adapt to a changing climate. For example, councils in the region are facilitating this by improving the preparedness of residents, volunteers and schools to build resilience in the event of, and following an emergency.

**3. Cool places**

Focuses on mitigating heat and providing outdoor infrastructure that can deliver positive health and wellbeing benefits. Urban Heat Island Mapping is being conducted to facilitate this foundation project.

**4. Source to sea**

Aims to enable the region to respond to the impacts of climate change on the coast and water resources. This is facilitated by working with the Adelaide and Mount Lofty Ranges NRM Board and Coast Protection Board to protect beaches and cliff tops, water quality and marine biodiversity.

# Case study 5: Resilient landscapes, resilient communities

## Barossa Region

### Key partners

The Barossa region released their RAP in 2014, continuing an established dialogue in the region around climate change and sustainable futures.

The key partners were RDA Barossa, the Barossa Council, Light Regional Council, Adelaide Plains Council (formerly the District Council of Mallala), the Barossa Grape and Wine Association, and the Adelaide and Mount Lofty Ranges NRM Board.



### Related information

The region has a high value economy and environment and is famous for its wine production, regional food culture, livestock, grains and horticulture farming. The region also supports a diverse range of native ecosystems.

The RAP highlights the need for the region to prepare for a different future climate and understand how traditional industries (mentioned above) can respond to climate change and thrive into the future.

An IVA identified key areas of decision making that provided a focus for the development of adaptation actions. Adaptation options highlighted in the RAP include growing new varieties of wine grapes and managing parts of the environment that provide refuge for species during climatic extremes.

Inputs from the project team, stakeholders and the steering committee were used to identify the highest priority adaptation actions.

The key areas of decision making in the RAP are illustrated by Figure 5.

Figure 5: Key areas of decision making



For each key area, specific context has been given and adaptation options considered. Each key area focusses adaptation options on safeguarding the region's unique environment.

For example, the adaptation options for viticulture focus on how viticulture can maintain quality and production levels given changing climatic conditions. Adaptation options for this area include:

- Labour/resources;
- Irrigation management;
- Biodiversity catchment management;
- Water resource management;
- Biosecurity;
- Managing extremes;
- Varieties; and
- Vine management.



Comparatively, the adaptation options for biodiversity management focus on how the region can maintain biodiversity and habitats for native flora and fauna given the rising threats of a warmer and drier climate. As shown in Figure 6, adaptation options have been categorised into passive, active and transformational options in order to prioritise the adaptation actions to be taken for different landscape types.

### Drivers

Several factors drove the RAP's focus to safeguard its unique environment.

Drivers include the need to further develop water efficiency measures, back-up water and power supplies, community scale emergency response planning, climate sensitive design of infrastructure, and water reuse with a focus on stormwater management and aquifer storage and recovery.

### Achievements

The key to RDA Barossa's implementation of the adaptation framework has been to embed actions into:

- Normal dialogues;
- Business plans;
- Disaster readiness;
- Succession planning;
- Infrastructure;
- Cycle path planning;
- Future industries; and
- Energy and other business costs.

By embedding actions, the conversation does not focus on climate change itself, and instead encourages a future thinking orientation for businesses which incorporates knowns and unknowns about climate, weather and water, and prepares for a less polluting, more resilient, self-sufficient and self-determined future.

The RAP's focus on protecting its environment has resulted in a range of actions. For example, two plans have been developed during the implementation phase:

- The Water for Adaptation Plan helps divert water resources from multiple sources to supply fit for purpose water as and when needed for environmental, social and economic uses; and
- The Extreme Heat Risk Management Plan has been developed following investigations and identification of options for managing extreme heat risk and disasters in the region. This Plan identifies safe havens and gaps in supporting infrastructure and services, and makes better use of existing assets.

A number of initiatives have also begun since the release of the RAP:

- Transition Gawler is a community based group that undertakes initiatives for sustainable futures for Gawler including better renewable energy options and green spaces; and
- Resilient Landscapes is a Barossa Grape and Wine led initiative to improve adaptive qualities of our environment, landscapes and farming lands. This initiative aims to improve understanding of these landscapes, and how they are responding to climate change.

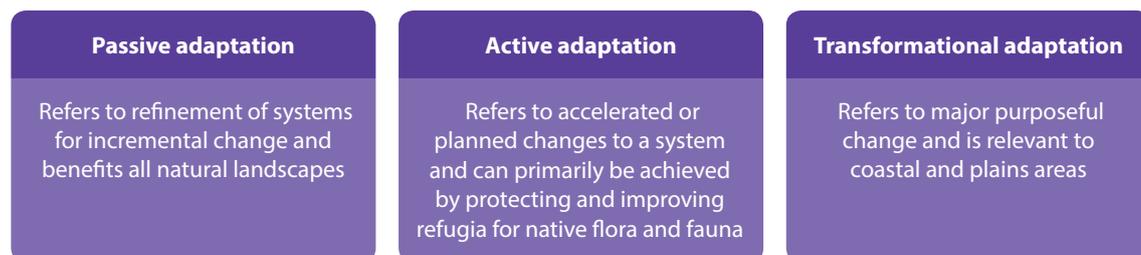


Figure 6: Categorisation of adaptation options for biodiversity management

# Case study 6: Industry conceptual models

## South East Region

### Key partners

The Limestone Coast RAP was finalised in April 2016.

Key partners were RDA Limestone Coast, the Limestone Coast LGA and the South East NRM Board.

Over 100 key stakeholders from sectors including community development, environmental NGOs, education, health and primary production were involved in the development of the RAP.



### Related information

Since the planning stage, project partners have been committed to ensuring the RAP is implemented.

The RAP identifies that raising awareness and understanding of the risks of climate change, as well as information sharing and collaboration to build capacity, are important adaptation options.

In conjunction with the development of the RAP, the South East NRM Board has been reviewing its regional NRM Plan to make it climate change-ready. As part of this process, conceptual models of the main natural resources-dependent industries and the potential impacts of climate change were developed in collaboration with industry representatives.



Representatives at a drafting workshop

Conceptual models have been developed for the following industries:

- Cropping (hay and pasture);
- Livestock (sheep, beef and pork);
- Forestry;
- Dairy;
- Fishing (including rock lobster and scale fisheries);
- Irrigated perennial horticulture (apples, cherries, wine grapes);
- Grains and seeds;
- Irrigated annual horticulture (including potatoes and onions);
- Manufacturing (woods and paper products, wine, milk products, meat products, etc.); and
- Nature (including nature-based tourism, parks and recreation).

The models summarise the key environmental and socio-economic values underpinning the industry, as well as what natural resources the industry depends on, what drives its productivity, the benefits from the industry, and the pressures/threats to the industry and to natural resources.

The models were developed through workshops and one-on-one meetings with over 100 representatives from the industries, where the outputs, benefits and threats to and of each industry were identified.

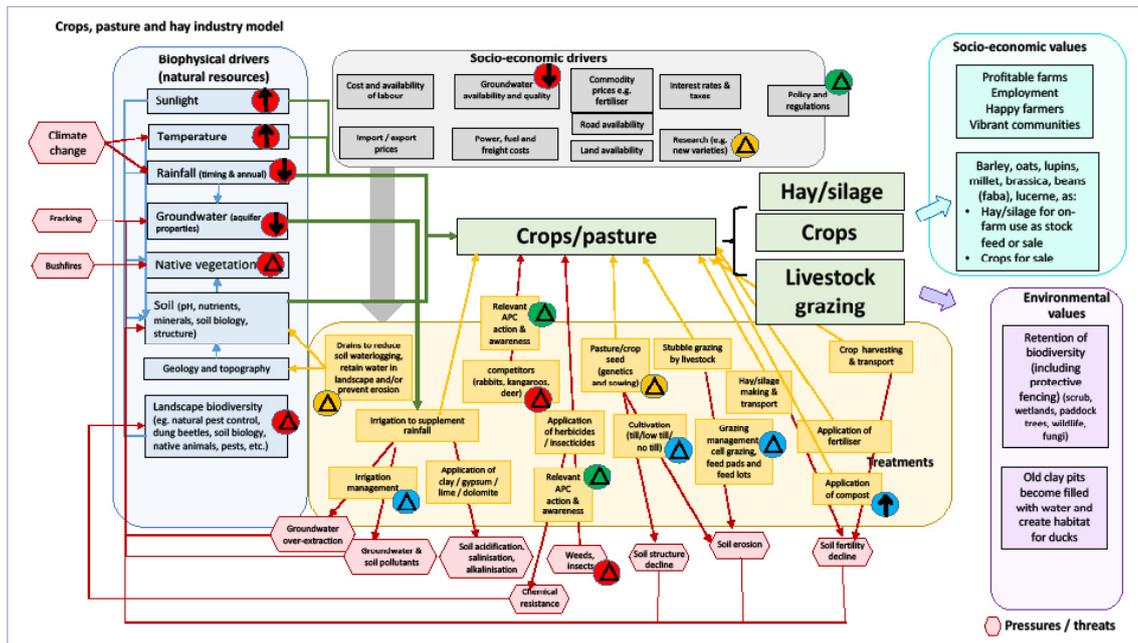


Figure 7: Conceptual Map developed for Cropping

During the workshops, the climate change projections for the region were considered. Actions to adapt to climate change were identified, including whether they should be implemented by the industry, the NRM Board, the State Government or other groups and agencies.

The actions were indicated on the box-and-line diagrams using symbols to identify where the action is expected to have an effect.

As shown in Figure 7, biophysical (including natural resources) and socio-economic drivers are illustrated on the left side and top respectively. The figure also shows various pressures and threats existing in relation to both the biophysical drivers, and the treatments available. Socio-economic and environmental values are also identified to the right of the figure.

**Drivers**

The RAP recognises that climate change has the potential to impact key businesses and industries in the region, and therefore emphasises the need for the region to be climate change ready.

The NRM Board is embedding climate change adaptation and mitigation into its own planning process, commencing with the regional NRM Plan. The NRM Board has also taken a landscape approach to natural resources management, including those natural resource-dependent industries that sit within the regional landscape.

To develop the models, NRM staff engaged with industry representatives, including those that were involved in the

development of the RAP, to discuss in depth the values, drivers and threats for each industry under climate change, and hear from industries about what they think is important in the use and management of natural resources.

**Achievements**

The RAP identifies the importance of raising awareness and understanding of climate change risks, as well as the importance of information sharing and collaboration to build capacity.

By developing these industry models, industries' use of natural resources can be better understood. The models identify how key industries in the South East work, and highlight where natural resource management action is needed. The models identify industry-specific actions that can be taken and suggest who is responsible for undertaking these actions.

The models have served the dual purpose of raising both awareness and understanding of the risks and potential impacts of climate change.

The use of conceptual models has allowed the application of the Theory of Change methodology linking action to outcomes. The models will inform NRM action plans to be implemented in the region over the next 1–5 years by the NRM Board and community, helping to embed climate change adaptation and mitigation.

# Case study 7: Adaptive capacity building for urban heat

## Metropolitan Western Adelaide Region

### Key partners

The AdaptWest partnership formed to undertake and implement the Metropolitan Western Adelaide Region's RAP. The key partners are the Cities of Charles Sturt, Port Adelaide Enfield and West Torrens. Adelaide and Mount Lofty Ranges NRM and RDA Adelaide Metropolitan were also involved in the development of the plan.

Seed Consulting, URPS, AECOM and Geoscience Australia helped to develop the RAP, which includes exposure and vulnerability maps.

The development of AdaptWest has been underpinned by the involvement of key stakeholders including community groups, industry and service providers who have helped to identify the region's values, vulnerabilities to climate change and adaptation opportunities.



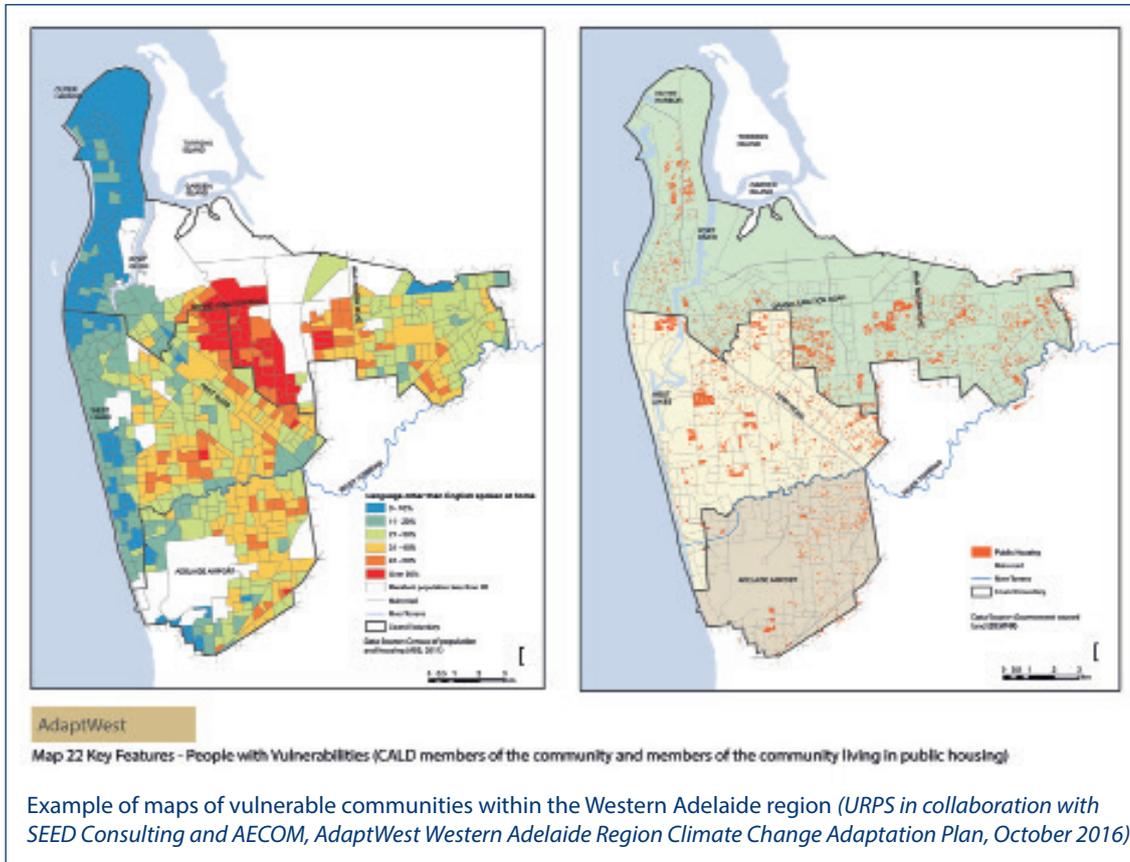
### Related information

Vulnerable communities and their sensitivity to heat stress was a key area of interest for the region, and this issue was explored in more detail in Stages 1 and 2 of the planning process. In addition, it was explored in detail in AdaptWest's Social, Community Resilience and Health Research Paper ('Research Paper').

As part of the analysis, average vulnerability population data from across greater Adelaide (2011 Census) was compared to averages in the Metropolitan Western Adelaide region. It was concluded that vulnerability in the region was much higher than the average across greater Adelaide.

The main vulnerabilities recorded in the data are listed below:

- A greater population aged over 65 years who will be more vulnerable to heat stress;
- More people who assess themselves as having poor health who will also be more vulnerable to heat stress;
- A significantly greater proportion of the population who speak English 'not well' or 'not at all' and may miss initiatives to raise awareness and other supports offered by councils; and
- Escalating electricity prices that prohibit use of air conditioning for the following:
  - » Single person households;
  - » Pensioners living alone;
  - » More income support recipients;
  - » More people who need assistance with core activities;
  - » More people living with psychological distress; and
  - » Above average proportion of dwellings with one or no motor vehicles.

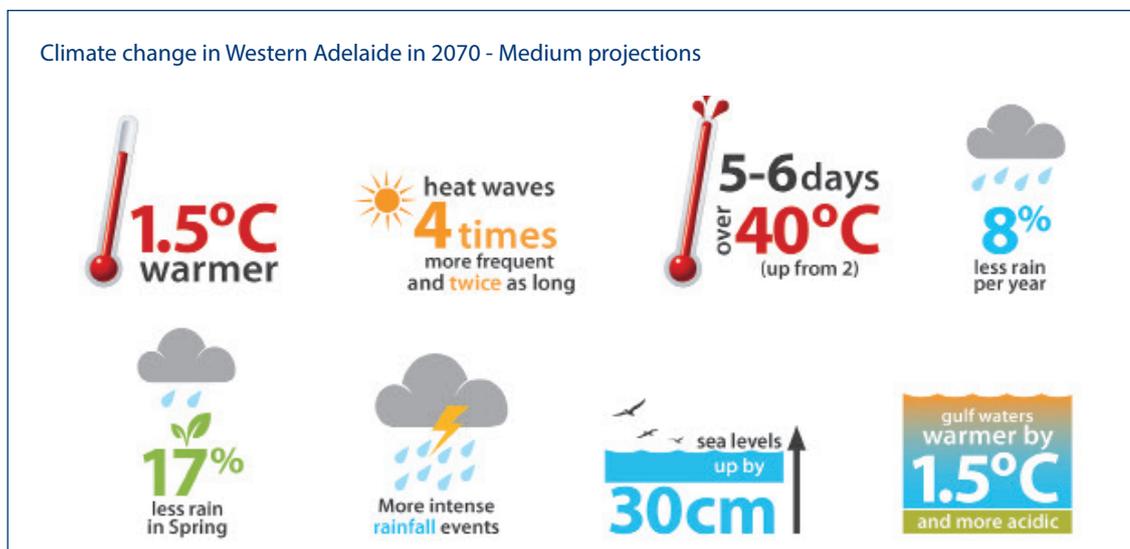


These findings highlight the potential impact of heat stress on communities, and how urban heat will be a major challenge for the region as the climate changes.

The Research Paper drew on previous experience of heatwaves, including:

- Data from Department for Health about the increase in emergency department presentations during heatwaves; and
- The impact of heat on residents from certain demographics or with particular medical conditions.

The evidence contained within the Research Paper was used to inform vulnerability scores as part of the region's IVA. The highest vulnerability score within the Social, Community Resilience and Health theme was attributed to the risks associated with increasing frequency, intensity and duration of heatwaves, and in particular the demand for emergency services.



# Case study 7: Adaptive capacity building for urban heat (cont.)

## Metropolitan Western Adelaide Region

Based on the analysis undertaken in the IVA and the transition of that information into the adaptation planning framework, critical adaptation pathways were identified. Examples of these pathways that relate to the challenge of urban heat include:

- Theme: Community Resilience
  - » Communicate and educate to raise awareness about climate risks and promote current responses;
  - » Increase the capacity of the emergency services sector;
  - » Develop and enhance community connectedness programs that build resilience; and
  - » Plan and design climate resilient community facilities and public places.
- Theme: Urban Living
  - » Reform standards, regulations and land use planning policy to promote and encourage development, urban design and public realm that is climate resilient;
  - » Increase green urban spaces; and
  - » Increase tree canopy cover.

### Drivers

Planning for people with vulnerabilities is an important element of building strong and connected communities and quality of life for everyone.

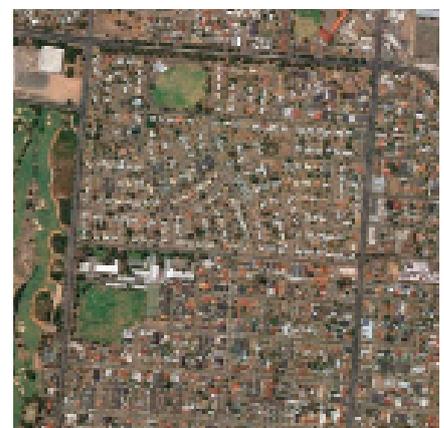
The Metropolitan Western Adelaide demographic profile highlights some of the vulnerable communities within the region and emphasises the need to further understand how heat is likely to impact these people and the adaptive capacity of the region and its community to respond to extreme heat events.

### Achievements

From the RAP's findings, the Urban Heat Mapping Project (Seed Consulting Services, 2017), in conjunction with thermal imagery maps, have been developed and are a useful tool to commence meaningful conversations about climate change adaptation.

The maps and case studies have provided a valuable snap-shot of the nature of heat in the region. This visual information helps to guide planning, analysis, communications and decision making about the challenges and opportunities presented by this element of climate change, and helps to prioritise adaptation options.

Example of the cooling effect of light coloured roof materials, tree canopy cover and irrigated open space in the urban environment (Seed Consulting Services, Western Adelaide Urban Heat Mapping Project Report, August 2017)



# Case study 8: Integrating climate adaptation and economic development in the transition to a low carbon economy

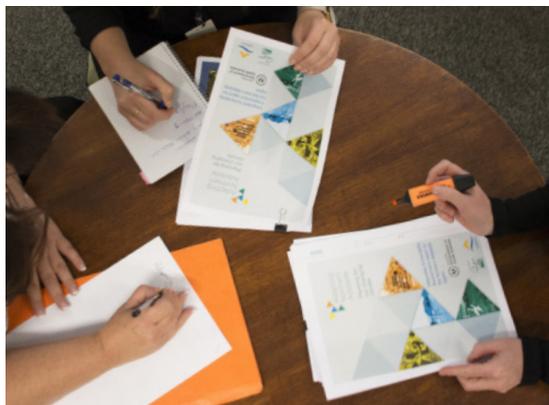
## Metropolitan Northern Adelaide Region

### Key partners

The Adapting Northern Adelaide RAP was released in 2016.

Project partners were the Cities of Salisbury and Playford, as well as stakeholders and communities that live and work in the Metropolitan Northern Adelaide region.

Adelaide and Mount Lofty Ranges NRM and RDA Adelaide Metropolitan were also involved in the development of the plan.



The region is undergoing major economic change with the closure of General Motors Holden car manufacturing. Unemployment and youth unemployment rates are high yet the region has a strong and collaborative business culture, a highly skilled workforce, and demonstrates continued drive to adapt to challenges and seek out new opportunities and partnerships.

This RAP is unique in that it blends the process of developing adaptation actions with the region's continuing efforts to support its economic transition.

Many of the adaptation responses identified in the RAP align strongly with policy initiatives at the state and federal government level to support green and low carbon economies.

Four of the RAP's adaptation priorities focus on ways in which adaptation and economic development can be integrated. These priorities focus on the creation of liveable communities through climate-ready developments, adapting the economy through investment in horticulture, smart investment in urban green space and natural environments, and the development of green industries.

### Related information

The region is undergoing rapid and significant change. The City of Playford has the fastest growing population with new developments such as Playford Alive and Buckland Park likely to drive continued population growth into the future. In addition, the City of Salisbury is experiencing significant levels of in-fill development.

# Case study 8: Integrating climate adaptation and economic development in the transition to a low carbon economy (cont.)

## Metropolitan Northern Adelaide Region

### Example: Horticulture – challenge and opportunity

The growing horticultural sector in northern Adelaide provides an excellent example of the linkages between climate adaptation and economic development.

Secure and reliable sources of water have been created through the Virginia Pipeline Scheme to be expanded to create the Northern Adelaide Irrigation Scheme with multiple benefits in providing resilience against drought, while reducing the amount of wastewater discharged to the marine environment. The growing horticultural sector will support more food processing and value adding, as well as local jobs.

Growers are looking for solutions to improve irrigation efficiency, or adopt advanced hydroponic technologies, which require smart monitoring and control systems.

Growers, like all businesses, face significant challenges from the rising cost of electricity which is used particularly in refrigeration pumping systems that are energy intensive. It is therefore critical for the sector to adapt by incorporating local renewable energy and energy efficiency solutions as well as to strive for the best energy contracts.

Another aspect of horticulture relates to maintaining soil health for the longer term by taking steps to reduce the risk of storm flooding, water logging, irrigation salinity, and sodicity. While these are not exclusively climate change issues, growers recognise that there are climate variability and climate change components in each risk which need to be managed in order for the horticultural sector to prosper.



Adelaide Produce Market Stall at the Adelaide International Bird Sanctuary Fly-away Festival 2015



Figure 8: Infographic showing key area of decision making themes for the Adapting Northern Adelaide Project

**Drivers**

The region acknowledged that climate change risks must be addressed in order to build resilience in its community, economy and environment.

Economic drivers remain at the forefront of strategic planning and decision making, particularly in Northern Metropolitan Adelaide, where traditional industries are being compelled to look at new business models, markets and products.

Through the identification of progress in areas such as water management, wetlands creation, recycling and advanced horticulture, it became evident that Northern Adelaide businesses and communities have a culture supportive of continued adaptation.

**Achievements**

To implement the RAP, the region has taken action to encourage the integration of climate adaptation and economic development. For example:

- During the first year of implementation, efforts focussed on engaging and connecting with businesses by hosting an Adaptive Economy Forum where priorities for moving towards an adaptive economy were identified;

- In March 2017 an Energy Speed Networking Forum was held to bring together businesses in need of energy solutions with providers of energy related systems and services;
- The Northern Adelaide Waste Management Authority (a regional subsidiary of the Cities of Playford, Salisbury and the Town of Gawler) has partnered to develop one of the first solar and landfill gas co-generation plants in Australia with an approximate 4MW capacity; and
- The region is providing leadership in the area of street lighting, with the City of Salisbury establishing ownership models that can change street lighting asset management into the future, while the City of Playford is working with SA Power Networks to change approximately 11,000 P-category lights to 14W LEDs.

As highlighted by these actions, this RAP demonstrates that adaptation planning can provide a rational approach to considering options that capitalise on existing economic opportunities.

# Case study 9: Understanding the importance of values in decision making

## Metropolitan Eastern Adelaide Region

### Key partners

The Resilient East Partnership of councils is made up of the Cities of Adelaide, Burnside, Campbelltown, Norwood, Payneham and St Peters, Prospect, Tea Tree Gully, Unley and the Town of Walkerville. Adelaide and Mount Lofty Ranges NRM and RDA Adelaide Metropolitan were also involved in the development of the plan.



Values were assessed as part of an interconnected system of values, rules and knowledge ('VRK'), where values were considered as important as the rules (governing laws, strategies and policies) and the knowledge that had amassed through the research elements of developing the RAP.

A workshop was held in the initial phase of the project to identify the vision and values important to decision makers in councils, along with a series of stakeholder engagement sessions. Decision makers and stakeholders also participated in an IVA workshop and in the development of key decision areas for developing adaptation actions.

As part of developing adaptation actions, the values of decision makers and stakeholders were applied to the development of adaptation actions which provided a context for how they would like to see the identified issues addressed. This resulted in buy-in from the decision making body that is now more likely to support implementation of the actions in the RAP.

Figure 9 demonstrates how VRK was considered in the context of developing adaptation actions for the RAP.

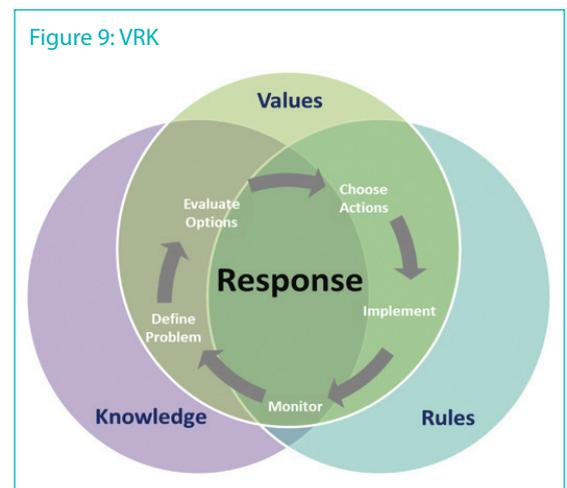
### Related information

The Partnership completed the Resilient East RAP in June 2016.

The aim of the RAP is to ensure that the "Eastern Region remains a vibrant, desirable and productive place to live, work and visit and that our businesses, communities and environments can respond positively to the challenges and opportunities presented by a changing climate."

This RAP focussed on the creation of 'enabling conditions' through understanding the values of council decision makers (Mayors and Elected Members) and stakeholders, and the drivers of the individual councils that were part of the process.

Figure 9: VRK



The adaptation actions were further refined into eight key areas of decision-making with associated adaptation pathways. From these areas, priority adaptation actions were identified based on their relevance to the broader region, and if the actions would provide multiple benefits.

The partners are now focused on implementation of actions which have included heat mapping, developing guidelines for the public realm, green infrastructure and urban design, and increasing community education and awareness.

Enabling conditions for implementation were identified as:

- Commitment to implementation over the longer term;
- Regional collaboration and appropriate governance;
- Embedding climate change considerations as 'business as usual';
- Communication and building awareness with the broader community;
- Resourcing and coordination; and
- Understanding the challenges and opportunities in the changing urban form.

Progress to date includes:

- Ratifying regional commitment to implement the RAP through the establishment of a Climate Change Sector Agreement;
- Developing a governance approach to support implementation of the RAP including designating a lead group/organisation and establishing the Resilient East Project Coordinator role; and
- Embedding a commitment for climate change considerations in key organisational strategies, plans, policies and processes.

### Drivers

The driver for this process was the desire to ensure that adaptation options could be properly and effectively implemented through a partnership approach across urban councils. This was achieved through developing a strong governance approach to decision making and clear allocation of responsibilities.

This approach is reducing duplication and costs, and increasing collaboration, with individual partners leading actions where they are better placed to do so.

### Achievements

Assessing what immediate and ongoing work was needed to ensure that favourable enabling conditions were established was vital when considering the adaptation actions that were to be implemented.

Understanding this context was viewed as being just as important as identifying the adaptation actions themselves. Current activities include:

#### Heat mapping

Partner councils have begun to use urban heat mapping and modelling to understand localised heat impacts and how increasing greening can reduce urban heat.



#### Canopy cover

Tree canopy cover assessments are being used by partners to provide baselines and benchmark current levels of greening, as well as to track historical trends in levels of greening on both private and public land.



#### Community participation in greening

In addition to direct greening initiatives (e.g. street tree planting), partner councils are funding programs to encourage community-led greening initiatives, such as street verge greening programs or incentives for other green infrastructure initiatives (e.g. green walls).



#### Working groups

Working groups are being established to collaborate across councils for each of the major actions in order to best utilise council subject experts and share collective experience and learnings.



# Case study 10: Project partners' commitment to implementation of the RAP

## Adelaide Hills, Fleurieu and Kangaroo Island Regions

### Key partners

*Resilient Hills and Coasts* is a collaborative project covering the Adelaide Hills, Fleurieu Peninsula and Kangaroo Island region.

Project partners include Adelaide Hills Council, Alexandrina Council, City of Victor Harbor, District Council of Yankalilla, Kangaroo Island Council, Mount Barker District Council, Southern and Hills LGA, Kangaroo Island NRM Board, Adelaide and Mount Lofty Ranges NRM Board, and RDA Adelaide Hills, Fleurieu and Kangaroo Island.



### Related information

Since 2014, project partners have been collaborating to develop a range of climate-related reports and activities, culminating in the release of the RAP in December 2016.

Significantly, during the development of the RAP, project partners committed to providing resources (financial and human) to ensure implementation. All project partners recognised that maintaining momentum as the project transitioned from planning to implementation was a critical factor to ensuring the RAP's success in building resilience and enabling adaptation.

The project partners were determined to build on the momentum achieved during the development of the RAP to bring about meaningful action – to both lead by incorporating climate change considerations into day-to-day decision making in their own organisations, and also to champion and support action across regional communities.

### Drivers

The project partners recognised that climate change is a complex and critical challenge that requires individual and collective innovation and ingenuity. The project raised the profile of climate change among regional decision makers, with mayors representing each of the six partner councils publicly demonstrating their commitment in the form of a collective statement, pledging ongoing and proactive action on climate change.

The adaptation planning process identified 155 adaptation actions, of which eight emerged as key regional priorities for the Resilient Hills and Coasts project to address. The eight key regional priorities are depicted in Figure 10.

More broadly, continuing education and awareness-raising were also acknowledged as key to promoting adaptation and strengthening resilience across the region.

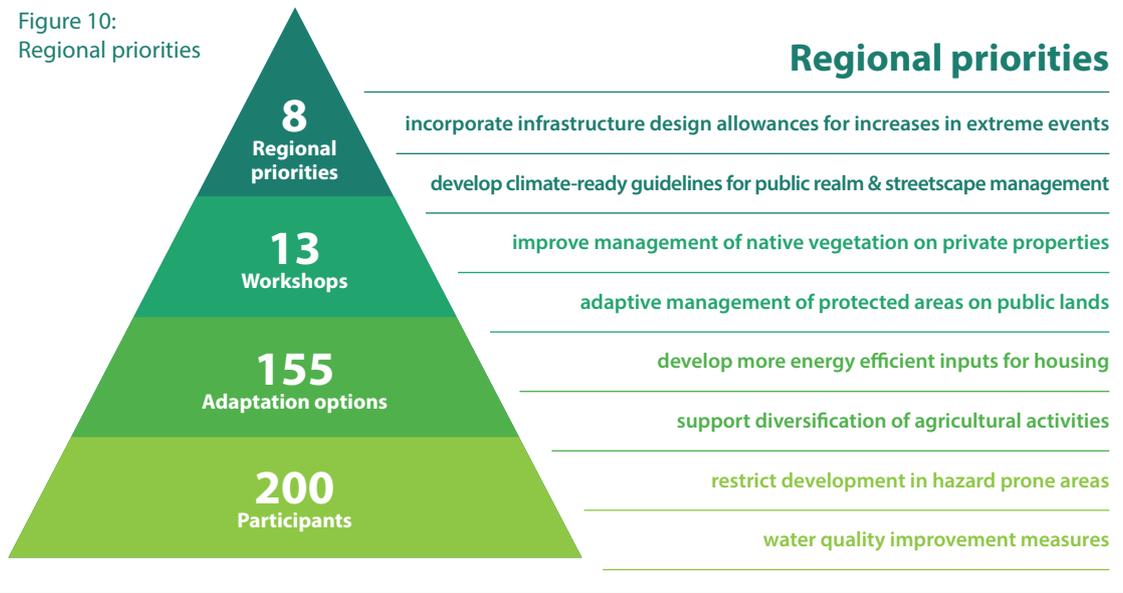
Partners now work systematically to progress these priorities, and actively pursue partnership opportunities from across a diversity of sectors.

### Achievements

Key achievements, post-adoption of the RAP, include being nominated as a finalist in the 2016 Premier's Climate Change Council SA Climate Leaders Awards and signing a Regional Sector Agreement committing all partners, including state and local government organisations, to ongoing collaboration and adaptation action.

Of particular focus in 2017–18 is the overarching theme of *Where We Build / What We Build*, providing leadership in climate-ready development. Exploring this theme, and incorporating several of the regional priorities, including public realm and streetscape management and climate-resilient housing, Resilient Hills and Coasts has:

Figure 10:  
Regional priorities



- Secured funding from the National Disaster Resilience Program for a hazard mapping and community engagement project; and
- In partnership with the Cooperative Research Centre for Water Sensitive Urban Cities, delivered a series of microclimate modelling workshops for developers, planners, engineers and landscape architects.

It is the intent of the project that any outcomes, tools or case studies developed as a result of its activities are an open source wherever practical, and resources and learnings shared as widely as possible.

The project now has an extended portfolio of engagement activities and program collaborators to realise priority actions.



Signing the Regional Sector Agreement, Kangaroo Island, July 2017: Mayor Graham Philp, City of Victor Harbor, Richard Trethewey, Presiding Officer, Kangaroo Island Natural Resources Management Board, Hon. Ian Hunter, Minister for Climate Change, Mayor Peter Clements, Kangaroo Island Council.

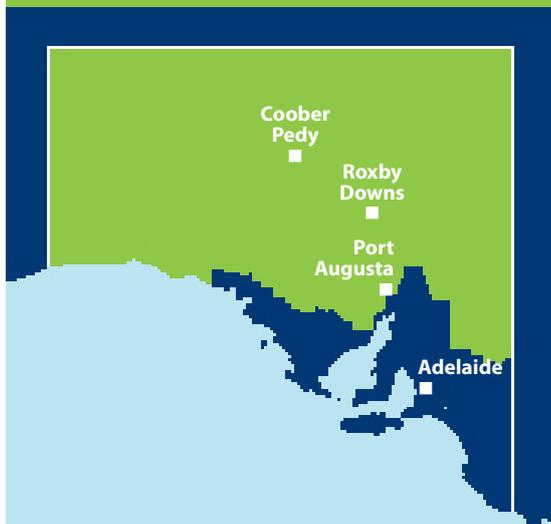
# Case study 11: Knowledge auditing

## Far North Region

### Key partners

The Far North and Outback RAP was released in December 2016.

The RAP was developed by RDA Far North, the Outback Communities Authority, the Arid Lands NRM Board, the Alinytjara Wilurara NRM Board, the Flinders Ranges Council, Port Augusta City Council, the District Council of Coober Pedy, the Municipal Council of Roxby Downs, the Upper Spencer Gulf Common Purpose Group, the Traditional Owners of the region, and the Zone Emergency Management Committee.



### Related information

The preliminary stage of the development of this RAP involved conducting a knowledge audit in order to identify and summarise key findings of existing research, studies and plans relating to climate change for the Far North. The knowledge audit assisted in the development of a regional profile.

The knowledge audit was based on data from the Goyder Institute's SA Climate Ready project ('SACR'), and from the Commonwealth Scientific and Industrial Research Organisation and the Bureau of Meteorology's Climate Change in Australia project ('CCIA').

The data summarised in the knowledge audit from the SACR and CCIA illustrated how climate change will impact the region and assessed rainfall, rainfall intensity, maximum temperature, heat extremes, fire weather, and ocean and gulf waters.

As illustrated by Figure 11, project partners identified nine key sectors for the knowledge audit to focus on.



Figure 11: Key sectors focused on in the knowledge audit

These sectors align with the goals and objectives of the RDA Far North, the Outback Communities Authority, and the two NRM Boards, especially the objective of improving the well-being of people living, working and visiting the region.

The knowledge audit assessed impacts of climate change and response options for each key sector. The knowledge audit was subsequently used for an IVA (more about the IVA below) and for the identification of the RAP's adaptation actions.

The following examples summarise the conclusions for three of the nine key sectors which are shown in Figure 11.

For the agricultural sector, the knowledge audit identified impacts in relation to changing temperature, rainfall/ water supply and extreme events.



Such impacts include changes to pasture growth, increased erosion and pasture property damage. The knowledge audit then identified possible management responses by the pastoral industry in order to address the impacts identified.

The knowledge audit also assessed how the tourism sector may be impacted by climate change. Impacts to the tourism sector were identified to include a change in habitat for native flora and fauna, rising temperatures, an increase in flooding and an increase in the frequency of bushfires. Such impacts may result in a decrease to the region’s tourism, and consequently the knowledge audit highlighted the necessity for the sector to improve its adaptive capacity.

For the water resources and management sector, the knowledge audit assessed ground, surface and alternative water resources. The knowledge audit highlighted two studies to assess the possible climate change impacts on the region’s major resources. Impacts to water resources and management were identified to include salt lakes becoming more saline, groundwater recharge decreasing in the south and increasing in the north, and an increase in flood variability with larger flood events and longer dry periods. Response options for these impacts were then addressed.

**Drivers**

The knowledge audit was undertaken as the project partners recognised the need to identify the main climate risks in the region, especially as the region is particularly vulnerable to climate change due to naturally dry and hot conditions.

Furthermore, project partners acknowledged that as the region is underpinned by tourism, pastoral, mining and extractive industries, it is becoming increasingly important to adopt adaptation mechanisms to mitigate climate change impacts.

**Achievements**

This planning tool (which was also adopted by several other regions) provided clarity on existing research, studies and plans.

As shown by Figure 12, the results of the knowledge audit provided information for the second stage of the planning process – the IVA. The knowledge audit also helped to identify adaptation options.

Importantly, development of this RAP has meant that climate change adaptations are now embedded within the region through other regional plans, such as the SA Arid Lands NRM Plan.

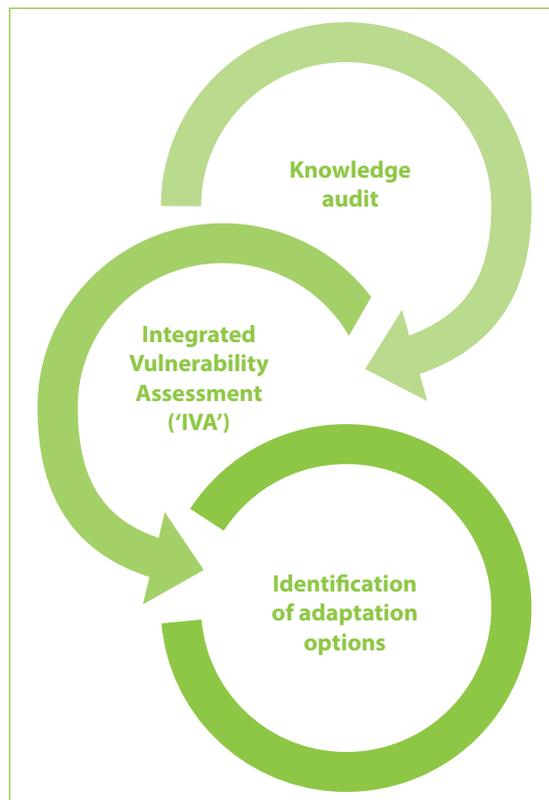


Figure 12: Illustrates how the Knowledge Audit was used in the development of the RAP



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