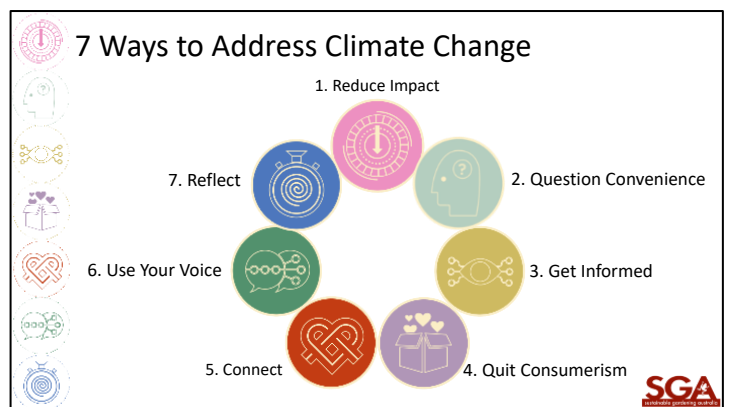


- **Gardens and Climate Change**

- There are about approximately 9 million dwellings in Australia (2016 Census) therefore there are potentially 9 million gardens in Australia which can be places of climate action
- Land use (including a garden) is a Source of emissions and Sink for Carbon storage
- Gardens are an important tool in reducing the GHG emission resulting from our lives and will need to adapt to a changing climate
- Gardens will play an important role in helping wildlife survive and thrive as the climate changes
- What we do at home and in the garden impacts the environment and the climate
- Our gardens can be places of positive impact on us, the environment and climate
- We need to adapt to changes in the climate and environment
- Climate Action Needs to be Driven by all Parties
- Climate Change needs to be addressed by Government, Business and Community
- We should develop our own personal climate action plans
- Incorporating our gardens into our personal climate action plans is a great place to start
- The more people that take responsibility for their choices and impacts, the more pressure placed on Government (democracy) and Business (economy) to act faster

- **Climate 7 – [www.climate7.com](http://www.climate7.com)**

- Climate 7 is a framework that helps us focus on what we can do to address climate change
- Climate 7 has been developed by Rachel Forgasz from Monash University
- More information on Climate 7 can be found at [www.climate7.com](http://www.climate7.com)



1)  **Reduce Impact**

- Reduce Impact – **Mitigation**
- Mitigation – Actions to reduce greenhouse gases caused by human activities
- There are a number of ways we can reduce our emissions: Reduce direct use of energy, Reduce indirect use of energy, Use cleaner sources of energy, Use less new materials with embedded energy, Store carbon, Offset emissions
- **Reduce Impact Question** - How can gardens help us reduce our greenhouse emissions?
  - Mitigation - Organic Waste in Landfill
    - Organic waste, makes up 40% - 50% of waste sent to landfill
    - Organic waste in landfill breaks down anaerobically (without oxygen) producing methane and other climate gases
    - Methane is approx. 25x stronger than CO<sub>2</sub> as a Green House Gas
    - Efficient composting will break organic waste down aerobically (with oxygen) and emit CO<sub>2</sub>, but not methane and other more harmful GHGs
  - Mitigation - Composting to Decrease your Emissions
    - FOGO is a great option to reduce emissions
    - But - additional emissions are emitted to transport the waste to the facility
    - Home composting has additional benefits including: Improving soil structure, Improving soil life and health, Increasing soil carbon, Improving food production
  - Mitigation - Water Services and CO<sub>2</sub>
    - Melbourne Water makes up approx. 51% of the total Victorian State Government's carbon emissions

- Treatment processes for Melbourne's water include filtration, disinfection, fluoridation and pH correction and all require energy
- Approx. 20 pumping stations move water through the distribution system and keep pressure constant, all requiring energy
- Energy is required to treat wastewater
- Every litre of water we use has embodied energy
- The less dam water we use and wastewater we release to the sewage system, the less indirect emissions we are responsible for
- Reduce Emissions to Build & Maintain Your Garden
  - Build Your Garden - Use building materials that have lower embodied energy over their life cycle; Use recycled materials reducing new investments in embodied energy; Use timber from renewable plantations rather than old growth forests; Reduce Emissions to Build & Maintain Your Garden
  - Maintain your garden- Reduce use of garden power tools that emit CO<sub>2</sub> e.g. Petrol mower vs. Electric mover (fossil fuel) vs. eclectic mower (renewables) vs. hand mower; Decrease the size of your lawn to reduce mowing; Grow a native lawn (e.g. Microlaena stipoides) to reduce water usage and mowing; Reduce your use of petrochemical based garden fertilisers; Use organic and home sourced soil conditioners and fertilisers (e.g. compost, vermicast); Maintain your compost bin – A poorly maintained compost produces methane (no oxygen); Buy quality garden tools. Maintain and repair rather than dispose and replace
- Increase environmental services from your garden
  - Insource (Garden-source) resources and services
  - Compost or worm farm your organic wastes and make your own soil conditioners
  - Grow some / more of your food, reducing emission from food choices (farming practices, transport, storage, processing, waste, packaging)
  - Grow and eat more fruit and veggies and reduce emission from meat consumption
  - Grow deciduous plants to cool the micro-climate and help reducing energy bills
  - Have a body of water (pond) to increase humidity and reduce temperature
- Increase Carbon Stored By Your Garden
  - Plants - Decrease your lawn area by increasing garden beds with plants; Decrease hard surfaces (paths, paved or concreted areas) and activate the soil with mulch and plants; Plant some trees for the future; Plant some fruit trees (in the ground or pots); Grow your own firewood; Grow your own building material (e.g. clumping bamboo)
  - Soil - Feed the Soil-Food-Web with carbon to increase amount of living organic matter; Protect soil with ground cover plants and increase CO<sub>2</sub> extraction from the atmosphere; Plant cover crops and green manure crops in the veggie garden to increase carbon and nitrogen in the soil; Reduce soil compaction – soil compaction reduces oxygen exchange resulting in methane producing microbes being more active; Implement no dig gardening practices to improve soil life (carbon-based life forms), improve soil carbon storage and reduce emissions from disturbed soil
- Reassess Lifestyle Choices
  - Don't use outdoor / patio heaters
  - Eat seasonal produce only
  - Shop at farmer's market to access local produce
- Reduce Impact – **Adaption**
  - Adaption - Preparing for the impacts of a changing climate resulting from past emissions
  - Weather patterns are expected to change
    - Longer and dryer summers
    - More heat events
    - Potential for less total rain but unpredictable rain events

- Dryer and warmer winters and springs
- More evaporation and transpiration
- Heightened risk of food insecurity
- Negative impacts on human and animal health
- **Reduce Impact – Question** - How can we use our gardens to prepare for a changing climate?
- Adaption – Choose Plants for a Hot Dry Climate
  - **Leaf size and Design** - Spines, strappy & small leaves reduce surface area & water loss; Furry / hairy leaves increase retention of moisture near the leaf; Waxy leaves keep water in the plant and reduce transpiration
  - **Grey/Silver Leaves** - Green leaves absorb more heat and lose more moisture; Grey / silver / blueish leaved plants reflect heat and reduce transpiration; Cope well with heat & drought
  - **Indigenous Plants** - Suited to local soil & climate; Water efficient; Provide habitat (shelter and food) for native wildlife
  - **Succulents** - Retain more moisture in the plant when photosynthesising
  - Very water efficient
- Change How We Think About Water in the Garden - Goal - To reduce the amount of water used by the garden and lost from the landscape while maintaining ALL the environmental benefits
- Mitigation & Adaption - Water Application
  - Water should be delivered directly to the plants root zone, preferably in the early morning; Use water efficient systems e.g. drip irrigation
  - For garden beds - Water more thoroughly, less often; Encourage deep roots, increasing resilience to heat events and water shortages
  - For container gardens - Water sparingly, more often; Water coming out of the bottom is a waste and a loss of vital nutrients; Place a saucer or container under the pot to collect water
- Adaption - Preparing for a Heat Event
  - Water in the morning, deeply to root zone; Fill wicking bed reservoir; Add seaweed solution when watering; Mulch exposed soil; Shade vulnerable plant (old cotton sheet)
  - Pots - Water a couple of times a day; Place in a saucer of water; Move into the shade
  - Look after yourself – slip/slop/slap/slurp
  - If plants have been severely affected - Soak pots in a bucket of water; Water with seaweed solution; Prune burnt leaves when weather cools
- Adaption - Stormwater Management in the Garden
  - In urban landscapes intense rain events inundate the storm water infrastructure causing floods
  - Our garden can be designed to help reduce the storm water surge reducing floods and damage
- Rainwater harvesting; Rain gardens; Swales; Downpipe diversion
- Mitigation and Adaption – Mulching - Reduces use of water from dams; Reduces evaporation; Keeps the soil moist; Suppress weed growth; Adds nutrients to the soil; Improves soil structure; Keeps soil friable; Reduces compaction; Reduces run-off and erosion; Regulate soil temperature; Provide habitat for insects, lizards, birds
- Supporting Wildlife as the Climate Changes – Food, Water, Shelter, Nesting resources
- Garden Structure and Diversity. Level 1 – Large Canopy Trees, Level 2 – Mid story – Small trees and large shrubs; Level 3 – Under story – Small Shrubs; Level 4 – Ground covers and grasses; Level 5 – Water, Rocks, logs, Mulch, Level 6 – soil
- Other Adaption Examples
  - Grow some food at home to improve food security
  - Install wicking beds to help manage water needs to grow food
  - Reduce water usage by using water smart strategies
  - Build polytunnels or shade tunnels to extend the growing season and protect the crops from harsh weather

## 2) Question Convenience

- Convenience - To do something without difficulty
  - Many of our habits and daily choices are based on convenience
  - What is the fastest or least hassle option? Can I outsource the effort?
  - There are often unseen consequences of convenience
  - e.g. A homemade sandwich has approx. 2 X less carbon emissions than a ready-made sandwich (1)
  - Question Convenience - reassessing our choices and making a conscious assessment that the benefits are greater than the consequences
- **Question Convenience – Question** - What gardening choices do we make based on convenience and are the benefits greater than the consequences?
  - How can a garden help us question convenience in our lifestyle and provide alternative options?
- Buying all our Veggies is Convenient, BUT...
  - Intensive Farming
    - Synthetic fertilizers derived from petroleum by-products are often used
    - Chemical based pest controls are often used
    - Fruit & veggies can be harvested before ripe, artificially ripened and stored for long periods of time affecting freshness, taste and nutrient levels
    - More steps in the process = more emissions
  - Food Miles
    - The energy (and therefore emissions) to store and transport food to a consumer can be substantial
    - Out of season produce travels even further
  - Packaging - Energy is required to manufacture / distribute and dispose and /or recycle packaging
  - Can we grow some of our veggies at home?
- Nutrients, Instead of Buying in Bag
  - Nitrogen – N - Green leaves, grass clippings, legumes, stinging nettles, compost, manures
  - Phosphorus – P - Comfrey, animal manures, dock weed and clover, worm castings
  - Potassium – K - Seaweed, wood ash, comfrey, banana skins, manure
  - Calcium – Ca - Egg shells, wood ash
  - Copper – Cu - Seaweed
  - Magnesium – Mg - Epson Salts, seaweed, Animal manure
  - Sulphur – S - Organic matter
  - Iron – Fe - Cow manure, pine needles, iron chelates
  - Manganese – Mn - Well rotted compost and manure
  - Zinc - S Aged manure
  - Boron – B - Organic matter, compost, seaweed
  - Molybdenum – Mo - Compost
- Question Convenience – Other Examples
  - Buy all your food v Grow some food at home
  - Buy compost in bags v Homemade compost
  - Buy bags of fertiliser and soil additives (NPK) v Homemade conditioners and thrifty nutrients
  - Using harsh garden chemicals to deal with garden pests v low impact pest management solutions (IPM)
  - Buy veggie seedlings v Grow veggies from seeds
  - Buy seeds v Save seed
  - Throw out your excess harvest v Share excess harvest at a local food swap
  - Eat meat in every meal v Eat more Vegetables
  - Buy a new one v Repair the old one
  - 365 day access to foods v Eat seasonally

### 3) Get Informed

- Get informed – Increase your knowledge so you can make considered and informed decisions
- Our urban, consumer and technology based lives mean we are losing connection with the environment and its natural cycles
- When we lose connection with the environment, we reduce our responsibility for the consequences of our choices
- **Get Informed – Question - What natural cycles, systems and methods can we learn about that will help us to Reduce Impact?**
- Regenerative Gardening
  - Based on Regenerative Agriculture
  - An approach to food growing that seeks to rehabilitate damaged and strengthen eco-systems. It focuses on: Strengthening the health and vitality of soil; Increasing biodiversity; Improving the water cycle; Enhancing ecosystem services; Increasing soil carbon; Increasing climate change resilience; Increasing productivity
- Plants, Soil and the Carbon Cycle
  - Plants take in Carbon as a gas - CO<sub>2</sub>
  - Through photosynthesis plants convert CO<sub>2</sub> into liquid carbon i.e. glucose
  - ~60% of the liquid carbon is converted to solid carbon e.g. leaves, branches, roots
  - ~40% of the liquid carbon is pumped into the soil to feed the soil-food-web
  - Dead organic matter falls to the ground and decomposes into the soil feeding the Soil Food Web
  - Carbon matter broken down to its lowest level is called humus and is a very stable storage of carbon
  - Biomass Distribution on Earth – 550 Gt C
- Soil Food Web – The diversity of life in our soil that makes it a living entity
- 17 Elements Required by Plants
- Cycles in Nature – Carbon, Water, Nitrogen, Phosphorous, Sulphur
- Integrated Pest Management - IPM
  - Physical - Physically removing pests: Barriers, Traps, Removal
  - Cultural - Our behaviors and choices that impact the balance in the garden eco-system: Crop Rotation, Use of Soil Conditioner, Garden Hygiene
  - Biological - Re-balancing the garden's eco-system. Using nature to help manage nature: Companion plants, Beneficial Bugs
  - Chemical - Using low impact chemical solutions as a last resort, Homemade brews, Pheromone traps

### 4) Quit Consumerism.

- **Consumerism – the continual acquisition of goods and services in increasing amounts**
- It is about: Having stuff, The search for the cheapest option, The rise of the throw-away society
- Consumption contributes more than 60% of global GHG emissions and between 50% and 80% of total land, material, and water use (1)
- It allows us to outsource responsibility for impacts and emissions
- Consumerism can hide the negative impacts of our lifestyles on the climate and environment
- **Quit Consumerism Questions**
  - What do we consume in building and maintaining our garden?
  - How can our garden be used to reduce our consumption of stuff?
- Renovate Old Tools
  - Old Tools tend to be higher quality
  - Pick up old tools at markets / car boot sales / fetes
  - Replace broken handles

- Sand old handles and oil with a mix of linseed oil and turpentine
- Sand back rusty metal and give a coat of oil
- Oil any moving parts / hinges
- Sharpen shovels and blades
- Clean tools after use and store in a dry place
- Re-visiting an Old Waste Message
  - Rethink – Question what you do, the waste you generate and what happens to it
  - Reduce – Use less for the same outcome, avoid unnecessary packaging and excess quantities
  - Reuse – Single use is lazy. Invest in multiple use. Repurpose the old. Extend life
  - Recycle – Deconstruct and make into something new. BUT - It's only one step away from landfill
  - Rethink – if there is still waste, go back to rethink
- One Person's Waste is Another Gardener's Treasure - Talk to your neighbours and friends if they are having a cleanout; Renovations are a great source of treasure; Check out fates, car boot sales and op-shops; Go to your local tip shop; Gumtree and eBay; Check Out Your Local Recycled Goods Shops
- Grow Your Own Building Materials – e.g. Clumping Bamboo
- Containers – Think Outside the Box
- Thrifty Composting Inputs
- [www.sharewaste.com](http://www.sharewaste.com)
- Connects people with kitchen scraps with neighbours who are composting, worm-farming or keep chickens
- Retaining Walls & Pathways (Various)
- Vertical Gardening (Reo, dip tins)
- Bathtub Worm Farm (Bathtub, sleepers, corrugated steel)
- Propagation - Seeds
  - Great value
  - Big variety to choose from - colour, size, flavour and texture
  - Many seeds can be sown directly in the soil saving time and money
  - Cold frame / mini glass house can speed the germination process
  - Saving seed means you rarely have to buy seed
- Quit Consumerism – Other Examples
  - Buy quality tools that last a lifetime and care for them
  - Seed saving and sharing
  - Share a packet of seeds with neighbours / friends / family
  - Eat seasonally
  - Grow some of your own food
  - Love Food, hate waste e.g. eat the whole plant

### 5) Connect

- Connection – a relationship in which a person is linked with someone or something else
- Connect to what? Ourselves, Our community, Wildlife, The environment, Connection is important for health and resilience, Personal - mental / emotional / physical, Family, Community - cohesion and support, Environment
- Connection → care → protection → action
- Through gardening we can reconnect to environment / wildlife / community
- **Connect Question - How can a garden help you connect to:** Yourself, Your family, Your community, The environment, How can connecting help climate mitigation and adaption,
- Join a Local Community Group
  - Meet your neighbours, make new friends and grow your community
  - Learn new skills
  - Grow some of your own food
  - Share with others

- Contact your local council for your local community garden
- Other Connect Examples- Community gardens, Gardening clubs, Food / seed swaps, Food share, Climate action groups, Inter culture gardening e.g. immigrants, Transition town movements, Intergenerational gardening i.e. grandparents / parents / grandchildren, Storytelling, Debating and challenging ideas in a no- threatening space

## 6) Use Your Voice

- Use your voice – Be heard. Be counted. Your opinion matters
- Share your concerns and experiences, Celebrate your successes and failures, Advocate for change, Speak up for those who can't, Find your way to use your voice
- **Activ-ism** - Bring about change through campaigning, Leading change by expressing an opinion
- **Action-ism** - Bring about change through doing, Leading change by being the example
- **Use Your Voice – Questions - How can a garden help you find your voice?**
  - Use Your Voice - Examples
  - Find like minded people – your tribe
  - **Activ-ism** - Sign petitions, Write articles / opinion pieces, Join marches / protests
  - **Action-ism** - Thoughtfully spend your dollars based on your climate and ethical beliefs, Share your climate action plans, successes and failures with family and friends, Inspire others by opening your home and garden for tours e.g. sustainable house day, open gardens, Run sustainable gardening workshops on something you are good at, Invite friends over to share a home grown / home cooked meal and stories

## 7) Reflect

- Reflection - Thinking about your behaviors and actions and the reasons that lie behind them
  - Revealing your true self and the pathways for change
  - Reflection is “informed by” and “informs” the other six elements of the framework - Reduce impact, Question convenience, Get Informed, Quit consumerism, Use your voice, Connect
  - **Reflect – Question - How can your garden help you reflect?**
  - Include a Place to Sit and Relax - A special place in the garden for reflection and connection
  - Time to observe wildlife and consider what is important
  - A flat spot in your garden for yoga, meditation, tai chi, qi gong
- **7 Ways in 7 Days – In the Garden**
    - **Monday:** Reduce Impact Day - Tend to you compost
    - **Tuesday:** Question Convenience Day - Evening pest / snail hunt in the veggie garden
    - **Wednesday:** Get Informed day - Research sustainable gardening topics
    - **Thursday :** Quit Consumerism - Recycle / re-purpose something in the garden.
    - **Friday:** Connect Day- Friday (virtual) gathering with your tribe
    - **Saturday:** Use Your Voice Day - Ethical shopping
    - **Sunday:** Reflect Day - Reflect on the past week and plan for the new one