

Future Proofing Community Sport & Recreation Facilities

A Roadmap for Climate Change Management
for the Sport and Recreation Facilities Sector

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Research and Industry Contributors & Advisors:

- Florian Billirant, University Centre of the Westfjords, Iceland
- Chelsea Caple, Summersalt Gymnastics Club
- Jonathan Casper, North Carolina State University, USA
- Ben Cooke, RMIT University, Australia
- Dr. Greg Dingle, La Trobe University, Australia
- Dr. Tony Gendall, La Trobe University, Australia
- Lisa Goettler, La Trobe University, Australia
- Dr. Samantha Grover, RMIT University, Australia
- Tim Kellison, Georgia State University, USA
- Audra Liubinas, Metro Trains
- Brian McCullough, Seattle University, USA
- Dr Aurel F Moise, Bureau of Meteorology, Australia
- Zac Passmore, Sports Environment Alliance
- Professor Ian Porter, La Trobe University, Australia
- Stefan Preuss, Office of Victorian Government Architects
- Mr. David Riches, La Trobe University, Australia
- Jen Severn, Holy Trinity Cricket Club
- Amy Steel, Sports Environment Alliance
- Alex Wylde, Sports Environment Alliance

Steering Committee Members:

- Alison Cleary, Built Environment Professional
- Tracey Gaudry, Respect Victoria
- Matt Green, Grant Thornton
- James Reid, Victoria Racing Club
- Kirsty Reidy, Sport & Recreation Victoria

Design and Production Team:

- Michelle Wilson, OnDigital Pty Ltd

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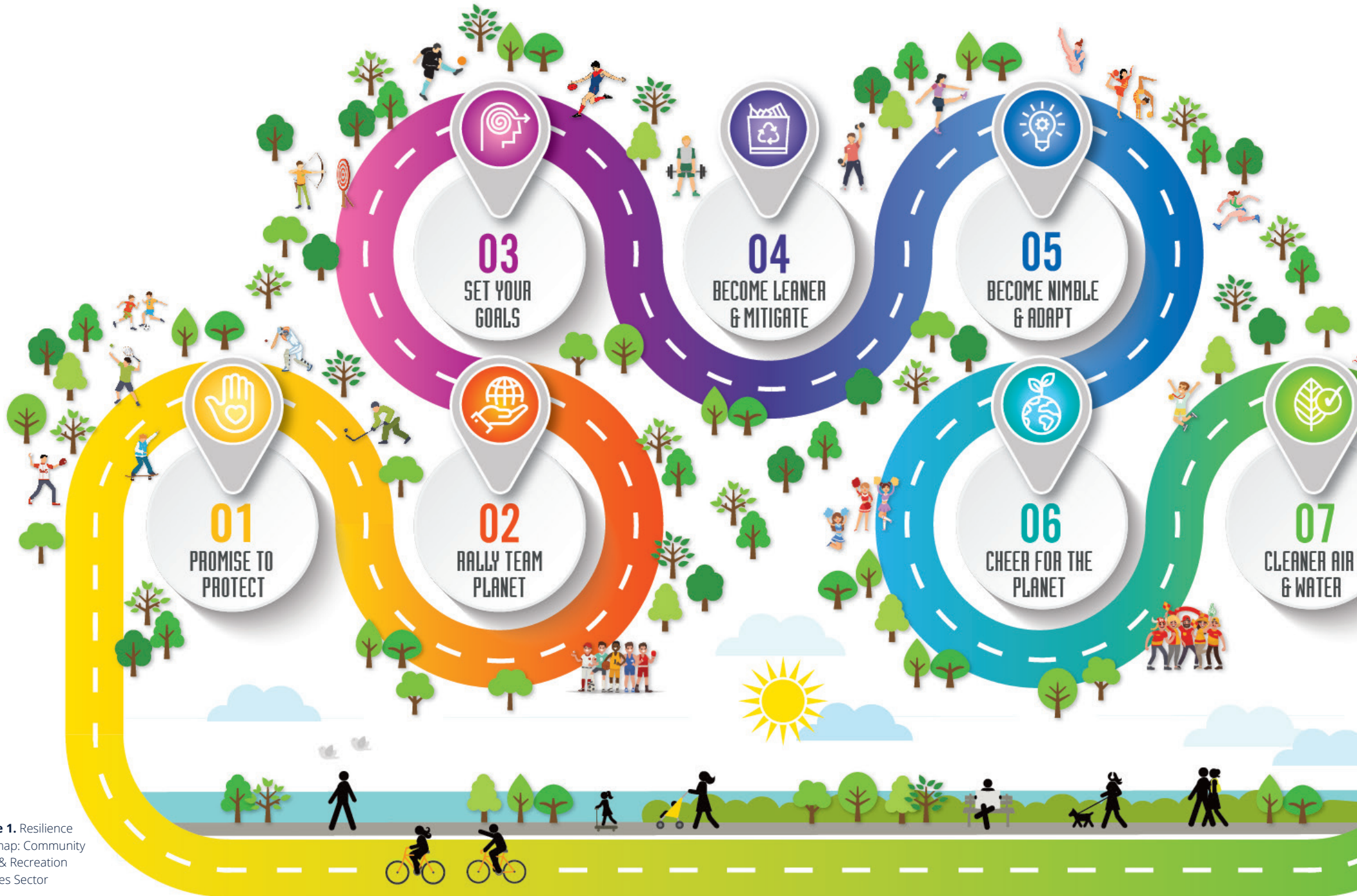


Figure 1. Resilience Roadmap: Community Sport & Recreation Facilities Sector

HOW TO FOLLOW THE ROADMAP

This roadmap has been designed to support all the incredible people who care to share their time for sport and recreation, to those who deliver opportunities for all to play, and to those who want to protect all the good that sport and recreation provides to our community and to all who share the love we have to watch and play.

What we love is under threat, and we have an opportunity to act today for others to play for generations to come. This roadmap outlines key milestones of action which we can engage to contribute to a future where the water is blue, the grass is green, and the air is clean so we can kick, run, hike, swim, cycle, jump, and whatever else we do on courts, trails, pools, pitches, and any other space where we play.

The roadmap is designed for sport and recreation which has a specified home of play and is not intended to provide direct guidance to informal, 'deep in nature' spaces of play.

The roadmap will support your place of play to be nimble and resilient to climate change through commitment, mitigation and adaptation to our ever changing environmental conditions. The way in which you might engage with the roadmap milestones may not necessarily be in a linear fashion, and there are no expectations for how fast or how long it takes for you to act within each milestone along your journey.

If there is one learning to be had from this guide, it would be that we must act now, however small or large the action.

Let's value the places where we play, commit to protecting them, and take charge of our future.

Printing

This document is only available as a downloadable PDF file. If you must print a copy, please choose double-sided, black and white printing on 100% recycled paper.

Feedback




We hope that our "Roadmap for Climate Change Management" guide will provide sufficient information to be a stepping stone to a more integrated and valued approach to protecting our places of play. We acknowledge that climate related changes are always evolving and the ways in which we approach management and resilience in changing conditions will advance with technology innovations, greater knowledge, and progressed systems. As a result, some of the information may become irrelevant or obsolete. We rely on your thoughts and comments on how we can provide relevant and accurate material ongoing. Please reach out and let us know what we can improve upon, what advice worked, what actions were effective, what learnings came from the efforts which didn't work. We want to know the good, the bad, the ugly, and all the stories about your eco-journey: research@sportsenvironmentalliance.org


Navigation


This document has been designed as an interactive PDF to enable easy navigation and readability.

The roadmap opposite includes interactive icons. These will take you directly to the page that is relevant to that particular step of the roadmap.

At the bottom of all pages, you will find three navigation buttons:

-   arrows to help you move back and forth through the document
-  a button to return you to the contents page.

On the contents page, each listed item has an icon  next to it to help you navigate directly to that page.

In each of the roadmap steps, you will find a checklist. To download a copy of this checklist, simply click on the icon  in the top right hand corner of the coloured panel.



...WITH THE WAVES
OF SOCIAL CHANGE,
ENVIRONMENTAL
ISSUES ARE PART OF
A RISING WAVE THAT
SWEPT INTO THE
WORLD OF SPORT.

(McCullough, Pfahl, & Nguyen, 2016)

OUR HOME AND WHAT WE LOVE

We live in a country that is known equally for its natural beauty and for its sporting culture. And yet, even though we are the 55th largest country in the world by population, Australia has the world's 15th largest greenhouse gas emissions in 2015, making its citizens' per-capita contribution around three times the global average (Timperley, 2019).

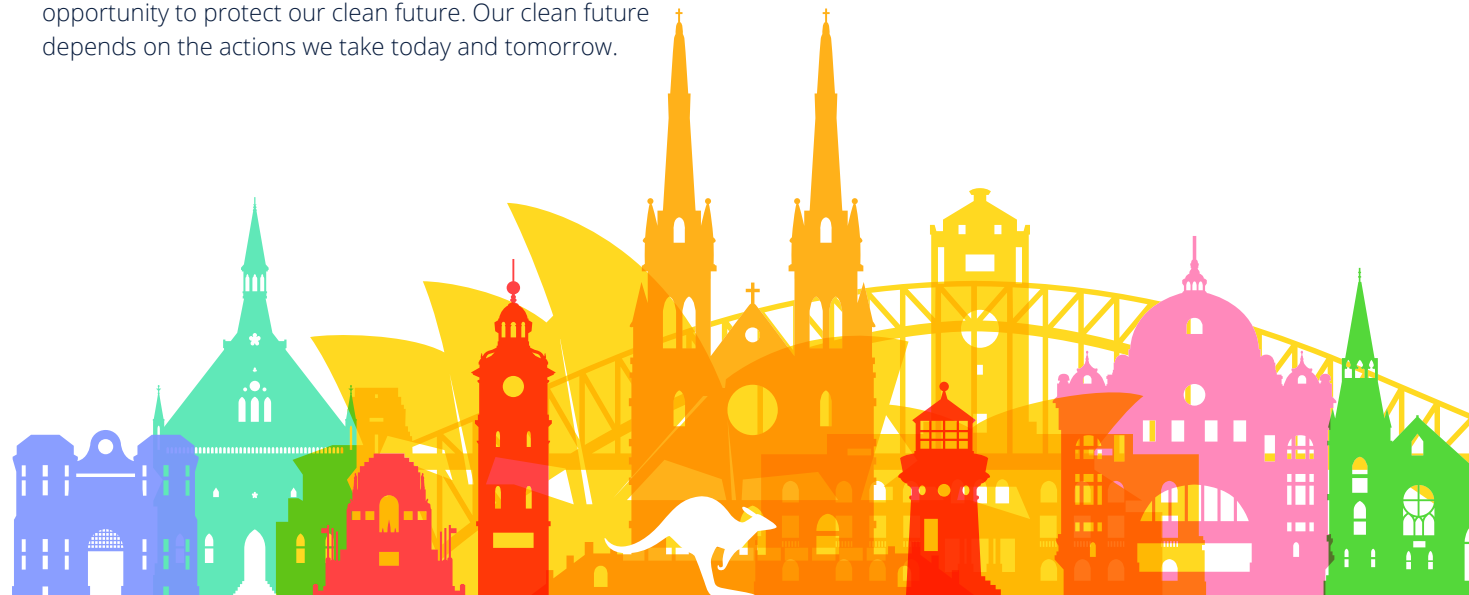
Our actions don't match our love for the ocean, the beaches, the parks, and the mountains which make up our home, and which are also home to where we play sport and engage in recreation. The places where we play are home to our physical and mental well-being, they are home to where we can experience the joys and challenges which help us grow individually, and they provide the 'glue' to hold our communities together.

We must, we can and we will protect our home for sport and recreation and we want you to take action.

In Victoria, we are fortunate to have access to over

20,000 places to play, 16,000 sport clubs, and 2,000 trails to walk and ride. With the health of the places where we play so inextricably linked to the health and happiness of our communities, we have an inherent obligation to contribute to our shared vision for a net zero emissions, climate-resilient Victoria in 2050 ("Victoria's Climate Change Framework", 2018).

Our places of play are at risk, but we have an opportunity to protect our clean future. Our clean future depends on the actions we take today and tomorrow.





FOREWORD

The Hon Ros Spence MP **Minister for Community Sport**

There's a big reason why Victoria is the sporting capital. We love our sport!

Come rain, hail or shine there's 4.2 million of us once a week doing some sort of sport or recreation activity including taking a walk, playing soccer, or visiting a play space.

Victoria boasts 16,000 clubs, more than 10,000 sports venues and playgrounds and 44 state facilities that are in demand and filled by thousands of participants, volunteers, and spectators all year round, many of which are outdoors.

Sport and recreation not only delivers great tourism, social, health and community benefits - it's an engine room of our economy - adding \$9.2 billion to our economy and employing over 70,000 people, so there's a lot at stake.

That's why the Victorian Government is proud to partner with Sports Environment Alliance – Australia's peak body for supporting the environment through sport - to develop this great resource *Future Proofing Community Sport and Recreation Facilities*.

In the face of global warming, our land of drought and flooding rains is presenting a range of new challenges when it comes to maintaining the health of our sport and recreation facilities and environments.

This resource brings together all the current research, challenges, and opportunities to develop world's best

practice to help your club, facility or organisation stay on top of its game when it comes to future proofing your participation in the face of climate change.

From water saving ideas to climate change action plans, the guide suggests practical tips and actions to better prepare facilities for extreme weather conditions, including floods, droughts and heatwaves.

The resource also provides a useful and hands-on reference for organisations to lead practical and behavioural change.

I'd like to commend the Sports Environment Alliance for working in partnership with Sport and Recreation Victoria, and the broader sports sector to bring together critical information to help tackle climate change impacts from the grassroots up with education and empowerment.

I encourage everyone in the sports sector to embrace the innovative ideas presented in this great resource and join us in leading the way in *Future Proofing Community Sport and Recreation Facilities*.



MALCOLM SPEED AO **Inaugural Chairman, Sports Environment Alliance**

Sport, with all of its benefits, is incredibly important for our communities, connecting us to one another in the spirit of the game – it is the glue that holds Australia together.

Sport will not survive, however, without our ambitious and collaborative efforts to raise our awareness and do much more to mitigate and adapt to changing climatic conditions. The Sports Environment Alliance is proud to work with sport leaders, at all levels, who have pledged to work together towards the aim of protecting the places where we play.

The *Future Proofing Community Sport and Recreation Facilities* guide was developed for those needing direction and insight on what our changing climate means for their sustainability. Sport is a big user of resources and we believe that sport needs to do more and do it quickly. Sport has a community leadership role in relation to sustainability and this guide will help us deliver on that responsibility.

I commend the Victorian Government and Sport and Recreation Victoria on this initiative.

Your efforts to future proof community sport will be a legacy worth working towards for generations of play to come.

THE CONNECTION: PLANET, SPORT & RECREATION

The health of our planet has a direct impact on the availability and accessibility of healthy places where we play. As will be presented at length herein, the places where we play are being affected by climate-related changes in weather patterns across the world (“Sustainability Essentials”, n.d.).

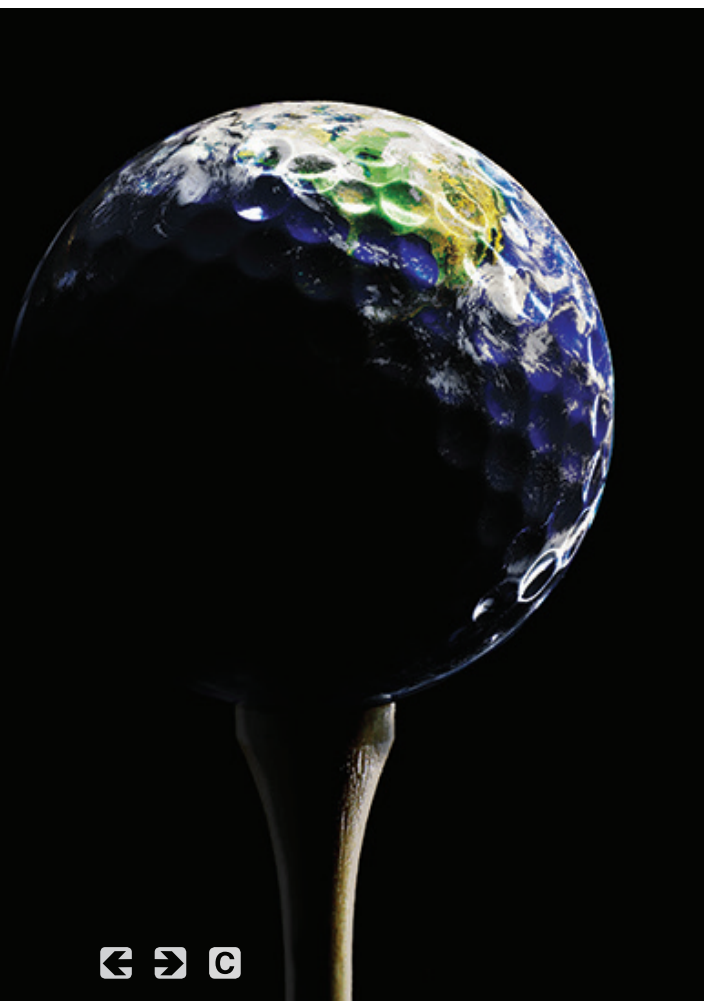
Climate change impacts on sport and recreation include the following:

- damage to playing surfaces due to extreme temperatures, extended periods of drought, flooding, and/or pest species extending their natural range;
- damage to buildings and other infrastructure due to violent storms;
- coastal erosion and sea level rise directly affecting sport and recreation infrastructure in seaside areas;
- warmer winters and lack of natural snow threatening ski resorts at lower altitudes;
- unseasonal rainfall forcing cancellation or abandonment of sport matches;
- heat waves forcing changes to timing of sport events;
- increased injuries to players from heat exhaustion and impact injuries from harder playing surfaces;
- more potentially harmful algal blooms limiting direct contact outdoor water sports;
- sub-standard fan experience where high temperatures create potential health risks and detract from the enjoyment of the event; and
- climate adaptation measures being required in the design of new or refurbished sport facilities.

(“Sustainability Essentials”, n.d., p. 19)

Of Australia’s population (24.6 million), 3.8 million people Of Australia’s population (24.6 million), 14 million participate in sport (Commonwealth of Australia, 2018). Almost two-thirds of Australian children participate in organised sport outside school and more than 7.5 million Australians attend a sporting event each year (Australian Bureau of Statistics, 2008). The sport industry contributes an estimated \$83 billion in combined economic, health and educational benefits each year, representing 3% of our national GDP. Sport and recreation provides participation and employment opportunities as well as contributes to social capital and community development (Coverdale, 2007; Commonwealth of Australia, 2018)

When our places of play are affected by climate change, such as floods and drought, surfaces are unsafe or unavailable for play, and when there are heatwaves and bushfire, those who participate in sport and recreation are exposed to precarious conditions. Directly, we expose our community to risk of health impact (e.g., air pollution and particulate matter, heat illness, etc.). Other impact areas are: finance, equity in access, loss of employment, loss of participation, rise in antisocial behaviours, safety in play, quality of play, scheduling and maintenance of playing surfaces, run off, and overall participant and community health (Climate Institute, 2015; Coverdale, 2007). The sport and recreation community has the opportunity to leverage its reach and power to make the changes we need by both advocating for environmental stewardship and at the same time, considering how we can reduce our community’s ecological footprint (Beyer, 2006; Casper, Pfahl, & McSherry, 2002; Morgan & Summers, 2012).



As senior writer for Sports Illustrated, Alexander Wolff, noted in his article “Going, Going Green,” these climate threats are already transforming when, where, and how we play sports. “As global warming changes the planet, it is changing the sports world.... Global warming is not coming; it is here. As temperatures around the globe increase, oceans are warming, fields are drying up, snow is melting, more rain is falling, and sea levels are rising. All of which is changing the way we play and the sports we watch” (National Resources Defense Council [NRDC] & Green Sports Alliance [GSA], 2013, p. 13).

A good starting point for new national approaches and policies on sports and environment should simply be the recognition that healthy athletes need a healthy environment to train and perform at their optimum level. As a minimum that means that governments, sports organisations and athletes have a common interest in best air quality standards, basic water quality standards, basic food and nutrition standards and adequate green space and facilities for sports and recreation, especially in the many densely populated and fast growing urban slums throughout the world (International Olympic Committee, Sport and Environment Commission, 1999, p. 11).

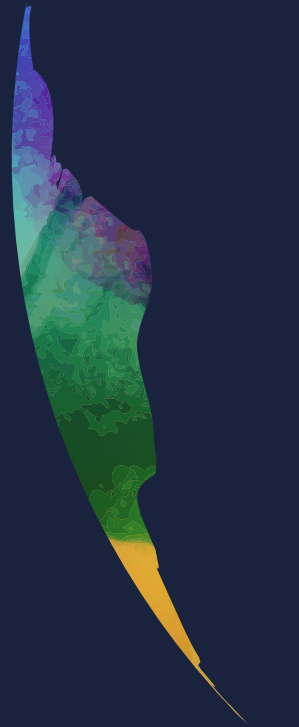
We must embed ‘planet’ in the way we understand excellence and performance of our community. Further, our commitment, actions, and celebrations must be ongoing and grow in impact as we continue on the journey of improvement for generations to come. It is said that the only thing that is certain about climate change is that there will be greater uncertainty, so with that, there is a lack of end state in climate conditions, making our respective actions ever changing in ebb and flow to match the needs of ever greening (McCullough, Pfahl, & Nguyen, 2016).

WHAT HAPPENS
WHEN SPORT
MEETS NATURE?
AS THE PLANET
CHANGES, SO DO
THE GAMES WE
PLAY...TIME TO PAY
ATTENTION.

(Mincyte, Casper, & Cole, 2009, p. 103)

SINCE 2008, ADVANCES IN CLIMATE CHANGE SCIENCE HAVE BROADLY CONFIRMED THAT THE EARTH IS WARMING, THAT HUMAN ACTIVITY IS THE CAUSE OF IT AND THAT THE CHANGES IN THE PHYSICAL WORLD ARE LIKELY, IF ANYTHING, TO BE MORE HARMFUL THAN THE EARLIER SCIENCE HAD SUGGESTED...BEYOND REASONABLE DOUBT.

(Garnaut, 2009)



THE STATS: GLOBAL IMPACT OF CLIMATE CHANGE

Climate change is driven by rising greenhouse gas emissions, particularly from the burning of coal, oil and gas. Since the 1970s, global average temperature has trended strongly upwards (e.g. Rahmstorf et al., 2017), with a global temperature now more than 1°C above pre-industrial levels.

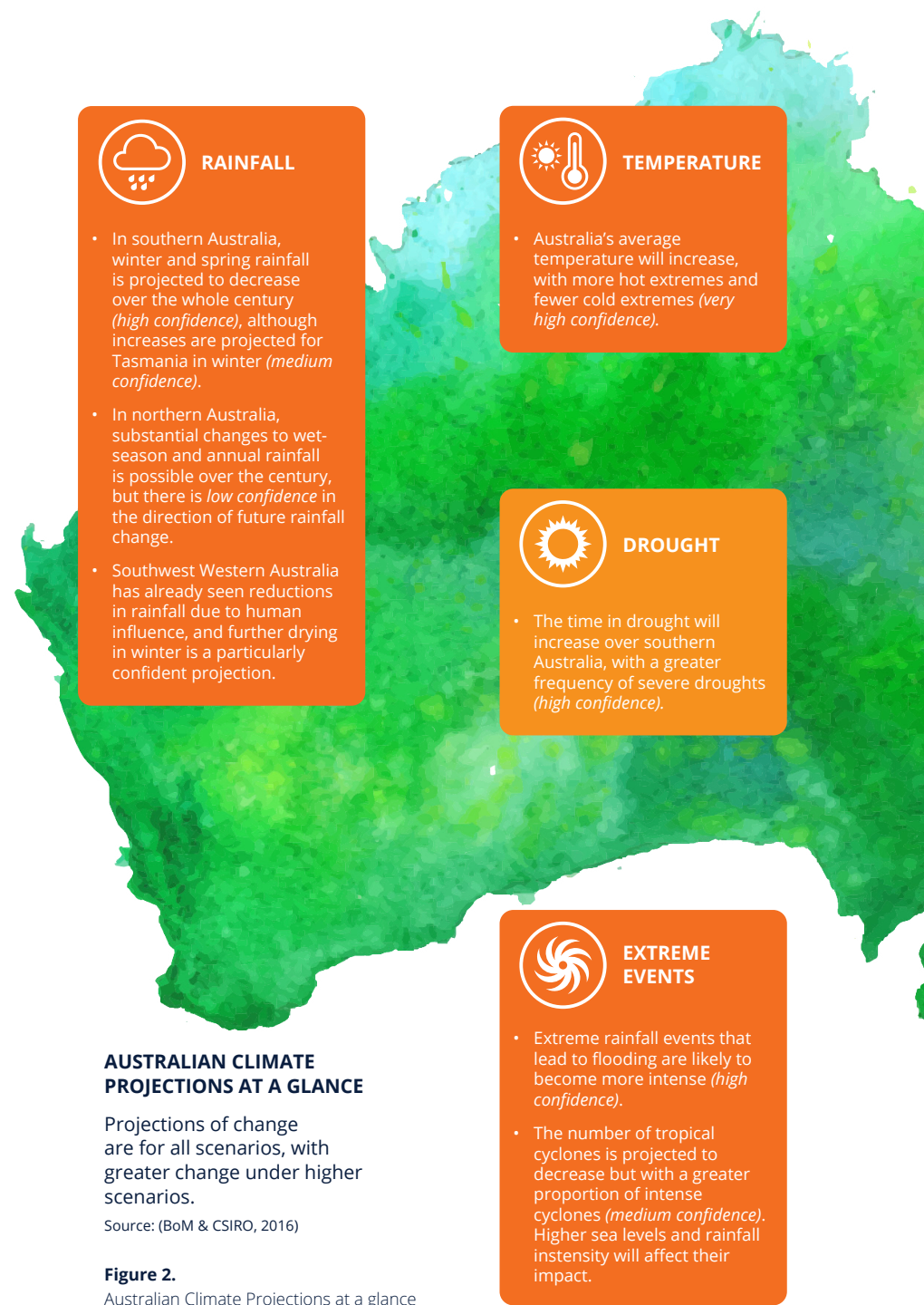
The years between 2013-2017 are recognised as the warmest five-year period on record (World Meteorological Organization, 2017).

We understand that, globally:

- Temperatures have risen with most of the warming in the last 35 years and with the five highest temperatures on record from 2010; the change occurring as a result of human-made emissions into the atmosphere (Climate Change Evidence: How Do We Know?, 2019)
- Climate change contributes directly to global temperature rise, warming oceans, shrinking ice sheets, glacial retreat, decreased snow cover, sea level rise, declining arctic sea ice, extreme events, and ocean acidification (NASA, 2019).

With the acknowledgement of the significant global impact of climate change, 196 countries signed the Paris Climate Agreement in 2015, signalling to the world that industry, governments and community must act to stop temperatures from rising more than 1.5°C (some say well below 2 degrees). Further, their commitment is to assist poorer countries to adapt to the impacts they are already experiencing. In 2018, the United Nations Framework Convention on Climate Change (UNFCCC) Sport for Climate Action Framework was released which brings sport into the dialogue and encourages sport to engage in action which contributes to our clean future (United Nations Climate Change, 2018).

ACROSS AUSTRALIA,
WE FACE A NUMBER
OF CLIMATE
RELATED IMPACTS
WITH SOME REGIONS
AFFECTED BY
EXTREME WEATHER
CONDITIONS
SUCH AS FLOODS,
DROUGHT, AND
HEAT WAVES.





THE STATS: IMPACT OF CLIMATE CHANGE IN AUSTRALIA

Research indicates that Australia is highly vulnerable to many of the consequences of a changing climate. Exacerbated heatwaves, droughts and bushfire weather, to devastating coral bleaching, sea level rise and coastal flooding are among the cited climate impact areas (Climate Council 2017; CSIRO 2018).

We acknowledge that in Australia:

- Our greenhouse gas emissions have climbed upwards every quarter since March 2015, while much of the developed world has begun the journey towards net zero emissions.
- Heatwaves are now hotter, lasting longer and occurring more often exacerbating drought conditions and with drought projected to increase across southern Australia by future trends (Perkins & Alexander, 2013; Climate Council, 2017; CSIRO, 2018).
- Climate change has also increased extreme fire weather in the south and east of Australia since the 1970s (Clark et al., 2013; Bureau of Meteorology [BoM] & Commonwealth Scientific and Industrial Research Organisation [CSIRO], 2016), and is likely making drought conditions in southwest and southeast Australia worse (CSIRO & BoM, 2015; Climate Council, 2017).
- At the same time, sea level has been rising rapidly, exposing coastal infrastructure and property to increasing both coastal erosion and risk of inundation from storm surges (McInnes et al., 2015; Climate Council, 2017).
- Climate change has contributed to a southward shift in weather systems that typically bring cool season rainfall to southern Australia.
- Late autumn and early winter rainfall has decreased by 15 percent in southeast Australia, and Western Australia's southwest region has experienced a 15 percent decline in cool season rainfall, all since the 1970s.
- Rainfall over southern Australia during autumn 2018 was the second lowest on record.
- It is predicted that total autumn and winter precipitation will reduce potentially as high as 50 percent by the late 21st century (Climate Council, 2017).



THE MOTTO OF THE OLYMPIC ENVIRONMENTAL MOVEMENT, “THINK GLOBALLY, ACT LOCALLY” TO EXEMPLIFY THE IMPORTANCE OF SMALL ACTIONS TO OBTAIN GLOBAL RESULTS IN SAFEGUARDING OUR ENVIRONMENT.

(International Olympic Committee, 2011, p. 42)

THE STATS: HOW CLIMATE CHANGE IMPACTS VICTORIANS

As seen, Australia is particularly vulnerable to climate change impacts, with Victoria facing very specific eventualities such as increasing temperature, fewer frosts, more frequent and intense downpours, harsher fire weather among other climate effects. Victoria has committed to work towards a resilient and net zero carbon 2050 (“Victoria’s Climate Change Framework”, 2018).

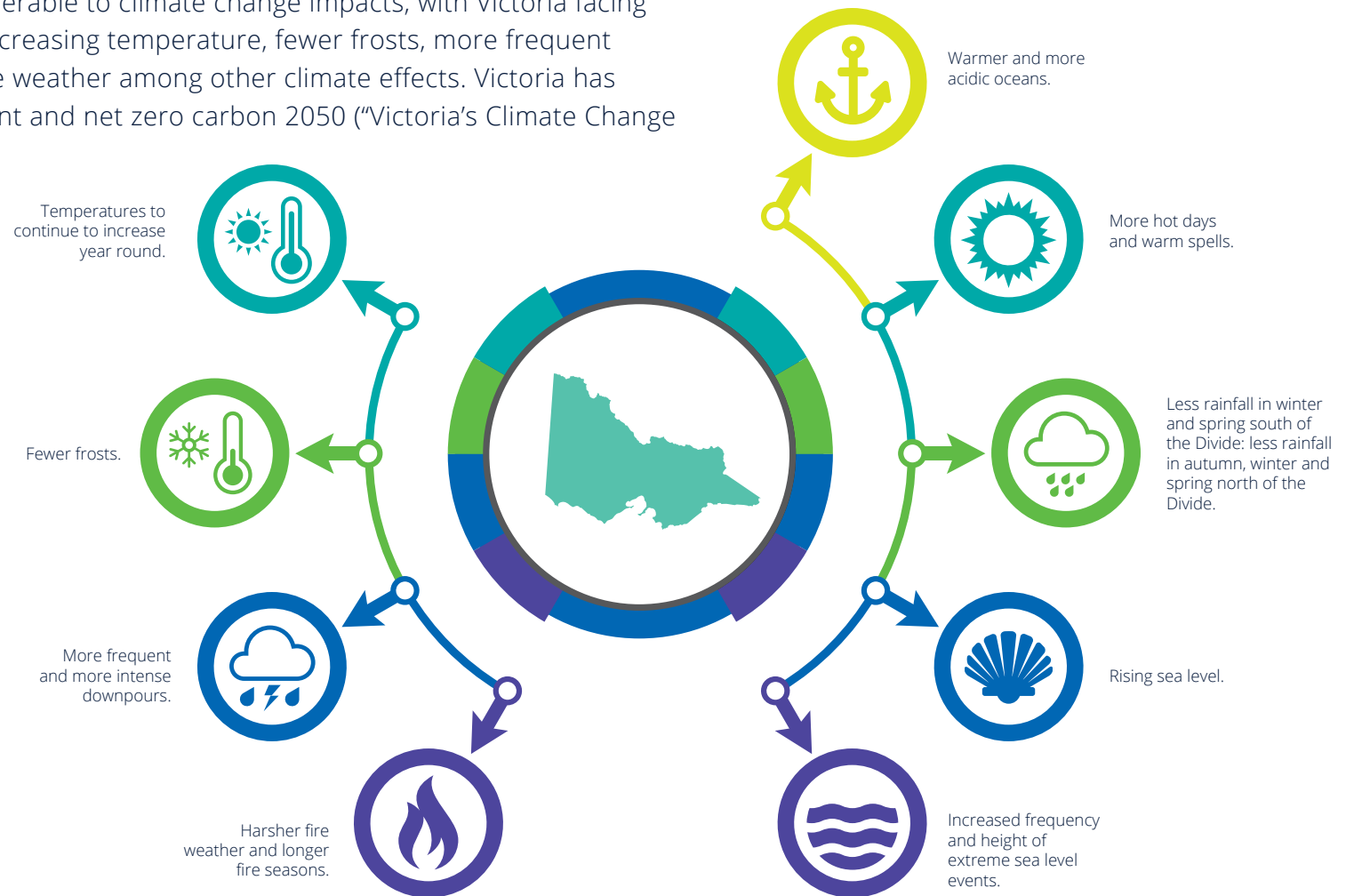


Figure 3. Victorian Climate Projections at a glance

THESE CLIMATE CHANGES WILL POSE CHALLENGES FOR THE PLACES WHERE WE PLAY AND FOR THE PEOPLE WHO PLAY SPORT AND ENGAGE IN RECREATION, BOTH INDOORS AND OUTDOORS.



Projected number of days per year exceeding 35°C for locations in Victoria using a high and low emissions scenarios. Reproduced from: Bureau of Meteorology and CSIRO, 2019.

Table 1. Projected number of days per year exceeding 35°C in Victoria

	MELBOURNE	GEELONG	MILDURA	BENDIGO
Baseline (1981 - 2010)	8.33	6.40	35.90	12.93
2030, RCP 8.5	11.77 (10.50 - 13.27*)	9.10 (8.17 - 10.67*)	46.39 (42.17 - 51.70*)	18.87 (16.50 - 21.17*)
2050, RCP 8.5	14.55 (12.67 - 17.47*)	11.04 (9.80 - 13.13*)	55.97 (49.03 - 68.00*)	24.39 (20.53 - 29.43*)
2030, RCP 4.5	11.57 (10.83 - 12.90)	8.88 (8.17 - 10.10)	45.59 (42.23 - 49.50*)	18.30 (16.63 - 21.20)
2050, RCP 4.5	12.84 (11.70 - 15.27)	9.86 (8.80 - 11.73)	49.23 (45.90 - 55.40)	20.77 (17.80 - 25.87)

Note: RCP = Representative Concentration Pathway

* General Circulation Model (GCM): CanESM2 has been selected to demonstrate the “worst case” using the CSIRO Climate Change in Australia model assessment methodology.

Victoria is home to 5.5 million people (23% of Australia’s population) and 16,000 sports clubs, whose members play across 10,000 sport facilities, 2,000 trails, and 10,000 parks, playgrounds, and reserves (Sport and Recreation Victoria, 2019). In the International Olympic Committee’s Sustainability Essentials, examples of climate change impact on sport in Victoria included: 1,000 fans treated for heat exhaustion during 2014 Australian Tennis Open, three quarters of metro and rural AFL leagues delayed or cut short their season due to temporary and permanent ground closures, over 100 community cricket clubs in Geelong were forced to end their season three months early, and football pre-seasons were affected by the lack of available training ovals, and two-thirds of surf lifesaving clubs are located on unstable shorelines. These are only a few of the ways in which our Victorian sport and recreation community is affected by climate change.

FUTURE PROOFING OUR PLACES OF PLAY

Where we play takes on all shapes, dimensions, sizes and are in locations which are exposed to a range of climate conditions. Due to the variability, the places where we play require design and operations which take into account the unique impacts of our natural environment and the demands of purpose and users of these places of play (Garner & Preuss, 2018; Orts & Spigonardo, 2013).



In the face of changing climate, it is recommended that ecological impact is strategically considered across the planning of places where we play, and embedded as business as usual in design and operations.

Furthermore, there are no 'end points,' only successes and milestones along the ever changing conditions and demands for mitigation and adaptation (McCullough, Pfahl, & Nguyen, 2015).

In future proofing our places of play, there are two key areas of opportunity: built environment and stakeholder engagement. How we design, build and then engage stakeholders to behave in alignment with how we operate our places of play must be focused on protecting our clean future. To address the built environment:

- consult internationally and locally recognised standards for 'green' and 'healthy' infrastructure
- conservation of the natural environment and positive impact on biodiversity;
- conservation of historic buildings and other cultural heritage;

- conservation of water resources;
- minimisation of energy use and of greenhouse gas emissions;
- minimisation of adverse impacts on land, water, noise and air quality;
- use of long-lasting environmentally and socially responsible materials;
- minimisation of waste and maximising reuse and recycling of materials;
- universal design;
- internal environments that foster health and well being; and
- creation of opportunities to leave a positive legacy for local businesses and communities. ("Sustainability Essentials: Introduction to Sustainability", n.d., p. 47)

These recommendations are often included in the principles of Environmentally Sustainable Design (ESD), an approach used to decrease the impact of building and operating facilities on the natural environment (McLennan, 2004). ESD aims to reduce negative impacts on the environment and improve the health and comfort of buildings by using low impact materials, being water and energy efficient, optimising operational and maintenance practices, and designing for reuse, recycling and durability (Gibson et al., 2008). Contrary to popular belief, ESD provides developers a way to reduce building and operating costs linked to energy consumption, water consumption and waste management of sport facilities (Lucas et al., 2017) making ESD facilities more cost effective to build and operate than traditional ones (Belson, 2018; Lucas et al., 2017). Further, there are many technological and operational recommendations which specifically address pitch sports (Weller & English, 2009).

OUR PLACES OF PLAY
CAN BE CONSTRUCTED
TO BE ABLE TO REDUCE
ITS CARBON EMISSIONS,
ENERGY USE, WATER
USE, CONSTRUCTION
AND OPERATIONAL
WASTE WHILE IMPROVING
BIODIVERSITY, INDOOR AND
OUTDOOR ENVIRONMENTAL
QUALITY, AND HUMAN
HEALTH AND WELLBEING

ESD decreases the overall costs of operating facilities by incorporating two main design options: passive design and active design (Aquino et al., 2015). Passive measures can be obtained in the planning and construction phases, and does not involve technological solutions (Lucas et al., 2017). ESD will reduce energy related operating costs by 20%, particularly if venue location is optimised (implementing design measures such as lowered playing field, landscape design for natural cooling and lighting) (Aquino et al., 2015; Lucas et al., 2017). Active measures use technology to decrease building and running costs, while improving the ecological footprint (Lucas et al., 2017) by integrating renewables, automated control systems, water (via reduction in potable water use, ultra low flush toilets, etc.) and materials management efficiencies (sourcing, packaging, recycling, etc.) (Gibson et al., 2008; Lucas et al., 2017).

ESD displays other cost-related advantages (Gibson et al., 2008), such as low cost of maintenance, can benefit from subsidies and grants by governments and organizations, and attracts commercial partners wanting to support green infrastructure. The return on investment for renewable energy sourcing has been cited as 7 years, wind turbines at 7.3 years, LED lighting between 5-6 years (Aquino et al., 2015) with water and energy efficiencies across various venues showing significant savings (Orts & Spigonardo., 2013; Porteshawwer, 2009).

The World Green Building Council outlined the strong financial case for incorporating ESD principles into the design and construction of buildings (World Green Building Council, 2013), noting:

- Building green does not always increase design and construction costs, especially if the principles are incorporated from the very beginning of the project
- Green buildings tend to attract higher rent and sale price
- Green buildings save money by reducing operating costs, such as energy and water, and ongoing maintenance costs
- Sustainably designed buildings can improve worker productivity, health and wellbeing and
- There are significant risks involved with not building for environmental sustainability into the future – regulatory changes banning inefficient buildings, increased insurance, reduced demand for unsustainable products.

01



PROMISE TO PROTECT OUR PLACES OF PLAY

If you've already started, or you want to start on your journey, a solid first step is to signal to your community that you are invested in its clean future.

There are several ways to make the commitment towards cleaner air, water, and greener grass for sport and recreation. Create a positioning statement, policy, or integrate environmental regeneration into your organisation's values. Engage locally by signing up for campaigns which encourage good eco behaviour, or engage globally and express your commitment by becoming a signatory for the United Nations Framework Convention on Climate Change (UNFCCC) Sports for Climate Action Framework (UNFCCC, 2018), and join a like-minded group of leaders, such as the Sports Environment Alliance ("Sports Environment Alliance", 2019). Positioning statements and policies communicate your commitment to internal and external stakeholders (Smith & Westerbeek, 2007; Trendafilova, Babiak, & Heinze, 2013) and related policies could be reviewed to help you become a leader in your community, while reducing costs (Weller & English, 2008).

STEP 1: CLIMATE ACTION



- Create your commitment: positioning statement, policy, values
- Join a leadership group or support a local or global campaign to encourage positive eco behaviour
- Ask questions of your organisation to establish what you will commit to ("Sustainability Essentials," n.d., p. 18)
Are there any aspects of your organisation's activities that might have an impact on the environment, cultural heritage, local communities or other people?
- Do you have any existing, or previous, initiatives related to sustainability? If so how successful are/were they and what have you learnt from them?
- Is your organisation potentially at risk from impacts of climate change (flooding, drought, forest fires, temperature rise)?
- What resources do you have – people, sites, partner organisations, expert advisers, funds?
- Research what others might already be doing.

02



RALLY TEAM PLANET

Like with any other effort, your organisation will have likely champions who may want to form a working group or committee to address your eco work's short and long-term planning.

Executive support, clear drivers for engagement (e.g., healthy living, environmental legacy, promotion of wellbeing, etc.) and strong planning will motivate your team to work effectively towards your goals. The most effective way to garner support is to speak in the language that most resonates with your audience; reduction in resource use may equate to cost reductions which resonate with those managing your club's financials and less litter may mean more aesthetically pleasing facilities which may appeal with those in charge of attracting and retaining members (Nguyen, 2015).

Research recommends collaborative approach to your efforts with support by a strategic partner and third party stakeholders (local governing bodies and regulators, environmental groups, etc.) to address the simple to complex opportunities in future proofing our places of play (Casper & Pfahl, 2012; Ottman, 1998; Pfahl, 2010; Dodouras & James, 2004; Nguyen, 2015; Nguyen & Trendafilova, 2015).

STEP 2: CLIMATE ACTION



- Identify your eco-champions (waste warriors, captain plastics, bin goalies, whatever you want to call them)
- Seek executive and/or committee support by translating the opportunities into their language
- Form partnerships with community groups and others who may add value to your commitment





BASELINE & SET YOUR GOALS

The well-worn adage for improvement is that you cannot manage what you do not measure (Porter, 2014). In environmental efforts, understanding where you start, where you want to go and how you progress thereafter is reliant on: baselining, setting goals, measuring progress, {celebrate wins}, and setting new goals.

Goals are not evaluated based on the level of their ambition, but rather the commitment and progress towards those goals. Targets can be set for all parts of your efforts, both the kinds of targets focused on built environment (e.g., efficiency in design and operation) and stakeholder engagement (e.g., water and energy use, material waste, awareness and engagement) (Farrow, Johnson, & Larson, 2000; Kellison & Kim, 2014). Key considerations in setting your goals, include (but are not limited to):

- the integration of environment as a strategic priority
- the values of your organisation
- actions where immediate impact can be made
- the requirements of action (e.g., legal, financial, etc.)
- the limitations of systems and infrastructure
- the availability and advances in technology and related innovations
- related positioning and policies of your organisation
- planning set where greatest improvement and impact can be made over time.





The targets set can include a myriad of issues, but your actions must be driven by thoughtful consideration of what role you want and can play in protecting the health of our future. Ask questions which will direct your first, second and ongoing actions: where you are located? what climate impacts affect you most? what are the priorities of your council area and your stakeholders? what related decisions do you have control over? how much can you invest in resourcing changes? what would you like your organisation to be known for (i.e., your green legacy)? where can you make the most impact?

These questions and others may set you on the path of least resistance and greatest impact. There are cited areas where your organisation could address ("Sustainability Essentials", n.d., p. 24):

- having a positive impact on biodiversity
- having operations that emit no greenhouse gases or other harmful substances
- sourcing all products and services in ways that have no negative environmental or social impacts and applying ethical supply chain policies
- treating all products and materials as valuable resources that can be reused multiple times
- creating a safe and inclusive working environment in which all your people can flourish
- helping to create and support thriving communities wherever you operate and
- engaging and empowering your partners to act in the best interests of people and the environment.

STEP 3: CLIMATE ACTION



- Take stock: baseline measure your resource use (water, energy, materials) and other related measurements
- Ask questions to identify your most aligned and greatest impact for eco legacy
- Set goals: quick wins (little investment), competitive need (little investment, high impact), systemic change (high investment, high impact)
- Measure progress {and celebrate wins} ongoing
- Reassess state of climate conditions against impact on organisation and organisation's performance
- Identify new goals which match the new environment
- Create action plans to meet your goals



LEANER, FASTER & CLEANER THROUGH MITIGATION

We know how changing climate can impact us and our sport community, but how do we take action to mitigate the effects climate change can have on us and lessen our contribution to global emissions? We must recognise our sources of emissions and plan to avoid and reduce the actions which contribute to our overall ecological footprint.

Reducing our ecological footprint

Our ability to future proof community sport and recreation is reliant on our commitment to follow the standard hierarchy of natural resource management: refuse, reduce, reuse, repurpose (if appropriate) and recycle (Environment Protection Authority Victoria, 2019; Kenway, 2013; Turner et al., 2016).

When we consider our ecological footprint, an aggregated indicator of global ecological impact, we are evaluating our lifestyle (Collins, Flynn, Munday, & Roberts, 2007; Thibault, 2009) which requires food, shelter, clothing, travel, and all else which rely on water, oil and electricity use which are key factors in the measurement of our ecological footprint (NRDC & GSA, 2012, 2013). We can frame our approach with success being contingent on a 'triple bottom line: people, planet, profit' and apply the resource management hierarchy in those decisions. Following such a hierarchy will not only address our general ecological footprint, but also affect specific contribution to the key emissions producing industries: Energy, transport, manufacturing/industry, agriculture, land use and forestry, and residential and commercial.

In Australia, the energy sector (stationary energy, transport and fugitive emissions from fuels) is the dominant source of Australia's greenhouse gas emissions (74% of net emissions), which is reflective of our heavy reliance on fossil fuels (coal dominant) as our primary source of electricity production. Transport and agriculture make up the next highest sources of emissions. ("State of Environment", 2011). Our sport community's ecological footprint comes from:

- food production & sourcing,
- travel & transport,
- construction and operation of facilities,
- games/events,
- procurement, and,
- consumption of natural resources (Collins & Flynn, 2008; Jones, 2007; Kellison & McCullough, 2016; Langenbach & Krieger, 2017; McCullough, 2013; Thibault, 2009).

In making changes to our ecological footprint, we will lessen our contribution to climate change, thus, reducing the severity of its impacts on our places of play, by just being leaner ("National Greenhouse and Energy Reporting", 2018).

Being leaner is the key to mitigation action. By definition, mitigation refers to any actions focused on reducing or preventing emissions of greenhouse gases (GHG) ("Mitigation", 2019), which could range from us installing solar panels or more efficient lighting to changing what and how we consume food, use equipment and choosing a more efficient and less impactful decision when it comes to playing and watching sport. We can contribute individually, by being more conscientious in our pro-environmental behaviour, and in making less impactful choices.

Our sport and recreation community can demand more sustainable development where we play and create opportunities for ecological behaviours (e.g., installing water fountains to reduce use of plastic bottles; building in connected bike and walking paths to encourage no emissions in active transport, etc.). Preliminary research specifically related to our sport and recreation grounds indicate that they have a significant GHG footprint. The role of energy and fuel use associated with management activities in its respective footprint is already well known. However, less well known is the role of GHG emissions from soil microbial processes, the process by which soil mineralises micronutrients for growth and development. By simply improving nutrient and water management, there is potential to mitigate some of the climate change impact in these intensively managed, and much loved, ecosystems (Kong, Shi, & Chu, 2014; Porter, Riches, & Scheer, 2017; Ravishankara, Daniel, & Portmann, 2009; Riches, Mattner, Davies, & Porter, 2016; Scheer, Grace, Rowlings, & Payero, 2012; Townsend-Small & Czimczik, 2010). In making changes in the way our facilities are designed and the way we use and care for them, we can avoid hazardous pollutants, materials and chemicals and benefit from reductions in water and energy use, decreased waste, and lower emissions of harmful pollutants, such as nitrogen oxides (the



primary contributor to smog), particulates (the primary contributor to respiratory sickness), sulfur dioxide (the primary contributor to acid rain), and carbon dioxide (the primary component of GHG) and secure the overall well-being of the places where we play (Kats, Alevantis, Berman, Mills, & Perlman, 2003; Schmidt, 2006)

Tackling climate change may seem insurmountable, but is very doable with so many ways to take action to protect where you play sport and engage in recreation.

The management of sports and recreation facilities must be such as to respect the environment and preserve our natural resources. A critical factor will be how these places are managed, thus, volunteers must be trained in environment-friendly techniques and economy of resources. The quantity of waste produced must be reduced and the use of recyclable materials encouraged. Use of dangerous or polluting chemical products should be avoided across the management and care of sport and recreation spaces (e.g., cleaning chemicals, overuse of pesticides, etc.). If they are deemed essential, they must be used in accordance with existing legislation and with restraint (International Olympic Committee, Sport and Environment Commission, 1999, p. 35).

Mitigation: In action

The global sport industry is taking up mitigation efforts in professional sports and stadia (e.g., Major League Baseball, National Football League, Arsenal Football Club, etc.) (NRDC & GSA, 2012, 2013). Australian major sports are following suit with examples like: Metricon Stadium with major solar panel installation, water tank and treatment plants at Marvel Stadium and Melbourne Cricket Ground, respectively (Climate Institute, 2015); then SuperDome (now Qudos Banks Arena) with its 100% renewable energy sourcing among other sustainability features and co-generation at Stadium

Australia (Campbell, 2001).

The greatest impact can come from our sport and recreation community, and thankfully, they have taken leadership with support from local council and other key stakeholders to consider their structural mitigation opportunities. In Victoria, water has been a key area of concern, and as a result, Level 3a water restrictions, which have been in force in Victoria since 2007, required initially that local councils water only '1 in 4' sports grounds (Weller & English, 2008, p. 23).

In Melbourne alone, there are 1,650 sportsgrounds covering around 2,500 hectares of land. Water authorities require that councils develop a "Water Conservation Plan" and that they:

- Install water meters on all sports grounds to monitor water use
- Introduce centralised watering systems for all sports grounds
- Provide detailed plans for the conversion of all grounds to warm season grasses
- Undertake an efficiency audit of different irrigation systems in local conditions
- Monitor water consumption and report to the water authority on a monthly basis
- Publish irrigation schedules online and display signage at affected grounds.

Councils have responded by investing in water efficient technologies, drought tolerant turf, water recycling and storage and implementing strategies that reduce their water consumption. (Weller & English, 2008, pp.1-2).



CASE STUDIES:

Wangaratta Indoor Sports and Aquatic Centre

Wangaratta Indoor Sports and Aquatic Centre

The Wangaratta Indoor Sports and Aquatic Centre (WISAC) and adjacent Eco Living Community Centre form the Eco Living Precinct. This project enhances the energy efficiency and sustainability of this precinct substantially through the installation of: cogeneration at WISAC with associated signage and a real time energy display, solar hot water system at WISAC, purge system for the HVAC system at the Eco Living Community Centre with associated education signage, and a wall insulation display at the Eco Living Community Centre with temperature sensors. As a result of their efforts, they have seen a reduction of 23% in greenhouse gas emissions. The predicted reduction from the Energy Efficiency data of the installations is 23,000kWh of electricity, thus saving them \$2,070 per annum, however this is likely to increase, once again, depending on electricity and gas prices. (Chapman & Thrum, 2015)



Barwon Heads Football and Netball Club

Barwon Heads Football & Netball Club (BHFNC) received a Community Sport Infrastructure grant from the Federal Government to upgrade lighting at their facility to improve energy efficiency. BHFNC is currently working on a number of initiatives, including the elimination of plastic from the canteen, as well as plastic water bottles and straws. Instead, BHFNC sells aluminium water bottles and have installed water coolers to provide free water refills.

Their future initiatives include:

- Stocking more sustainable products (i.e. bamboo, cardboard)
- Promoting their environmental work to encourage and educate other sports clubs to engage in pro-environmental behaviours.
- Improving the management of material waste

(Barwon Heads Football and Netball Club, personal communication, May 13, 2019)



Rip Curl Pro - Surfing Victoria

The Rip Curl Pro, held at famous surf break Bells Beach, is the longest running world championship event on the World Surfing League (WSL) World Tour. Surfing Victoria, in collaboration with Rip Curl, the Surf Coast Shire Council and the WSL, has transformed this iconic contest into a waste wise, plastic-free event, ensuring the coastline and oceans remain free from unwanted plastic waste.

The Rip Curl Pro's plastic-free policy helped the 2018 event divert 65% of its waste from landfill, setting a new benchmark for the contest moving forward. It also encouraged food vendors and external partners to boost their environmental efforts to ensure they complied with this new policy. Under the guidance of Surfing Victoria, the Rip Curl Pro is committed to reducing its environmental footprint as they endeavour to protect the local environment from unnecessary waste. ("Rip Curl Pro", n.d.; "Rip Curl Pro", 2018).

CASE STUDY:



Fawkner Food Bowls - Community Garden

Fawkner Food Bowls transformed a disused bowling green into a community garden and a place for community to connect. With help from The Neighbourhood Project, the Fawkner Bowling Club and Moreland City Council initiated its partnership in 2017 and continues to build momentum. The garden covers one standard sized bowling green (approximately 37 m²), providing a welcoming space for the community to grow fresh produce, share gardening and growing skills, host family events, and engage with other community members.

Since its inception, the garden has helped the club and local community divert approximately one cubic metre of waste from landfill each month and composts the bowling clubs' food scraps, green waste, paper towels, as well as spent coffee grounds, shredded paper and much more from local businesses and community members. This transformative project has helped

raise the profile of the bowling club, in turn boosting membership numbers and involving more community members in sport and its community. Their future is fruitful with plans to improve their garden, add green houses and work spaces which will repurpose the bowls club's unused shade shelters.



STEP 4: CLIMATE ACTION



- Identify your key sources of emissions and ecological footprint contribution
- Follow the standard resource management hierarchy for all natural resources (water, energy, material): refuse, reduce, reuse, repurpose (if applicable), and recycle
- Engage in mitigation actions as outlined in the table on the following page, and consider reduction of overall resource use (e.g., turn off the lights, take shorter showers, carpool or walk)
- Ecologically sound procurement: purchase necessarily and with end-of-life in mind; choose products made from sustainable materials, packaging sourced ethically
- Demand ecological design and operational efficiencies
- Seek ways to engage on site conservation and biological diversity, remediation, and positive carbon contributions, like community gardens, tree planting and other heat island effect reduction mechanisms
- Continually consider emissions reduction options such as lowering travel related emissions by cycling, walking and carpooling and sourcing locally to reduce transport emissions

The sport and recreation community has an opportunity to reduce our ecological footprint by making changes to reducing our use of natural resources and simply being more efficient with what we do use. By doing so, we are participating in mitigation actions which will lessen our ecological harm and extend the availability of resources for use in years to come. Table 2 Climate Mitigation Actions and Areas of Opportunity provides a number of actions, some of which your club can do today and some which will take longer uptake and implementation. Overall, the key action will be using less: water, energy, materials (in particular single use). Table 3 Climate adaptation actions and areas of opportunity lists action items which reference how we might adapt and adjust to the inevitable changing climate. Whilst, we can mitigate our ecological footprint, the expectations for change in climate variables (e.g., temperature, precipitation, etc) will challenge us to consider how we might still play within the new conditions. The areas of risk, related variables, and adaptation actions are presented alongside vulnerability levels (low, medium, high), as determined by the researchers and advisors linked to this guide.

Across both mitigation and adaptation, it is integral that there is collaboration among the sport and recreation community, their Local Government Authorities, and the respective State Government.

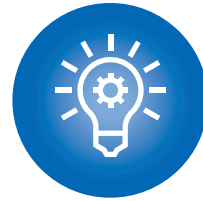
Table 2. Climate mitigation actions and areas of opportunity

	RESILIENT AREAS	IMPACT AREAS	MITIGATION METHODS
1	Infrastructure/ Venue	Sustainable sites	<ul style="list-style-type: none"> • Transport: Incentivising public transport use or other no/low emissions travel (cycling, walking) • Reducing transport emissions: Linking facility to cycling/walking trails • Ensuring supply vehicles and cargo transport is fully maximised (e.g., not sending 1/2 empty trucks to/from sites), and carpooling to matches • Low impact site management: no/low pesticide use • Brown (e.g. reclaimed sites) to green (rejuvenated, repurposed sites): building on brown sites to develop green sites • Landscaping: native species, biodiversity and conservation • Stormwater management: water capture and reuse, efficient irrigation • Heat island reduction: rooftop gardens, minimising parking spaces • Biodiversity & Conservation: consider conservation of native wildlife (e.g., bird boxes, apiaries, etc), community edible gardens, composting on site, tree planting and clean up initiatives
2	Infrastructure/ Venue	Efficient water use	<ul style="list-style-type: none"> • Plumbing fixtures and fittings: low flow • Water use measurement: submeters meters which measure for specific site use to ensure accurate water management (e.g., too much water being used in submetered area) "solar hot water?" • Water efficient landscaping and sports field management: efficient irrigation, reduction of potable water use, increase use of grey water/non-potable water • Installing water fountains: reducing single use/plastic bottle use
3	Infrastructure/ Venue	Energy	<ul style="list-style-type: none"> • Energy best management practices: operating plans; energy performance; energy audits; efficient lighting installation and ongoing upgrades • Commissioning and auditing: calibration, planning with clear objectives • Clean & renewable power sources: solar hot water options, wind, geothermal, onsite solar, battery storage, and electric vehicle charging stations on site (paired with renewable energy source)
4	Infrastructure/ Venue	Materials	<ul style="list-style-type: none"> • Smart development: Reuse of building material for new development • Infrastructure materials: Sourcing of low impact, low embodied carbon and renewable building materials • Efficient building design: low ongoing resource use in operations, cooling, heating, electrifying

	RESILIENT AREAS	IMPACT AREAS	MITIGATION METHODS
5	Infrastructure/ Venue/People	Indoor Air Quality (IAQ)	<ul style="list-style-type: none"> • Outdoor air delivery and monitoring: CO₂ sensors; IAQ best management practices • Occupant comfort: temperature, quality, acoustics • Green cleaning: consider volatile organic compounds (VOCs); Heating, ventilation & air conditioning (HVAC) effective cleaning to reduce spread of bacteria from inefficient systems.
6	Organisation	Materials/ Resource	<ul style="list-style-type: none"> • Procurement policies and processes (e.g., environmental tender process, sourcing, transport) • Materials management policies: avoidance of building materials and products that may negatively impact the natural environment throughout their entire lifecycle; reduction of packaging and/or excessive material use • Consideration of end of life: reuse, repurpose, recycle.
7	Organisation	Awareness, education and action	<ul style="list-style-type: none"> • Raising awareness & educate sport community: pro-environmental behaviours (e.g., bring water bottles, take shorter showers, ride your bike to sport, etc.)



Campbell, 2001; Casper, Pfahl, & McCullough, 2014; Dangelico & Devashish, 2010; Greenpeace International, Palese, De Heer, & Greenpeace Australia, 2000, p.4; International Olympic Committee, 2005; Mallen & Chard, 2012; McCullough, Pfahl, & Nguyen, 2015; McCullough & Kellison, 2016; Trendafilova & Babiak, 2011; Preuss, 2013; Trendafilova, McCullough, Pfahl, Nguyen, Casper, & Picariello, 2014; Subic, Shabani, Hedayati, & Crossin, 2012; Subic, Mouritz, & Troynikov, 2009; Weller & English, 2008)



CHANGING THE GAME THROUGH ADAPTATION

Sport is reliant on a stable climate to supply appropriate environmental conditions – temperatures, rainfall, snowfall, ice, humidity or winds – to enable us to play sport (Dingle & Stewart, 2018).

The fact is, the climate continues to change and with it comes its effect on worsening extreme weather conditions which we must be prepared for (Climate Council, 2017; CSIRO, 2018). Mitigation is one way of minimising our contribution, but the other way to be resilient in changing climate conditions is through adaptation efforts.

Adaptation is the process of adjustment to actual or expected climate and its effects (Intergovernmental Panel on Climate Change, 2018).

Mitigation is what we do to transition to adaptation, a new way of playing the game. Adaptation takes on various forms, however, our end goal is to ensure we can still play sport and engage in recreation in new climate conditions. For example, Weller and English (2009, p. 27) listed a number of changes which can contribute to a more resilient sport and recreation community where turf is affected:

- Limiting (or in some cases, cancelled) pre-season training;
- Changing the location of pre-season training;
- Reducing the number of pre-season practice matches;
- Imposing limits on the number of teams they field;

- Imposing limits on the number of players on team lists;
- Changing the times and locations of training;
- Reducing the number of training seasons held on turf surfaces;
- Altering the content of training activities (for example, by replacing sessions that would have been on turf with sessions held at indoor stadiums, gyms or swimming pools);
- Altering the scheduling of matches;
- Playing more games 'away' from their home grounds, often playing on grounds some distance from their local area;
- Reducing the duration of playing seasons;
- Changing the arrangements and locations of finals series;
- Cancelling matches when grounds are closed or not available.

Infrastructure is the main area that will have to adapt to climate change (Covello, 2008). Increased frequency and intensity of extreme weather conditions such as severe storms and drought will likely play a large role in the development of climate change resilience strategies. A snapshot of the primary impacts of the effects of increased frequency, intensity and duration of heavy

LOCAL COUNCILS HAVE ALSO HAD TO BALANCE CLUB AND COMMUNITY DEMANDS TO KEEP GROUNDS OPEN FOR USE WITH THE PRACTICAL NEED TO PRESERVE THE LONG TERM VALUE OF THE GROUND AS A LOCAL ASSET AND RESOURCE.

(Weller & English, 2008, p. 24)

rainfall is highlighted by one of the worst recent flooding events in Queensland, Australia (2010/2011). Extended periods of intense rainfall had an economic cost of \$1 billion, with approximately 2.5 million people affected and nearly 30,000 homes and businesses experienced flooding (Canadell & Poulter, 2014). Suncorp Stadium (Brisbane) was covered by 1.5 metres of water, and in response, its management made the decision to integrate many flood resistant adaptations (The Climate Institute, 2015, p. 4).

Sport needs to be prepared to be more resilient to these types of extreme events, with disaster recovery plans needing to be made more readily available, and climate resilient playing surfaces at the forefront of decision-makers' minds (Dingle & Stewart, 2018; Climate Coalition, 2015; Orr & Inoue, 2018.)

Other forms of adaptation for infrastructure may include:

- Coastal erosion: Sea wall infrastructure, relocate inland
- Damage to assets e.g., loss of snow: new water efficient measures of snow making
- Loss of playing surface (grass): Variety of grass, greywater and rainwater tanks, efficient water management plans, climate-resilient playing surface; irrigating selectively for high-performance vs training areas (Dingle & Stewart, 2018; Climate Coalition, 2015; Orr & Inoue, 2018)

Alpine sport is greatly affected by global warming, thus, technology to address adapting to the ongoing effects have been explored. Prototypes for snow production are starting to be explored, and while snow making will not be hampered, ski resorts will have to face the rising cost of snowmaking in our climate change affected future (Steiger & Mayer, 2008, p. 297).

The most unpredictable form of adaptation is change in

demand and behavioural adaptation (Teich et al., 2007). The consumer related effects of climate change is yet to be known. Global warming will change the costs of many common items or experiences, so costs will have to be paid by the consumers, and their potential reactions must be examined to understand the possible changes in the financial variability (Steiger & Mayer, 2008, p. 297-298). As sport changes its expectations, demands and behaviours within our places of play, so will the other significant stakeholders such as local government, suppliers and partners. The apparel and equipment industries will need to consider international standards (International Organization for Standardization (ISO) 9,000 and 14,000 certificates for Quality Assurance and Environmental Management) and review its practice in sourcing, manufacturing and packaging as well as other industries servicing the needs of sport and the places where we play (Subic, Mouritz, & Troynikov, 2009; Subic, Shabani, Hedayati & Crossin, 2012). Adapting will mean living and playing differently in conditions which will be very different every day we move forward in a climate affected future.

STEP 5: CLIMATE ACTION



- Identify all the possible climate scenarios which may affect your community (e.g., drought, floods, coastal erosion, etc.)
- Prepare plans for possible and uncertain future climate conditions with the help of relevant authorities (e.g., Bureau of Meteorology, local council, etc.)
- Consider the ways your community will adapt to climate impact (as outlined in the table on the following page)

Table 3. Climate adaptation actions and areas of opportunity

	RISK AREA	PHYSICAL RISK	CLIMATE VARIABLE	ADAPTATION METHOD	VULNERABILITY
1	Infrastructure/ Venue Risks	Damage to infrastructure - extreme weather events (ie. bushfire, flood)	<ul style="list-style-type: none"> Increasing frequency and intensity of severe rainfall, Increasing severity of extreme weather conditions (e.g., hurricanes, drought conditions, extreme heat, etc.) Increasing fire weather 	<ul style="list-style-type: none"> Resilience of infrastructure, disaster recovery plans and equipment, climate-resilient playing surface. 	LOW (High adaptation potential, medium-term impact)
2	Infrastructure/ Venue Risks	Damage to assets - loss of playing surface (grass)	<ul style="list-style-type: none"> Increasing average temperatures, reducing average rainfall, increasing evapotranspiration, the natural precipitation cycle 	<ul style="list-style-type: none"> Variety of grass, greywater and rainwater tanks, efficient water management plans, climate-resilient playing surface. 	MEDIUM - HIGH (Available adaptation, short-term impact)
3	Infrastructure/ Venue Risks	Damage to assets - loss of snow	<ul style="list-style-type: none"> Increasing average temperatures, decreasing frost days and snowfall 	<ul style="list-style-type: none"> Machine-made snow 	MEDIUM (Low adaptation, long-term impact)
4	Infrastructure/ Venue Risks	Damage to assets - through coastal erosion and sea level rise (SLR)	<ul style="list-style-type: none"> Rising average sea levels, increasing coastal erosion 	<ul style="list-style-type: none"> Sea wall infrastructure, relocate inland. 	MEDIUM (Low adaptation, long-term impact)
5	Infrastructure/ Venue Risks	Damage to playing surface - loss of waves	<ul style="list-style-type: none"> Wave height 	<ul style="list-style-type: none"> Timing of events, artificial waves. 	MEDIUM (Low adaptation, long-term impact)
6	People/ Health Risks	Risks to health: Exertional heat illness (EHI)	<ul style="list-style-type: none"> Extreme heat (days exceeding 35 degrees) 	<ul style="list-style-type: none"> Heat policies and procedures, modifications in play (scheduling, length, breaks, indoors) Participant acclimatisation 	HIGH (Low adaptation, short-term impact)

	RISK AREA	PHYSICAL RISK	CLIMATE VARIABLE	ADAPTATION METHOD	VULNERABILITY
7	People/ Health Risks	Risks to health: Injury caused by unsafe playing surface (degradation of turf)	<ul style="list-style-type: none"> Increasing average temperatures, reducing average rainfall, increasing evapotranspiration 	<ul style="list-style-type: none"> Variety of grass, greywater and rainwater tanks, efficient water management plans, indoor play 	MEDIUM - HIGH (Available adaptation, short-term impact)
8	People/ Health Risks	Risks to health: air quality (particulate matter)	<ul style="list-style-type: none"> Fire weather, reducing rainfall, time in drought 	<ul style="list-style-type: none"> Policies and procedures, air quality monitoring, indoor play 	HIGH (Low adaptation, medium-term impact)
9	Organisation Risks	Disruption to events due to extreme weather (i.e. floods/ storms)	<ul style="list-style-type: none"> Increasing frequency and intensity of severe rainfall, Increasing severity of hurricanes, extreme heat, and drought conditions Increasing fire weather 	<ul style="list-style-type: none"> Roof cover/ shelter, adequate drainage, back-up venues 	LOW (High adaptation potential, medium-term impact)
10	Organisation Risks	Inability to secure affordable adequate water supply	<ul style="list-style-type: none"> Increasing average temperatures, reducing average rainfall, increasing evapotranspiration, increasing time in drought 	<ul style="list-style-type: none"> Greywater and rainwater tanks, efficient water management and water sourcing plans 	MEDIUM (Available adaptation, medium-term impact)
11	Organisation Risks	Decline in interest and participation	<ul style="list-style-type: none"> Second Tier impact of the above 	<ul style="list-style-type: none"> Marketing, community partnerships, athlete ambassadors 	LOW (High adaptation, medium-term impact)

(Casper, Pfahl, & McSherry, 2012; Climate Coalition, 2015; Climate Institute, 2015; Dingle & Stewart, 2018; Fortington et al., 2018; Martinich & Crimmins, 2019; McCullough & Kellison, 2016; Orr & Inoue, 2018)

06



SHOUT, CHEER, KICK GOALS FOR THE PLANET

As Allen Hershkowitz, a former senior scientist with the National Resources Defense Council (NRDC), commented in The New York Times: “Hundreds of millions of people pay attention to sport. It’s just astounding to me that for decades the modern environmental movement ignored professional sport as an area to mobilize our cause” (Kellison, & Kim, 2014, p. 34).

As we are well aware, our home and the places where we play are under threat from climate change. Sports and recreation plays a significant role in our communities and with that comes the opportunity to raise awareness, educate, engage and galvanise our players, parents, officials, volunteers, and those who love watching us play sport and engage in recreation, to do the right thing. We must work together to future proof our places of play, and as you progress through the key roadmap milestones, the greatest impact you can make is to share the good work that you do: shout and cheer about the good work in which your community engages. When you do share the actions you have taken, more people will want to follow your leadership and participate to act on behalf of our clean future (Casper, Pfahl, & McCullough, 2014; Kellison & Kim, 2014; Nguyen, 2015; McCullough, Pfahl, & Nguyen, 2015; Nguyen, 2015; Trendafilova, Babiak, & Heinze, 2013, p. 301; Trendafilova et. al., 2014). Share your news across social media, club newsletters, annual general meetings, be recognised through sustainability awards, and tell them about your work, such as:

- ESD features, efforts and the impact it has had on your site
- energy, water and other cost savings from being

ecologically astute

- hosted clean up days, tree planting opportunities, community and garden plantings
- material and water recycling initiatives
- reduction and offsetting of carbon emissions
- recovery and distribution of prepared food
- the details of your journey and the positive impact it has had (Kellison & Kim, 2014).

STEP 6: CLIMATE ACTION



- Identify the eco efforts you have engaged
- Craft stories about your work
- Share {shout} and celebrate
- Tell your community about the past and upcoming opportunities to engage through all communication channels
- Apply for a sustainability award; create your own community sustainability award
- Reward and recognise small and large wins ongoing



KEEP CHECKING

Continual measurement, calibration, and improvement are the imperative ideas in ongoing ecological engagement as our community's journey will initiate and change at various points along the path of reducing one's ecological footprint (McCullough, Pfahl, & Nguyen, 2015).

As well, climate conditions will vary and thus, our responses and targets will change accordingly. It was advised by SportsAccord leaders (2010) that measuring, checking and reviewing are important elements of the six sport sustainability steps:

- i. **defining the policies and guidelines for sustainability**
- ii. **identifying and engaging the stakeholders**
- iii. **setting objectives and key performance indicators**
- iv. **implementing**
- v. **measuring, and**
- vi. **checking and reviewing**

(International Olympic Committee, 2011, p. 33).

The process of re-committing to your actions, establishing new targets, and understanding how best to mitigate and adapt are ever evolving (McCullough, Pfahl, & Nguyen, 2015).

The focus on keeping our air and water clean, and our grass green, will motivate your community's continual commitment to making the difference which will help protect our clean future, secure the wellbeing of our community, and allow us to continue to enjoy the places where we play sport and engage in recreation.

STEP 7: CLIMATE ACTION



- Keep regularly informed about your climate conditions
- Reassess your preparedness and capabilities to mitigate and adapt with changing climate conditions
- Continue to further embed 'planet' in what you do, as it will secure our ability to play for generations to come

CONCLUSION

“Policy and procedures cannot be the only changes” to green management, it needs to be a community focus including key leaders such as sport and recreation managers. What also has “influence and impact is the education, knowledge, values and integrity of attitude, behaviour and proactive engagement of environmental sustainability within their workplaces and personal lives” (Casper, Pfahl, & McSherry, 2002, p.23).

As we are aware, sport and our natural environment are inextricably linked (Thibault, 2009). Whilst we may have historically considered environment relevant to only certain sports due to their intensive resource use, it is in fact, all of our sport and recreation communities who can engage and benefit from mitigation and adaptation to climate change (Lenskyj, 2000; Weiss et al., 1998; International Olympic Committee, 2011). We have the opportunity to explore ways to directly reduce our ecological footprint, benefit from environmental considerations, as well as share the good eco work we do to educate and influence behaviour change in our communities (e.g., schools, suppliers, local government, etc.) (Preuss, 2013, p. 3590).

We need to know more about:

- what sustainability actions we could employ which would reflect and contribute to the agenda of the Sustainable Development Goals Framework (Golob, Lesjak, Fabjan, Jakulin, & Stamenković, 2015; United Nations (“Outcomes & frameworks ... Sustainable Development Knowledge Platform”, 2019)
- the gaps in capabilities relating to the following outcomes: reducing energy use, maximising alternative energy resources, reducing water use, maximising alternative water supply, implementing and applying waste management hierarchy, handling,

storing, treating, and disposing waste appropriately, reducing and accounting for carbon emissions, enhancing auditing and environmental monitoring performance, complying with environmental systems (Subic, Shabani, Hedayati, & Crossin, 2012, p. 2140).

- which sustainable sport development approach to use in complex regional local government sport planning processes (Morgan & Summers, 2012).

While we continue to better understand these gaps and explore the ways in which sport and recreation can be more ecologically sustainable, we must and can absolutely take our first, second, and many other steps towards minimising our ecological footprint. Through mitigation and adaptation today, and regenerative practices we can future proof community sport and recreation to flourish in a climate affected future so that we can continue to play for generations to come.

Bibliography



Click on the icon to view the Bibliography.





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