

## PERSPECTIVE OPEN



# Climate warriors down under: Contextualising Australia's youth climate justice movement

M. Hohenhaus<sup>1,2</sup>✉, S. Rutherford<sup>1,2,3</sup>, J. Boddy<sup>1,3,4</sup> and E. Borkoles<sup>1,2</sup>

This perspective brings together published peer reviewed primary research on youth climate activism in Australia and provides context of the political and social landscapes in which young people are taking climate action. As the generation most vulnerable to the impacts of climate change, young people all over the world have mobilised to drive a climate justice narrative to the fore of the climate movement. Climate justice framing will be applied to contextualise youth climate activism in Australia. This perspective also addresses the context-specific challenges faced by youth, including the media's role in shaping public perceptions and, anti-protest laws that restrict the right to protest. Finally, this perspective highlights the opportunities for how to support youth climate activism in the future.

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## INTRODUCTION

Globally, children and young people are expected to experience three to four times as many extreme climate events in their lifetime compared to older generations according to the 2023 Intergovernmental Panel on Climate Change (IPCC) synthesis report<sup>1</sup>. Like preceding reports, this latest report provides yet another warning that urgent climate action must be taken by governments to safeguard the future of today's youth. With the planet 1.1 °C warmer than in 1850–1900, we are now experiencing increased climate related extreme events including more frequent heatwaves, floods, droughts and bushfires<sup>1</sup>. If no action is taken, the 2023 IPCC report<sup>1</sup> projects we are on track to a gain of 3.2 °C of warming by 2100, posing extreme risk to human life.

As young people face the most vulnerability to climate change impacts, they are now appearing at the fore of the climate justice movement and are mobilising through structured youth-led networks such as the famous 'School Strike 4 Climate' (SS4C)<sup>2</sup>. While the authors acknowledge there are other forms of climate activism, this perspective will focus on describing the collective, non-violent youth climate activism research that has been the predominate focus in Australia. It will identify the climate justice narratives used by three key activism groups: the Australian Youth Climate Coalition (AYCC), the Seed Indigenous Youth Climate Network (Seed Mob), the 'School Strike 4 Climate' (SS4C) network and two litigation cases; *Sharma v Minister for the Environment and Youth v Waratah*. This perspective will first introduce the Australian context in which climate activism takes place, it will then focus on identifying the climate justice narrative within the youth climate movement to explore the practices taken by young people.

## THEORETICAL FRAMING AND APPROACH

With much of the current discourse in youth climate activism situated around the concept of climate justice, it is important to define it and explain the theoretical framework that will be applied throughout this perspective. The climate justice

movement evolved out of environmental justice, a concept that emerged in the late 20th century that exposed the racially unjust impacts of environmental damage on minority groups<sup>3–5</sup>. Climate justice concepts have been addressed locally and globally through large organisations, academia and grassroots activism<sup>4,6</sup>. Climate justice in grassroots activism evolved around the early 1990's with a focus on addressing the root causes of climate change, and an emphasis on the role of the production and distribution of fossil fuels in causing harm to future generations<sup>3</sup>. This perspective will frame contemporary youth climate justice using Newell's<sup>4</sup> four pillars of climate justice described as procedural, distributive, intergenerational and recognition justice to explore the various practices and discourse undertaken by young people to drive a climate justice agenda.

Procedural climate justice refers to having fair, accountable, and transparent decision-making processes about the impacts of and responses to climate change. It also involves giving access to information, participation, and redress to those who are affected by climate change, especially the marginalised and Indigenous communities who often face exclusion and exploitation<sup>4</sup>. Distributive climate justice refers to how the costs and benefits of climate change and its solutions are shared among different groups of people. It also considers how factors such as race, gender, class, and ethnicity affect people's access to resources and their exposure to environmental injustice. Recognition justice is defined as respecting and representing the diverse views and rights of marginalised groups who face discrimination and exclusion. It also exposes and challenges the historical and current injustices that result from exploiting energy resources and people<sup>4</sup>.

Finally, intergenerational climate justice is a concept that recognises the responsibility within current generations to ensure that future generations are not harmed by a lack of responsible decision making on pollution and other climate risk management<sup>4</sup>. Respect for and protection of human rights of future generations living in Australia are the core concepts of intergenerational justice in this perspective. Although these pillars often overlap and are not mutually exclusive, this perspective will

<sup>1</sup>Climate Action Beacon, Griffith University, Gold Coast, QLD 4215, Australia. <sup>2</sup>Public Health Team, School of Medicine and Dentistry, Griffith University, Gold Coast, QLD 4215, Australia. <sup>3</sup>Cities Research Institute, Griffith University, Gold Coast, QLD 4215, Australia. <sup>4</sup>Disrupting Violence Beacon, Griffith University, Gold Coast, QLD 4215, Australia.

✉email: m.hohenhaus@griffith.edu.au

focus on the intergenerational and recognition pillars to frame Australian youth climate activism.

This perspective has been informed by a literature review that was undertaken by the first author as part of her PhD project. Using the genre outlined by npj, this perspective provided an opportunity to draw from the existing research to contextualise Australian youth climate activism and present suggestions for future research that can support young people. This paper will focus on Newell's notions of intergenerational and recognition justice. This is because these concepts highlight the growing realisation among young climate activists, including the first author, that political authorities and major polluters in Australia are failing to adequately address and take responsibility for climate change that will disproportionately affect young people and future generations.

### THE AUSTRALIAN LANDSCAPE: DISASTERS, MENTAL HEALTH AND YOUTH CLIMATE ACTIVISM

Natural disasters are a normal occurrence in Australia, however, frequency, predictability and intensity of these events are increasing and are attributed to climate change<sup>7</sup>. In recent years, climate related bushfires and floods have devastated communities and caused widespread damage to the ecosystem and wildlife<sup>8</sup>. The 2019–2020 bushfires in New South Wales caused widespread destruction, burning 46 million acres of land, resulting in more than one billion animals perishing and the deaths of 34 people<sup>9</sup>. The ongoing and increased frequency of disasters in Australia has shown that current disaster preparedness processes cannot keep up, with slow recovery time periods increasing the vulnerability of communities for future disasters<sup>10</sup>. The vulnerabilities of Australian communities and lack of adequate disaster preparedness at the national level was highlighted again in March 2022. Less than two years after the bushfires, regions in Queensland and New South Wales experienced the most severe flooding event since 2011<sup>11</sup>. The floods affecting southeast Queensland and northern New South Wales led to the deaths of 22 people with more than 10,000 homes lost or damaged and 7000 people displaced<sup>12,13</sup>. Hence, it is understandable that young people, who will become the most impacted demographic, are actively pursuing structured modes of collective climate action.

The severity, frequency and diversity of such disasters in Australia over the past 15 years provides a snapshot into the future for its young people. Increasing climate disasters are causing concern for young Australians, which is substantiated by a growing body of literature indicating increasing mental health issues in this population group<sup>14–16</sup>. For example, research by van Nieuwenhuizen et al.<sup>17</sup> and Gunasiri et al.<sup>18</sup> have identified how climate-related disaster events in adolescents' lives are affecting their mental health, with young people experiencing increased anxiety, grief, anger, powerlessness, fear and hopelessness. In the wake of the 2020 bushfires, a survey of young people found 90% of respondents aged 16–25 had experienced a natural disaster in the past 3 years<sup>19</sup>. Further, this survey also found that 88% of respondents felt that they are not being taught enough disaster resilience to protect themselves<sup>19</sup>.

Climate related disasters in Australia will continue to increase in both severity and frequency, requiring a focus on development and implementation of national adaptation policies within affected communities and the ecosystems that they rely on<sup>20</sup>. In the absence of effective climate leadership, Australians and future generations will continue to be exposed to ongoing disasters that have already been linked to social, physical and mental health issues<sup>21–25</sup>.

As the first generation that will be impacted by climate change throughout the entirety of their lifetimes, young people have emerged as leaders in advocating for climate action<sup>26</sup>. As a result of the increasing prevalence of climate risks, youth-led climate

activism in Australia has gained momentum and evolved into a structured movement, most famously through the 'School Strikes 4 Climate'. Youth climate activism plays a pivotal role in driving a climate justice agenda using both institutional and non-institutional pathways including litigation, protest, education, awareness-raising and personal carbon reduction practices<sup>27–30</sup> in activists attempts to hold governments and large corporations accountable for their role in the climate crisis.

### COLLECTIVE CLIMATE ACTION FOR INTERGENERATIONAL AND RECOGNITION CLIMATE JUSTICE: AN AUSTRALIAN PERSPECTIVE

It is clear more than ever before that young Australians are concerned about climate change and are mobilising to take direct action. This is reflected by the emergence of large coalition groups such as the Australian Youth Climate Coalition (AYCC), Indigenous youth-led Seed Mob and the 'School Strike 4 Climate' (SS4C) network and through litigation cases. These groups undertake various direct action, in the form of decentralised, non-violent grassroots activism primarily targeting governments, banks, and the fossil fuel industry to pressure decision makers to take responsibility for their actions. Each of these groups reinforce a climate justice narrative and leverage this through various climate action approaches both within and outside institutional systems. For example, SS4C primarily uses approaches that work 'outside' of institutional systems through protesting and the young people involved in the *Sharma v Minister for the Environment* litigation case have utilised working 'inside' institutional systems to take climate action.

It is important to understand how climate activism is practiced in youth-led organisations, which then can be applied to other personal and collective action in the Australian context. AYCC, for example, was formed in 2006 by 27 youth organisations to encourage young people to become leaders in climate advocacy and remains Australia's largest youth run grassroots organisation. With over 15 years of experience, the coalition demonstrates the diversity of their activism to run efficient campaigns that adopted an 'educative-movement-building' approach. This approach is grounded by a broad climate justice narrative frequently citing the social, economic, Indigenous and environmental issues associated with climate change<sup>31</sup>. Furthermore, AYCC's approach to activism utilises hybrid organisational structures to create a space for young people to act as capable political climate advocates and simultaneously provide education to enhance their leadership and agency. AYCC illustrates this by targeting schools and organisations and uses storytelling strategies that frame 'youthfulness' as a strength to connect, motivate, educate and mobilise young people to engage in climate action<sup>31,32</sup>. AYCC also runs 'Youth Decide' campaigns during federal elections. In the 2022 federal election, the campaign focussed on the importance of opening up the conversation about the impacts of climate change with family and friends in order to encourage more votes for political parties and independents with strong climate policies<sup>33</sup>. AYCC recorded over 3000 conversations with youth volunteers during the election period, demonstrating themselves as strong advocates for climate justice. These approaches to collective climate activism in Australian youth has been immensely successful at engaging young people to participate in taking climate action. It appears that the emphasis of personal growth through education and leadership within a collective climate action movement is an effective model that could be adapted locally and globally.

Another youth-led network in Australia is the 'School Strike 4 Climate' (SS4C) network (more commonly known as 'Fridaysfor-Future' in Europe). The network took the world by storm in 2018 after climate activist pioneer Greta Thunberg skipped school to sit outside parliament house in her home country of Sweden. Two years later in 2021, the SS4C network continued to strike with over

four million people globally participating, including 350,000 students and workers in Australia<sup>34</sup>. In 2023, SS4C describes themselves as an established student-led, decentralised, non-violent grassroots network<sup>2</sup>. Their primary target is the fossil fuel industry, with a focus on a just transition and job creation for communities and people reliant on the industry. Most recently, they continue to drive an intergenerational climate justice agenda by collaborating with adult-led climate justice organisations, including Extinction Rebellion, with joint campaigns including #DontNabOurFuture, targeting Australian bank NAB who currently support gas and coal companies Whitehaven and Santos<sup>2</sup>.

Whilst the network is widely known for its strikes, SS4C also provides training workshops and summits to educate budding activists on social movement strategies<sup>35,36</sup>. Much like AYCC, SS4C uses peer-to-peer education and leadership development opportunities to engage collective action and build political and social agency in young people<sup>35,36</sup>. It appears that these organisations have been effective in mobilising young people to advance the intergenerational climate justice agenda. However, a critical component to the youth climate justice movement in Australia is the way it is being enacted. In addition to focusing on holding decision makers and major polluters accountable for their actions, AYCC and SS4C build youth empowerment through peer-led education. By becoming agents of change through actively educating themselves and others, they are able to utilise their personal and collective resources, knowledge and critical thinking skills to navigate their own future to protect themselves and the next generation from climate change related harm.

The Australian youth climate movement also intersects recognition and intergenerational justice concepts. For example, young people of colour and First Nations youth have brought recognition justice to the fore of their campaigns—where a focus is given to Indigenous or marginalised groups who face discrimination or exclusion concerned with the unequal impacts of environmental issues<sup>4</sup>. AYCC recognised the need for authentic diversity and inclusion, and in response launched the People of Colour Climate Network to include a more focused multicultural voice into their campaigns<sup>33</sup>. The network now has 200 young climate activists, who regularly take direct action to include and educate marginalised communities about climate change and its impact on future generation of Australians. For example, during the 2022 Federal election, the network distributed flyers, posters and social media content in five languages, other than English, to engage migrant and religious relatives in the climate conversation and to encourage them to vote for climate action supportive politicians<sup>33</sup>.

Also originating within AYCC, the Seed Indigenous Youth Climate Network Programme (Seed Mob), was established in 2020 as an independent organisation. It is the first and only group of First Nation's youth-led climate organisation, made up of 250 Aboriginal and Torres Strait Islander youth volunteers and 35,000 supporters. The group aims to empower young Indigenous people through fostering leadership and Caring for Country<sup>37</sup>. Their primary campaigns have been focussed on fracking in the Northern Territory, Queensland and Western Australia by working alongside local Aboriginal communities<sup>37,38</sup>. The campaign is embedded in a long history of Indigenous land rights<sup>38,39</sup> and draws attention to the damage caused to First Nations communities by coal and gas mining. Their campaign, that focuses on the damage fracking has on human health, Country and water, is linked to climate justice through recognition of land rights and self-determination<sup>38</sup>. In addition, Seed held the HEAL Country summit in 2022 that aimed to provide a space for First Nations young people to share, discuss and inspire each other with their ideas for future networks and campaigns<sup>37</sup>. Like AYCC, Seed is also grounded in a climate justice agenda and peer-learning with a focus on addressing systemic inequality and working alongside marginalised communities. This is an important Australian

perspective, as it demonstrates how Seed Mob is also a learning organisation, that can support the diversity of Australian youth climate activists' needs both formally and informally within their organisation. As illustrated above, perspective lies at the crossroads of recognition justice and intergenerational justice within the organised collective youth climate movement. This becomes evident through Seed Mob's campaign strategies, which emphasise Newell's recognition justice pillar through the unjust and disparate consequences of fossil fuel production on marginalised communities. In the context of intergenerational justice, young First Nations peoples are also championing the cause, addressing both the aforementioned inequities and the need for a secure future for their communities<sup>38</sup>.

## YOUTH-LED CLIMATE LITIGATION: AN INTERGENERATIONAL JUSTICE PERSPECTIVE

Intergenerational climate justice has also been a key component in emerging litigation cases led by young people throughout the world including in Germany, the Netherlands and Canada<sup>40,41</sup>. Following suit in Australia, one group of eight teenagers argued that the Australian government had a legal duty of care to protect them and future generations from the harmful effects of climate change. The plaintiffs in *Sharma v The Minister for the Environment* argued that the Australian Federal government's approval of Whitehaven coal mine in New South Wales was inconsistent with its duty to protect the environment and the health and wellbeing of its citizens<sup>42</sup>. The case was ultimately unsuccessful, as the Federal Court ruled that the government did not have a duty of care towards its citizens in relation to climate change. This underscores a significant acknowledgement of how the existing political decision-makers and polluters receive support from the broader environmental legislative framework in Australia. However, the case sparked important discussions about the legal responsibilities of governments towards their citizens in the face of climate change and has inspired further legal action and activism around the world<sup>42</sup>.

In another landmark climate related human rights case brought on by First Nations young people, known as the *Youth Verdict v Waratah Mine* case. The case was centred around a proposed coal mine that was expected to cause significant environmental damage and contribute to impacts of climate change in an already highly affected area of Australia. Despite the Queensland Human Rights Act (HRA)<sup>43</sup> not specifying the right to a healthy environment or climate, the activists argued that the Galilee Coal Project, owned by Waratah Coal, would impact sections 6 and 23 of the Human Rights Act (2019)<sup>41,43</sup>. This included property rights, the right to life, right to privacy, rights of the child, the right to freedom from discrimination and cultural rights of Aboriginal peoples and Torres Strait Islander peoples<sup>43</sup>. The case was successful in blocking the development of the mine, demonstrating the power of human rights law in protecting vulnerable populations and preserving the environment for future generations<sup>41</sup>.

The landmark cases of *Youth Verdict v Waratah Coal* and *Sharma v Minister for the Environment* have had a significant impact on the climate justice movement in Australia, demonstrating the potential for a legal pathway as a tool for young activists. These cases illustrate that young individuals possess the capability to demand accountability from governments and corporations regarding their choices concerning the human rights of future generations in the context of climate change<sup>41</sup>. Similarly, Peel and Markey-Towler's<sup>42</sup> case study explored a 'recipe for success' in youth climate activism. They specifically identified an intergenerational justice focus as a powerful tool and demonstrated how making innovative legal arguments that emphasise duties of protection is an important component of such litigation cases. As demonstrated in the *Sharma* case, young people have used a duty

of protection claim as a legitimate argument for demanding intergenerational justice. This intergenerational justice perspective can be more widely adopted in Australia and globally as an effective campaign tool.

In summary, the above snapshot of Australian youth climate activism demonstrates the sophistication of grassroots action and the power of educational approaches individuals and organisations have taken in Australia. Their request for a just and equitable future has often become the core of their campaigns, reinforcing the validity of Newell's<sup>4</sup> intergenerational and recognition justice framing of youth climate activism in Australia.

### BARRIERS TO CLIMATE ACTIVISM IN AUSTRALIA

In this perspective, it is crucial to emphasise that Australian youth climate activists frequently encounter a significant obstacle in the form of conservative media outlets that consistently undermine and obstruct young people's endeavours to initiate a meaningful dialogue about their own future. These organisations can create a highly critical and hostile environment when discussions about climate justice arise<sup>44</sup>. The conservative media often portrays young climate activists as naive and misguided, dismissing their concerns about climate change as alarmist and unfounded. For example, Mayes et al.<sup>45</sup> conducted a media analysis on Australian newspapers between August 2018 and December 2019, which analysed the dominant narratives presented by the conservative media during the mobilisation of SS4C. The study found that youth climate activists were painted as politically inexperienced, vulnerable, and as "kids", or overly emotional and therefore "in a phase"<sup>45</sup>. This kind of ageism and dismissal of youth was found to be expressed in widespread journalistic reporting on climate activism across the mainstream media, acting perhaps as one of the largest barriers to legitimising youth climate activism. Moreover, the former Australian Prime Minister Scott Morrison fuelled much of this discourse in the media by condemning the strikes and berating the students for missing school<sup>36</sup>.

The "school-or-strike" moral debate inundated the media and diverted the focus from why young people were protesting and the intergenerational justice claims they made. Similarly, Alexander et al.<sup>44</sup> in their analysis of mainstream media representations of adult responses to the SS4C protests also identified how adults reinforced the notion that education in school should be the priority if young people want to create change. However, climate change education in Australian schools is still heavily focused on the science and not adequately explored across humanities or governance, failing to acknowledge climate change as a wicked problem that needs to be addressed through a multidisciplinary and holistic approach<sup>46</sup>. This highlights a gap (and an opportunity) for providing adequate climate education in formal schooling that is integrated across the curriculum<sup>47,48</sup>. This perspective demonstrated evidence of how young climate activists in Australia are "learning on the job" to become effective advocates for intergenerational climate justice. This presents another opportunity for researchers and educators to reimagine climate education and use a multidisciplinary approach that reflects climate justice and further supports young people in their advocacy<sup>36,49,50</sup>.

In addition to media adversaries, young people also face threats to their right to protest in various Australian States. There has been a concerted effort to criminalise climate protests and to limit the Australian public's right to peaceful assembly. New legislations brought in by several states in Australia including Queensland<sup>51</sup>, New South Wales<sup>52</sup> and Tasmania<sup>53</sup> aim to undermine the fundamental principles of democracy and limit young climate activists' ability to undertake direct climate action. These laws are not congruent with human rights under international law. Article 12 of the Convention on the Rights of the Child (p.3)<sup>54</sup>, states the following:

*"Parties shall assure to the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child, the views of the child being given due weight in accordance with the age and maturity of the child".*

The Convention on the Rights of the Child clearly implies that in cases where there are concerns that societal issues that have a direct impact on the child, in this case, climate change, the "best interests of the child"<sup>54</sup> (p. 15) must be determined by listening to the collective voices of the children. These international laws can provide a useful platform for Australian youth climate activists to reclaim their rights in Australia. Despite this, there has been efforts to curb human rights of Australians through the introduction of legislation by the 2019–2023 NSW Liberal state government (NB. in Australia, the Liberal Party is considered a conservative political party), who introduced a new anti-protest law. This was rushed through by the Legislative Council amending the Roads and Crimes Legislation Amendment Bill 2022. The new bill introduced measures that deliberately repress protestors, with provisions for up to 2 years imprisonment and a \$22,000 fine<sup>55</sup>. The ambiguous wording of the bill makes it unclear whether young climate strikers are legally allowed to advocate for climate justice in this manner without fear of arrest.

In order to achieve meaningful climate justice and support the voices of young people in Australia, it is crucial that such laws are revisited. The increased repression of protests and direct action through legislation in Australia is of concern to youth climate activists. These laws prevent youth climate activists from expressing their political agency to drive societal change outside of institutional pathways<sup>47,56</sup>. This ultimately excludes young people's voices in climate change discussions and decisions, limiting their ability to advocate for a sustainable future in Australia.

While the Australian states' governments have worked to silence youth voices, young climate activists have successfully advocated for political change. A month prior to the last Federal elections in Australia in 2022, 80,000 young people between the ages of 18 and 24 enrolled to vote within a week<sup>57</sup>. This was a major win for young Australian activists. In May 2022, the more socially progressive Labour government was selected, with a substantial increase in votes for the Australian Greens party<sup>58</sup>, and historically low votes for the Liberal-National Coalition in Generation Z and Millennial age groups<sup>58,59</sup>. This result was welcomed by youth climate activists, after an almost decade long inaction on climate change policy from the centre-right Liberal-National Coalition (LNP) in government, that largely supported fossil fuel extraction<sup>60</sup>. With a more climate-friendly government, this has created a more progressive socio-political space for intergenerational justice conversations.

Although the Labour Party's stance on climate change is a step in a more carbon neutral direction with changes to the Climate Change Act (2022) for more aggressive emissions reductions, with the approval of new oil and gas exploration projects<sup>61</sup> Australia continues to fail to transition away from fossil fuels quickly enough, this is compounded by a notable deficiency in adequately addressing a just transition for communities.

The next step for the Australian youth climate movement is to push for the acceleration of a just transition, however, there is extremely limited research on young people's climate action in regional communities that will be most affected. In mining, Indigenous and other small communities, it is unknown what a just transition will look like. This perspective paper illustrates that whilst SS4C works at lobbying fossil-fuel industries and governments to move towards a carbon-free future, the voices of the youth who will be impacted by this transition have not yet been included in the climate conversation. A report by Edwards et al.<sup>62</sup> suggested that the SS4C campaign towards a 'just transition' is not

always accepted by coal communities, with miners and community members seeing environmentalists as having very little understanding of the reality of living in a regional, coal-reliant community. The idea of a ‘just transition’ is often taken negatively and associated with threats of loss of high paying jobs and the future risk of not being able to support their families<sup>62</sup>. Curran<sup>63</sup> also points out this disconnect, where the culture associated with employment and a prospering economy associated with coal mining in regional Australia is something that is deeply embedded into people’s identities<sup>63</sup>. This perspective and understanding of what mining means to regional Australians has not been actively acknowledged in the climate movement. Given the lack of research with youth in these communities, the question remains: How can an intergenerational climate justice agenda be driven at the local level when we don’t know what young people in regional areas want climate justice to look like? Future research should aim to explore such gaps in our knowledge.

Indeed, previous research tended to focus on youth climate activism in metropolitan areas in Australia. It is essential to recognise this bias in climate activism research, as emphasised in this perspective paper. There is a pressing need for a greater representation of culturally and geographically diverse voices among Australian youth in climate activism research, as well as within the broader climate justice movement in Australia. We cannot assume homogeneity of young people’s needs, particularly those who live in regional Australia, who will be the most affected by climate related disasters and whose voices are currently missing. It is where direct action is needed by governments to ensure survival of these communities. Future research must take into consideration localised, place-based climate justice concerns of young people, recognising that community contexts go beyond the rural/urban divide. Research with young people should also utilise participatory and collaborative approaches to address power dynamics often inherent in traditional research methods. Inclusivity in research is exemplified by White et al.<sup>36</sup>, Godden et al.<sup>64</sup>, Sanson and Bellemo<sup>16</sup> who actively involve young people as co-authors in their research.

In conclusion, examining the youth climate movement with a climate justice lens in Australia highlights the ways young people leverage and hone their leadership and advocacy skills to drive climate justice to the fore of the youth climate movement. This perspective also identified the barriers associated with engaging in climate activism and pinpointed various opportunities for young people to be supported—namely through holistic climate justice education and furthering research into youth climate activism in regional Australia. After all, it is regional Australia that will shoulder the lion’s share of the ‘just transition’ to renewable energy, all the while enduring the escalating and compounding impacts of climate change.

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## AUTHOR CONTRIBUTIONS

Conceptualisation: M.H., S.R., E.B. and J.B.; Formal analysis: M.H.; Investigation: M.H.; Supervision: S.R., E.B. and J.B.; Writing—original draft: M.H.; Writing – review and editing: M.H., S.R. and E.B. All authors have read and agreed to the published version of this manuscript.

## COMPETING INTERESTS

The authors declare no competing interests.

## ADDITIONAL INFORMATION

**Correspondence** and requests for materials should be addressed to M. Hohenhaus.

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