# CLIMATE
PERSPECTIVES
2025

the climate centre

A commitment to social and environmental equity

The Climate Centre is committed to advocacy for the betterment of the environment, for reducing humanity's negative impact on the climate system, and the socio-cultural damage that has been caused by human activities. By developing sustainable practices, we can move towards a future where the impact of society is to uplift all peoples and living things, and live sustainably on a healthy planet. We reject the cultural norms that have allowed the destruction of the environment and society to take place. We acknowledge the wisdom in us to improve our way of life, and work towards a hopeful future.
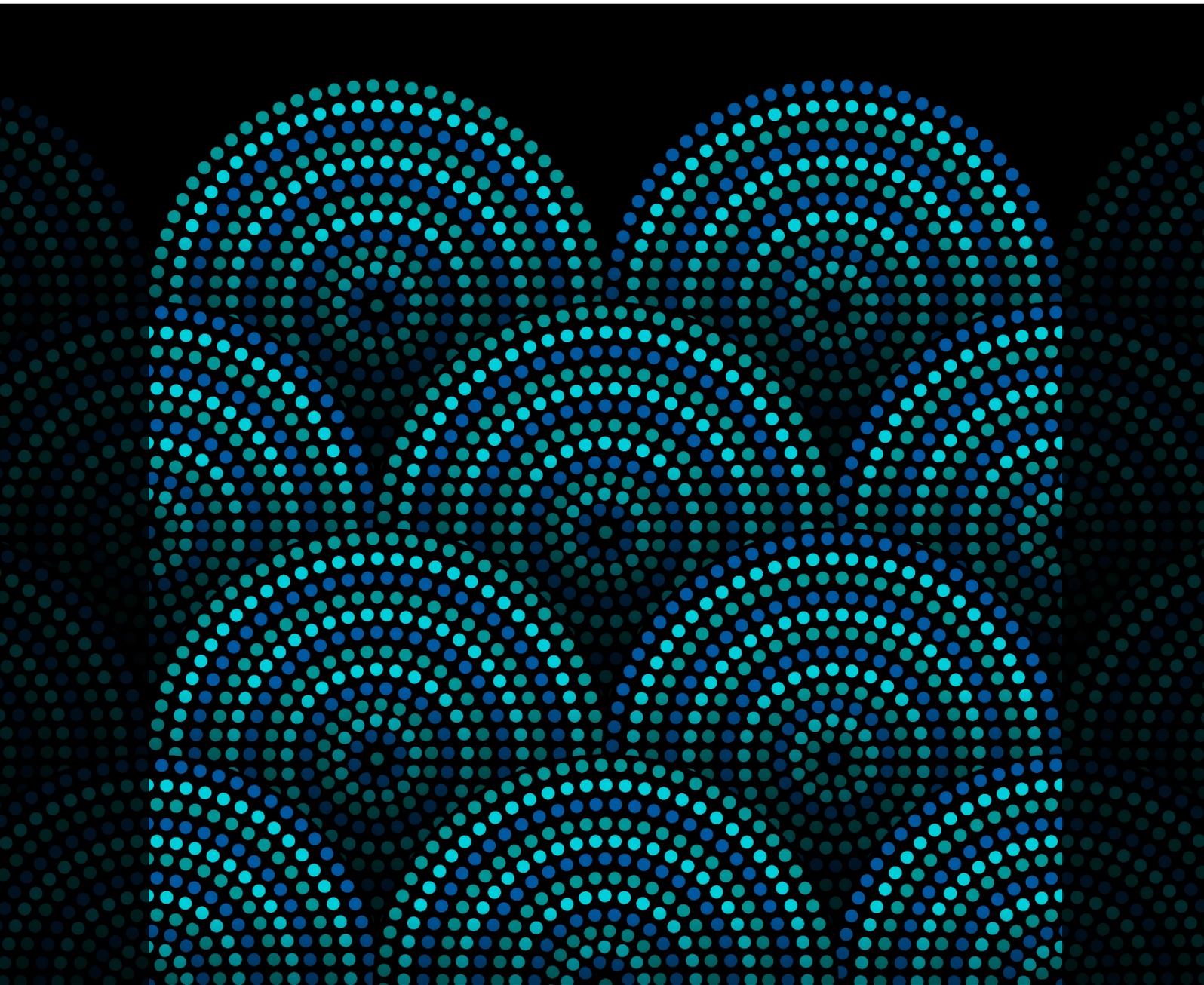
Acknowledgement of country

We acknowledge the Traditional Custodians of the lands, waters, and skies on which we work and live. We pay our respects to Elders past and present and extend that respect to all First Nations peoples.

We recognise that Aboriginal and Torres Strait Islander peoples have cared for country for tens of thousands of years — as stewards of the land, and as a part of it. Caring for the environment requires a deep spiritual connection to place, and we hope that all Australians can embrace similar principles in their lives and take inspiration from the wisdom of Indigenous knowledge and practices. In a time of climate crisis and environmental uncertainty, we acknowledge that embracing these traditions are vital to guide us toward true sustainability.
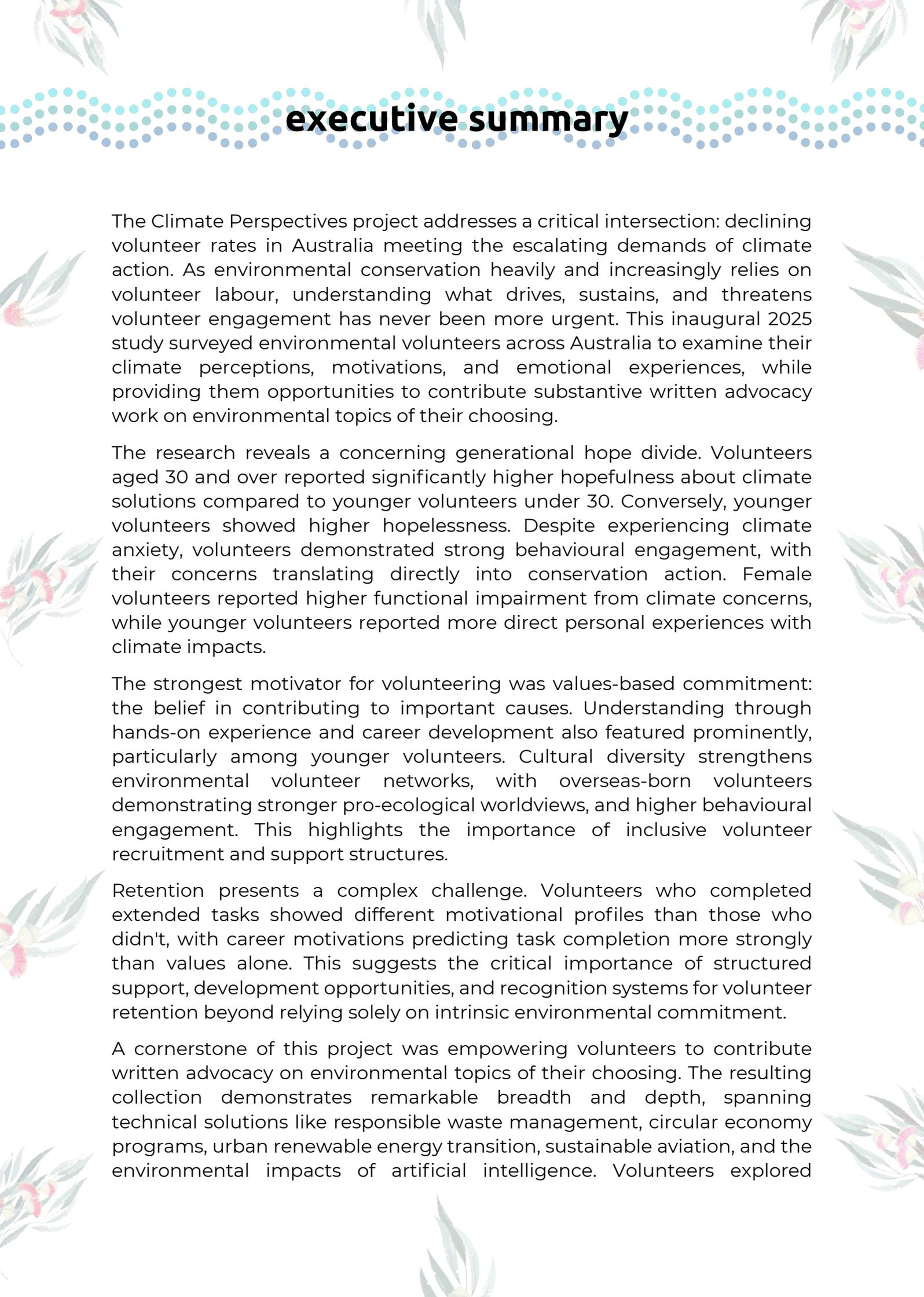
Acknowledgements

The Climate Centre relies on a passionate and dedicated volunteer base, without which we would not exist and the work we undertake would not be done. We would like to thank the many individuals who contributed to this report, including the authors of the chapters that make up this report:

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executive summary

The Climate Perspectives project addresses a critical intersection: declining volunteer rates in Australia meeting the escalating demands of climate action. As environmental conservation heavily and increasingly relies on volunteer labour, understanding what drives, sustains, and threatens volunteer engagement has never been more urgent. This inaugural 2025 study surveyed environmental volunteers across Australia to examine their climate perceptions, motivations, and emotional experiences, while providing them opportunities to contribute substantive written advocacy work on environmental topics of their choosing.

The research reveals a concerning generational hope divide. Volunteers aged 30 and over reported significantly higher hopefulness about climate solutions compared to younger volunteers under 30. Conversely, younger volunteers showed higher hopelessness. Despite experiencing climate anxiety, volunteers demonstrated strong behavioural engagement, with their concerns translating directly into conservation action. Female volunteers reported higher functional impairment from climate concerns, while younger volunteers reported more direct personal experiences with climate impacts.

The strongest motivator for volunteering was values-based commitment: the belief in contributing to important causes. Understanding through hands-on experience and career development also featured prominently, particularly among younger volunteers. Cultural diversity strengthens environmental volunteer networks, with overseas-born volunteers demonstrating stronger pro-ecological worldviews, and higher behavioural engagement. This highlights the importance of inclusive volunteer recruitment and support structures.

Retention presents a complex challenge. Volunteers who completed extended tasks showed different motivational profiles than those who didn't, with career motivations predicting task completion more strongly than values alone. This suggests the critical importance of structured support, development opportunities, and recognition systems for volunteer retention beyond relying solely on intrinsic environmental commitment.

A cornerstone of this project was empowering volunteers to contribute written advocacy on environmental topics of their choosing. The resulting collection demonstrates remarkable breadth and depth, spanning technical solutions like responsible waste management, circular economy programs, urban renewable energy transition, sustainable aviation, and the environmental impacts of artificial intelligence. Volunteers explored
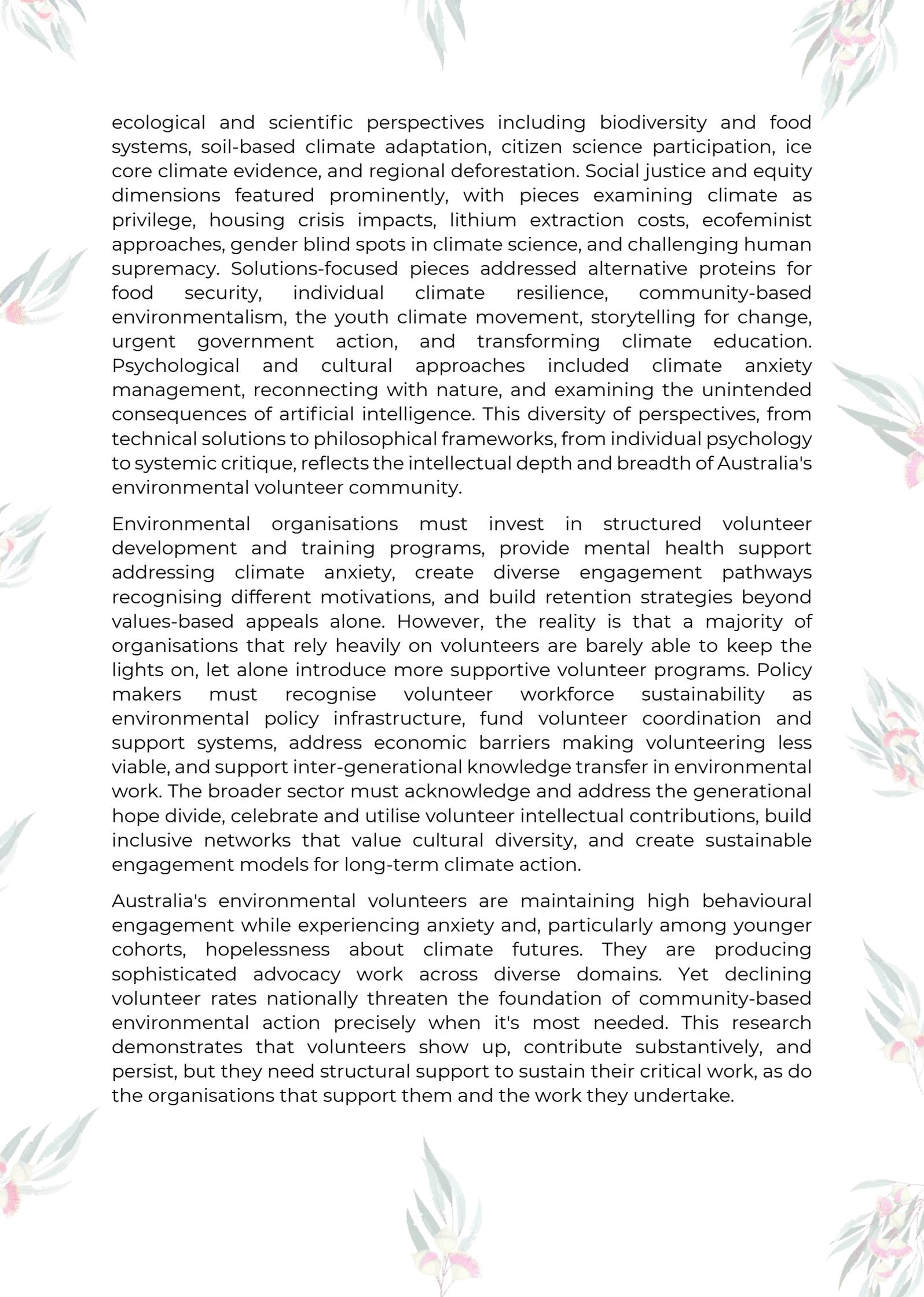
ecological and scientific perspectives including biodiversity and food systems, soil-based climate adaptation, citizen science participation, ice core climate evidence, and regional deforestation. Social justice and equity dimensions featured prominently, with pieces examining climate as privilege, housing crisis impacts, lithium extraction costs, ecofeminist approaches, gender blind spots in climate science, and challenging human supremacy. Solutions-focused pieces addressed alternative proteins for food security, individual climate resilience, community-based environmentalism, the youth climate movement, storytelling for change, urgent government action, and transforming climate education. Psychological and cultural approaches included climate anxiety management, reconnecting with nature, and examining the unintended consequences of artificial intelligence. This diversity of perspectives, from technical solutions to philosophical frameworks, from individual psychology to systemic critique, reflects the intellectual depth and breadth of Australia's environmental volunteer community.

Environmental organisations must invest in structured volunteer development and training programs, provide mental health support addressing climate anxiety, create diverse engagement pathways recognising different motivations, and build retention strategies beyond values-based appeals alone. However, the reality is that a majority of organisations that rely heavily on volunteers are barely able to keep the lights on, let alone introduce more supportive volunteer programs. Policy makers must recognise volunteer workforce sustainability as environmental policy infrastructure, fund volunteer coordination and support systems, address economic barriers making volunteering less viable, and support inter-generational knowledge transfer in environmental work. The broader sector must acknowledge and address the generational hope divide, celebrate and utilise volunteer intellectual contributions, build inclusive networks that value cultural diversity, and create sustainable engagement models for long-term climate action.

Australia's environmental volunteers are maintaining high behavioural engagement while experiencing anxiety and, particularly among younger cohorts, hopelessness about climate futures. They are producing sophisticated advocacy work across diverse domains. Yet declining volunteer rates nationally threaten the foundation of community-based environmental action precisely when it's most needed. This research demonstrates that volunteers show up, contribute substantively, and persist, but they need structural support to sustain their critical work, as do the organisations that support them and the work they undertake.

the survey

Volunteer rates in Australia have been gradually declining in recent years, with economic and time pressures some of the compounding factors that make it increasingly difficult for people to begin or stay engaged in volunteer work. Because of this, a considerable number volunteers either withdraw or are let go in the first year of volunteering (Volunteering Australia, 2024; Volunteering Australia 2025). This is also occurring at a global level, with drop out rates varying but in some cases being reported as approximately one third of new entrants (Volunteering Hub 2022; OECD, 2024). Despite this, people who stay engaged as volunteers indicate high levels of satisfaction, motivated by the desire to help others, to be active, and to use and develop skills and experience (Burns et al 2025).

To combat this decline, a number of strategies for retention have been proposed including training and development, and relationship building and flexibility allowed in their role (The Centre for Volunteering, 2023). While there is extensive work on this topic relevant to general populations of volunteers, it is less clear how those volunteering for environmental organisations within Australia can be attracted and retained. Additionally, people's perceptions of climate change as an issue is also important to consider, especially with regard to the fact that people are strongly influenced by misinformation and disinformation, causing progress on these issues to be difficult in the current socio-political environment. Without greater social pressure to make change, it is likely that governments will be less aggressive in the transition that is required to ensure our environment stays healthy into the future.

Methods

The Climate Perspectives project involves the use of several survey instruments, whose purpose is to investigate not only the motivations of volunteers to engage in environmental causes but also to better understand how volunteers perceive climate change as an issue. The survey also asked basic demographic information including their gender identity, their age bracket, whether they were born in or outside of Australia, and whether they identified as an Australian. Their survey responses were also categorised by whether or not they completed their written task. Differences between groups were compared at a test significance of $\alpha = .05$. There were 45 participants who responded to the survey in the 2025 cohort.

The survey instruments complete as part of the project included: the Climate Change Hope Scale (CCHS; Li & Munroe 2018), Climate Change Anxiety Scale (CCAS; Clayton & Karazsia 2000), New Ecological Paradigm (NEP) Scale (Dunlap & Van Liere 1978; Dunlap et al. 2000), the Climate Change Scepticism (CCS) questionnaire (Graaf et al 2023), the Climate Stewardship Survey, with questions relevant to those from the United States of America altered to be relevant to people in Australia (e.g. 'Republican officials' and 'Democratic officials' may be replaced by 'Liberal-National party politicians' and 'Labor party politicians'; Walker & McNeal, 2012), and the Volunteer Functions Inventory (VFI; Clary et al 1998).

The CCHS contained 8 hopeful questions (e.g., I believe people will be able to solve problems caused by climate change) and 3 hopeless questions (e.g., climate change

is so complex we will not be able to solve problems that it causes), scored on a 7-point scale from strongly disagree to strongly agree. The CCAS contained 8 cognitive-emotional impairment questions (e.g. I have nightmares about climate change), 5 functional impairment questions (e.g., my friends say I think about climate change too much), 3 personal experience of climate change questions (e.g., I have been directly affected by climate change), and 6 behavioural engagement questions (I recycle), scored on a 5-point scale from never to almost always. The NEP contained 8 questions relating to a "pro-ecological" world view and 7 questions relating to a "traditional" world view, scored on a 5-point scale from strongly disagree to strongly agree. The CCS contained 3 questions each relating to trend specticism (e.g. I am not sure that climate change is actually occurring), attribution scepticism (e.g. I doubt that human activities cause global warming), impact specticism (e.g. I believe that most of the concerns about climate change have been exaggerated), and response scepticism (e.g. Human behaviour has little effect on global warming), scored on a 7 point scale from strongly disagree to strongly agree. The VFI contained 5 questions each relating to protective factors (e.g. volunteering is a good escape from my own troubles), value factors (e.g. I can do something for a cause that is important to me), career factors (e.g. volunteering experience will look good on my resume), social factors (e.g. volunteering is an important activity to the people I know best), understanding factors (e.g. volunteering lets me learn things through direct, hands on experience), enhancement factors (e.g. volunteering makes me feel needed).

Results

Climate Change Hope Scale (CCHS)

There were no significant differences in scoring on the CCHS between those who did and did not complete the written task. Volunteers reported higher hopefulness (m = 5.89, SD = 1.16) than hopelessness (m = 2.37, SD = 1.40), t = 28.398, p < .001, d = 2.866. Volunteers ≥30 years reported higher hopefulness (m = 6.17, SD = 1.03) than those <30 years (m = 5.68, SD = 1.21), t = 4.086, p < .001, d = 0.436. Younger volunteers showed higher hopelessness (m = 2.60, SD = 1.47) versus older volunteers (m = 2.05, SD = 1.23), t = -2.295, p = .023, d = -0.400. Volunteers with an Australian identity showed higher hopefulness (m = 5.98, SD = 1.07) than those with a non-Australian identity (m = 5.64, SD = 1.35), t = 2.548, p = .011, d = 0.304. Australian-born volunteers reported higher hopelessness (m = 2.80, SD = 1.43) than overseas-born (m = 2.09, SD = 1.31), t = 2.976, p = .004, d = 0.523.
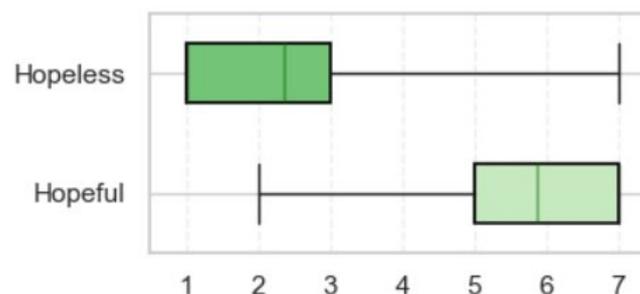
Fig. 1 Boxplot of responses to hopeless and hopeful questions in the Climate Change Hope Scale

Climate Change Anxiety Scale (CCAS)

There were no significant differences in scoring on the CCAS between those who did and did not complete the written task. Volunteers responded highest on behavioural engagement questions, with cognitive-emotional and functional questions both scoring lowest. Despite these average scores, responses across the full spectrum of values were recorded. Female volunteers scored significantly higher on functional impairment questions (m = 2.11, SD = 1.13) compared to male volunteers (m = 1.65, SD = 0.80), t = 2.901, p = .004, d = 0.437; and also significantly higher on behavioural questions (m = 4.49, SD = 0.78) compared to their male counterparts (m = 4.19, SD = 0.93), t = 2.614, p = .010, d = 0.360. Younger volunteers reported significantly higher personal experiences (m = 3.65, SD = 1.19) compared to older volunteers (m = 3.18, SD = 1.27), t = -2.239, p = .027, d = -0.390. Volunteers who were born overseas reported higher behavioural engagement (m = 4.51, SD = 0.71) compared to Australian born volunteers (m = 4.26, SD = 0.97), t = -2.478, p = .014, d = -0.308.
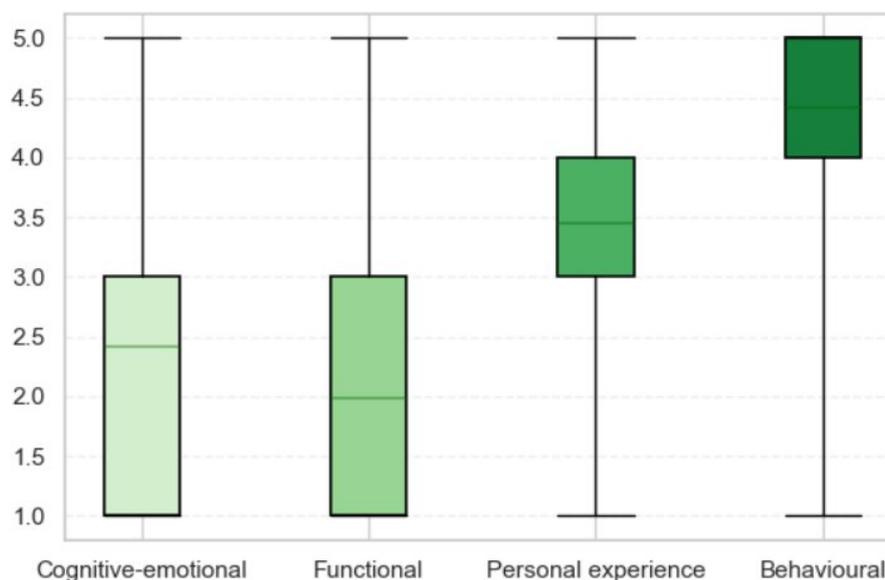
Fig.2 Boxplot of responses to cognitive-emotional, functional, personal experience and behavioural questions in the Climate Change Anxiety Scale

New Ecological Paradigm (NEP) scale

While there were no significant differences in scoring on NEP questions between those who did and did not complete the written task, there were significant differences in scoring on DSP questions between those who did and did not complete the written task. Those who finished the written task scored higher on DSP questions (m = 2.41, SD = 1.22) compared to those who did not finish (m = 2.02, SD = 1.24), t = 2.425, p = 0.016, d = 0.316. Volunteers were significantly more aligned with a "pro-ecological" world view (m = 4.24, SD = 1.06) compared to a "traditional" world view (m = 2.18, SD = 1.23), t = 23.309, p = <.001, d = 1.798. While there were no significant differences in volunteer responses to "pro-ecological" world view questions between genders, there were significant differences by gender in response to "traditional" world view questions. Male volunteers scored significantly

higher on "traditional" world view questions (m = 2.51, SD = 1.36) compared to female volunteers (m = 2.06, SD = 1.16), t = -2.891, p = .002, d = -0.368. Volunteers who identified as Australian reported lower "pro-ecological" world views (m = 4.11, SD = 1.12) compared to those who did not identify as Australian (m = 4.58, SD = 0.78), t = -3.820, p = <.001, d = -0.455. Volunteers who identified as Australian reported higher "traditional" world views (m = 2.32, SD = 1.23) compared to those who did not identify as Australian (m = 1.82, SD = 1.17), t = 3.208, p = .002, d = 0.409.

Fig.3 Boxplot of responses to questions belonging to "pro-ecological" (NEP) and "traditional" (DSP) world views, as part of the New Ecological Paradigm scale

Climate Change Scepticism (CCS) questionnaire

There were no significant differences in scoring on the CCS between those who did and did not complete the written task for questions relating to Trend, Impact or Response. However, for responses to questions relating to Attribution, there were significant differences in scoring on the CCS between those who did (m = 1.97, SD = 1.43) and did not complete the written task (m = 1.45, SD = 1.21), t = 1.994, p = .049, d = 0.397. Response to Trend, Attribution, and Response questions were similar, and responses to Impact questions were the lowest of all categories. Notably, there were no significant differences between responses when split by different demographic groups.
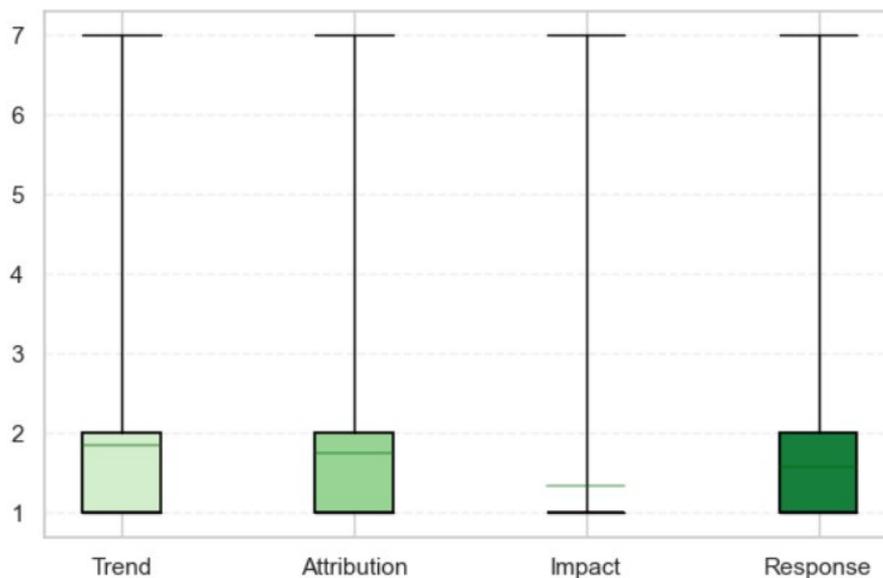
Fig.4 Boxplot of responses to trend, attribution, impact and response questions in the Climate Change Scepticism questionnaire

Adapted Climate Stewardship Survey (CSS)

Female volunteers scored higher on questions relating to the knowledge dimension for impacts of climate change (m = 3.84, SD = 0.48) compared to male volunteers (m = 3.72, SD = 0.67), t = 2.271, p = .024, d = 0.231. Overseas born volunteers scored higher on questions relating to the informed subscale within the issue scale of the perception dimension (m = 3.75, SD = 0.48) compared to Australian born volunteers (m = 3.51, SD = 0.63), t = -2.865, p = .005, d = -0.436. Volunteers who identified as Australian scored higher on questions relating to the knowledge dimension for misunderstandings about climate change (m = 1.34, SD = 0.67) compared to volunteers who did not identify as Australian (m = 1.06, SD = 0.23), t = 2.509, p = .013, d = 0.488. Volunteers who identified as Australian scored lower on questions relating to the informed subscale within the issue scale of the perception dimension (m = 3.58, SD = 0.58) compared to volunteers who did not identify as Australian (m = 3.88, SD = 0.39), t = -3.301, p = .001, d = -0.556. Volunteers reported the internet as their main source of information about climate change, followed by books, with similar average levels reported for all remaining categories (television, family/friends, magazines/newspapers, zoos/museums, and government).
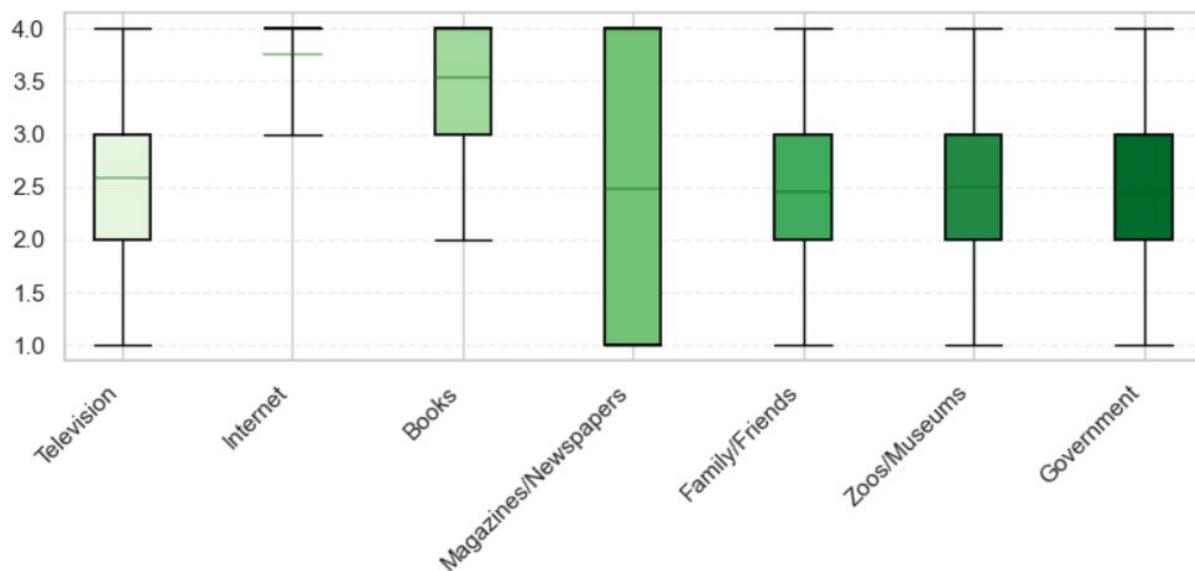
Fig.5 Boxplot of responses to sources of information in the Climate Stewardship Survey

Female volunteers scored higher on sourcing information about climate change from books (m = 3.67, SD = 0.54) compared to male volunteers (m = 3.17, SD = 0.94), t = 2.231, p = .031, d = 0.752. Volunteers aged below thirty scored lower on sourcing information about climate change from magazines or newspapers (m = 2.21, SD = 1.18) compared to volunteers aged thirty or above (m = 2.84, SD = 1.20), t = -2.492, p = .015, d = -0.532. Volunteers born overseas scored higher on sourcing information about climate change from television (m = 2.85, SD = 0.99) compared to volunteers born in Australia (m = 2.17, SD = 0.79), t = 2.464, p = .018, d = 0.750. Volunteers born overseas scored higher on sourcing information about climate change from books (m = 3.70, SD = 0.54) compared to volunteers born in Australia (m = 3.28, SD = 0.83), t = 2.093, p = .042, d = 0.637. Volunteers born overseas scored higher on sourcing

information about climate change from magazines or newspapers (m = 2.87, SD = 1.17) compared to volunteers born in Australia (m = 1.89, SD = 1.06), t = 4.050, p < .001, d = 0.871. Volunteers who identified as Australian scored lower on sourcing information about climate change from books (m = 3.39, SD = 0.75) compared to volunteers who did not identify as Australian (m = 3.92, SD = 0.29), t = 2.345, p = .024, d = 0.791. Volunteers who identified as Australian scored lower on sourcing information about climate change from magazines or newspapers (m = 2.24, SD = 1.16) compared to volunteers who did not identify as Australian (m = 3.13, SD = 1.15), t = 3.187, p = .002, d = 0.760. Volunteers reported they trusted scientists more than any other source of information, followed closely by scientific agencies. The average trust in all other categories was lower, with government viewed moderately, followed by family or friends (personal) and community (i.e. community groups that could relate to sports, religion, school, or other community), followed by social media, and finally news channels, which scored lowest of all sources.
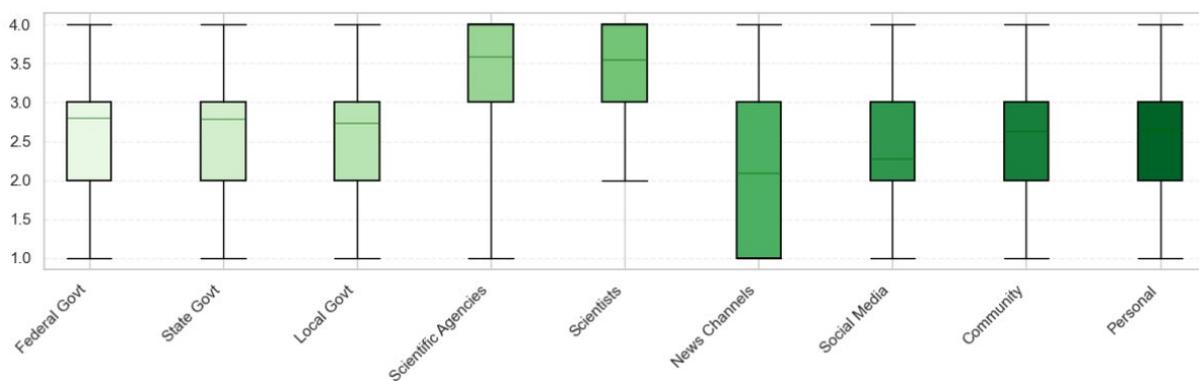

Fig.6 Boxplot of responses to trust in sources of information in the Climate Stewardship Survey

Female volunteers scored lower on trusting family and friends on information about climate change (m = 2.48, SD = 0.90) compared to male volunteers (m = 3.04, SD = 0.95), t = -2.557, p = .012, d = -0.610. Volunteers aged below thirty scored lower on trusting scientific agencies on information about climate change (m = 3.49, SD = 0.77) compared to volunteers aged thirty or above (m = 3.71, SD = 0.68), t = -2.149, p = .033, d = -0.290. Volunteers aged below thirty scored lower on trusting news channels on information about climate change (m = 2.00, SD = 0.85) compared to volunteers aged thirty or above (m = 2.21, SD = 0.96), t = -2.048, p = .041, d = -0.234. Volunteers who identified as Australian scored higher on trusting community groups on information about climate change (m = 2.74, SD = 0.86) compared to volunteers who did not identify as Australian (m = 2.29, SD = 0.91), t = -2.158, p = .034, d = -0.514. Volunteers who identified as Australian scored higher on trusting family and friends on information about climate change (m = 2.77, SD = 0.92) compared to volunteers who did not identify as Australian (m = 2.25, SD = 0.90), t = -2.390, p = .019, d = -0.570.
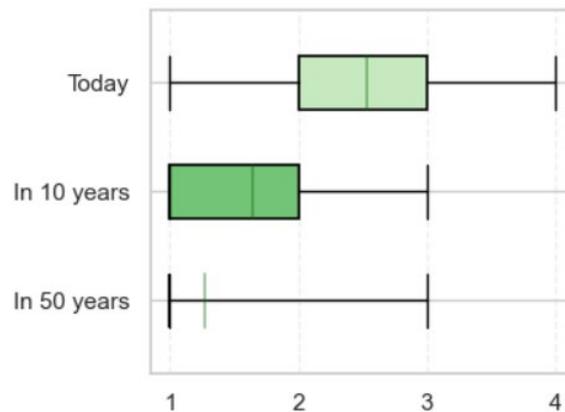
Fig.7 Boxplot of responses to the question of "rate the overall quality of the environment" in the Climate Stewardship Survey

Female volunteers rated the overall quality of the environment today as lower (m = 2.30, SD = 0.68) compared to male volunteers (m = 3.17, SD = 0.72), t = -3.698, p = .001, d = -1.247; and also rated the overall quality of the environment in 10 years as lower (m = 1.39, SD = 0.66) compared to male volunteers (m = 2.33, SD = 0.78), t = -4.032, p < .001, d = -1.359. Volunteers aged below thirty rated the overall quality of the environment today as higher (m = 2.73, SD = 0.72) compared to volunteers aged thirty or above (m = 2.26, SD = 0.81), t = 2.040, p = .048, d = 0.616.

Volunteer Functions Inventory (VFI)

There were no significant differences in scoring on the VFI for questions classified as protective, understanding, values or enhancement between those who did and did not complete the written task. Those who finished scored higher on career questions (m = 5.83, SD = 1.52) compared to those who did not finish (m = 4.76, SD = 1.81), t = 4.232, p < .001, d = 0.653; and those who finished scored lower on social questions (m = 3.46, SD = 2.15) compared to those who did not finish (m = 4.37, SD = 2.15), t = -2.755, p = 0.007, d = -0.425. The highest scoring factors for volunteers were values, followed by understanding, and then career. This was followed by enhancement, social and protective factors, which were more moderately scored. Male volunteers scored significantly higher on social factors (m = 4.30, SD = 2.14) compared to female volunteers (m = 3.49, SD = 2.17), t = -2.481, p = .014, d = -0.374. Younger volunteers scored significantly higher on value factors (m = 6.47, SD = 0.88) compared to older volunteers (m = 6.15, SD = 0.97), t = -2.556, p = .011, d = -0.347; and career factors (m = 5.70, SD = 1.60) compared to older volunteers (m = 4.55, SD = 1.92), t = -4.902, p = <.001, d = -0.662; and understanding factors (m = 6.05, SD = 1.28) compared to older volunteers (m = 5.53, SD = 1.47), t = -2.867, p = .005, d = -0.387. Overseas-born volunteers scored significantly higher on protective factors (m = 3.98, SD = 2.22) compared to Australian-born volunteers (m = 3.43, SD = 1.70), t = -1.971, p = .050, d = -0.268; significantly higher on social factors (m = 3.94, SD = 2.26) compared to Australian-born volunteers (m = 3.36, SD = 2.04), t = -1.978, p = .049, d = -0.269; significantly higher on understanding factors (m = 6.04, SD = 1.40) compared to Australian-born volunteers (m = 5.51, SD = 1.30), t = -2.876, p = .004, d = -0.391; and significantly higher on enhancement factors (m = 4.88, SD = 2.08) compared to Australian-born volunteers (m = 3.72, SD = 1.88), t = -4.259, p < .001, d = -0.580.
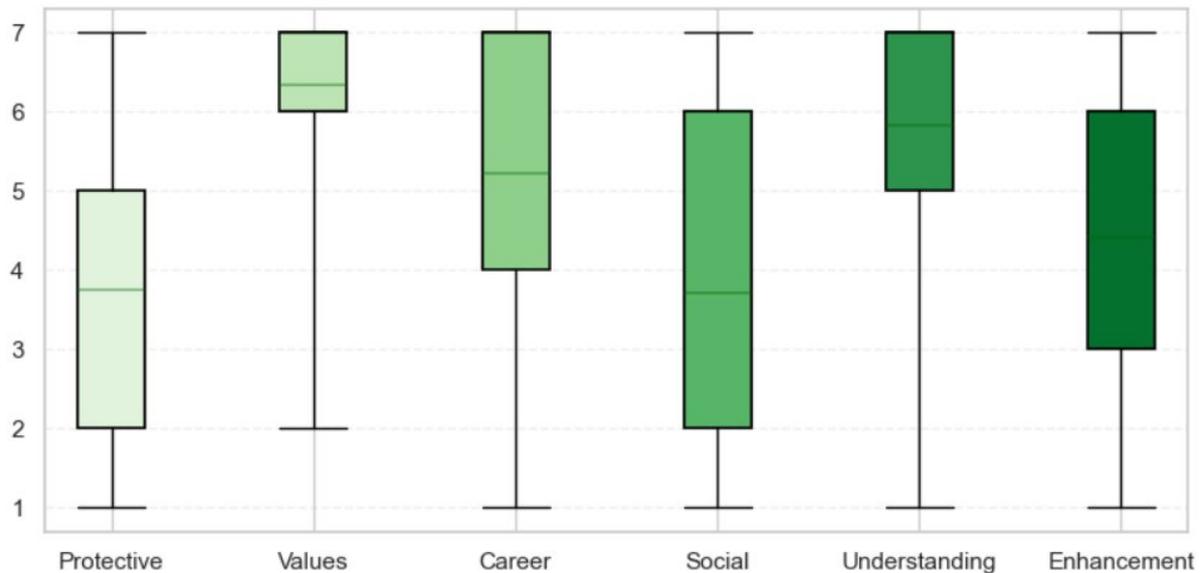
Fig.8 Boxplot of responses to protective, values, career, social, understanding and enhancement questions in the Volunteer Functions Inventory

Discussion

People volunteering for environmental causes hold substantially more hopefulness than hopelessness about climate change overall. However, age creates distinct emotional patterns: older participants (≥30 years) showed greater hopefulness and lower hopelessness, while younger volunteers (<30 years) experienced higher hopelessness, pointing to generational differences in climate emotion. On the Climate Change Anxiety Scale, behavioural engagement emerged as the dominant response, showing that volunteers channel their concerns into action. Female volunteers experienced greater functional impairment and behavioural engagement than males, while younger participants reported more direct personal experiences with climate impacts. Australian-born volunteers showed lower behavioural engagement compared to those born overseas.

Volunteers demonstrated strong alignment with pro-ecological thinking and minimal climate skepticism overall. Males and Australian-identifying volunteers leaned more toward "traditional" worldview positions compared to females and non-Australian identifying volunteers respectively. When examining what attracted people to volunteer, values emerged as the primary driver, followed by opportunities for understanding and career advancement. Male volunteers put greater emphasis on social factors compared to females, and younger volunteers placed particularly high importance on values, career prospects, and understanding compared to older cohorts. Overseas-born volunteers demonstrated consistently higher motivation across protective, social, understanding, and enhancement dimensions compared to Australian-born volunteers. Notably, volunteers who sustained their participation through task completion were characterised by stronger career motivations and weaker social motivations, suggesting that purpose-driven engagement matters more for retention than social belonging. Information-seeking patterns showed overseas-born volunteers favouring books and traditional media sources, while trust in scientists and scientific agencies ranked highest across all volunteer groups. The

internet was the primary source of information for volunteers about climate change, and social media and news channel were the sources with the lowest trust. While the survey participants rated the current state of Australia's environment as between fair and good, the average perception was that this state would degrade over time, being classed as fair to poor in 10 years time.

Enhancing the success of volunteer programs could therefore be considered to focus on skill development and professional growth alongside mission alignment in recruitment materials; designing substantive, impact-oriented activities to maintain volunteer commitment; prioritizing outreach to overseas-born and culturally diverse communities who demonstrate stronger engagement drivers; and acknowledging generational emotional landscapes by providing hope-focused framing for younger volunteers while ensuring all ages see tangible pathways to impact. Environmental volunteers appear motivated primarily by alignment with their values, desire for learning, and career development opportunities, while experiencing divergent emotional responses to climate change across age groups. Creating volunteer programs that deliver meaningful skill-building, purposeful tasks, and culturally inclusive approaches may strengthen both recruitment and long-term retention. These findings should be interpreted cautiously given the self-selected nature and size of the sample.

the perspectives

Advocating for a sustainable future via responsible waste management

This chapter can be referenced as "Ayeleru, O. (2026). Advocating for a sustainable future via responsible waste management . In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

Introduction

Today, our planet faces unprecedented environmental challenges such as climate change, deforestation, pollution, and loss of biodiversity due to the anthropogenic activities of man. These anthropogenic activities have always been leading to the incessant production of wastes that are either disposed indiscreetly to landfill facilities or structurally disposed to organised landfills. Bulk of the waste materials (particularly, the organic fraction of municipal solid wastes (food wastes) and plastic wastes), have greatly contributed to climate change being experienced in recent time. Food wastes occur at all stages of supply chains due to many considerations which include, local conditions within each territory, to mention but a few. Globally, a trend has been observed and this had clearly showed that in high-income countries, quantity of food waste is usually very high especially during processing, distribution and consumption. However, in low-income nations, food wastes take place during the production and post-harvesting stages. There are factors which are responsible for food wastes in developing nations and some of them include, dearth of adequate infrastructure and shortage of skills on appropriate storage and handling techniques, poor climatic/weather conditions and many more. While in the developed world, visual predilections and illogical expiry dates are major factors contributing to food waste. Food waste generation has continued to grow globally and it has been estimated that ~1.3 billion tonnes of the total quantity of food produced globally usually turns to food waste and its economic analysis has been valued at ~$USD 800 billion. In Australia, according to the 2021 report by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), the amount of food wastes produced annually was ~8 million tonnes translating to ~310 tonnes per person and the economic analysis was estimated as ~$37 billion yearly. It has also been established that bulk of the food wastes (~30% of the entire food waste generated) produced in Australia originate from the households and this has been estimated as ~2.5 million tonnes per annum, its economic analysis per household was $2500 and the land employed in growing the wasted food was estimated to cover over ~25 million hectares.

Continuous organic waste (food wastes) generation has since been contributing significantly to climate change via greenhouse gas (GHG) emissions to the atmosphere, which is largely methane when food wastes decays at landfills. GHG emissions occur during the production phase (which include, all agricultural inputs, machinery, livestock, soils etc.) and sequential stages (like, the processing, transportation, food preparation, and final disposal of food waste to landfills). When wasted food decays at the disposal facilities, it leaches into the soil thus contaminating the soil, and surface and underground water. The released leachate carries a mixture of pollutants, which include heavy metals, ammonia, and other

toxic substances that pose risks to health of the public and the ecosystems. While food wastes might not be the main cause of climate change, the harmful chemicals and gases released from leachate have the potential of damaging the environment and disrupting ecological systems, thus possibly worsening the effects of climate change.

Decreasing food waste has some crucial benefits and plays an essential role in mitigating climate change globally. The benefits comprise of the environmental benefits, economic benefits, social benefits and ethical benefits. For the environmental benefits, amount of methane emission from landfill facilities to the atmosphere is decreased drastically and energy expended in food production is also reduced. In the case of the economic benefits, when food waste is decreased, it leads to cost-saving for households, businesses and governments since both purchasing and disposal costs would also be reduced. For the social benefits, when surplus food is redirected to feed people who are in need, issues of hunger and malnutrition are addressed squarely. Finally, in the ethical or moral benefits, when we recognise that food is a valuable resource, this will promote responsible consumption and wastage will be minimized.

Thus, when the issues of food waste are addressed, its impacts on global food security will be lessened. Challenges of food security and negative environmental impacts linked with food production are likely to intensify since the demand for food has continued to be on the increase even as population continues to grow. Global social trends, such as changing diets associated with greater wealth, are leading to increased demand and providing private sector investment opportunities for resource-efficient food production and consumption. Beyond the issues of climate change and economic impacts, food waste is related to environmental harms, including; increased waste generation, increased water usage, incessant soil erosion, and loss of natural resources and biodiversity.

On the other hand, plastic material has become an essential part of our daily lives in the 21st century because of their durability, low cost, lightness and ability to reduce energy consumption. Globally, the pollution of plastic materials has become an issue of concern since plastic fragments are incessantly ending up in the environment and ultimately in the oceans, and thereby negatively impacting the lives of aquatic animals, damaging the economy, causing harm to the ecosystem and public health. Plastic materials production has continued to grow over the last two decades and this has been estimated to be ~340 million tonnes and it has been forecasted to reach ~600 million tonnes by 2030. Also, a recent report by the DCCEEW has stated that ~3.5 million tonnes of plastic wastes are generated in Australia yearly, only ~13% are recycled, ~84% constitutes single use plastics which are predominantly sent to landfills, and out of which ~130,000 tonnes leak into the marine environment, thereby polluting the marine habitat, and consequently contributing to climate change. The degraded products from plastic wastes might also be environmentally contaminants resulting in contamination of the soil and water table and thus causing harm to plants and animals that feed from the soil. Recent researches have shown that one of the most important environmental issues faced by this generation is in the indiscreetly generation and disposal of wastes. This issue can be resolved or minimized via the

adoption of the 5Rs strategy (refuse, reduce, reuse, reform, and recycle), as a pathway to closing the loop. In this way, waste items are employed as secondary raw materials for the production of new valuable materials, thus leading to complete diversion of plastic wastes from landfills via a strategy otherwise referred to as Zero waste or Circular Economy.

"Zero waste is a goal directed towards recovering of resources and safeguarding of the limited natural resources when waste is diverted from the incinerators and landfills".

According to Engineers Australia, "a circular economy (CE) is an innovative process model that prioritises sustainable and efficient use of resources, making it highly relevant to the engineering profession. Unlike the traditional linear model of "take-make-dispose model," the circular economy seeks to maintain the value of resources within the system for as long as possible".

CE involves waste minimization, composting of waste, recycling, reusing and a shift in the way our limited natural resources are consumed and redesigning of products by manufacturers for waste to be completely eradicated in the value chain.

For a sustainable future to be attained, we must prioritise sustainable development (SD). "Sustainable development (SD) is meeting the needs of the present without compromising the ability of future generations to meet their own needs".

The goal of SD is to have a society where living conditions and resources meet human needs without damaging ecological integrity. We are currently in an age where climate adversities are becoming the norm as we keep experiencing rising global temperatures, extreme weather conditions, continuous rise in sea level, and dangerous impacts on ecosystems and health of the public. All these issues are principally compelled by human anthropogenic activities, especially with regards to the indiscreetly waste generation and disposal and continuous extraction of fossil fuels, thus leading to emission of greenhouse gases into the atmosphere. Hence, keeping mute or showing lackadaisical attitude and behaviour towards the impact of human activities on the ecosystem can no longer be disregarded otherwise we would only wake one day and discover that we are having no planet to live in, since these activities threatens both wildlife and health of human. We have so much depended on fossil fuels for the production of virgin materials and many of these materials are for single use like some plastic materials which after initial applications, they become plastic wastes. These plastic wastes contribute to some of the environmental issues we are experiencing today. Some of the environmental issues include, (i) global warming through the emission of greenhouse gases (GHGs) from plastic wastes; (ii) depletion of natural resources experienced from fossil fuels extraction during the production of virgin plastic materials; and (iii) destruction of the ecosystem as a result of the anthropogenic activities of man. Also, we have so much generated food wastes either through purchasing more than we require or preparing in excess of what we could consume per time and these have been contributing to climate change.

The issue of climate change is no longer news to this generation as it is threatening our planet and staring at us in our faces, hence a collective collaboration effort with our local communities is required and very crucial. This can be achieved via education such as awareness campaign, provision of essential tools and knowledge, involvement of the public in conservation projects from inception to the implementation stages. When local communities are fully involved or carried along through the setting up of conservation projects, they will be willing to embrace the changes being proposed and they will also be flexible in their approach towards the initiative for the collective good of our future.

As Environment Advocacy writer, we can advocate (i) for nature-based solutions such as forestry, coastal ecosystems, wetlands, sustainable agricultural practices, urban green spaces, development of parks, green roofs, eco-friendly urban planning, ecosystem restoration, natural carbon sequestration, (ii) by backing policies and actions that protect forests and promote reforestation efforts, (iii) by campaigning against the use of single-use plastics and beginning to promote recycling, biodegradable alternatives, and zero-waste regimes; (iv) for increased adoption of solar, wind, hydro, and other renewable energy sources over fossil fuels; (v) by promoting policies and actions for the reduction of greenhouse gas emissions and beginning to help communities adapt to changing climate conditions, (vi) by raising awareness about water scarcity issues and advocating for cleaner waterways and responsible water usage, (vii) by highlighting how environmental issues excessively affect marginalized communities and encouraging equitable solutions, (viii) by promoting anti-poaching laws, habitat preservation, and ethical wildlife tourism and finally, (ix) by promoting lifestyle changes such as sustainable transportation, energy efficiency, and responsible consumption and educating the public on ways to attain to sustainability both for now and in the future.

Policy is also a powerful tool to advance and drive transformative change in any society. Policies are to be structured in a way that they are progressive, elastic, and entrenched in the opinions of the affected local communities. Therefore, the role of policy makers becomes very critical even as climate disasters persist so as to attain a sustainable future. Trying to influence the decision of policy makers is a moral obligation since climate crisis affects all and sundry. Therefore, effective advocacy backed by scientific research is a joint obligation and the way to go for climate action to be achieved. It is therefore noted that actions of policymakers can shape a robust, impartial and sustainable future.

Scientific research is also vital to understanding and combating climate change. Through rigorous investigation, we can develop innovative solutions, such as carbon capture and storage technologies, and identify effective mitigation strategies. According to Ayeleru et al. (2023), the best technology to eliminate or prevent the entering of carbon dioxide and GHGs into the atmosphere is via the adoption of carbon capture & storage. In that study, the authors' opinions include, (i) preparedness of all stakeholders to work together through a collaborative effort; (ii) readiness of governments or governmental organizations (such as the DCCEEW etc.) to be consistently educating the public or creating awareness on the need for a change of attitude and behaviour towards the environment; (iii) commitment of

government institutions to carry the public along from the initiation to the implementation of conservation projects and encouraging the public on the need to support the initiatives; (iv) the need to turn off lighting and appliances while they are not in use; (v) encouraging the use of public transport or train to minimize the release of carbon dioxide into the atmosphere rather than putting many vehicles on the road; (vi) encouraging the driving of low-carbon vehicles such as electric vehicles to drastically reduce the emission of carbon dioxide into the atmosphere; (vii) intensifying efforts on planting of trees (afforestation) since trees often absorb carbon dioxide and release oxygen and it has been confirmed that a tree can absorb up to ~1 ton of carbon dioxide in its entire lifespan; (viii) shunning products with too much wrapping since these packings would soon turn into wastes that will return to the environment and would in turn produce carbon dioxide; (viii) encouraging the use of renewable energy sources such as solar, wind etc., since they are more sustainable compared to fossil fuels; (ix) drying our clothing material on clothes line instead of constant usage of electric dryer; and (x) discouraging the dumping of surplus food items but redirecting them to feed those in need since the degraded food often releases methane which is a major source of greenhouse gases.

Thus, urgent coordinated research efforts are essential as delays could lead to higher costs and more severe environmental consequences, highlighting the need for immediate scientific and policy action to safeguard the future of our planet.

It is high time that we all (including, the public, corporate organisations, civil society, government agencies, research institutions, policy makers to mention but a few) take responsibility over our environment for a sustainable future. Awareness campaign and education, town hall meetings, continuous engagement with community groups, putting stringent environmental regulations in place and proposition of community-led conservation projects are crucial steps for a sustainable future. Every stakeholder has a role to play in responsible consumption, reducing waste, championing sustainable products, and advocating for policies that prioritise environmental protection.

This is very urgent as the more we delay in taking action, the costlier and irretrievable damage we cause on our environment. The protection of our environment is not just a duty but a prerequisite for a sustainable and prosperous future. It is important that we protect our environment to ensure the wellbeing of our planet and future generations. When we maintain sustainable practices, it will help us to preserve our natural resources, sustain our biodiversity, and promote economic stability.

It is therefore crucial that all stakeholders (including, the public, government agencies, industries, research institutions, civil society, policy makers, and many more) begin to act very swiftly to safeguard our future. One of the ways this could be achieved is via Environmental Advocacy writing which is about creating awareness and educating members of the public via different media such as social media platforms, bill board posts, newsprint, newsletters, national/international media houses etc. Through this medium, noticeable changes in attitude and behaviour of the public would be observed, communities will be mobilised to accept the change being proposed, policy makers would be easily influenced, and

above all, research institutions would begin to intensify efforts on how to conduct more groundbreaking researches that can address climate disasters, and Australia will be tending towards a sustainable future.

Conclusion

To promote sustainable practices that will lead to reduction of pollution, reduction of carbon footprints, enhancement of our ecological environment and ultimately, climate actions; our collaborative efforts in supporting any initiatives being proposed are very crucial and stakeholders must ensure that every voice counts and everyone is listened to.

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The last bird's song: food as resistance in the sixth mass extinction

The winds ceased their howling,

The clouds shed their tears,

When the last wild bird sang her final melody.

Each bittersweet note struck the souls of all who could hear,

Chills ran through fires,

And goosebumps appeared upon the posies.

The last wild bird sang an ode to the world,

To the forest, who gave her home,

To the sky, who gave her freedom,

To the ground, the most stable force she'd ever known.

And so, the last wild bird's final song was not sung in blue,

The tune was tinted by rose,

For an iron cage, she never knew.

Should there come a day where we have driven the last bird to extinction – what would become of humanity? Is it too daring to presume we would outlast the birds, descendants of species far older than us? Current extinction rates are running approximately 1000 times higher than the natural rate, with scientists estimating tens of thousands of species disappearing each year. The nature of life includes final chapters, sure, but we are currently well surpassing what the planet has evolved to accommodate.

Life on earth is nothing short of miraculous, having persisted despite five mass extinction events—the Ordovician, Devonian, Permian, Triassic, and Cretaceous disasters which each eliminated over 75% of all species on the planet. Hundreds of millions of years separated most of these catastrophes, allowing evolution to work its magic and life to rise and rejuvenate time and time again.

But we are living at the cusp of the sixth mass extinction. This time there is no singular asteroid, no super volcano. This time the cause is us—through habitat destruction, introduction of invasive species, spread of pathogens, poaching, and a rapidly warming climate. Our environment and the animals we share the planet with are suffering, and we do not need to speak the same language to understand this.

Environmental destruction has a long and lurid history. As the saying goes, we are standing on the backs of giants: Hippocrates pioneered medicine, Edison illuminated the path to technological advance, and the forefathers of the Industrial

Revolution fuelled modern luxuries at the earth's eventual expense. Here we are in the 21st century, where Jobs created digital means of distracting us from what's truly unfolding around us.

We simply do not have time to speculate about an injured Earth when she is already revolting with extreme floods, intensifying wildfires, and heat-related health crises. At the time of my writing this, the first country has already declared all its ice caps have melted. By the time the last country's ice caps melt, billions could be displaced as entire cities sink and global systems collapse.

Humanity has the power to heal the planet, but only through collective effort. That must start with individual action: mine and yours.

Many of us carry memories of nature that have shaped who we are. Perhaps you've felt at peace listening to the magpies' carol in the morning, or found your weekends drawn to the beach and its crystal-clear waters. You may feel a sense of awe when you drive out from the city and towards the bush, marvelling at its great expanse. The Australian continent is home to ecosystems found nowhere else on Earth: from the eucalypt forests, the Great Barrier Reef, and the ancient Daintree. Many of us carry some connection to the natural world that has shaped us in some capacity.

From a young age, I also took great fascination with the natural world. I spent time as a curious child running around the unkempt lawn across our house chasing butterflies. I took up animal and environmental activism throughout school and ate plant-based for over a decade. Now, as a postgraduate scholar in dietetics following a Mediterranean dietary pattern, I've spent years studying the biochemistry of nutrition, food systems, human physiology, and previously, human culture and history. Through all my studies, I've realized that food is perhaps the most accessible answer for each of us to create positive change for planetary health.

Despite all the differences between humans throughout time, space and societies, nutrition unites us all. Each of us needs specific nutrients to survive, and more to thrive. The most fundamental truth of an optimal diet is that it comes from the earth: wholegrains, legumes, fruits, vegetables, nuts and seeds, fish. The link between a healthy earth and healthy diet is clear—we need rich and fertile grounds and healthy oceans for food that does not harm either us or the planet.

Which brings me to a strange phenomenon: have you ever noticed that only the same dozen or so fruits and vegetables are sold in the two monopolizing grocery giants? There are hundreds of other plants we could be incorporating in our diets to enrich our health and support biodiversity. What we are witnessing in our grocery stores is the loss of biodiversity in action. Mainstream food manufacturers are only cultivating and selling the same few fresh produce: this comes at the expense of a rich gut microbiome. But we can help reroute the system by finding local farmer's markets or independent stores that sell diverse foods that you won't find in corporate grocers. This can open our tastebuds to fresh new flavours and can easily enrich our health. We all have the power to change supply-demand signals, and that can very well start with where we buy our food.

This connects directly to another critical issue: food waste. One third of all carbon emissions are food-related, and food waste contributes significantly to this burden. When we throw food out, biochemical reactions transform our organic waste into methane and other greenhouse gases that accelerate climate change. You could volunteer or donate money, leftover foods, or ingredients to those in need through organizations like OzHarvest, SecondBite and FareShare, addressing both homelessness and climate crises simultaneously.

Several simple food preservation methods can reduce waste at home. If you have access to a freezer, this is one of the easiest options—soups, curries, and sauces can be cooked in batches, portioned, and frozen rather than discarded. Leftover vegetables and herbs can be chopped and lightly salted to draw out moisture, then stored in airtight containers in the refrigerator. Herbs can be layered with salt and kept this way for several weeks, as salt slows bacterial growth and spoilage.

Other accessible methods include pickling (soaking vegetables in vinegar, water, salt, and sometimes sugar to create an acidic environment that allows refrigerated storage for weeks), drying or dehydrating (removing moisture through air-drying, sun-drying, or using a low-temperature oven), and fermentation (placing vegetables in salt-water solution where naturally occurring bacteria produce preservative acids, as seen in sauerkraut—which also benefits our gut microbiomes). Finally, repurposing foods—using overripe fruit in smoothies or sauces, adding wilted vegetables to soups and stocks—extends their usability and prevents waste.

These preservation techniques become even more important when we consider what we're preserving: whole foods rather than ultra-processed alternatives. Currently, around 40% of energy in the Australian diet comes from ultra-processed foods laden with added sugars, salt, saturated fats, and preservatives. This dietary pattern correlates with escalating rates of colon cancers, Type 2 Diabetes, cardiovascular diseases, and other conditions that diminish quality of life and strain our healthcare systems.

The environmental cost mirrors health costs. Ultra-processed foods demand excessive energy at every stage: industrial farming of ingredient crops, chemical processing in factories, elaborate packaging (often plastic), long-distance transportation, and refrigerated storage. This industrialized food chain generates significant greenhouse gas emissions, depletes natural resources, and contributes to biodiversity loss. Local whole foods and minimally processed ingredients require far less energy and create a lighter environmental footprint.

When we choose local, whole, minimally processed foods, we're making a dual investment: in our own vitality and in a more sustainable food system. This shift isn't about perfection or deprivation—it's about recognizing that every meal is an opportunity to nourish ourselves while treading more lightly on the earth.

If you are not considering the environmental-nutrition overlap by this point, what about if you had no access to adequate food at all? Rising global temperatures are threatening food systems themselves—each year farmers worldwide witness decreased yields and qualities of crops, including commodities like cocoa and

coffee beans. These environmentally induced pressures are driving up costs of basic foods, creating a feedback loop where the climate crisis makes food less accessible, which in turn makes sustainable eating harder to achieve.

But I am not a pessimist.

We have time to change our dietary habits and contribute to tangible, positive outcomes for our earth and our futures. We have the power to help others believe in this shared cause through gentle conversations and, mostly, through education.

If you want to learn more about natural preservation and sustainable land management, First Nations Peoples across Australia and around the globe are among our most vital teachers. Water activist, Muruwari and Budjiti man, Uncle Bruce Shillingsworth, demonstrates how First Nations land management practices, skills, and knowledge have the power to heal the earth. Dr Anne Poelina, a Nyikina Warrwa woman of the Kimberley region, has shared extensive wisdom on the inseparability of human and earth rights. In our shared quest to preserve the natural world, we must recognize that First Nations cultures have lived with the earth for hundreds of generations. Their systems of knowledge and practice are rich with lessons we ought to learn with reverence and humility.

For tens of thousands of years, Indigenous communities have practiced sophisticated systems of land management, seasonal harvesting, and ecological balance that Western science is just beginning to fully appreciate. Their knowledge of fire management, water conservation, biodiversity protection, and sustainable food systems reflects a profound understanding of humanity's place within nature, not above it. Where modern industrial practices have sought to dominate and extract from the land, Indigenous wisdom has centred on reciprocity, respect, and regeneration.

As we face environmental crises largely born from disconnection with natural systems, Indigenous voices offer pathways forward rooted in deep ecological knowledge. Listening to and learning from First Nations Peoples is essential for building a sustainable future. Their leadership in environmental stewardship reminds us that preservation, health, and cultural connection are inseparable.

My name is Shreyasi Baruah. I'm a writer, wellbeing coach, an anthropology major, and soon to be an accredited dietitian. Above all, I am of the earth and for the people. We each have intrinsic strengths and unique qualities that we should all be empowered to leverage for the good of the planet and humanity. Take the time to reflect on what changes you can make, on how you can inspire others to be part of the movement for change. Revolutions don't begin with crowds—they begin with one person who decides enough is enough, who takes that first step when the path ahead is unclear. Your hands, your voice, your choices matter more than you realise. Let's work together for our children and our future generations, so they may hear the songs of many wild birds to come.

Stories that can save us

This chapter can be referenced as "Barzanji, S. (2026). Stories that can save us. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

Introduction

Climate change is not just a scientific, technological, or policy challenge; it is also a challenge of human perception. As Kim Stanley Robinson notes in The Ministry for the Future, "It's not that people don't know. It's that they don't believe what they know" (Robinson, 2020). While scientific evidence clearly shows rising temperatures, melting ice, and ecological collapse, knowledge alone often fails to motivate action. Rob Nixon describes this disconnect as "slow violence", which is the gradual, often invisible harm that climate change inflicts over years or decades (Nixon, 2011). In Australia, this slow violence is visible through the bleaching of the Great Barrier Reef, the desertification of the Murray-Darling Basin, and rising sea levels that threaten Torres Strait Islander communities. Such impacts may not be immediately dramatic, but over time, they damage ecosystems, displace families, and erode cultural heritage, highlighting how the slow pace of climate change can hinder urgent responses.

While reason is important, emotion also shapes perception, and literature engages our feelings. By depicting climate change's slow violence through compelling narratives, literature makes the human, social, and ecological costs of environmental neglect personal and immediate. The recent rise of climate fiction ('cli-fi') has brought these stories to the forefront, with novels like Kim Stanley Robinson's New York 2140 transforming scientific data into relatable experiences, helping readers grasp the urgency of the crisis.

In The Conversation, Bernadette McBride and Johns-Putra argue that climate change challenges us to look ahead, past our own lives, to consider how the future might look for generations to come, and our part in this" (McBride; Johns-Putra, 2019). Through powerful stories, cli-fi highlights potential futures shaped by today's choices and encourages moral reflection, empathy, critical thinking, and ultimately change. The launch of the Climate Fiction Prize in 2024 further highlights storytelling's role in raising climate awareness, celebrating novels that inspire action and understanding. As the Prize founders say, "For societies to fully grasp the climate change threat and to embrace its solutions, we need better stories. It's not enough for audiences to know about climate change; they need to see an uncertain future and understand that change is urgent but possible" (Climate Fiction Prize, 2024).

Literature can motivate people to care, and when people care, they act. Using stories in climate communication, through school programs, climate-themed book clubs, short story competitions, and storytelling workshops, empowers young people to find their voices and imagine solutions. Public displays like 'story walks' in parks or climate-inspired art installations bring stories into everyday spaces, connecting narratives to simple actions such as planting trees or organising clean-ups to link imagination with real-world impact.

If literature can highlight the unseen sides of climate change and foster empathy through stories, then its potential shouldn't stay limited to novels or academic debates. The challenge is to move from awareness to action, making sure that the power of climate fiction is woven into our culture and education. Stories are most effective when encountered early and often, shaping how children and communities imagine their future. That's why my proposal focuses on integrating climate storytelling into education and public life, starting with the youngest generations.

Proposal for Action: Raising Awareness from Prep/Primary School Onwards

Children are among the most vulnerable to climate disasters, yet they also possess extraordinary transformative potential. According to UNICEF Australia, more than 1.4 million children experience a climate disaster or extreme weather event in an average year, with those in remote areas, lower socio-economic contexts, and Indigenous communities most severely affected (UNICEF Australia, 2024). Beyond being passive victims, children can influence families, peers, and communities. When given space to imagine and narrate futures, they become active participants in creating them.

Early Educational Integration

Formal curricula can struggle to adapt quickly, but storytelling provides a flexible and age-appropriate approach. Narrative-based learning promotes critical thinking, empathy, and moral reflection more effectively than factual instruction alone, particularly in primary education. Chawla (2018) also demonstrates that stories facilitate moral reflection, allowing children to engage with complex issues like climate justice. This study suggests that pairing stories with early education curricula can reduce eco-anxiety among young Australians and spark early empathy and a sense of agency. For example, The Tantrum That Saved the World (Herbert and Mann, 2018) combines storytelling with practical activities, showing children how they can participate in climate solutions. These narratives become even more effective when paired with hands-on projects, such as classroom gardens, small recycling initiatives, or weather journals, that connect abstract issues to tangible practices.

School and Community Story Clubs

Book clubs in schools and local libraries can pair novels with discussions about local environmental issues, such as bushfire recovery in Victoria or coastal erosion in Queensland, helping children relate global challenges to their own experiences.

Inviting authors, Indigenous storytellers, and climate advocates brings diverse perspectives and enriches the experience while connecting literature to cultural knowledge and intergenerational wisdom. Indigenous knowledge systems, as highlighted by the Intergovernmental Panel on Climate Change (IPCC, 2023), are vital for understanding resilience and adaptation, and storytelling is a key way this knowledge is passed down through generations. Including such voices in community book clubs ensures that young readers not only learn about ecological challenges but also encounter traditions of care, sustainability, and belonging that are often missing from mainstream stories. In Australia, partnerships with the

National Indigenous Australians Agency could incorporate First Nations stories to ensure cultural relevance.

Community-based reading programs have shown positive outcomes: the UK's Big Climate Read fostered dialogue, reduced eco-anxiety, and encouraged pro-environmental behaviour, while Australia's Greening Libraries program demonstrates libraries as hubs for climate education. Situating climate stories within schools, libraries, and community spaces nurtures literacy, empathy, and social networks for climate action.

Storytelling Competitions and Creative Expression

Competitions in fiction, poetry, comics, short films, or spoken word performances give young people opportunities to reimagine their world and articulate visions of resilience. Research in education and creativity studies highlights that such "expressive modalities" enhance critical thinking and problem-solving skills by allowing learners to process complex issues through imagination (Sawyer, 2012; Robinson, 2015). In the climate context, creative expression provides a psychologically safe space for young people to explore eco-anxiety, reframe it as agency, and generate alternative futures.

Public exhibitions of student work not only amplify their voices but also position them as active contributors to climate dialogue. The UN's Youth in Action on Climate Change (United Nations, 2019) report emphasises that showcasing youth creativity in public forums fosters a sense of recognition and belonging, which is key to sustaining civic engagement. Competitions like Australia's Young Writers' Awards and the 'Poets for the Planet' initiative in the UK demonstrate how literature and performance can motivate communities and policymakers alike, drawing attention to young people's climate concerns in emotionally resonant ways.

Moreover, visual and performative storytelling is particularly effective in engaging diverse audiences. By supporting competitions that encourage experimentation across genres, schools and community organisations can ensure inclusivity, allowing both avid readers and visual or oral learners to participate meaningfully. Ultimately, storytelling competitions transform youth from passive recipients of climate discourse into cultural producers who reframe the crisis in their own terms. When their work is celebrated publicly in libraries, galleries, festivals, or digital platforms, it signals to communities and decision-makers that children are not only affected by the climate crisis but are already envisioning and narrating solutions.

Public Engagement and Story Walks

Public 'story walks' in parks or exhibitions in libraries in city or suburban spaces can bring climate narratives into everyday life. Research on public pedagogy shows that learning beyond formal institutions, through cultural spaces, green areas, and community events, broadens civic engagement and strengthens environmental literacy (Sandlin, O'Malley, and Burdick, 2011). When climate stories are displayed in public, they move the issue from the margins of science and policy into everyday community conversations.

The 'Story Walk' demonstrates that setting literature into outdoor spaces enhances accessibility, family engagement, and place-based learning. When adapted to climate themes, 'story walks' can connect text with environment; for example, situating narratives about water scarcity beside rivers, or pairing biodiversity tales with botanical gardens. Such spatial storytelling deepens participants' emotional connection to their local ecologies and reinforces that climate change is not distant but locally felt.

Including Indigenous storytelling in these projects helps connect climate awareness to the deep history of land, water, and care for the environment. Stories like Australia's Dreaming or North American First Nations' seasonal tales tie environmental care to cultural identity. Inviting Elders and community storytellers to lead story walks honours their wisdom, supports cultural traditions, and boosts sustainability education.

Moreover, public storytelling strengthens social cohesion as cultural programming in shared outdoor spaces fosters dialogue across generations and communities. Story walks that merge children's creativity with Indigenous knowledge thus become more than art and serve as community climate classrooms, cultivating shared responsibility, respect for cultural wisdom, and collective imagination for a sustainable future.

Workshops and Multimedia Storytelling

Multimedia workshops that integrate literature, science, and the arts not only encourage interdisciplinary collaboration but also equip children with twenty-first-century communication and digital literacy skills. Youth media initiatives such as the Our Climate Voices podcast in the U.S. and UNICEF's Voices of Youth digital storytelling platform demonstrate how digital formats amplify young perspectives on global challenges and foster leadership skills. In Australia, programs like the ABC's Heywire competition have shown that giving young people space to tell their stories through podcasts, radio, and digital art cultivates confidence, advocacy, and community engagement. When adapted to climate narratives, such platforms ensure that children's imaginative and creative ideas of the future reach far beyond the classroom, inspiring conversations at local, national, and even international scales.

These projects foster agency. When children and adolescents see their podcasts shared on streaming platforms, their animations screened at festivals, or their comics circulated online, they gain recognition as knowledge producers rather than passive learners. This not only confirms their creative contributions but also sends a powerful message to policymakers and communities: young people are active agents shaping climate narratives, not just future victims of the crisis.

Linking Stories to Action

Narratives are most powerful when paired with practical, tangible initiatives. Research in environmental psychology and education shows that combining imaginative engagement with hands-on action significantly increases pro-environmental behaviours in children and adolescents (Chawla, 2009; Stevenson et al., 2014). By connecting storytelling with activities such as tree planting, school

gardens, local clean-up days, water-saving challenges, or citizen science projects, young people can see that their creativity is not merely symbolic but transformative. Linking narrative to action cultivates agency, resilience, and a sense of efficacy, which are critical factors in sustaining long-term climate engagement.

Programs like Eco-Schools Australia and Citizen Science projects demonstrate the power of integrating education, storytelling, and action (Eco-Schools Australia, n.d.). Students who participate in storytelling-linked initiatives not only develop literacy and critical thinking but also contribute to measurable environmental outcomes, such as increased tree cover, waste reduction, or biodiversity monitoring. Similarly, initiatives like The Climate and Health Alliance's school climate programs show that storytelling paired with local environmental action helps children connect global climate issues to their communities, reinforcing relevance and responsibility (Climate and Health Alliance, n.d.).

Conclusion

Climate change is not only a scientific or technological challenge; it is a profound cultural and ethical dilemma that reshapes how we perceive the world and our responsibilities within it. While scientific data provides critical insights, it often cannot convey the human experience behind the statistics. Literature, particularly climate fiction, confronts this gap by implanting slow violence within compelling narratives, portraying the human, social, and ecological costs of environmental neglect. By engaging imagination, empathy, and moral reflection, storytelling transforms abstract knowledge into lived experience and motivates action.

As Amitav Ghosh asserts, "When future generations look back upon the Great Derangement, they will certainly blame the leaders and politicians…for their failure to address…climate…but they may well hold artists and writers to be equally culpable – for the imagining of possibilities is not after all, the job of politicians and bureaucrats" (Ghosh, 2016). This underscores the unique responsibility and power of artists, writers, and educators to shape societal responses to climate change.

By integrating climate narratives into early education, story clubs, competitions, public installations, multimedia workshops, and tangible environmental initiatives, we can cultivate imagination, agency, and resilience from a young age. Let us use the power of storytelling to make the future a better place for our children and the next generations.

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A path back to nature

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Growing up in Southeast Queensland, school holidays were spent either camping, at the beach or going on road trips, habits I still have now as an adult. Like many Australians, I am drawn to the bush and the sea, seeking the extraordinary biodiversity that defines this country. From spotting Koalas and Kookaburras to exploring rock pools and watching humpback whales breach, these experiences are deeply treasured and part of who I am. Australia's deserts, rainforests and reefs make it one of the most biodiverse places on Earth, and our wildlife is central to how we see ourselves and how the world sees us. People travel from all over the world to come and experience our biodiversity and we are so lucky that we still have so much of it right in our backyards. Yet despite this deep connection, Australia is a global leader in biodiversity loss, driven by systems that prioritise profit over care.

The world is currently experiencing its sixth mass extinction event, and Australia is leading the way due to biodiversity loss. A mass extinction event is when a high percentage of biodiversity is lost in a short period of geological time. The previous five extinction events were caused by natural phenomena (asteroid, volcanoes, natural climate change) whereas the one we are currently experiencing is caused by humans (Carrington, 2017). This is due to our unsustainable use of land, water, and energy, and anthropogenic (human-caused) climate change, which has devastating consequences not just for us but also for the species that inhabit the planet with us. All species are interconnected; one species interacts with many others, so if one species goes extinct, it has a domino effect on other species and ecosystems.

Each country faces its own challenges when it comes to biodiversity loss. In Australia, we face invasive species, high rates of land clearing and resource extraction, inadequate environmental laws, and anthropogenic climate change. Our society, like most others around the world, has pillars of colonisation and capitalism, which view the environment as a commodity to be extracted for short-term economic gain, regardless of social and environmental consequences. The mass extinction event we face, has been created by our social structures, but that means we have the power to change them and help our planet come back from the brink. We all need to understand the problems and consequences we are facing, so we can collectively make changes. The only way to deal with the challenges before us is together. To do this, we need a multi-pronged approach, from small changes we can make as individuals in our everyday lives to larger-scale changes in policy and business. It's not going to be easy, but it's much easier to do this now than to face a future where we haven't done enough.

One of the leading drivers of biodiversity loss in Australia is invasive species from introduced feral mammals and predators to invasive parasites and weeds. Many of Australia's native wildlife are soft-footed with padded paws, while many feral animals, such as camels, horses, and pigs, are hard-footed with hooves. They contribute significantly to soil erosion, making it harder for native plants to

regenerate (DCCEW, 2025). Australia is also unique in that our predators, carnivorous mammals (Tasmanian tigers, Tasmanian devils, quolls, bandicoots), mostly disappeared from Australia's mainland thousands of years ago when dingos were introduced, probably by South-East Asian seafarers. Which means many of our small mammals, birds, and amphibians are particularly vulnerable to introduced wild cats, foxes and rats, resulting in Australia having the highest rates of mammal extinction in the world (WWF Australia, 2025). Rabbits are also detrimental to our wildlife, with high breeding numbers they take over native burrows and threaten more than 300 plant species that have not evolved to cope with their appetites. However, rabbits do not eat many of the invasive weeds; they mostly eat our native plants, so once they eat our plants, the invasive weeds have more room to spread (Invasive Species Council, 2025). If you notice an invasive animal, report it via FeralScan, or an invasive weed via the Exotic Plant Pest Hotline, this helps identify and track where these species are present, allowing responses to be targeted and their impacts reduced.

Once an invasive species has entered Australia, there's not much we can do to remove it, which is why we have control methods in place to minimise its impacts. Australia has some of the strictest biosecurity laws in the world. While customs declarations and inspections can feel inconvenient after a long international flight, they play a critical role in protecting our already fragile ecosystems. Disease, parasites, fungi and weeds can easily enter Australia from soil, mud and plant matter. If we don't answer the Incoming Passenger Card truthfully, that's how invasive species can get in. With increasing global travel and trade, invasive species are hard to keep out, but remember what is at stake; this is one of the simplest collective actions Australians can take.

Protecting our biodiversity starts with understanding which species live in our communities and ensuring they have space to survive. This knowledge is essential in developed and developing areas. Local councils should actively engage residents, helping them understand which species share their neighbourhood and what actions can support them. By learning about the microclimate in our own gardens, balconies, and shared green spaces, we can understand where more shade is needed, which native plants attract pollinators, and how we can provide shelter for wildlife, making meaningful contributions to local biodiversity.

Waverly Council provides a strong example through its native vegetation and animal habitat framework, a model that could be adapted by councils across Australia. To help encourage public participation in biodiversity protection, councils need more support from state and federal governments to publish local species lists and to implement practical initiatives. These could include providing households with bird baths or boxes, insect hotels and native plants and flowers (in pots or communal green spaces). These small interventions create vital habitats and food sources for local wildlife. There are so many small changes we can make collectively that will make a difference and shift Australia from a story of biodiversity loss to one of recovery. To do this, we need to rethink how we design and build our urban areas to integrate nature back into these spaces.

Most of my adult working life has been spent in cities, surrounded by concrete, steel and glass with only pockets of green in between. Like many city workers, I

seek out those small green spaces during lunch breaks, craving fresh air and a brief connection to nature. Imagine instead leaving work and looking up to see buildings covered in plants, linked by green corridors that bring nature back into our cities. Green infrastructure would transform urban life by improving our wellbeing, reducing urban heat, lowering energy demands and providing vital habitat for wildlife (Choi et al., 2021). We should be looking at innovative materials such as eco-concretes that encourage moss growth on new buildings and vegetated wall systems.

We can look to other countries that have green infrastructure and adapt their policies and frameworks to Australia. In Singapore, new urban developments are required to replace lost greenery through green roofs, green walls and urban vegetation. Organisations like the Australian Green Infrastructure Network (AGIN) are already bringing together experts to map out how green infrastructure can be embedded in Australian cities. Green infrastructure will deliver long-term economic gains, improve mental health and well-being and benefit the climate (Bowen & Lynch, 2017); it's not just an aesthetic luxury, it is essential urban infrastructure for a liveable and resilient future. How and where we build matters just as much as how we design our buildings, this is where policy directly intersects with biodiversity loss.

Australia's housing crisis is increasingly driving land clearing and urban sprawl due to new developments, making it a significant, but often overlooked, contributor to biodiversity loss. This intersection is something I have been witness to my entire life. I have been returning to the same stretches of bush, coastline and hinterland since my childhood, and I have seen how much the environment has changed. Highways have been widened, bushland cleared, insects that used to splatter on windscreens are absent, and entire suburbs have replaced areas where biodiversity once thrived. As Australia's population has increased, our biodiversity has declined. The long-celebrated 'Australian Dream' – a house with a big backyard, multiple cars and pets - has come at a significant environmental cost, driving land clearing, habitat fragmentation and loss. For many people in my generation, this dream is increasingly unattainable and, personally, undesirable. I don't want a quarter-acre block; I would happily live in an apartment, townhouse or tiny home surrounded by green infrastructure and native gardens. If we want to mitigate biodiversity loss, our cities and suburbs must grow smarter. Rather than meeting housing demand through new developments, we could make better use of existing housing stock, invest in social housing with a government rent-to-buy scheme, limit multiple property ownership and remove capital gains tax. This could reduce the need for further land clearing.

While new development is inevitable and sometimes necessary, it needs to occur differently, prioritising density over sprawl. Building higher-density housing within existing urban areas will protect surrounding ecosystems, reduce habitat fragmentation and preserve biodiversity. Housing and construction must be greener by design, prioritising energy efficiency and renewable energy such as solar power, battery storage, and water tanks in all new and existing developments. Social justice and environmental outcomes are deeply interconnected; when

housing systems fail, ecosystems suffer. Smarter housing policy is essential to protecting Australia's ecosystems.

Land clearing also occurs due to agriculture, livestock and resource extraction, and we need more government action to mitigate the environmental impacts. Deforestation not only destroys habitats but also increases greenhouse gas (GHG) emissions, as trees capture carbon. This is a nationwide problem in Australia, but Queensland is a hotspot. Most farmers are good land managers; however, a few beef producers are bulldozing forests unchecked and account for most of the deforestation (Wilderness Society, 2025). We need more monitoring, policy reforms and harsher penalties to stop further deforestation. Food production (livestock and agriculture) accounts for just under 18% of Australia's GHG emissions, and food loss and waste account for 3% (DCCEEW, 2024). One-fifth of our emissions come from food production and consumption; we can each take simple steps to reduce our carbon footprint.

Individually, we can decrease our meat intake (one vegetarian meal a week makes a huge difference), eat locally produced and seasonal foods and compost our food scraps. At a larger scale, we can look to France for its food waste laws, which ban supermarkets from dumping edible food and adapt these to Australia. Australia's agriculture and livestock industries are transitioning toward more sustainable practices, driven by groups such as Farmers for Climate Action and lobbying by the Australian Conservation Foundation. This transition must be supported by the government and not be pushed onto farmers alone. Measuring emissions, establishing carbon baselines, and funding offset initiatives should be publicly funded to ensure agriculture becomes climate-resilient without being overtaken by large duopolies.

Mining, oil, and gas extraction present a more troubling picture and are among the most serious threats to biodiversity in Australia, due to land clearing, GHG emissions, and marine seismic surveying. When proposed projects threaten protected species, they are often allowed to proceed through offset agreements. While environmental offsetting sounds effective in theory, in practice, it often fails to protect biodiversity (Cox, 2025). These offsets claim to compensate for habitat destruction by protecting land elsewhere or investing in carbon capture. However, destroying a unique ecosystem and replacing it with a distant parcel of land with minimal biodiversity is not an equal exchange. Offsets must occur locally and benefit the affected species. The new nature laws passed at the end of 2025 address offsetting by creating a "restoration fund" that developers pay into, despite evidence that a pay-to-destroy scheme does not work (Green & Medlock, 2025). We can do better than this, we need to fix our policies, so they make a positive difference, not create policies that are just more of the same. Furthermore, companies often lobby politicians to weaken or remove environmental protections after approval is granted, undermining the entire purpose of offsetting (Snider, 2025).

Offshore oil and gas extraction further compounds these impacts as many projects overlap with whale migration routes and fragile marine ecosystems. Seismic blasting, drilling and associated GHG emissions pose serious threats to marine biodiversity and ocean health. Right now, oil and gas companies are seeking to

expand exploration and production off Australia's coasts, with companies competitively bidding for an exploration permit from our government (Australian Marine Conservation Society, 2025). Public consultation is part of the approval process, allowing Australians to review, question and object to projects that threaten ecosystems, cultural heritage or our climate targets. We can have our say if we want these projects to go ahead or not, meaning they're not inevitable.

At the same time, much of Australia's resource extraction is carried out by multinational companies that generate billions in profit while contributing relatively little in tax revenue, because of loopholes (Starr, 2025). This has been an ongoing issue in Australia; more money is collected from students' HECS/HELP debt repayments than from international gas companies. In the last financial year, $5.1 billion was collected from HECS/HELP debt and only $1.1 billion from the Petroleum Resources Rent Tax (PRRT). Compared with Norway, where taxes raised from the fossil fuel industries provide free university education and childcare (Thrower, 2025). If our resources are to be extracted by international corporations, they must be properly taxed, and those funds should be directed towards mitigating the impacts of climate change and social welfare.

Resource extraction also carries profound social and cultural consequences, particularly for Indigenous communities. Too often, projects proceed on or near Country that holds deep cultural and spiritual significance, resulting in irreversible heritage loss and community disruption. Companies frequently prioritise procedural 'tick-box' compliance over genuine engagement and fail to uphold principles of free, prior and informed consent (FPIC). For this reason, FPIC must be a non-negotiable foundation for any new resource extraction proposal; if consent is absent or found to be compromised with new approvals or on existing projects, work should be halted.

Whilst Australia is beginning to phase out coal mining, this transition must accelerate, with clear pathways to support workers into renewable energy industries. At the same time, the mining of critical minerals needed for renewable technologies presents an opportunity to do things differently. These projects can have smaller environmental footprints, but only if strict safeguards, comprehensive rehabilitation plans and full-cycle accountability are in place and adhered to. What we approve today will shape landscapes and ecosystems for generations. Learning from past failures is essential if future projects are to proceed with care, justice and environmental responsibility.

Australia also faces an extinction debt: the delayed impacts of land clearing and environmental damage that occurred decades ago and are still unfolding today (Kuussaari et al., 2009). While we now understand the long-term impacts of these actions, profit too often remains the primary driver of development, overriding environmental responsibility. What is the value of environmental policies and safeguards if they can be weakened or dismantled when political power changes hands? Environmental degradation and biodiversity loss are above party politics; climate change does not discriminate by political ideology, and its impacts will be felt by everyone. This is why we need strong, legally binding climate triggers that protect ecosystems, communities and future generations, regardless of who is in government. At the next election, look up how your MP voted via They Vote For You

to see how your representative has voted for the environment and see if their decisions align with you. Overall, Australia's environmental laws must be strengthened, properly enforced and safeguarded from political changes. Nature-positive decisions must be prioritised and treated as essential to our economy, not expendable.

Humans have lived on this continent for around 65,000 years, and native species and wildlife have evolved here over millennia. While most species alter their environments to survive, the scale of human alterations, especially since colonisation, has been unprecedented, but this doesn't have to be the end of our story. As long as species still survive, we can make a difference. Protecting nature must be a collective effort done in genuine, consensual collaboration with Indigenous Australians. First Nations people have been custodians of Country for tens of thousands of years. If we want to repair our relationship with nature, we must repair our relationship with Indigenous peoples. We need Indigenous-led conservation and a collaborative approach to mitigate the environmental challenges we face as a country. We can co-design policies and mitigate the extinction event currently happening. We are all custodians of this land, and all hold a responsibility to care for Country not just for ourselves and future generations, but for the amazing biodiversity that shares this land with us.

In 2025, Australia showed genuine steps and meaningful progress towards a nature-positive future. Southern right whales recorded their best breeding season since 2016, and green sea turtles are no longer listed as endangered. Species that were on the brink, such as the woylie and the mountain pygmy possum, are showing signs of recovery. A number of new species have been discovered, from marsupials like the kultarr and native bee species with tiny devil-like "horns" to deep-sea sharks and crabs. While conservation programs have successfully reintroduced animals into national parks, restoring ecosystems (Greenpeace Australia Pacific, 2025). Stronger protections for our environment were passed, which will reduce native forest logging, end fast-tracking of some fossil fuel projects and create a national environmental protection agency (Cox, 2025). Victoria became the first state to sign a treaty with First Nations people, taking the first steps toward a better, fairer future together. This shows what is possible when we choose to act. We need local initiatives, stronger state and federal legislation and individual action. These all matter and are all needed.

Australia and the world have understood the reality of anthropogenic climate change for decades, and biodiversity loss is just one symptom of this wicked problem that affects us all. Our current linear, capitalist model, built on mass extraction, production, consumption, and waste, treats nature as expendable rather than an essential foundation of our system. We know this path is failing, and if we continue to place economic growth above environmental and social well-being, the damage will only accelerate, and recovery will become harder the longer we delay.

This is not the end of our story, because humans created these systems, we can also change them. Every environmental challenge we face requires collaboration and cooperation between business, government and the public; we all have a role to play. We must adopt a systems-thinking approach to deal with the challenges

before us. Protecting nature needs to rise above politics and profits and become a shared responsibility. Many people and organisations are already leading the way, showing that change is possible. Remember, small choices matter. Consuming less, buying second-hand, eating less meat, sourcing local, seasonal produce, composting, supporting ethical and local businesses, and voting for leaders who prioritise nature all make a difference. At the same time, we must transition to a regenerative, circular economy that values repair, reuse and renewal rather than endless extraction and waste. With 27 million Australians, collective action has real power. We are at the beginning of a new year; let's create a new system that benefits all life in Australia.

Camping, beach days and road trips, those quiet moments in the bush and by the sea have shaped who I am, just as the deserts, rainforests and reefs shape our national identity. Memories of spotting geckos on walls, being swooped at by magpies, seagulls trying to steal my chips, and checking my shoes for spiders are part of my deep connection to Australia and moments all Australians share. We are incredibly lucky to be living in a country with such amazing biodiversity at our fingertips. A healthy environment underpins a healthy society, and if we change course now, through everyday choices, community action and strong, nature-positive leadership, we can protect the wildlife and landscapes that define Australia and become a leader in a new future where both people and nature thrive.

The youth climate movement

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When I was in year 9, I went to a rally at Garema Place about climate change, I was intrigued.

Then in the same year in my science class we were learning about climate change I was so curious and sad about it. We watched the day after tomorrow. It was so real and scary. I was thinking about it for months at a time. "We got to do something about it, I said to my mum and dad. "

The next few months I attended a sustainability fair at Canberra Girls Grammar School, and they were also launching the website called "EthicalJobs.com.au" (It was founded in 2009). I was very intrigued about the website and how to stop climate change. EthicalJobs.com.au is a job board platform in Australia focused on roles in the not-for-profit / "for-purpose" sector (charities, social enterprises, community organisations).

According to their own info: they support more than 9,000 for-purpose organisations across Australia and have a community of around 300,000 unique users visiting the site each month.

I was trying to become as sustainable as possible in my house and the actions that we took as a household. I bought sustainable and quality meat (mind you I was working and had money so I could afford such products), organic and local vegetables and fruit. We also consumed less processed food and junk food when necessary. I was also mindful about my carbon footprint, recycling and composting. We also tried not to print too many pages and automated our bills (I only had to pay for food and smartphone payments). I'd always been into animals and non-violence. Mind you this was when I worked at Kmart and FSW Shoes, so money is privilege and I had the choice to be able to choose this lifestyle. My mum has always been frugal and good with money even when I was younger, so I obviously learnt about this from her.

Then I looked up the Australian Youth Climate Coalition, I'd never heard about them. About 6 years later I decided to join the movement. I was a member but not a volunteer yet. I learnt about Stop Adani and the mines. I participated in the community rallies and wanted to do more about it.

The AYCC was founded in 2006 by Anna Rose and Amanda McKenzie, with a youth-driven coalition of organisations coming together to launch the movement.

The Australian Youth Climate Coalition focuses on these things below:

Campaigns: AYCC runs high-profile campaigns pushing for renewable energy, stopping fossil fuel expansion, and promoting climate justice. E.g., their work to stop the Adani Group coal mine.

Education & Youth-Leadership Programs: They run programs like "Switched On Schools" (which delivers climate-justice education in schools).

Volunteering & Local Groups: They have volunteer-led groups all over Australia; young people (typically up to ~30 yrs) can join, lead actions, host events.

Movement Building & Narrative Change: Beyond single campaigns, they aim to shift how society talks about and acts on climate change — make it not just a policy issue but a youth-driven movement.

The founding summit in November 2006 brought together around 30 youth organisations including:

- Australian Student Environment Network (ASEN)
- United Nations Youth Australia
- Oz Green
- Oaktree Foundation
- Australian Youth Affairs Coalition
- Law Students for a Just Community
- International Young Professionals Foundation

At that summit they formed an interim steering committee (9-person) to guide the coalition. The AYCC originally described itself as a coalition of around "27 youth organisations" at its founding. The founding summit (20-22 November 2006, Melbourne) adopted a structure that included a nine-person interim steering committee.

A separate source (the 2009 Annual Report) lists some names of steering committee members (e.g., Ben Margetts, Angela Baker, Emily Murray, Steph Smith, Tessa Dowdell, Sarah Purcell, Nicky Ison, Nick Moraitis) — but not the full original nine and not necessarily from 2006.

A few years later, I decided to step up as the area leader for the Belconnen Area, I joined with another young person, who was also passionate about climate change. We organised activities, petitions and flyering mainly at University of Canberra Bruce campus to recruit university students.

It was very successful, as I really stepped up and dared to do things differently.

A year later I became a Volunteer Outreach coordinator and coordinated events and used the Nation builder system to recruit people from different universities (mainly). I organised events at Canberra Institute of Technology Bruce Campus and Harrison School. I also worked in a small diverse team. It was very rewarding and flexible.

After this I became the Campaigns Coordinator, trying to convince the public about Stop Adani, divestment and Saving the Great Barrier Reef, mainly through social media. I was also doing videos for myself and others about the Adani Mines. I was talking to politicians, especially Shane Rattenbury (MLA) and his assistant. We had a meeting with him about stopping gas in the ACT. I worked closely with the State coordinator and volunteer team. I stopped being a climate campaigner for a while due to my ill health, which is unrelated to the topic. When I did return to climate advocacy, I was surprised that there were other people and diverse groups around the world campaigning for climate change in the same way, this was mainly on social media, especially Facebook and Instagram. I was surprised

by the number of young people, mainly girls and women that were stepping out from the partriachy.

A few years later, a girl named Greta Thunberg appeared on social media, especially on Instagram. She started a school climate strike outside the Swedish Parliament. Her speeches are well known and went viral on social media. She is the one responsible for the Greta effect. In August 2018 she began striking from school every Friday under a sign reading "Skolstrejk för klimatet" ("School strike for climate") outside the Swedish Parliament.

The strikes grew internationally; the Fridays for Future movement saw participation from students in many countries.

She addressed high-level forums including the United Nations climate summit, the World Economic Forum in Davos and other national/ international bodies.

Her activism helped push the climate conversation further into public view; media and analysts talk of the "Greta effect" in catalysing youth engagement on the climate crisis. She has published books, including No One Is Too Small to Make a Difference (2019) and The Climate Book (2023).

Greta's story shows how individual action (a 15-year-old skipping school) can amplify into a global movement.

She connects climate justice, generational equity and youth voice in the public sphere. Her visibility (and the backlash she faces) highlight tensions in how societies deal with climate change, youth activism and institutional responses. Her naming as Time Person of the Year signified broad public acknowledgement of climate activism and youth leadership.

Damon Gameau from That Sugar Film and 2040 fame, directed a documentary film called Future Council (2024) where a bus full of teenagers go to Europe to fight climate change and meet with powerful leaders and solve environmental challenges. Tailored for youth audiences, especially middle-to-high school age (approx years 5–9 is specifically mentioned for some resources) but the themes are broad enough for older audiences too.

One critical question raised by reviewers: Are we placing too much burden on children? The film doesn't shy away from showing moments of emotional overwhelm

Social media is a big part of the Youth Climate Movement and now the effect of the Under 16 social media ban in Australia (the law takes effect on the 10th of December 2025), as it will affect young people's voices. What will the future look like if there are no youth climate activists and how will this affect free speech, not just in Australia, but around the world?

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Advocating for a faster renewable energy transition in Australia's urban energy system

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Introduction

Australia is on the path to a cleaner electricity system. However, the present results are unsatisfactory in light of the country's expectations. The country's electricity was provided by 64% in 2023-2024 by fossil fuels (45% of coal and 17% of gas) (Australian Government, 2023). Renewables have a contribution of 36% which is yet to be adequate in the long term (Australian Government, 2023). Government targets are 82% renewable electricity and net zero emissions by the year 2030 and 2050, respectively (Commonwealth of Australia, 2024). Achievement of these aims demands an increase in the utility-scale and household renewable systems. Nonetheless, in 2024, new large-scale renewable generation capacity grew only to 2 GW, in contrast to the recommended 6 GW of renewable capacity to cover the loss of coal layer playing out every year (Clean Energy Council, 2025).

On the contrary, rooftop solar is expanding at a rapid pace. Over 4 million rooftops have already been installed, and in recent evaluations, rooftop solar has been supplying over 12.4% of the total electricity. It is also applicable to households, and they earn a saving of over 1500 dollars annually, demonstrating that there is overwhelming support among the populace to use clean energy on a small scale (Zou et al., 2024). The contrasting character of speedy expansion in rooftop solar and gradual development in utility-scale initiatives puts forward the perception of an uneven transition.

Discussion

1. Australia's Current Electricity Mix and the Need for Faster Transition

The recent energy statistics indicate that the Australian electricity system is predominantly fueled by fossil fuels, even though there have been further increases in renewable sources. The 2023-24 financial year energy statistics have it that fossil fuels generate 64% of overall electricity, with coal accounting for 45%, gas and oil accounting for 17% and 2% respectively (Australian Government, 2023). Renewables added 36% of all electricity, of which solar was 18%, wind was 12% and hydro was 5% (Australian Government, 2023). Even though it is the highest renewable portion ever taken, the numbers indicate considerable structural reliance on coal and gas.

This is reinforced by data available from the Clean Energy Council. In the year 2024, 40% of the total generation was provided through renewable energy. This indicates that renewable energy has marginally increased in 2023 (Clean Energy Council, 2025). Renewables have passed 46% of electricity in the last quarter of 2024, and coal was less than half of the load for the first time (Macdonald-Smith, 2025). Although these quarterly results show that there is a positive momentum, they also reflect that there is inconsistency between short-term and long-term peaks and transition pace. The Guardian has also provided identical results of AEMO,

where renewable supply became 46% in the December 2024 quarter, and the maximum renewable supply was 75.6% on 6 November 2024 (Cox, 2025). These are high and indicate technical capacity, but they are not indicative of continued annual performance.

2. Limitations in Utility-Scale Renewable Deployment

The amount of utility-scale renewable implementation in Australia continues to be much lower compared to what will be needed to make the transition consistent and in-good-time. According to the Clean Energy Council, Australia needs approximately 6 GW of new utility-scale renewable generation every year in order to fill the gap created by the ageing coal-fired power plants and also to achieve the 2030 targets.

There are a number of implications of this shortfall. To begin with, the imbalanced pace of the accomplishment of projects adds strain to the grid since coal generators will be retired prior to sufficient renewable capacity. Second, gradual scale rotation in the utility leads to uncertainty surrounding the attainment of the goal of 82% renewable electricity target by 2030 (Commonwealth of Australia, 2024). Third, the unalignment of the growth of rooftops with the utility-scale deployment creates imbalances in the grid planning and transmission requirements.

3. Strength of Rooftop Solar and Small-Scale Renewable Adoption

Rooftop solar has remained a key element in the development of renewable energy in Australia. Over 4 million rooftop solar systems have currently been installed. According to the Clean Energy Council, 3.2 GW of rooftop capacity was installed in 2024, and the ratio of rooftop solar energy was 12.4% of the total electricity production (Clean Energy Council, 2025). It also contributed 31% of the renewable generation, which indicates that household adoption is significant in the growth of renewable energy.

These trends are supported by the Clean Energy Regulator. The Small-scale Renewable Energy Scheme has accredited over 4 million small-scale installations, with over 300000 new installations each year since 2020 (Clean Energy Regulator, 2023; Jervis-Bardy, 2025). The SRES incentives save households over 1500 dollars per year on energy bills, and installation costs are reduced by approximately 30% as well. The payback times have been reduced to approximately 3.5 years. This strengthens the economic viability of the rooftop systems. In the same year, the Regulator added that rooftop solar provided over 12% of the grid electricity in the year up to August 2024.

The data provided by the Climate Council also demonstrates the national significance of rooftop solar. Over 3.6 million homes use rooftop systems, which approximates to one in every three Australian homes. The total savings of these households are estimated at almost 3 billion dollars annually on power bills (Jeffrey, 2024). The number of installations is more than 300000 per annum, and the rooftop power is approximately 23 GW. These characters indicate that roof solar offers robust household advantages, lowers the grid electricity consumption, and favors the national emission reduction objectives.

4. National Policy Targets and the Requirements for System Change

The climate policy framework in Australia has a high level of national goals that need collective action on a large scale. Australia plans to reduce its carbon emissions twice by 2030 and achieve net-zero carbon emissions by 2050 under the Climate Change Act of 2022. In the policy, there is also a clean electricity goal of 82% renewable energy by the year 2030 (International Energy Agency, 2022). According to the International Energy Agency, the above objectives need to be achieved through the rapid implementation of renewable generation and heavy investment in modern grid infrastructure.

Austrade reassures of the Australian Government's intention of curbing emissions by 43% below 2005 carbon emission levels by 2030 and net zero emissions by 2050. Another target that the government has introduced is the 2035 emissions target of 62 to 70% (Lam & Turnbull, 2025). These are the goals on which the Future Made in Australia plan is based and which are supposed to open the potential of clean energy through investment and industrial transformation.

Nevertheless, the difference between the real implementation of renewable energy and the policy objectives poses a significant problem. According to the Clean Energy Council, the lack of utility-scale capacity in 2024 compared to the needed puts a heavy strain on the coal retirement schedule and creates the potential of available shortages of supply in the future, in case renewable projects are not up to the national demand.

5. Public Health and Environmental Drivers for Accelerated Transition

Critical evidence of public health and the environment also underlies the transition to renewables. According to a national study in ABC News, it is estimated that over 1800 premature deaths in Australia are due to traffic-related air pollution (Purtill, 2025). Approximately half of the air pollution-related deaths are caused by vehicles. These results demonstrate that energy and transport policies should collaborate and decrease emissions to enhance air quality.

The study highlights that cleaner energy, electric cars, and better public transportation are necessary in order to minimize premature deaths. This fact proves that not only is the energy transition a climate goal, but also a health need of the population. The need to reduce the use of fossil fuels also contributes to the reduction of emissions and better air quality in the city, due to the fact that rooftop solar and other small-scale renewable systems reduce energy demand.

Conclusion

Australia has enhanced the share of renewable electricity. However, the change is too gradual to achieve domestic climate and energy objectives. The weakness lies particularly in the utility-scale development. Conversely, solar and roof are highly adopted, with over 4 million units generating an excess of 12% of the nationwide generation and saving households of over $1500 annually. Nonetheless, the small-scale systems cannot eliminate the necessity of large-scale projects, posing threats to the stability of the grid and the future supply. There is also evidence in terms of public health because the number of premature deaths due to air pollution is

approximately 1800 per year, which cannot be resolved without faster action. Well-developed utility scale, superiority in planning transmission, and enhanced confidence in investments are necessary to realize national goals.

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Closing the loop: why circular waste programs like FOGO are the future of local sustainability

This chapter can be referenced as "Chetty, C. (2026). Closing the loop: why circular waste programs like FOGO are the future of local sustainability. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

Introduction: Rethinking Waste as a Resource

Australia's waste sector is shifting away from traditional landfill dependent systems towards circular models that prioritise resource recovery, emissions reduction and long-term sustainability. Under this approach, waste is not regarded as a disposal problem but as a potential resource that can support environmental and economic resilience.

Regional FOGO (Food Organics and Garden Organics) implementations across Australia illustrate this transition. Programme data and case studies consistently show that improved source separation, contamination reduction strategies and community education enhance the quality of organics recovered. Evidence from both local government operations and consultancy assessments also demonstrates that high quality organic streams can support compost production, anaerobic digestion, cogeneration and participation in the Australian Carbon Credit Unit (ACCU) scheme.

This research examines the environmental, economic and social benefits of circular waste systems such as FOGO and outlines why coordinated national support is essential to scaling these programmes into long term sustainable practice.

Environmental Benefits: Reducing Emissions and Restoring Soil Health

Organic material in landfill is a significant contributor to methane generation, a greenhouse gas far more potent than carbon dioxide. Circular systems such as FOGO reduce this impact by diverting food and garden organics into composting and anaerobic digestion facilities where emissions are significantly reduced.

Regional rollouts show that contamination reduction is central to environmental outcomes. Higher quality organics enable compost producers to generate nutrient rich material for agriculture, landscaping and climate adaptation. Consultancy analyses further indicate that processing clean organics through anaerobic digestion can produce biogas for cogeneration or earn ACCUs, strengthening the environmental value of modern resource recovery facilities.

Education is also critical to environmental success. Community behaviour, such as correct separation and consistent bin practices, directly influences emissions reduction and compost quality. When residents understand the environmental consequences of their waste decisions, soil health, air quality and local ecosystems all improve.

Economic Benefits: Local Jobs and Sustainable Regional Systems

Circular waste systems offer significant economic advantages when compared with the rising costs associated with landfill, including gate fees, transportation

costs and long-term remediation liabilities. FOGO programmes shift waste from being a cost burden to becoming a valuable resource stream.

Regional examples show that FOGO programmes stimulate local employment through contractors, compost processors, equipment suppliers, data specialists and transport operators. Where anaerobic digestion or cogeneration potential exists, recovered organics can generate income through energy production or ACCUs. This provides councils with long term financial offsets and more resilient waste management budgets.

Processing organics locally reduces transport requirements and decreases landfill liabilities. Compost produced through these systems supports agricultural and landscaping sectors, boosting regional economic activity and encouraging closed loop material cycles. As communities see clear financial and environmental benefits, participation improves and long-term efficiencies emerge.

Social Benefits: Behaviour Change and Community Engagement

Community participation is essential to the success of sustainability initiatives. Evidence from regional FOGO programmes shows that early resistance to behaviour change often stems from household routines, time pressures and perceptions of inconvenience.

Behavioural insights from council programmes demonstrate that regular feedback, such as bin audits, contamination tagging and ongoing education, significantly improves household practices. When residents understand how their actions influence the broader programme, participation increases and contamination decreases.

These systems also encourage broader cultural change. Communities begin to recognise not only the value of diverting organics but the importance of reducing waste generation altogether. This transition from a waste disposal mindset to a resource recovery mindset becomes one of the most significant social outcomes of FOGO.

Scaling Waste to Resource Models: National Coordination and Policy Support

Local governments have shown that circular waste programmes are effective, but national coordination is needed to fully realise their benefits. Programme assessments indicate that when organics are consistently processed through composting or anaerobic digestion, facilities can operate as resource hubs that generate high quality compost, biogas and ACCUs.

Scaling these benefits requires national investment in:

• Regional composting and anaerobic digestion infrastructure: Greater federal support is needed to establish modern, high-capacity facilities in regional and peri urban areas. This includes funding for in vessel composting, anaerobic digestion technologies, leachate and odour management systems, and integrated resource recovery hubs. Reliable infrastructure ensures consistent processing quality, reduces transport costs for councils and increases the volume of organics diverted from landfill on a national scale.

• Standardised contamination and quality frameworks: Nationally consistent guidelines for acceptable contamination levels, bin auditing practices and compost quality standards would create uniformity across states and territories. This provides processors with confidence in feedstock quality, simplifies data reporting for councils and improves the reliability of outputs such as compost, digestate and biogas.

• Unified education and engagement campaigns: A national education framework would support councils by delivering consistent public messaging on waste separation, contamination reduction and the environmental value of FOGO. Well-designed public campaigns help normalise correct sorting behaviour, improve participation rates and reduce the communication burden on individual councils. Unified messaging is especially important for residents who move frequently between regions.

• Consistent data collection and reporting systems: A coordinated national data framework would improve the accuracy and comparability of waste information across jurisdictions. This includes harmonised measures for contamination, diversion, emissions reduction and compost quality. Reliable and comparable data strengthens decision making, informs infrastructure planning and supports the case for ongoing federal investment in circular economy initiatives.

• Funding models that reward diversion, emissions reduction and resource recovery: National incentive structures could provide councils with financial benefits for meeting diversion targets, achieving emissions reductions or generating carbon credits. This may include grants, rebates, performance-based payments and streamlined eligibility for ACCU participation. Rewarding successful programmes encourages continuous improvement and supports councils that adopt innovative waste to resource approaches.

Conclusion: Closing the Loop for Australia's Future

FOGO programmes demonstrate that environmental, economic and social benefits can align when circular principles are adopted by communities, councils and industry. Regional case studies and consultancy assessments show that high quality organics recovery supports compost production, emissions reduction, potential energy generation and broader sustainability outcomes.

While transformation takes time and consistent behaviour change, the way forward is clear. With national support, investment in regional infrastructure and continued community education, circular waste systems such as FOGO can become standard practice across Australia.

Closing the loop involves rethinking the lifecycle of materials. When waste is treated as a resource, communities become cleaner, regional economies grow stronger and Australia moves closer to a resilient and sustainable future.

Climate adaptation starts from the ground up: recognising the role of soils as a foundation for Australia's climate resilience

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Soils are ecosystems more diverse than our rainforests, storing more carbon than the atmosphere and vegetation combined. They underpin every ecosystem function, yet are often overlooked. When we talk about adapting to climate change, we focus on water, biodiversity, and agriculture, but rarely about the ground beneath our feet.

Soils sustain life on earth. They provide 99% of our food, filter water, and maintain biodiversity. Every ecosystem on the planet is being reshaped by rapid climatic variability - biodiversity and habitat loss are well documented, carbon dioxide levels are monitored daily, and extreme weather events are becoming the norm. Yet soils are rarely named directly in climate discussion or policy frameworks.

They are not just the dirt beneath our feet; they are living systems that will be deeply affected by climate change. Without healthy soils, no adaptation plan will succeed. Recognising soils as central in policy, and investing in education, jobs, and better soil management, will allow us to treat soils not as a backdrop to resilience, but as its foundation.

Why soils matter for adaptation

As the foundation of ecosystems and the unseen infrastructure beneath society, soils regulate the processes that keep landscapes and economies functioning. Ecosystem services are defined as the benefits that nature provides to humans, through the transformations of natural resources into essential goods and services, such as clean air, food, and water[1]. Within an ecosystem, resilience - the ability to absorb disturbance while retaining structure and function - is underpinned by biodiversity. Genetic variation among animals, plants, and microorganisms directly influences an ecosystem's ability to adapt and respond to global pressures. Biodiversity delivers services both directly, through the provision of food and fibre, and indirectly, by regulating water and air quality, and facilitating energy transfer[2].

Soils underpin this biodiversity at extraordinary scales. A single teaspoon of soil can contain more microbes than there are humans on earth[11]. These below-ground communities drive key ecological processes: transforming organic and inorganic compounds into plant-available nutrients, decomposing residues, cycling carbon and nutrients, and improving soil structure and fertility[12].

Beyond supporting life below ground, soils enable the production of food, feed, fibre and timber. They regulate air quality, the carbon cycle, water purification, erosion processes, disease and pest control, support pollination and buffer extreme events. Soils also hold profound cultural value - contributing to spiritual and religious practices, recreation, aesthetics and human wellbeing[13].

Considering these essential functions and services, Australia's soils are estimated to provide an annual value of $930 billion AUD, according to McBratney et al. (2017). Protecting and restoring soil health is therefore not only an environmental imperative, but an economic one: the resilience of ecosystems, communities and industries alike depends on the living systems beneath our feet.

As the natural infrastructure sustaining the world's ecosystems, soils also play a central role in climate adaptation. Healthy soils buffer the impacts of extreme weather, moderating floods and droughts through improving water infiltration and retention. They store carbon in long-term pools, helping to offset greenhouse gas emissions, and support vegetation growth that stabilises landscapes and sustains biodiversity.

Sustainable soil and water management can restore depleted carbon stocks, enhancing biomass production, and improve the quality of surface and groundwater. Conservation agriculture practices such as cover cropping, residue retention, compost or biochar addition, and nutrient recycling have all demonstrated potential to build soil organic matter and resilience[14]. However, no single approach works everywhere. Soil properties vary widely, and management must be tailored to local conditions. For example, adopting no-till practices on Western Australia's sandy soils can increase water repellency, reducing moisture infiltration and yield[15].

Ultimately, improving soil health represents more than a set of agricultural techniques - it is a cultural and systemic shift. Whether through large-scale land management or local initiatives, such as restoring marginal lands to functioning ecosystems, actions that rebuild soil carbon and structure generate far-reaching benefits: healthier landscapes, greater climate resilience, and improved food and water security. Yet despite their central role in adaptation, soils remain largely absent from climate policy and planning frameworks.

The current state of recognition: gaps in climate policy and research

Soils deserve direct recognition: they are foundational to the natural world and to the societies built upon them. Within human timescales, soils are a finite resource with a hidden economic value estimated at close to a trillion dollars in Australia alone. Despite their central role in ecosystems, economies and climate regulation, soils remain largely peripheral in international and national policy frameworks and assessments.

The Intergovernmental Panel on Climate Change (IPCC) Assessment Report 6 (2024) recognises the role of soils through discussions of land use, carbon cycles and agriculture, though rarely as a system in their own right. Soils are typically framed within themes of agriculture, food security and ecosystem collapse, with limited recognition as a direct climate impact. Yet, the FAO has estimated that about a third of soils globally are degrading and increasingly vulnerable to climate change[16].

Australia's National Climate Risk Assessment and National Adaptation Plan (2025) follows a similar pattern. References to soils are largely indirect, positioned through agricultural productivity. This reflects a primary industry lens that tends

to view soils as agricultural inputs rather than as living systems underpinning biodiversity, water regulation, and cultural values. Despite their central role in sustaining ecosystems, soils still appear as background context rather than as active components of adaptation planning.

Internationally soils are beginning to gain recognition through initiatives such as Canada's Sustainable Soil Strategy[6], the EU's Soil Mission[7] and China's national programs on soil health for food security. Australia's National Soil Strategy (NSS) similarly represents an important milestone, signalling growing awareness of the importance of soil management[9]. However across all these frameworks, acknowledgement has yet to translate into integration. Without the necessary investment in human capital, coordination across sectors, and sustained implementation, the NSS risks achieving only incremental improvements in soil condition over the foreseeable future[10].

The existence of the National Soil Strategy therefore highlights both progress and the challenge ahead: soils are now recognised in principle but not yet embedded in practice. Integrating soils as a core element of climate policy - alongside water, biodiversity and energy - will be essential for building a genuinely resilient Australia.

The gap: Why this matters for climate policy

Soils underpin every ecosystem function and adaptation pathway; from carbon storage and biodiversity to agricultural productivity and water regulation. For millennia, ecosystems have provided humans with countless forms of support, yet these services are often overlooked until they fail. Because many ecosystem functions are difficult to observe or quantify, they tend to hold little weight in economic systems until their loss imposes a measurable cost. The widespread investment in river restoration, including significant funding for Queensland's degraded river systems in 2024, illustrates how environmental neglect only becomes a priority once the damage is done.

The same logic applies to soils. Degraded soils threaten food security, reduce water quality and increase vulnerability to floods and droughts. Yet soils are still treated as background context rather than as critical national infrastructure. The narrow framing of soils in adaptation frameworks limits the scope of action, ignoring that healthy soils interconnect the hydrological, ecological and carbon systems that sustain communities and economies alike. Their absence in global and national climate policies is not a minor omission - it is a structural blind spot that undermines resilience planning.

As a result, Australia's current approach remains largely reactive: spending billions cleaning up floods, mitigating droughts and attempting to reverse biodiversity loss. These are treated as separate challenges rather than symptoms of a shared underlying issue - soil degradation.

Repositioning soils within climate policy would shift Australia from a reactive to a proactive model of adaptation. This can be achieved by:

- Embedding soil health indicators into national risk assessments,

• Integrating soil targets across sectors, and

• Recognising soil restoration as a nature-based solution.

Linking soil management to energy, biodiversity, agriculture and regional planning will produce cross-policy integration, allowing more efficient delivery and resilient outcomes for drought preparedness, flood mitigation, food security and carbon sequestration.

Barriers to Adoption

Recognising the importance of soils in adaptation planning requires first addressing a foundational challenge: a widespread literacy gap. Soil science is taught at only a handful of universities, creating a narrow and difficult pathway into the discipline. As a result, Australia's intake of early-career soil scientists has dwindled to the point where the workforce is barely replacing retirements. Those who do enter the field often lack essential training, placing additional pressure on an already overstretched professional cohort.

This shortage of expertise has direct implications for policy. With few soil professionals available to inform decision-making, soil literacy among policymakers remains low, reinforcing a negative feedback loop where soils are under-recognised precisely because too few people understand them. Fragmented governance, jurisdictional overlaps, limited long-term data, and inconsistent monitoring frameworks further compound the challenge.

Soil concepts are also largely absent from primary and secondary curricula. Without early exposure, soils remain invisible to students considering future career paths, shrinking the pipeline of professionals and limiting public understanding. Because soil processes are complex, slow to change and difficult to observe, they are hard to prioritise within short political cycles. Yet these barriers highlight not a lack of value, but a lack of investment, coordination and cross-sector understanding.

Pathways for Action

Addressing these systemic challenges opens clear pathways for meaningful integration of soils into climate policy. Education is a powerful lever: embedding soil science in school curricula would build long-term literacy, cultivating an informed citizenry and future professionals who understand soils as living systems rather than background resources. Expanding university programs and strengthening professional training would widen the pool of experts capable of guiding policy, implementation and innovation.

Beyond formal education, soil literacy can be strengthened through non-traditional platforms. Enhanced extension services can support informed land management, while community programs can reconnect urban populations with the origins of their food and the landscapes that sustain them. A deeper public understanding of soil diversity and spatial variability is essential for communicating why different landscapes require different management approaches.

Reframing soils as active drivers of adaptation, rather than passive elements of the environment, can shift public perceptions and rebuild community connection to land and agriculture. Prioritising soils in policy design strengthens not only the agricultural sector but the resilience of communities, ecosystems and regional economies.

Incorporating Indigenous knowledge into soil management and adaptation planning adds another essential dimension. First Nations knowledge offers deep, place-based understanding of soil, water and vegetation interactions, providing insights that complement scientific approaches. Integrating these knowledge systems supports adaptive strategies that are culturally grounded, ecologically sound, and aligned with long-term custodianship.

Building Resilience from the Ground Up

In short, building climate resilience must start from the ground up. Recognising soils as central to adaptation transforms them from overlooked background resources into living infrastructure - essential for sustaining people, nature and economies in a rapidly changing climate.

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Making a green future, one airport at a time

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On the 28th of October, various news outlets ranging from Sky News to The Daily Telegraph reported on a historic milestone that occurred at the new Western Sydney International Airport. For the first time, a passenger-size aircraft was able to land on the runway. This significant event will most likely mark the final stages of the airport's construction, as it means that planes will be able to go in out of the airport.

However, this milestone comes with some negative implications. The presence of more airplanes and a large airport around the Badgerys Creek area, as well as a new city centre in nearby Bradfield to complement it, has had some adverse effects on the local environment. These effects must be rectified.

My perspective

Now, I will be completely honest. At first glance, this ambitious project does seem to be very beneficial to Australia. However, should one take a deeper look, it becomes very apparent that the plan actually has a multitude of negative consequences. Looking at the various ways the airport and new city could impact the climate and environment had me second-guessing the benefits of yet another airport in Sydney.

The damaging of local water in the area, the destruction and disruption of local habitats due to noise pollution and deforestation, and the potential emissions from airplanes coming in and out of the site were all immediately noticeable to me. There have already been reports that the groundwater and surface water around the airport site have been degraded due to the current airport construction and use. For example, the Airport themselves admitted that their current usage of the land had resulted in a further degradation of water quality based on nearby catchments of water. At the same time, based on my own observations of the site in Badgerys Creek and Bradfield, I ended up finding something even more concerning. There isn't just a degradation of local water supplies in the area - there is an ongoing erosion of water in the nearby region.

BELOW: Two images from my observation. The left image shows what are meant to be numerous bodies of water near the airport site. The right image shows an image I took around the area that is marked in red in the left image.

Looking at these images from my observations helps to illustrate the point that I am trying to make; the development of the airport and new city is coming at the expense of the natural environment. The erosion of natural water sources in the area does not bode well for other surrounding bodies of water around the airport and new city centre.

For me, I have found some concerns regarding the nearby Lake Burragorang and Warragamba Dam. These two bodies of water are crucial to Sydney's environment, not only because of the surrounding trees and various animals and fish that live there such as eels, fish, and swans according to the Blue Mountains Greens, but also because they help to provide drinking water to the city. Should any fuel emissions from planes taking off or entering the airspace of Badgerys Creek end up getting into those bodies of water - the animals, and the City of Sydney could suffer the consequences. This does not even get into the ramifications of more airplane emissions causing the climate to rise up further and further. It is well known that emissions from aviation are a significant contributor to climate change, as they release carbon dioxide. The release of carbon dioxide due to fossil fuels used by planes means that every time planes are used, they contribute more and more to the heating up of the Earth's atmosphere.

There was also the 2014 report on the site of the airport that stood out to me. It revealed that there were various ecological communities that lived on the airport site. These included snails, various woodland birds, bats such as the Grey-headed

Flying-fox. With the airport, these animals' habitats have been disrupted due to deforestation and noise pollution. Without any trees, where can the woodland birds nest? With a cacophony of noise from construction, how can bats, a nocturnal animal, rest during the day? It is clear that the projects are making many animals' native homes uninhabitable. It should also be mentioned that the loss of trees due to deforestation also increases carbon dioxide levels, further contributing to the heating up of the Earth.

BELOW: More images from my observation. The left image shows ongoing construction that was very loud, and thus could hurt animals. The right image shows the aftermath of a construction site to get rid of trees.

With all of these various issues in mind, my perspective is clear. The Western Sydney Airport Project, and the new Bradfield City Centre, as of right now, is ultimately more damaging to Sydney then it is beneficial. I believe that a quote from Henry David Thoreau, as seen below, can help to explain my perspective.

"What is the use of a house if you haven't got a tolerable planet to put it on?"

Quote from Henry David Thoreau, philosopher and naturalist

Potential solution

Now, whilst I did just mention all of the negative consequences that the projects could have, it would be remiss of me to not try and also mention some positive solutions. After all, the events of October 28 have proven that this airport is happening no matter what. Thus, it would be responsible to find ways to minimise the negative environmental impacts that the projects will have and prevent such impacts from occurring again at such a drastic level.

Fortunately, there have been various solutions offered by many different parties to combat the environment impacts of a new airport and new city. For example, the official government websites for the Bradfield City Centre Project have mentioned their aims of making the city as environmentally friendly as possible through various methods such as focusing on walkability and public transport over the usage of cars (which use fossil fuels just like planes), planting new trees and other

plants, integrating solar panels into new buildings, and having carbon friendly street lights. There have also been various proposals throughout the years to raise the height of the Warragamba dam. The hope is that it could be a preventive solution to stopping emissions from falling into the dam and nearby Lake Burragorang. The Airport project also stated that they are seeking to work with conservation organisations to relocate animals affected by habitat loss to new areas. It is with these initiatives in mind that I do commend the government in trying to mitigate the negative environmental effects that their projects are causing.

However, there are two additional solutions that I believe should be advocated for as well. That is of course, the combating of airplane emissions and the changing of legislation.

Regarding airplane emissions, the fact that the projects have not found a solution to this issue is why I believe that they have not done enough. Thus, I seek to advocate for a method to decrease the amount of carbon dioxide emissions released from airplanes. The solution is ditching fossil fuels and instead using "sustainable aviation fuel" (SAF). SAF is an alternative energy source that can help save the environment. With the advancements made by its various producers, it can now help to reduce emissions by up to 80% today if used by airplanes. In fact, according to Aviation: Benefits Beyond Borders, nearly 1 million flights have used SAF since 2011, and there are already at least 69 airports with regular supplies of SAF. I strongly believe that the Western Sydney International Airport should become the 70th to regularly use SAF. This could even be codified into the remaining process of making and operating Western Sydney Airport, especially since there is a legal method to do.

There are already at least 69 airports around the world that regularly use SAF. One of them, Frankfurt Airport, even advertises the use of SAF. Western Sydney Airport should follow suit.

Regarding changes to legislation, I believe that this should also be strongly considered as something to advocate for, since there are pieces of legislation that

have allowed the projects to be environmentally irresponsible, such as Section 96G of the Airplane Act 1996, which states that the Western Sydney Airport is exempt from having to follow Parts 3 and 9 of the Environmental Protection and Biodiversity Conservation Act 1999 - an act whose third part covers the protection of threatened species and communities. This actually explains reports of threatened species being displayed from the site. I firmly believe that repealing this exemption can be a viable way for policy makers to ensure that the Western Sydney Airport can be more environmentally responsible.

All of these solutions show that even with many negative environmental impacts, projects such as the one in Bradfield and Badgerys Creek can still help the environment in the end with the right corrections to their plans. Thus, I believe that with enough awareness and feedback, project makers and government legislators can realise their wrongdoings and fix them before it's too late. After all, the current federal government already have a policy initiative called Future Made in Australia. It seeks to connect industrial and economic policy with green initiatives. With this in mind, would advocating for changes in legislation and advocating for the Bradfield and Airport Projects to invest in SAF and more not contribute to having a green future, made in Australia?

"Saving our planet...advancing economic growth... these are one and the same fight. We must connect the dots... solutions to one problem must be solutions for all."

Quote from Ban Ki-moon, Former Secretary-General of the United Nations

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Citizen science: a history and how you can participate

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You have it in your power to make a difference. Don't give up. There is a future for you. Do your best while you're still on this beautiful Planet Earth that I look down upon from where I am now.

Dr Jane Goodall, primatologist and anthropologist.

I avoid turning on the news. Every day—headlines of environmental collapse, political retreat from climate commitments, another species extinct and anti-global warming conspiracies. Hope can feel like a fragile, almost naïve concept.

Born in 1997, in my short lifetime I have witnessed the Sydney Water Crisis, Millennium Drought, Black Saturday Fires, bleaching of the Great Barrier Reef and the catastrophic 2019-2020 Black Summer bushfire season.

Like many in my generation, I grapple with existential questions: is it too late? What's the point anymore?

I recycle, limit my meat consumption, have short showers, pack a bag with me to the supermarket, take my reusable coffee cup to the cafe, recycle my plastics and batteries, but the world still keeps getting hotter, the environment continues to suffer and I am left feeling like my efforts go nowhere.

This was before I was introduced to the concept of citizen science.

What is citizen science?

Citizen science refers to the involvement of everyday people in scientific research—collecting, recording, and analysing data that contributes to our understanding of the natural world.

Citizen science dismantles the traditional hierarchy between scientist and observer. Citizen scientists provide the data; professional scientists provide the tools to interpret it. The result is a richer, more inclusive form of environmental science—one that acknowledges that we all have a responsibility in the future of our world.

While the term citizen science has gained traction in recent decades, the practice itself has deep roots in Australia's scientific, cultural and Aboriginal identity.

Before colonisation, Aboriginal and Torres Strait Islander peoples practiced their own version of Citizen science, now often referred to as Indigenous Knowledge Systems (IKS) (CSIRO, 2025).

The four primary avenues of IKS are:

- systematic observation of the natural world: First Nations peoples made long-term, detailed observations of plants, animals, weather, and celestial patterns over tens of thousands of years;

- fire and land management: Aboriginal peoples used controlled burns to shape the landscape, promote plant regrowth, and attract grazing animals. They developed hypotheses about how different fire regimes affected the environment. Over time, they tested and refined these methods, sharing results across groups;

- astronomy and seasonal calendars: Aboriginal peoples observed the night sky to track time, predict weather, and guide travel and ceremonies; and

- sharing knowledge: knowledge was collectively maintained, not owned individually. Stories, songs, and art encoded complex environmental data so communities could remember and transmit it accurately. This ensured open, communal data sharing.

Today, citizen science complements and works alongside IKS.

How IKS and citizen science work together

A common ground for citizen science and IKS is bushfire management.

Published in the journal Nature Ecology & Evolution, a study by the University of Tasmania (in 2024) found that six of the past seven years have been among the most extreme on record for wildfires (Cunningham et al., 2024). The number of extreme bushfires has also more than doubled between 2003 and 2023. The university predicts that the increase in bush and wildfires will continue to increase "at an alarming rate" (Cunningham et al., 2024).

With bushfire conditions expected to worsen, due to increasing global temperatures, IKS have never been more important.

The University of New South Wales is incorporating Indigenous knowledge in their bushfire research, "to better prepare for an increasingly uncertain future thanks to climate change" (University of New South Wales, 2024). First Nations peoples have a cultural and historic knowledge of bushfires that is integral in preparing for current and future fire seasons.

Citizen bushfire forums have also become an essential part of bushfire management. In 2020, Minister Karen Andrews conducted a series of roundtables, between "scientists and experts to frame a science-led response" (CSIRO, 2020) to bushfire control. It was recognised that "considerable energy and capability exists in the citizen science community, providing a[n]... opportunity to increase both the scale and impact of research-led responses" (CSIRO, 2020).

Both IKS and local knowledge were recognised as critical to future protection from increasingly extreme bushfire seasons.

How you can get involved

Anyone in any community in Australia has the ability to contribute to citizen science.

As mentioned before, bushfire management is a strong topic in the citizen science community. Many local councils still conduct bushfire forums and actively engage their local community.

A growing amount of citizen science is also in communities along the Great Barrier Reef.

The Great Barrier Reef is one of the most biodiverse and vulnerable ecosystems on Earth (Pogson, 2020). The Reef's sheer size—over 2,300 kilometres long—makes it impossible for scientists to monitor every coral formation or track every bleaching event. Citizen science fills this gap.

Programmes such as Reef Check Australia (2023), CoralWatch (2023), and the Eye on the Reef initiative (Great Barrier Reef Marine Park Authority, 2023) are accessible ways for everyday Australians to contribute to conservation.

These programmes ask for volunteers to record events such as coral bleaching; monitoring reef health and marine animal sightings. They rely on the time of both volunteers, experienced divers and snorkellers, as well as coastal communities, meaning every person contributes to the preservation of the reef.

The invaluable observations recorded inform management decisions, shape conservation policy, and provide real-time data on reef health that could not be done by the Great Barrier Reef Marine Park Authority alone.

For many young Australians, these projects offer more than scientific engagement; they offer a pathway to hope. They transform abstract fears about environmental degradation into tangible action—into something measurable and visible.

Going forward

For young people like myself, citizen science is an optimistic, proactive activity that allows you to contribute in a meaningful way to the climate emergency.

Recording valuable data grants you participation in solving the problem. I know for myself that being a part of the solution eases my climate anxiety and makes me feel empowered.

As a member of the generation that will inherit the full weight of climate change, I find solace in citizen science—while we may not have caused this crisis, we can still be part of its solution.

Citizen science embodies a form of hope and reminds us that we all have the power to make a difference and to shape our future.

For further information on how you can participate in citizen science, visit the CSIRO page: https://www.csiro.au/en/work-with-us/citizen-science.

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Climate change: a privilege to care

This chapter can be referenced as "Kantimahanti, B. (2026). Climate change: a privilege to care. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

Climate change is a growing issue, but not everyone has the privilege to take action, as they have other socio-political issues that take priority. Material circumstances can often prevent individuals and groups from mitigating climate change. Given this, what this advocacy piece will contend is that there are various societal, political and historical aspects of the climate discourse that have shifted blame onto the individual rather than placing a greater onus on the private sector and wider systems in place that are only perpetuating climate change. The class-based perspective, as articulated by Catherine Liu as the Professional Managerial Class (PMC), holds up the mirror to institutions such as big oil companies and governments that purport great political will and yet view climate change as a performative and insincere global concern (Hedges, 2025).

In addition, the effects of shifting such blame, this piece will divulge the years of climate change disinformation spread by big oil companies that have created an echo chamber of climate change propaganda, fueling the gap between theory and action (Supran and Oreskes, 2021). Despite signs of environmental decline, this piece illustrates the years of climate disinformation that have made it increasingly difficult for collective action, especially by those in the global south who lack the technology, resources and financial support to do so (IPCC, 2023). Lastly, a focus on equality and justice will be discussed to highlight an ethical standpoint in the climate change discourse. Ethical considerations when creating mitigation strategies are fundamental to ensure any effects of poor implementation are not shunted onto communities that are unfit to deal with the fallout.

The Professional Managerial Class (PMC)

The Professional Managerial Class (PMC), as Liu calls it, "a group of courtiers made up of academics, media figures and cultural elites who hover above the working class and dictate the aesthetic direction of 'progress," notably without ever addressing the material needs of the workers it claims to look after" (Hedges, 2025). Looking at this from a climate change lens, the "workers" are the vulnerable majority of the global south where the effects of climate change were shunted onto. Rather than addressing systematic issues and creating proactive and well-funded mitigation strategies, the PMC is a useful class-based theory that highlights the perpetuation that climate change is something performative and not a genuine global concern.

The PMC calls out the leaders and organisations who wield great political influence to translate climate change mitigation theories into practice. Involving a class-based perspective, such as the PMC, in the climate change discourse is crucial as it allows people from micro, meso and macro levels of society to visualise and understand the detrimental, material and irreversible damage of climate change. Particularly those from the working class and those in the global south who cannot mitigate climate change in isolation. Hence, calling out to those within the PMC can be a useful systemic path to holding governments accountable, as well as

providing easy access to resources that make a real and tangible mitigation of climate change to those in the global south.

The Insemination of Climate Change Propaganda

In comparison to the Australian context, Geoffrey Supran and Naomi Oreskes, both research associates in the History of Science at Harvard University, have analysed a history of climate disinformation within the fossil fuel industry (Supran and Oreskes, 2021). Their analysis of an array of advertisements over the past 30 years illustrates how oil companies do not "pump life"; instead, marketing campaigns like BP between 2004 and 2006 use buzzwords such as 'carbon footprint' to shift responsibility away from companies and onto consumers (Supran and Oreskes, 2021). The assertion of Big Oil that fossil fuels are essential for the foreseeable future is "deemed false advertising by regulators", ultimately spreading disinformation to the public and policymakers (Supran and Oreskes, 2021). Additionally, placing a high level of responsibility on individuals and big oil companies, simultaneously spreading propaganda over the past 30 years, creates a static environment for individuals to change their material circumstances to mitigate climate change.

Equality and Justice - The "Pro-Poor" strategy

Equality and justice are central to transformative change within the climate change discourse. These are not only fundamental to future climate change policies, but transformative change cannot be attained without ensuring that any repercussions from policy changes are not shunted onto vulnerable communities, particularly those in the global south, who are least equipped to handle the fallout (World Population Review, 2024).

Policies surrounding renewable energy, biofuels, closure of coal, and improvement of energy consumption in homes all have significant potential to achieve greater equality outcomes as climate change mitigation policies become more ambitious and complex. As a result, taking a "pro-poor" policy stance in mitigating climate change can ensure that existing inequalities are not worsened in marginalised communities (Markkanen and Anger-Kraavi, 2019).

The vast political landscapes and social issues that vary from the global north and south illustrate that the majority of the global south lack financial support, technology and assistance and access to resources that can be offered by the global north, to curb many of the effects of climate change. However, a strong exception to this argument is evident within China and India. Although these nations are categorised as the global south and as developing nations that have limited resources to tackle climate change, they are making the largest strides towards curbing the effects of climate change (Sandrin et al., n.d.). For example, China's announcement to cut emissions to 7-10% by 2035 is not an unattainable target when China's current environmental trajectory illustrates that it will likely exceed this target (V olcovici and Zhang, 2025). China's GDP per capita is far smaller ($13,303.1 USD) than Australia ($64,407.48 USD) and has not only achieved environmental goals but exceeded it. China should not be the exception but the standard for other nations like Australia to take on a proactive climate change commitment. Targets are that future focused and aspirational, not just a temporary fix.

Additionally, vulnerable communities that have historically contributed the least to current climate change events and are the most vulnerable to climate change (IPCC, 2023). This includes parts of Africa, South America, parts of the Caribbean and globally for Indigenous People who are small-scale food producers (IPCC, 2023). Though these disadvantaged communities contribute the least to greenhouse gas emissions, they benefit least from climate change policies and reap the majority of the social and environmental costs. This inequality only perpetuates the broken cycle of climate change action between those in vulnerable nations and those who allegedly hold the solution.

Migrants, ethnic minorities, and low socio-economic households are not as involved in th decision-making process, whilst also being the most exposed to the fallout of poorly designed policies (Markkanen and Anger-Kraavi, 2019). The theory behind a pro-poor mitigation strategy should be taken into account. Alternatively, marginalised communities bear the brunt of underfunded adaptation projects, which are poorly implemented (Bouyé and Waskow, 2021).

So what now?

Climate change is all-enveloping, meaning it affects all of us, and we, individuals and more importantly, larger corporations, have a shared responsibility to undo what we have done. The social, ethical, and historical arguments outlined in this advocacy piece have hopefully shed light on how the effects of climate change have eaten into trust in governments and big oil companies with a promise of "pump[ing] life" into society (Supran and Oreskes, 2021). However, in the past, sanguine mitigation strategies have been; it is clear that roadblocks such as those in the PMC, media, the lack of equality and justice implemented into the strategies and the transfer of blame from companies to the individual, have become a cost that the global south has had to pay consistently. Given the current climate trajectory, let's proactively prevent climate change—and not just for some.

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Mo' money, mo' problems

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In today's episode of who owes who? The US took a back seat while Africa's unfair colonial debt architecture stood sturdier than ever.

At the end of 2025, the G20 Summit for the first time was held in Africa, specifically South Africa. The summit was held with the aim of promoting solidarity and the impending importance of debt reduction. In an age of ecological breakdown, Africa's echoing of the idea of climate debt is important now more than ever.

Essentially, climate debt is the idea that wealthy nations have consistently polluted the atmosphere with greenhouse gases yet place their responsibility to repair the Earth, onto developing nations who have the least environmental impact. Nations like Australia, America and the United Kingdom, in the highly industrialised north have consumed an abundance of the global carbon budget, with wealthier countries owing almost US$36 trillion to African countries in climate debt.

The result of this?

A complete violation of nature's right to regenerate, loss of biodiversity, and food insecurity in the global south. More importantly, the opportunity for African nations to spend less on external debt payments, deeply rooted in colonialism, to the global north and instead invest in their continent's climate, health, education, and housing infrastructures. The disproportionate level of blame and accountability by wealthier countries has only created an ecosystem of poor climate infrastructure and goes against the polluter pays principle. *You did it, so you fix it!*

However, the diverted blame is a small portion of the G20 Summit. The summit also highlights how the atmosphere is a common global resource. No country has more right to the global atmosphere than any other. Using the atmosphere as a net to catch the global north's emissions has not only perpetuated capitalism but has robbed millions of people from long-term economic transformation, especially those in Africa.

The bottom line is that collective action is needed. It's not about polar bears, it's about people. The reality of the G20 summit highlights the importance of solidarity when the Earth is a shared space, yet the global north is left unaccountable. The climate debt discourse illustrates the disparity and cruel contrast between those who caused the climate crisis (global north) and those vulnerable communities with worse effects, like Africa.

Comparatively, Chinese influence in the climate debt arena is one that often goes unheard. For example, the Africa Solar Belt initiative is an opportunity for African nations to not only branch away from the global north's colonial clutch but also collaborate with China who is home to more than 80% of the world's renewable energy manufacturing. The economic and environmental impact alone would strengthen Sub-Saharan Africa, and ultimately the livelihoods of local populations.

The recognition that climate change cannot be mitigated without the global north's involvement was reality the G20 brought to light. The G20's implicit acknowledgement that climate action is impossible without the full, material engagement of the Global North is not a diplomatic breakthrough, but a long-overdue confrontation with reality. This is the core political truth of the 21st century: the atmospheric commons have been saturated by the historical emissions of the industrialised world, yet the most devastating consequences are being levied disproportionately on nations that contributed the least to the crisis. To frame this as a revelation is to underscore a decades-long failure of leadership. The G20, representing the world's largest economies and emitters, has merely stopped pretending that the burden can be elsewhere. Ultimately, this recognition forces a binary choice. Either the wealthy nations of the Global North broker a grand bargain, one that finances a global green transition openly and equitably, or they become complicit in presiding over a destabilised planet. Climate change is the ultimate borderless threat; half-measures and hollow rhetoric from those with the greatest capacity will condemn all.

The G20 has, perhaps reluctantly, laid bare this ultimatum. The North's choice is no longer between involvement and detachment, but between active, equitable leadership and catastrophic historical culpability. The moment for parsing words is over. The only remaining question is whether the north will pay its share now, or force everyone else to pay an infinitely higher price later.

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Are Australian winters the coldest on Earth? Victoria's hidden housing crisis

This chapter can be referenced as "Maher, M. (2026). Are Australian winters the coldest on Earth? Victoria's hidden housing crisis. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

My friend visited me in June and couldn't stop laughing at me, not because of the debatable food I served them (although the plain pasta and cheese dish I served was laughable), but because I was wearing a puffer jacket and a beanie inside my own living room. It wasn't until I handed them a spare blanket that they stopped laughing at me.

Far too many Victorians face a cold reality. The winter months mean avoiding certain rooms altogether because they're like iceboxes, leaving the oven door open after cooking just to let some warmth spill into the kitchen and staying in bed longer in the morning because the idea of feeling the cold morning air is unbearable. Step outside into the brisk Melbourne air, and you'll need a jacket. Step back inside and you'll need the same jacket - plus a beanie and thermals if you want to make it through the evening. The summer months, on the other hand, mean living in a home you just can't keep cool. These conditions are common in our poorly insulated housing market.

With electricity prices climbing and the broader cost of living squeezing household budgets, many Victorians simply can't afford to run a heater all the time through winter. For families already choosing between groceries, rent, and bills, cranking up the heater isn't a realistic option but more of a luxury. Instead, people are forced to layer up indoors, huddle under blankets, or retreat to a single heated room, while the rest of the house stays icy cold.

It's even become a running joke online. Australians decked out in ski gear inside their own homes, memes claiming Victorian winters are colder than Nordic winters, you've seen them. It isn't a coincidence that people are making these videos; the virality of these videos reflects a truth that isn't so funny. Australian houses, particularly in Victoria, are built to trap cold air like it's going out of style, while heat disappears the moment you turn off the heater.

A hidden crisis that affects everyone

The problem is simple. For decades, houses in Victoria were built with little to no insulation. Builders focused on speed and cost rather than comfort and efficiency. As a result, most homes leak heat through the roof, walls and floor, while draughts creep in through unsealed windows and doors, making homes colder in the winter and hotter in the summer. This is not just a matter of discomfort. The health consequences are well documented. Cold indoor temperatures are linked to respiratory illness, worsened asthma, and higher risks for older people. According to the Australian Institute of Health and Welfare, thousands of hospitalisations each year are linked to preventable cold-related illnesses. In the UK, where the housing stock faces similar issues, "excess winter deaths" have long been recognised as a public health concern. Here in Victoria, the problem remains

under-acknowledged, perhaps because we don't think of our winters as particularly extreme. Poorly insulated homes drive up unnecessary carbon emissions for the state as a whole. In effect, we're burning more coal and gas simply to heat the outdoors, an outcome that undermines climate goals. We talk endlessly about the rising cost of living and carbon emissions, but rarely acknowledge that much of it is literally seeping through the cracks in our walls. What a waste.

The absurdity of ignoring insulation

The obvious question is, why hasn't this been fixed? The solution of insulation is neither new nor complicated; it just hasn't been coordinated. "Your Home", an Australian Government resource, indicates that heating and cooling account for around 40% of household energy use. It emphasises that effective passive design and insulation can significantly reduce these energy demands. Draught sealing alone can transform the comfort of a home. Every dollar invested in insulation pays itself back multiple times over in reduced energy bills, improved health, reduced demand on the energy grid and lower carbon emissions.

And yet, insulation is invisible. You can't see it in glossy real estate ads. It doesn't have the political sparkle of electric vehicles or solar panels. It's not something people brag about at dinner parties. Because of that, governments have largely ignored insulation. However, state governments are the natural ones to champion insulation, since they set building rules and ensure the delivery of public necessities like clean water, electricity and sewerage treatment. In the same way, insulation, the act of having a soundly built home that keeps its inhabitants healthy and comfortable, should be ensured.

Low-income households and renters face hurdles in insulating their homes. That's why state support is key: it makes sure insulation is affordable and accessible, turning every home into a fairer, healthier, and more comfortable place to live.

One million retrofits by 2035: the program we need and what it will require

That's why Victoria needs to set targets and take action on a state-led program to retrofit one million homes by 2035.

Aiming to insulate one million homes by 2035 is ambitious but achievable. It sets a goal post and encourages Victorians to participate. A pilot program should start smaller. Over the first five years, targeting around 100,000–150,000 homes would allow the program to test approaches, work out logistics, and ensure that low-income and rental households aren't left behind. If successful, the program could then scale up to hit the million-home goal.

The Department of Energy, Environment and Climate Action (DEECA) should lead Victoria's insulation rollout, working closely with homeowners, landlords, renters, and councils. The program could include:

- Rebates and grants to cover upfront costs for homeowners

- Mandatory rental standards to protect tenants in cold homes

- Local council partnerships to coordinate delivery, especially in regional areas

Other state departments would play key roles too. The Department of Families, Fairness and Housing could prioritise low-income and social housing; the Victorian Building Authority would oversee compliance and quality; the Essential Services Commission would guide energy efficiency standards; and the Department of Treasury and Finance would manage funding. Public health agencies and community organisations could help run education campaigns, sharing insulation tips and showing how insulation saves money, improves health, and cuts emissions - making warmer, fairer, and more energy-smart homes a reality for Victorians.

A practical state-led insulation program needs to consider more than just materials and installers. It should prioritise homes most at risk and address building constraints, such as inaccessible ceilings or heritage requirements. Safety and compliance with building codes are essential, as is ensuring materials are available across both metro and regional areas. The program must include clear rebate systems and monitoring to track energy savings and health benefits.

Finally, aligning insulation with other energy efficiency measures, like heating systems or draught-proofing, can maximise impact while keeping costs and logistics manageable.

This isn't just social policy. It's climate policy. Retrofitting homes is one of the cheapest, fastest ways to cut household emissions while also delivering immediate cost-of-living relief. Victoria has ambitious targets to reduce emissions by 2035. Without addressing the black hole of residential energy use, those targets will remain out of reach.

The cost of inaction

Some will argue that such a program is too expensive. But the real cost comes from doing nothing. Right now, Victorians are paying billions in wasted energy bills every year. The healthcare system incurs additional costs due to cold and heat-related illnesses. Businesses lose productivity when employees are sick or unable to heat or cool their homes adequately. And every tonne of emissions we fail to cut now will cost far more to offset later.

In contrast, large-scale retrofitting is an investment that pays for itself. International studies show that for every dollar spent on insulation, governments save several dollars in healthcare costs and energy subsidies. The jobs created by such a program in trades, manufacturing, and local services would provide a significant boost to the economy.

Counterarguments and why they don't stack up

"But can't people just use heaters?"

Sure, but in a draughty, uninsulated house, a heater is like trying to warm the outdoors. You can spend hundreds a month and still be cold!

"What about solar panels and batteries?"

Absolutely, and they're vital for our energy transition. But solar panels only work if the energy they produce is used efficiently. What's the real benefit of solar panels on the roof when the heat is vanishing out the windows below?

"Should taxpayers really fund this?"

Yes. Just as we fund government housing, roads, schools and hospitals, we should fund insulation. The benefits flow to everyone: lower emissions, stronger energy security, and reduced strain on the health system. Public funding ensures fairness. No one should have to choose between staying warm in winter and paying the power bill.

"Why not just knock down old houses and build new ones?"

Building new homes is extremely expensive, time-consuming, and resource-intensive. Demolition creates waste, and new construction uses large amounts of energy and materials, which adds to emissions. Upgrading insulation in existing homes is faster, cheaper, and far more sustainable - delivering warmth, lower bills, and energy savings immediately, without the environmental and financial cost of starting from scratch.

Reimagining winter in Victoria

Imagine if, by 2035, one million more Victorian homes were warm and comfortable through winter. Elderly residents could live independently without fear of respiratory illness. Families could heat their homes without dreading the next power bill. And collectively, we could meet our climate targets while saving billions in wasted energy.

That future is not a fantasy. It is the logical outcome of treating insulation as essential infrastructure.

From humour to urgency

So, are Australian winters the coldest on earth? Of course not. Our winters are relatively mild by global standards. But when I'm sitting in my living room, layered in jumpers, socks, and a puffer jacket, still shivering, you could forgive me for thinking otherwise.

The humour helps us cope, but the urgency is real. Behind every meme of Australians rugged up indoors is a family struggling with bills, a child developing asthma, an elderly neighbour at risk and an extensive amount of wasted energy.

We cannot afford to laugh this off any longer. It's time to fix Victoria's hidden housing crisis. With one million retrofits by 2035, we can turn the punchline into progress and finally wear our puffer jackets in the right place: outside.

Looking the other way: the unseen costs of lithium's green promise

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Is lithium really the "new gold" of the Anthropocene? In the race to meet net-zero targets, lithium has become the cornerstone of the green transition, powering electric vehicles (EVs), stabilising renewable grids, and quickly replacing oil as today's coveted commodity. But there is an inconvenient truth behind the clean-tech promise. In the world's urgent push to decarbonise, we are often compelled to look the other way, ignoring where our "green" materials come from and who pays the price for their extraction.

The Contradictory Reality: What the Decarbonization Narrative Leaves Out

At first glance, lithium is integral to decarbonization. From Tesla's gigafactories to vast arrays of grid-scale batteries, lithium paves the way to hope, or so the story goes. Yet recent studies and growing investigative journalism reveal troubling contradictions. Lithium mining depletes fragile water systems, sometimes consuming 2 million litres per metric ton extracted. Such ruthless extraction has devastating impacts on landscapes and threatens the subsistence of already vulnerable Indigenous and rural communities. The process generates toxic waste, leaches hazardous chemicals, increases carbon emissions, and irreversibly alters local climates. These impacts remain notably absent from most official climate accounting, lost in the shine of clean energy narratives.

In major production zones across South America and Africa, lithium and cobalt extraction have been tied to human rights violations, Indigenous dispossession, unsafe labour conditions, and social unrest.

The Jujuy province of northern Argentina offers a striking example. Lying within South America's so-called "lithium triangle," which holds an estimated 85 per cent of global reserves, Jujuy is home to 11 Indigenous groups who rely on small-scale agriculture and llama herding for food, textiles, and craft. Since 2010, large international companies have pumped billions of litres of brine from beneath the desert into vast evaporation pools. Roughly 800,000 litres of brine are needed to produce a single tonne of lithium. This level of water extraction has already reduced surface-water flows and threatened the communities' inherent rights to land, culture, and livelihood. Such local realities expose the human cost hidden behind glossy narratives of "clean" technology.

These social costs, much like the environmental consequences, are often overlooked in the pursuit of green technological dominance. The "end justifies the means" mentality of climate urgency has inequitably affected the Global South and predominantly vulnerable communities. This dynamic exemplifies what many scholars call "green colonialism", wherein industrialised economies of the Global North, eager to meet their climate pledges, turn to resource-rich nations in the Global South to fuel their transition. The burdens of mining are externalised to

poorer regions, while the benefits of green technologies flow disproportionately to wealthier ones. It is a familiar story, one that echoes the exploitative history of fossil fuel extraction, only now cloaked in the language of sustainability.

Electric Vehicles: A Poster Child with Dirty Shoes

EVs have been crowned the heroes of climate policy driven by Lithium batteries, the poster child of decarbonised mobility. The global demand for lithium, also known as white gold, is predicted to increase by over 40 times by 2040, driven predominantly by the shift to electric vehicles. Yet, this framing grossly oversimplifies the true systemic footprint of electrified transport. EV battery manufacturing emits 60–70% more carbon upfront than making a petrol vehicle, or the so-called "carbon debt". Most EVs only "break even" after about 2–4 years, when lifetime emissions finally dip below those of similar petrol cars. This is because lithium and cobalt require more energy to produce, lengthening their payback times. The mining itself, with its carbon legacy in regions with weak environmental regulation and high social costs, results in polluted water, lost biodiversity, and health crises for local communities. Addressing these environmental concerns, the European Union's Green Claims Directive has questioned the green aspects of EVs by ensuring that automakers provide full lifecycle evidence, including mining, shipping, and end-of-life impacts.

The current EV boom is not just about meeting climate mandates; it is also about industrial competitiveness and the geopolitics of supply chains. The US's affinity for private cars in its rambling cities and expansive suburbs, where driving to work, school, or shop is the sole option, makes the transition to EVs of paramount significance. Despite certain anti-climate change policies under the Trump administration, the US is powering to decarbonise the transport sector by 2050. Not only the US, but governments across the world are pouring billions into EV subsidies, while automakers race to secure lithium contracts to maintain market dominance. Yet these investments raise a fundamental question: are we genuinely transforming mobility, or are we merely electrifying the status quo? The predominance of 'car culture' in high-income countries such as the US has further significantly decreased their budget for extending the public transport network, and often understates the role it plays in decarbonising the transport sector.

Private car ownership, even when powered by electricity, still generates congestion, road degradation, and high material consumption. Replacing one billion internal combustion engine cars with one billion electric ones is not inherently sustainable; it simply swaps one set of problems for another. Meanwhile, public transport systems, cycling infrastructure, and shared mobility options remain underfunded and politically neglected. However, the imbalance is striking. In many countries, governments subsidise the purchase of brand-new EVs, often affordable only to wealthier households, while underinvesting in the buses and trains that serve the majority. This raises concerns about climate justice: who benefits from the transition, and who is left behind?

Moreover, alternatives to lithium-heavy EVs, such as hydrogen fuel cells or advanced battery recycling, remain underexplored. Without diversification and critical scrutiny, we risk locking ourselves into a pathway that is neither just nor

sustainable. Technological constraints do exist, but one must ask: Is the dominance of EVs a result of genuine efficiency or the product of strong lobbying by automotive and mining industries eager to preserve their markets? The fact that electric vehicles require large, repeated inputs of lithium means any delay in battery innovation keeps the market tethered to a few key suppliers. This technological bottleneck hands disproportionate leverage to countries that dominate lithium mining and processing, turning a scientific limitation into a geopolitical one.

Global Inequality and Neocolonial Greenwashing

The scramble for lithium is also reshaping geopolitics. With China currently holding a near-monopoly in the lithium supply chain, from mining to refining to battery production, other nations are scrambling to secure their supplies. This has elevated lithium to the status of a strategic mineral, much like oil in the 20th century. Trade tensions, resource nationalism, and new forms of dependency are emerging.

This dynamic raises uncomfortable parallels. Just as fossil fuel geopolitics exposed countries to volatile prices and political leverage, the lithium economy risks creating similar vulnerabilities. Resource-rich countries could find themselves trapped in extractive relationships, while resource-poor countries may struggle to compete in the clean tech race. In both cases, the rhetoric of green transition obscures the power struggles beneath. The green transition, led by industrialised nations, increasingly resembles a greenwashed form of neo-extractivism. The Global South provides the raw materials, often at tremendous social and ecological cost, while the Global North reaps the rewards of new technology and economic leverage. China's near-monopoly on critical minerals turns lithium into a new axis of geopolitical power, further complicating clean energy ethics and global justice.

Toward a Just and Sustainable Transition

The inconvenient truth is that lithium is not inherently green; its sustainability depends on how and where it is extracted, who controls the profits, and whose lives are disrupted in the name of "climate progress." The green transition cannot replicate the injustices and ecological destruction of the fossil fuel era. To change course, transparent governance and global accountability, grounded in the rights and participation of affected communities, must become central pillars of the transition.

With the demand for lithium batteries surging across the world to rapidly electrify transport and store renewable energy, investments in heavy recycling, circular economy practices, and alternative chemistries can dramatically reduce both environmental and social harms. In some countries, including Australia, newer battery technologies are being explored to power the country's residential and commercial ventures, without the use of lithium. Sodium is a greener replacement of lithium as it consumes over 682 times less water for extraction and easier to recycle than lithium-ion batteries. Similarly, Vanadium offers a more immediate and scalable alternative to lithium.

In addition to research and development in exploring greener battery chemistries, policies must prioritise affordable, accessible public transport, active mobility, and

community-driven solutions, not merely a swap from tailpipes to plugs. Corporate greenwashing must end, with environmental claims backed by full-lifecycle data rather than clever marketing. Most importantly, the voices of frontline communities, particularly Indigenous groups, must guide decisions affecting their lands and waters.

At the individual level, we must adopt the practice of conscious consumerism, where our purchasing decisions are mindful of the social, environmental and ethical impact of a product's production, life cycle and disposal. Every smartphone or laptop contains a fraction of a lithium-ion battery, and producing a single phone battery can require the clearing of several square metres of land and thousands of litres of water when mining and refining are included. These numbers are a reminder that our personal electronics and transport decisions carry hidden footprints. Consumers can help cut that toll by keeping devices longer, repairing rather than replacing, recycling old electronics, and supporting companies with strong end-of-life take-back programs. Such everyday actions cannot replace systemic reform, but they make the costs visible and give individuals a tangible role in reducing demand.

Lithium's "green" lustre should no longer blind us to the social and ecological shadows at its source. Confronting these contradictions is essential if we are to achieve a climate transition that is not only greener but truly just, equitable, and sustainable for all. Only then can we craft a future that is not just greener, but fairer for everyone.

Alternative proteins: a strategic pathway for Australia's food security

Australia's food systems are already being reshaped by climate change. Farmers are facing droughts that dry out once-productive land, floods that devastate crops, and heatwaves that stress both animals and workers. These events are no longer occasional disruptions - they are becoming the norm (Xu et al., 2023). The CSIRO warns that if left unaddressed, climate change could cut the profitability of major agricultural sectors by up to 50% in some regions by 2050 (CSIRO, 2024). For a nation that has long prided itself on being a global food supplier, this is an alarming trajectory.

At the same time, livestock production - currently the backbone of Australia's agricultural output - poses its own challenges. It is one of our largest sources of agricultural emissions, while also consuming immense amounts of water and land. This leaves us caught in a double bind: the sector most vulnerable to climate impacts is also one of the biggest contributors to the crisis. Business as usual is simply not an option.

The Climate Imperative

According to researchers, it will be impossible to meet the Paris Agreement's goal of limiting global warming to 1.5°C without transforming food systems (Chester, 2023). That means agriculture cannot remain a blind spot in climate policy. If we continue to rely on livestock-heavy models, Australia will struggle to meet its own emissions reduction commitments while also exposing its food supply to growing instability. Alternative proteins are not a silver bullet, but they represent one of the most pragmatic levers we have to reduce emissions while strengthening resilience.

A $3.1 Billion Opportunity

Far from being a fringe idea, alternative proteins are emerging as a major growth sector. The Australian Farm Institute estimates that they could unlock $3.1 billion in growth for our agricultural industry, while Food Frontier projects that plant-based meats alone could generate nearly AU$3 billion in sales and create 6,000 full-time jobs by 2030 (Food Frontier, 2021). These figures highlight that this transition is not about sacrificing prosperity but about diversifying it. It is about creating new industries alongside existing ones - industries that are better aligned with the realities of a warming climate.

Trade Benefits and Regional Growth

Beyond strengthening domestic food security, alternative proteins also present a significant trade opportunity. Ten major Asian countries - including China, India, Indonesia, Japan, and South Korea - are projected to require at least 85% of their protein to come from non-animal sources by 2060 (Chester, 2023). These markets

are already signalling demand for sustainable, traceable ingredients that align with Australia's production strengths (Mridul, 2025). If we act now, we can secure a leading position in supplying these rapidly growing markets.

However, the risk of inaction is a real concern. Without a coordinated national plan, Australia risks ceding its future market share in plant protein manufacturing to competitors with stronger policies and clearer investment pathways. Countries like Canada have already made significant headway with targeted strategies to position themselves as global suppliers of plant-based protein ingredients. Australia has the crops, capability, and credibility to do the same - but only if we match potential with political will.

Food Frontier's 2025 research highlights that with coordinated leadership, strategic investment, and whole-of-government planning, Australia could transform its protein-rich crops into high-value ingredients. This would not only drive resilient regional growth but also secure a differentiated global position in the fast-emerging wave of protein diversification (Food Frontier, 2025).

Climate Adaptation and Food Security

Alternative proteins also help insulate us against climate volatility. Unlike traditional livestock, which requires years of land, feed, and water to produce, alternative proteins are less resource-intensive and more adaptable to fluctuating conditions. For example, plant-based proteins can be produced with significantly less land and water, reducing exposure to droughts and other climate-driven shocks. Cultivated and fermentation-based proteins, while newer technologies, also hold promise for reducing reliance on fragile supply chains that can be disrupted by extreme weather or geopolitical tensions.

This adaptability is crucial for food security. As climate change disrupts harvests and increases competition for resources, having a diverse set of protein sources will help Australia ensure a stable and reliable food supply. For consumers, this means greater security at the checkout. For farmers, it means new markets and reduced exposure to climate risks.

Supporting Farmers, Not Replacing Them

Some critics argue that promoting alternative proteins threatens the livelihoods of farmers. I see it differently. This transition should not be about replacing farmers - it should be about supporting them to adapt and innovate. Australian agriculture has a long history of resilience and reinvention. From developing water-efficient irrigation systems to pioneering wheat varieties suited to tough conditions, our farmers have always found ways to thrive in adversity. Alternative proteins represent the next chapter in this story.

Farmers could play a leading role in this emerging industry - growing the crops needed for plant-based proteins, supplying inputs for fermentation technologies, and diversifying production systems to reduce risk. Australia's strengths lie in the convergence of several necessary conditions required to accelerate change: world-class R&D capacity, strong investment appetite, favourable market opportunities, and the raw materials needed to scale (Eassom, 2024). With the right policy signals,

farmers could be at the heart of this transformation, rather than left on the sidelines.

A Strategic Imperative

The choice before us is clear. If we cling to the status quo, we risk investing in production models that will become increasingly unsustainable and unprofitable under climate pressure. But if we embrace alternative proteins, we can create a food system that is more resilient, more competitive, and more aligned with the realities of a warming world.

This is not just a consumer trend or a question of dietary preference. It is a strategic imperative. By investing in alternative proteins now - through research, incentives, and supportive policy frameworks - we can future-proof Australian agriculture, safeguard food security, and open new economic frontiers.

Feeding the Future

Australia has always been a nation of agricultural innovators. We have the science, the land, and the expertise to lead this transition. What is needed now is coordinated leadership and a collective vision to make alternative proteins a central part of our food security and climate strategy.

Shifting towards alternative proteins isn't just an option - it is one of the most pragmatic, evidence-based steps we can take to feed the future. For the sake of our farmers, our economy, and our planet, it's time for Australia to seize the opportunity.

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The climate clock is ticking: why governments and communities must act now

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Introduction

There is a continuous increase in global warming and it is defined as the "average temperature of Earth's climate system". The steady increase in greenhouse gas production has led to the average temperature at the highest record to date (Mathew, 2022). The United Nations has also stated that global warming is increasing since the Industrial Revolution and burning fossil fuels (Letcher, 2021).

Government parties and policy makers from across the globe have tried to implement strategies to combat the rise of global warming, however it is still increasing at a substantial rate (Stavins, 1997). This opinion will discuss how detrimental global warming really and will be addressed to both government parties as well as local communities and individuals. It will seek to advocate for further actions to be put into place and to challenge what government parties are currently doing now.

The Alarming State of Our Climate

2024 was considered the hottest year yet and global temperatures reached a maximum point of 2.30 degrees Fahrenheit (1.28 degrees Celsius) which is way higher than the record set in 2023 (Bardan, 2025). Previous records include the 20th-century average of 57.0°F (13.9°C) and the 1850–1900 baseline of 56.7°F (13.7°C) (Lindsey & Dahlman, 2025) This massive increase is only going to be detrimental to agriculture, environment, biodiversity and human population.

The number of fires is only growing as time goes on. When temperatures keep rising so do the amount of marine heatwaves which affects the marine wildlife and plants. Australia is a country that is known for being extremely susceptible to fires which range from low to high. When there are high winds, the fires will grow and become worse. These warmer climates also dry out grass and leaf litter which just generates more fuel to increase the abundance of fires. There has been a massive prevalence across the country but especially in the south and will only continue (Sims & Canadell, 2024).

Climate Tipping Points And Impact of Climate Change

Global warming also increases climate tipping points too which is becoming a massive worry because they are known for correlating to irreversible change that a society or community finds difficult to adjust to. Tipping points are defined as "thresholds at which abrupt and/or irreversible qualitative changes in parts of the climate system are triggered by self-perpetuating feedback" (Armstrong McKay et al., 2022; Lenton et al., 2008, 2019; Abrams et al., 2023). The detrimental impacts of climate tipping points are extremely severe. These include an increase in melting of ice sheets and a rise in global warming (Abrams et al., 2023).

For example in Australia, The Great Barrier Reef has been extremely threatened by the effects of climate change. It is known as one of the most richest and diverse ecosystems in the world. However due to the rise in global warming, the reef is suffering and coral reef species are vulnerable. Not only that, but climate change can also bring about natural disasters like cyclones or storms, which again damages a coral reef's structure and development. Other marine wildlife would have no choice but to leave their homes in order to protect themselves and they could die as a result (Great Barrier Reef Foundation, 2025).

The more time the government takes to implement strategies that may not be effective, the faster climate change grows and becomes more detrimental to the planet and human population. If nothing is done now, it will be too late.

Government Efforts Are Falling Short

There have been many strategies put into place to try and combat the rise in climate change including the Paris Agreement whose sole purpose was to decrease the level of greenhouse gas emissions. However, it is said that countries including Australia are not doing enough or what is needed to stop global warming (Maizland & Fong, 2025).

In fact, the Federal Government in Australia has put forward over $54 billion towards the fossil fuel industry. This is five times the amount they had put towards housing the $10 billion Housing Australia Future Fund (Barnott-Clement, 2024). In 2024-2025, there was a total of $14.5 billion worth of tax and funds to help with fossil fuel production and a 3% increase on 2023–24. There has been a $2 billion dollar increase to a record approximate of $67 billion which is 14.2 times larger than the nation's billion dollar disaster fund (Grudnoff & Campbell, 2025). This highlights the continued emphasis on fossil fuels over climate adaptation and conservation.

The Australian Government has introduced a number of policies aimed at addressing climate change, including the Powering Australia plan, the Net Zero 2050 strategy, and regulatory frameworks like the Safeguard Mechanism and the Renewable Energy Target. These programs are designed to reduce emissions through measures such as upgrading the electricity grid, lowering the price of electric vehicles, carbon farming and more (Australian Government, 2025).

However, is this really enough? Even though these strategies are implemented, climate change just keeps getting worse. Diverse habitats such as the Great Barrier Reef are just continuing to suffer the consequences of poor decision making when it comes to how to deal with climate change. The human population is suffering.

Empowering Communities and Individuals

Even though government policy and actions make a huge difference, local communities and the youth have power and can do something to help. We can advocate and talk about the effects of climate change and spread the word so more people know how serious global warming is.

Right now more than ever, young people are actively taking a stand and vocalising their thoughts and opinions on the climate crisis. They are demanding for more effective and stronger political decision making from the government and parties

in power. Over the years, many schools across over 150 countries in the world have taken part in strikes, demanding change in climate policy making. They are much more powerful as they advocate for the rights of everyone including Indigenous people, who are often excluded from decision-making (Tapping into the Power of Young People for Climate Action | United Nations Development Programme, n.d.).

Furthermore, the opinions of the youth are extremely valid and reasonable, they are also living the world that we are in. They are the generation that will face the most consequence from the rise of climate change and global warming. So therefore, they deserve to have their voices heard through involving them in decision making (Tapping into the Power of Young People for Climate Action | United Nations Development Programme, n.d.).

It does not just stop there though, as education is so fundamentally important. Go to schools and discuss the impacts of climate change on the environment and engage in activities with students. This can allow them to understand and gain knowledge of climate change and can hopefully inspire them to even just small actions such as recycling to help stop the spread of climate change. Also, policy makers should open up workshops or run events where people can learn about climate change from experts in the field.

Collective action at the community level sends a powerful message to policymakers: we are ready for change and we demand it now.

Conclusion: A Call to Action

We are no longer at a point that we can just sit on the sidelines and watch our planet go down. Climate change is real whether we like it or not and global warming is just increasing and increasing. Even though governments are putting into place strategies, it is not at all enough. We need to act now.

However, there is strength and power from the youth and local communities. We have the potential to do great things. Now is the time to act. We can make a meaningful difference and change. We can work together. Let's do something before it's too late.

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Transforming education through climate awareness: how severe weather and climate change shape teaching, learning and wellbeing in Australia

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In today's climate (pun not intended), education has quietly shifted from a guaranteed right to something that increasingly depends on environmental stability, economic conditions, and access to safe school infrastructure. Extreme heat, smoke haze, heavy rainfall, unexpected cold snaps, and sudden floods now disrupt school routines with a frequency we would have considered unthinkable just a decade ago. At the same time, digital overload, cost-of-living pressures, student disengagement, and systemic funding inequalities deepen the challenges faced by teachers and young people.

We often discuss climate change as an environmental or political issue: melting ice caps, rising emissions, endangered species, and global agreements. Yet what is often overlooked is the immediate, tangible impact climate conditions already have on teaching and learning. The climate crisis is shaping schooling in real time. It is determining who can concentrate in class, who feels physically safe, who can access extracurricular activities, and who is being left behind.

For today's students, climate change is not an abstract future threat. It is the lived reality of trying to learn in classrooms not built for this world.

A Fragile Learning Environment

Managing the Heat

Australian classroom – many built decades ago – were never designed for the extreme temperatures we now experience. When classrooms reach unsafe heat levels, students face headaches, dizziness, irritability, fatigue, dehydration, and reduced cognitive function. Teachers struggle too, trying to maintain behaviour, clarity, and lesson quality in environments that work against concentration.

Schools with reliable air conditioning can protect students, but even this creates new challenges: higher energy consumption, reliance on outdated fossil-fuel-based grids, and sharp increases in electricity costs. Schools without proper cooling face far worse; windows, dusty fans, and darkened rooms simply cannot counter consecutive days above 35 degrees.

One widely publicised example occurred at Albert Park College in Melbourne, where students were sent home because classrooms became dangerously hot. The school avoided air conditioning to honour its eco-friendly policy, relying instead on passive cooling methods. But these systems were not built for modern heatwaves. Parents questioned why learning time should be cut short and

whether sustainability policies were being placed above student health. One parent rightly asked whether government offices would be expected to operate without cooling on a 38°C day. This incident wasn't simply a "policy clash" revealing the growing tension between environmental ideals and the realities of Australian weather. Sustainability is essential, but it must not compromise safety.

Where Sustainability Works

By comparison, several Western Sydney schools involved in the Cooler Classrooms Program were retrofitted with energy-efficient AC systems powered by solar panels and improved insulation. Early assessments found:

- reduced heat stress,
- improved student concentration,
- fewer early pick-ups due to heat headaches,
- lower electricity bills,
- and overall reduced emissions.

This shows that when governments prioritise students' needs, sustainable climate control is possible and effective.

Hydration Station

Heatwaves significantly increase student demand for water. Long lines at bubblers delay transitions, taps are accidentally left running, and ageing plumbing systems strain under increased pressure. In drought-affected areas, this creates a visible tension: students need more water for safety, yet communities are trying to conserve it.

A practical response came from Queensland, where several regional schools trialled timed refill stations and auto-stop taps during the 2020 heatwaves. These reduced water wastage by up to 30% while still supporting adequate hydration. These interventions show that with thoughtful design, schools can protect students and the environment simultaneously.

There's a Stench in the Air

Hygiene isn't usually part of climate conversations, until classrooms become hot and humid. Aerosol deodorant bans protect students with asthma, but without alternatives, many adolescents feel embarrassed, self-conscious, and distracted. In poorly ventilated rooms, odours linger and contribute to headaches, nausea, or sensory overload. These seemingly "small issues" can undermine focus and participation.

Victorian secondary schools trialled fragrance-free roll-on deodorant dispensers in PE change rooms. This solution reduced odour-related discomfort while safeguarding respiratory health. It's a simple, low-cost change that acknowledges real student needs in a warming climate.

Technology, Teaching, and the Post-COVID Classroom

The pandemic permanently reshaped Australian education. Laptops, tablets, digital platforms, and online submissions are now core parts of learning. While

these tools expand accessibility and improve continuity, especially during extreme weather, they also create new pressures:

- Increased screen exposure
- Eye strain and headaches
- Higher electricity usage
- Growth of e-waste
- Fatigue and reduced motivation

Some Sydney schools now implement a digital-light day to rebalance screen time. Others encourage eco-friendly stationery brands such as Spirax, Olympic Eco, and Studymate, which reduce waste and help schools meet sustainability goals.

Importantly, with proper funding, all students could access devices equitably allowing teachers to manage screen use intentionally, rather than rely on technology out of necessity.

Declining Wellbeing in a Warming World

Student wellbeing has been declining nationwide due to academic pressure, digital overload, and social stress. Climate change adds a new layer: extreme weather frequently cancels outdoor activities that promote physical health and emotional stability. When sport, PE, carnivals, and play are repeatedly postponed due to heatwaves, poor air quality, or flooding, routines break down and so do healthy habits.

Multicultural Impacts

In a multicultural country like Australia, temperature adaptation varies:

- Students from cooler European countries often struggle more during summer heatwaves.
- Students from tropical or subtropical countries adapt better to heat but struggle more in sudden cold snaps.
- New migrant students may find Australian weather unpredictable and overwhelming.

These differences affect mood, concentration, behaviour, and engagement. Yet few wellbeing policies address them.

Climate change doesn't only alter the environment; it reshapes how young people experience their school day, their bodies, and their sense of self.

The Climate Divide: Inequality in Education

Climate change deepens socio-economic inequality in ways that directly affect learning.

Food Security and Nutrition

Heatwaves, floods, and drought disrupt agricultural production, raising the price of fresh produce. Families struggling with rising living costs turn to cheaper, processed foods, leaving students under-fuelled, tired, and unable to concentrate. Schools with agriculture programs have reported improved wellbeing, nutrition,

and engagement among students who participate in growing and eating fresh produce.

Energy Poverty

Many households cannot afford heating in winter or cooling in summer. Students attempt homework:

- while shivering in cold rooms,
- sweating through heatwaves,
- sharing a single fan among siblings, or
- trying to sleep in unsafe temperatures.

Comfort becomes a privilege. Learning becomes unequal.

Funding Inequity

The rise in private school enrolments means public schools receive comparatively less funding. Yet private schools charge high fees and are not government-run, raising questions about why public money is directed toward institutions already funded by families. Public schools often lack:

- proper cooling,
- updated ventilation,
- modern facilities,
- water-efficient systems,
- safe indoor recreation spaces for hot-weather days.

Redirecting public funding into public schools would better support the majority of children, particularly during climate stress.

From Schools to Systems: What Needs to Change

Schools cannot adapt to climate change alone. Systemic solutions are essential.

1. Government Funding Priorities Must Shift

Recent proposals to invest public funds into coal and gas industries contradict Australia's climate commitments and fail to address rising energy costs. These funds would be far more impactful if redirected to:

- school microgrids and renewable energy,
- upgraded cooling and ventilation,
- climate-safe building materials,
- sustainable water systems,
- community gardens and agriculture programs,
- eco-conscious school resources and recycled materials.

We cannot ask schools to prepare students for a climate-impacted future while simultaneously investing in sectors accelerating the crisis.

2. Climate-Responsive Attendance and Learning Policies Work-From-Home (Remote Learning) Climate Days

With extreme weather becoming more common, education departments should introduce statewide protocols for when learning from home is not just convenient — but necessary. Remote-learning climate days should activate when:

- temperatures exceed a set safe threshold,
- heavy rainfall makes travel unsafe,
- bushfire smoke reduces air quality,
- flooding prevents attendance.

Students with limited resources can still attend school for supervised study. Attendance could be validated by work submission rather than physical presence. If several extreme-weather days occur in a single week, a designated day prevents disruption while preserving learning quality. This approach aligns with national discussions about a four-day school week, allowing gradual transitions without compromising curriculum.

3. Future-Proofing School Infrastructure

Microgrid trials in Western Sydney have proven that schools can remain cool, safe, and operational during heatwaves while drastically lowering energy bills. States and territories should scale these initiatives systemwide, ensuring every public school has:

- solar power and battery storage,
- efficient cooling systems,
- quality insulation,
- water-efficient stations,
- clean air filtration during smoke events,
- indoor activity spaces for heatwave days.

Climate resilience should not depend on a school's postcode.

Protecting Students Today, Not Just Tomorrow

When young people march for climate action, they are often framed as fighting for "the future." But climate change is already shaping:

- school hours,
- lesson quality,
- physical health,
- mental wellbeing,
- attendance,
- nutrition,
- access to safe learning environments.

If Australia wants a generation capable of leading in sustainability, innovation, and community resilience, we must protect their wellbeing now. That means equipping schools with the infrastructure, funding, and policies needed to weather the storms — literal and metaphorical — that students face daily.

When the weather becomes the biggest barrier to learning, the climate crisis becomes an education crisis. And what's truly at stake is not just academic achievement, but the health, dignity, and future of every young person in Australia.

Not in my backyard: the fear and stigma around renewable energy in Australia

This chapter can be referenced as "Saiprasad, N. (2026). Not in my backyard: the fear and stigma around renewable energy in Australia. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

Introduction: A Nation at the crossroads

Australia stands at a critical juncture in its energy future. With abundant sunshine, wind, and space, the country is uniquely positioned to lead the world in renewable energy adoption. Yet, paradoxically, many renewable energy projects across the country face intense local opposition. From solar farms halted by community backlash to transmission lines delayed by legal battles, there is a growing disconnect between national climate ambitions and local community acceptance.

This phenomenon, commonly referred to as "Not In My Backyard" (NIMBY), is often dismissed as irrational or selfish. However, such a view oversimplifies what is, in fact, a deeply human response to change. This piece explores the stigma around renewable energy projects in Australia, contextualising it within a long history of societal resistance to new technologies. It argues that just as we have adapted to past technological disruptions, we can and must adapt to the energy systems of the future.

The Legacy of Resistance: Technology and Human Fear

Throughout history, every major technological shift has been met with scepticism, concern, and, at times, outright fear. In the 19th century, trains were feared to cause health issues from excessive speed. When electricity was introduced, there were public campaigns about its dangers. Even the telephone, now an indispensable tool, was once seen as an invasive threat to privacy and tradition.

These reactions were not unfounded in their time. New technologies often disrupted existing ways of life, threatened jobs, or changed landscapes. But over time, society learned to adapt, accept, and eventually embrace them. The current wave of renewable energy infrastructure- wind turbines, solar arrays, transmission corridors, battery storage facilities, and emerging technologies like bioenergy plants, wave energy converters, and geothermal heating systems is no different. It challenges the status quo. It reshapes rural and regional communities, at many places it did. And, as with past transitions, it provokes a range of emotional, cultural, and practical concerns.

Understanding NIMBYism: Beyond the Stereotypes

NIMBYism "Not In My Backyard" is often portrayed as a knee-jerk or selfish reaction to development. However, this oversimplification overlooks the complex and legitimate concerns that motivate many community responses. Understanding these concerns is critical for planning and engagement strategies that are both respectful and effective. Common concerns include:

- Visual Impact: New infrastructure, such as wind turbines, solar farms, or industrial facilities, can alter the character of landscapes that communities have long valued. For residents, this visual change is not merely aesthetic, it can represent a loss of connection to local history, natural beauty, or the sense of place that defines their community.

- Noise and Health: Fear of noise pollution and potential health risks is a frequent driver of opposition. Modern wind turbines, for example, produce sound levels typically around 35-45 decibels at the nearest residence, roughly equivalent to a refrigerator humming or gentle ocean waves. Extensive research, including studies from Australia's National Health and Medical Research Council as well as peer-reviewed work in Europe and North America, consistently finds that turbine noise does not directly cause adverse health effects when projects adhere to established planning guidelines. Nonetheless, even perceived health risks can strongly influence community attitudes.

- Property Values: Communities often worry that nearby developments could lower property values, affecting long-term financial security. While empirical studies on this topic produce mixed results, the perception alone can generate significant resistance, particularly among homeowners with strong ties to their locality.

- Distrust in Developers or Government: Opposition can stem from a feeling of exclusion from decision-making. When communities perceive that developers or authorities prioritize profits or policy objectives over local voices, trust erodes. This can amplify skepticism toward the project and intensify NIMBY responses.

- Loss of Identity or Control: Beyond material concerns, many community members worry about the erosion of local culture or autonomy. Projects perceived as imposed from outside, especially large-scale infrastructure, can be seen as a threat to local traditions, landscapes, and ways of life.

The projects that have been affected by NIMBYism in Australia are:

1. Yass Valley & Upper Lachlan Wind Projects (NSW, Southern Tablelands)

- Community concerns: turbine noise, landscape "saturation," property value impacts.
- Current status: Expansions (e.g., Bango, Crookwell) slowed.
- Reason for halt/delay: Local council pushback and resident petitions blocking approvals.

2. HumeLink Transmission (NSW, Snowy Mountains to Wagga)

- Community concerns: land acquisition disputes, visual intrusion, property devaluation.
- Current status: Facing cost blowouts and timeline slippage.
- Reason for halt/delay: Landholder opposition and legal challenges delaying land access.

3. Western Renewables Link (VIC, Sydenham to Bulgana near Ararat)

- Community concerns: farmland loss, property rights, visual impact.

- Current status: Years of delay; still under review.
- Reason for halt/delay: Strong farmer protests and planning objections.

4. Golden Plains Wind Farm (VIC, near Geelong/Ballarat)

- Community concerns: noise, birdlife impacts, landscape changes.
- Current status: Stage 1 proceeding; Stage 2 scaled down.
- Reason for halt/delay: Opposition forced reduction in turbine numbers.

5. Moorabool Wind Farm (VIC, Ballan region)

- Community concerns: noise, health claims, visual amenity
- Current status: Built but smaller than originally proposed.
- Reason for halt/delay: Years of planning disputes led to turbine reduction.

6. Darling Downs Solar Projects (QLD, Toowoomba & Warwick)

- Community concerns: loss of agricultural land, glare, farming conflicts.
- Current status: Some projects redesigned; slower rollout.
- Reason for halt/delay: Objections from farmers led to redesigns and planning delays.

7. Borumba Pumped Hydro (QLD, near Gympie)

- Community concerns: environmental concerns, Traditional Owner opposition.
- Current status: Still moving forward but behind schedule.
- Reason for halt/delay: Delays in gaining community consent and environmental clearance.

8. Eyre Peninsula Transmission - EnergyConnect Extension (SA)

- Community concerns: compulsory land access, visual intrusion.
- Current status: Proceeding with route changes.
- Reason for halt/delay: Landholder resistance forced design modifications.

These concerns are not limited to any single demographic or geographic area as seen from the table above. They often reflect a broader unease with rapid technological and societal change, as well as a desire to protect what is familiar and valued. In some cases, misinformation, sensationalist media coverage, and social amplification can intensify fears, making it harder for communities to separate fact from fiction. Recognizing the legitimacy of these concerns, rather than dismissing them as mere obstructionism, is essential to fostering meaningful dialogue and achieving sustainable, community-supported outcomes.

The Role of Trust, Equity, and Participation

At the heart of NIMBY resistance is a breakdown of trust. Communities are more likely to oppose projects when they feel they are being imposed from above, rather than shaped from within. This is especially true in rural areas, where large-scale projects often arrive with little local input but considerable long-term impact.

To bridge this divide, renewable energy developers and policymakers must prioritise authentic engagement. This includes:

- Early Consultation: Involving communities at the concept stage, not after plans arefinalised.
- Transparent Communication: Sharing clear, honest information about impacts and benefits.
- Benefit-Sharing Models: Ensuring local communities gain from the projects through jobs, funding, or co-ownership.
- Respect for Local Knowledge and Culture: Collaborating with Indigenous communities and recognising place-based values.

If communities are empowered to shape renewable energy projects, they are more likely to support and champion them.

Australia's Diverse Renewable Energy Potential

While solar and wind often dominate the renewable energy conversation, Australia is home to a much broader suite of clean energy resources:

- Geothermal: Hot sedimentary aquifers across South Australia and Victoria offer long-term heating and power generation opportunities.
- Wave and Tidal Energy: The Southern Ocean and Bass Strait have significant wave energy potential, with pilot projects already underway.
- Bioenergy: Agricultural and forestry residues, as well as organic waste, can be converted to electricity, heat, or gas.
- Green Hydrogen: With excess renewable electricity, Australia can become a global exporter of hydrogen fuel.

Leveraging this diversity not only builds resilience but also spreads the infrastructure footprint, potentially reducing concentrated opposition.

Global Perspectives: Lessons from Abroad

Australia is not alone in facing NIMBY resistance. Countries around the world have experienced similar challenges and developed strategies to address them:

- Denmark: A global leader in wind energy, Denmark has increased community acceptance by offering co-ownership schemes for local residents. In many projects, locals can purchase shares, creating both financial and emotional investment in the turbines on their landscape. This model transformed resistance into pride and a sense of ownership.
- Germany: The Energiewende (energy transition) emphasised decentralisation and citizen participation. Community-owned cooperatives became a backbone of the movement, with ordinary citizens directly investing in wind and solar projects. This distributed ownership model gave Germans both energy independence and a personal stake in the transition.
- Scotland: Community benefit funds tied to wind farms ensure that a portion of project revenues is reinvested in local infrastructure, schools, and services. This approach reframed wind energy as not only an environmental solution but also an economic development tool for rural regions.
- Japan: After the Fukushima disaster, trust in nuclear energy collapsed. Many rural areas turned to community-led renewable initiatives, supported by government policy and financing schemes. By empowering towns and

villages to drive their own projects, Japan reduced resistance and fostered resilience in regions once wary of large-scale energy projects.

- United States: In states like Texas, land lease payments to farmers and ranchers hosting wind turbines have created strong local support, transforming renewables into an economic lifeline for rural communities. Meanwhile, community solar programs across several states allow households including renters to buy into shared solar farms, democratising access.
- Spain: Once plagued with resistance, Spain successfully revived its renewable rollout by prioritising local ownership models and regional autonomy in project development. This localisation of energy planning gave communities a greater voice and sense of control.
- New Zealand: Māori-led renewable energy projects, such as geothermal developments in the North Island, integrate cultural values, environmental stewardship, and local benefit-sharing. This co-governance approach strengthens both community trust and long-term sustainability.

These examples highlight a common theme: acceptance grows when people feel they have a stake in the outcome. Co-ownership, local reinvestment, and community-driven projects transform renewable infrastructure from an imposition into an opportunity.

Lessons from History: We Have Adapted Before

Looking back, Australia has weathered many transformative moments from electrification to the rise of the internet. Each wave brought disruption, but also opportunity. The fears people once had about electricity poles, microwave towers, and high-rise buildings have largely faded. What seemed alien became normal. What was feared became familiar.

The clean energy transition should be viewed in this same light. Wind farms and solar fields may feel disruptive today, but in time, they could become as unremarkable as the streetlight or mobile tower. Already, rooftop solar is common across Australian suburbs. What began as a fringe technology is now mainstream. By reframing the conversation from one of sacrifice to one of shared progress we can begin to see renewable energy as an evolution, not an imposition.

Reimagining the Backyard: Towards a Positive Vision

What if instead of saying "Not in my backyard," we began to proudly say, "Yes In My BackYard"?(YIMBY). Imagine communities where wind turbines carry the local footy team's colours. Where solar panels power community centres and schools. Where local kids visit energy farms on field trips. Where First Nations communities co-lead the design of renewable energy landscapes that respect culture and Country. Imagine regional towns with geothermal district heating, coastal villages generating tidal power, and farms producing bioenergy from crop residues. Imagine local governments helping communities build microgrids, allowing them to be energy independent during blackouts or climate events.

These aren't fantasies, they are possible outcomes when people are included in shaping the future. A backyard isn't just a space behind a home; it's a symbol of

identity, ownership, and belonging. If we make renewable energy a source of local pride and resilience, we change the story.

Conclusion: Building the Future, Together

Australia's clean energy future is about far more than technology; it is fundamentally about people, communities, and the choices we make together. History shows us that humans are remarkably adaptable when faced with change. Resistance often arises not from stubbornness, but from uncertainty, fear, and the desire to protect what we value most. By approaching this transition with empathy, transparency, and a genuine commitment to shared purpose, we can move past fear and foster meaningful collaboration.

We have seen this adaptability in action before whether in the adoption of new technologies, the reshaping of cities, or the expansion of energy networks. These experiences remind us that large-scale change is possible when communities are engaged as active participants rather than passive observers. The renewable energy revolution does not need to occur in distant, untouched regions; it can and should happen here, in our own backyards, while respecting the landscapes, cultures, and identities that define them.

To achieve this, we must embrace the full spectrum of renewable energy technologies, from wind and solar to emerging solutions like biogas and energy storage. We should learn from global experiences while tailoring solutions to local contexts. Crucially, we must value and integrate community voices at every stage of planning and development. Doing so ensures that the transition is not only environmentally sustainable but also socially just, inclusive, and resilient.

The path to a clean energy future is not a matter of if, but how. By working together with the government, developers, and communities alike we can create a future that is green, equitable, and enduring. The renewable revolution is not an abstract goal; it is a tangible opportunity to redefine how we live, work, and thrive in harmony with our environment. Together, we can make it a reality.

The ripple effect: how individual actions drive climate resilience

This chapter can be referenced as "Saiprasad, N. (2026). The ripple effect: how individual actions drive climate resilience. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

Introduction: The Paradox of Powerlessness

We live in a time of unprecedented awareness of environmental decline. Climate change dominates headlines, policy debates, and public consciousness, yet alongside this awareness sits a quiet paralysis. Many people feel overwhelmed by the scale of the crisis and unconvinced that their individual actions hold any real power. Climate change is framed as a global, systemic failure too large, too complex, too political for one person to influence.

This paradox of powerlessness remains a persistent challenge for climate resilience. When individuals disengage, believing their actions are insignificant, the cultural momentum required for systemic change begins to erode. Yet history tells a different story. Every major social transformation from public health reforms to civil rights movements has been shaped by individuals who acted before systems caught up.

Climate resilience is not solely the product of infrastructure, technology, or policy. It is also a cultural condition: a collective willingness to adapt, care, and persist. And culture, fundamentally, is built by people. This work explores the role of individual action in shaping climate resilience not as a substitute for systemic change, but as its foundation.

Through reflection and lived experience, individual actions create ripples that influence communities, institutions, and ultimately, systems. These actions matter not because they are perfect or measurable, but because they cultivate agency, normalise sustainable behaviour, and sustain hope in the face of uncertainty.

The Myth of Insignificance

One of the most persistent narratives in climate discourse is that individual action is negligible. People are told sometimes explicitly that recycling, reducing consumption, or choosing renewable energy is meaningless compared to industrial emissions or government policy failures. While it is true that large-scale change is essential, this framing creates a false dichotomy between individual and systemic responsibility.

Systems do not change in isolation. They respond to social pressure, market demand, and shifting cultural norms all of which are shaped by individuals. Consumer behaviour influences supply chains. Voting patterns influence political priorities. Workplace norms influence organisational practices. Individual actions, when repeated and visible, accumulate into signals that institutions cannot ignore.

The myth of insignificance also relies on a narrow definition of impact. It prioritises quantifiable outcomes over cultural influence. Yet some of the most powerful

forms of change are intangible: a shift in what is considered normal, acceptable, or desirable. When sustainable choices become everyday behaviour rather than exceptional effort, resilience begins to embed itself into society.

Rejecting the myth of insignificance is not about inflating the importance of personal lifestyle choices; it is about recognising their role in shaping collective direction. Individual actions are not endpoints, they are catalysts.

Climate Resilience as a Social and Psychological Capacity

Climate resilience is often framed in technical terms engineering solutions, risk mitigation strategies, adaptive infrastructure. While these are critical, resilience is equally social and psychological. It is the capacity of individuals and communities to respond creatively, support one another, and persist through disruption.

Individual actions contribute to this resilience by fostering agency. When people engage directly with sustainability, whether through conserving energy, growing food, or participating in local initiatives they develop confidence in their ability to respond to change. This sense of agency is essential in times of crisis.

Communities with strong social connections and shared environmental practices are more resilient because they are already practiced in cooperation. Climate action, at its most effective, builds relationships alongside solutions. It encourages participation rather than dependence.

Storytelling also plays a role. Personal narratives humanise climate change, making it relatable rather than abstract. They shift the conversation from fear to possibility. Through stories, individual actions become part of a shared identity- one that values care, adaptability, and collective responsibility.

The Ripple Effect in Practice

The ripple effect is rarely immediate or visible. One action influences another indirectly, often in ways the originator may never witness. A sustainable choice made today may shape decisions years later through networks of influence that are complex and indirect.

This uncertainty can be discouraging, but it is also liberating. It allows individuals to act without needing guaranteed outcomes. Climate action becomes an act of trust and a belief that intention, when sustained, will find its way forward.

Importantly, individual action does not require perfection. The pursuit of flawless sustainability often alienates more people than it inspires. What drives resilience is participation, not purity. When individuals allow themselves to act imperfectly but consistently, they create space for others to join.

The ripple grows not through moral authority, but through empathy. Through acknowledging limitations, sharing struggles, and continuing anyway. This is how climate action becomes inclusive and enduring.

Redefining Impact and Sustaining Engagement

If climate resilience is to endure, we must redefine what success looks like at the individual level. Impact is not always immediate or measurable. Sometimes it is

simply the decision to stay engaged to continue learning, questioning, and participating despite uncertainty. Sustained engagement matters more than dramatic gestures. Climate action is not a sprint toward solutions but a long-term commitment to care. Individual actions gain strength through repetition and persistence.

The ripple effect teaches patience. Not every action will yield visible results. Some influences unfold slowly, quietly shaping attitudes and opportunities. Trusting this process is itself an act of resilience.

Ultimately, individual actions do not compete with systemic change; they enable it. They create the cultural conditions necessary for bold decisions, collective courage, and shared responsibility. Climate resilience is not something we wait for, it is something we practice. Each action, no matter how small, affirms a belief in possibility. And in a time defined by environmental uncertainty, that belief may be one of our most renewable resources.

Countries and Individual Actions Driving Climate Resilience

The following examples from the countries reflect culturally observed patterns of individual behaviour that, over time, have supported broader climate resilience. While these examples are not presented as evidence-based case studies, they highlight how everyday actions can scale into collective norms.

Japan

- Everyday energy consciousness, such as switching off unused appliances and reducing water use, is culturally ingrained rather than policy-driven.
- Individuals practice shared responsibility during crises, reinforcing social cohesion and rapid collective response.
- Resource mindfulness at the household level strengthens national resilience during heatwaves and natural disasters.

Denmark

- Citizens routinely choose cycling over cars as a default mode of transport, driven by practicality and habit.
- Individual commuting choices reshaped public expectations of urban mobility.
- Infrastructure followed behaviour, not the reverse, embedding low-carbon transport into daily life.

New Zealand

- Strong personal and community connection to land and water encourages everyday environmental stewardship.
- Individuals participate in conservation, restoration, and protection activities as part of civic identity.
- Climate resilience is reinforced through cultural guardianship rather than compliance alone.

India

- Communities and individuals adapt creatively to climate stress through local water-sharing, farming practices, and informal support systems.
- Household-level resilience strategies often compensate for limited formal infrastructure.
- Collective survival is driven by cooperation and shared responsibility at the grassroots level.

Germany

- Widespread individual participation in household energy efficiency and renewable adoption reflects strong environmental norms.
- Citizens actively engage in local energy initiatives, reinforcing decentralised resilience.
- Climate action is socially expected, not exceptional.

Netherlands

- Individuals actively engage with water management culture, respecting flood awareness and preparedness as part of daily life.
- Personal responsibility for adaptation complements large-scale infrastructure.
- Resilience is lived as a shared societal duty, not solely an engineering challenge.

Costa Rica

- Individuals strongly support conservation and biodiversity protection as part of national identity.
- Everyday lifestyle choices reflect respect for ecosystems and long-term stewardship.
- Cultural pride in environmental protection strengthens adaptive capacity.

These examples demonstrate that climate resilience is not imposed from the top down. It emerges when individual actions align with shared values, creating cultures that are prepared to adapt long before policies demand it.

Final Reflection

The ripple begins with individuals but it does not end there. It moves outward, shaping communities, institutions, and futures we may never fully see. To act is to participate in that unfolding story. And participation, sustained over time, is how resilience is built.

Climate resilience is not an abstract ideal or a distant goal. It is a lived practice, shaped daily by the choices people make, the values they uphold, and the care they extend to one another and the environment. When individual actions align and accumulate, they form the social foundation upon which collective responses become possible.

By staying engaged imperfectly but persistently, individuals help normalise sustainability, strengthen community capacity, and sustain momentum for

broader change. In this way, climate resilience grows not only through systems and strategies, but through people choosing, again and again, to act.

Deforestation in Western Australia: a silent crisis hitting close to home

This chapter can be referenced as "Schmid, A. (2026). Deforestation in Western Australia: a silent crisis hitting close to home. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

Living in Western Australia, I quickly became aware of the awe-inspiring beauty of our native forests. The towering Jarrah, Karri, and Marri trees are among the most majestic hardwoods in the world. As someone with a natural appreciation for wood, I've always admired their strength and presence. But with that admiration comes a deep concern for what remains of these irreplaceable ecosystems, especially in the face of relentless deforestation in the South West.

In Western Australia we are undeniably beholden to the mining giants. These corporations contribute significantly to both the State and National economies, helping fund essential community programs and infrastructure. Mining, in this regard, is politically attractive, offering immediate financial return.

On the other hand, climate activism, often represented by figures like Greta Thunberg, has begun to lose traction in a world grappling with post-COVID fatigue and economic stress. In such a climate, environmental protection is too often seen as a luxury rather than a necessity. Conservationists are commonly perceived as "greenies" who can afford to drive Teslas.

But the truth is that deforestation is not a distant or abstract problem. Its impacts are felt in our everyday lives, even if we don't always see the trees fall.

Firstly, deforestation severely disrupts the water cycle. Trees draw water from the ground and release it into the atmosphere through a process known as transpiration. This moisture contributes to cloud formation and helps regulate local and regional rainfall patterns. When forests are removed, whether for agriculture, logging, or development, this natural process is disrupted. Without the presence of trees, the land becomes drier, and the frequency and intensity of rainfall can change dramatically. Droughts and late frosts are relatively frequent events and can significantly affect growth.

This shift in the water cycle has a direct and often devastating impact on agriculture. Crops depend on consistent rainfall and healthy soil, both of which are compromised when forests are cleared. Over time, this leads to reduced agricultural yields, crop failures, and soil degradation. In regions that rely heavily on farming, the consequences are immediate: food becomes scarcer, and prices rise. For many families, especially those already under financial pressure, this means fewer fresh fruits and vegetables on the table and greater reliance on processed, less nutritious alternatives.

The ripple effects go beyond food. Water shortages caused by deforestation can also affect drinking water supplies, increase the risk of wildfires, and contribute to long-term climate instability. While deforestation may offer short-term economic gain, its long-term costs, both environmental and social, are steep. Ultimately, the

destruction of forests has real, measurable consequences for ordinary people, especially those already vulnerable to rising living costs.

Then there is the critical issue of air quality and community health. Trees act as nature's air filters, absorbing pollutants, trapping dust particles, and removing carbon dioxide from the atmosphere while releasing life-sustaining oxygen. This ecosystem service is especially important in urban and suburban areas, where pollution levels can be high and green space is limited. By reducing tree canopies, not only is the oxygen output reduced, but large amounts of stored carbon is released back into the atmosphere, accelerating climate change and further degrading air quality.

This has very real consequences for human health. Poor air quality is linked to a rise in respiratory conditions such as asthma, bronchitis, and other lung-related illnesses. Vulnerable groups, including children, the elderly, and those with pre-existing health issues, are especially at risk. In many communities, particularly those near deforested or heavily developed areas, residents may find themselves dealing with increased hospital visits, medication costs, and overall poorer quality of life.

Whilst discussing health, we cannot ignore the psychological impact that forests have on the mental health of the community. The results of a vast amount of research show that forest visits promote both physical and mental health by reducing stress. There is a growing interest in the health benefits associated with people undertaking outdoor activities in a natural environment. Forests and other natural environments are recognized as fundamental health resources and may play a role in disease prevention.

Various studies have been conducted to examine the effect of forest environments on health promotion and well-being. Several recent environmental studies have claimed that a number of medical symptoms related to lifestyle stress can be treated by encouraging individuals to interact with nature. Furthermore, one study revealed an association between positive health outcomes and the amount of exposure someone has to a green environment.[1]

Moreover, research supports potential benefits in the management of psychological symptoms including anxiety, depression, lifestyle-related stress and overall quality of life. Studies investigating the effect of forest therapy on physiological well-being have also demonstrated a positive impact on cognitive function, immune function, blood glucose levels, cardiovascular disease, and cancer. Other studies conducted with surgical patients suggest that exposure to a green environment is associated with the recovery of illness and even decreased mortality.

Beyond individual health, there are broader social and economic costs. Healthcare systems may become more strained, and productivity can decline when workers are frequently unwell. While environmental degradation is often discussed in abstract terms, its impact on air quality brings the crisis quite literally into our lungs. Protecting forests isn't just about conserving biodiversity, it's about

safeguarding the health and well-being of our communities now and for generations to come.

In addition, there is the cooling benefit of trees in relation to canopy shading. Urban forests can significantly reduce heat flux (the rate of heat energy transfer per unit area through a surface), thereby cooling areas. By intercepting radiation from the sun, a tree canopy reduces the storage and convection of surface heat, directly reducing surface temperatures, and absorbing radiation from the surrounding area to regulate the urban thermal environment. Canopy transpiration reduces the air temperature and increases the ambient humidity under and around the trees.

In Western Australia, deforestation is a particularly urgent issue. For decades, the South West forests have been cleared, first for timber, now increasingly for mining. Alcoa's current proposal to expand bauxite mining in the region is a stark example. The plan would see even more of the region's ancient jarrah forests cleared; ecosystems that have evolved over millennia and cannot simply be restored through replanting or rehabilitation efforts. Add to this the fact that West Australia is the largest lithium mining area in the world! Demands for this commodity will only increase in the foreseeable future. All this, sadly, promises more destruction of ancient forest, with no true way to replace what will be lost. These forests are not just carbon sinks or wildlife habitats; they are intricately linked to the local water cycle, soil stability, and biodiversity.

Some argue that reforestation programs will offset this damage. But these programs are often plantation-based, monocultures lacking the biodiversity, resilience, and carbon-storing capacity of old growth forests. A plantation is not a forest; it's a crop. We cannot afford to treat forests like crops. To truly heal our landscapes, we must protect remaining old-growth forests and restore degraded land with diverse, native trees that rebuild ecosystems, not just timber. Communities must be empowered to care for their forests, while cities can become green refuges that reconnect fragmented habitats. Strong policies, sustainable practices, and real accountability are essential.

I think it is time to take the conversation away from abstract politics and bring it back to the community. This is not just an environmental issue; it's a human issue. Our forests are not distant wilderness. They are our backyard, and their loss is our loss. We, as a community can take an active part in trying to limit the damage of deforestation, which along with climate change is impacting our lives.

We can look at planting more native trees in our own backyards, and retaining what canopies are already present. In January 2025, the West Australian Government's Treebate program was announced. This program encourages West Australians to plant native trees on their properties. If you purchase a native tree from a local nursery, you can make a claim of up to $150 via the ServiceWA app. Small steps, I know, but moving in the right direction.

We can reach out and volunteer to local governments and communities to plant trees and help in conservation.

I think the greatest need is to engage the larger population in this conversation through education on the very real consequences of removing healthy trees and forests.

As Einstein famously quoted, ""For every action, there is an equal and opposite reaction."

1 - Shanahan DF, Bush R, Gaston KJ, et al. Health benefits from nature experiences depend on dose. Sci Rep. 2016;6:28551

We are not the centre: dismantling the myth of human supremacy

This chapter can be referenced as "Shumona, F. (2026). We are not the centre: dismantling the myth of human supremacy. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

Introduction: Beyond Carbon and Plastic

When we talk about the environmental crisis, the conversation almost always circles back to statistics: carbon emissions, rising sea levels, vanishing forests, species on the brink of extinction. These are urgent realities. But focusing only on them risks treating the crisis as technical — a matter of emissions to offset or plastics to recycle — rather than what it truly is: a cultural and moral reckoning.

At the root of our ecological collapse lies a myth so ingrained that we barely notice it: the myth of human supremacy. The idea that we are separate from and above the natural world, destined to control and consume it. It is this worldview, more than any single smokestack or oil well, that has set us on the path to collapse. And until we confront it, no technological innovation will save us.

The Legacy of Anthropocentrism

Anthropocentrism — the belief that human beings are the most important life form on Earth — is not merely an abstract idea. It has shaped centuries of policy, philosophy, and practice. From religious doctrines that granted humans "dominion" over creation, to Enlightenment science that carved the world into resources to be measured and exploited, anthropocentrism has framed the Earth as an object, not a subject.

In this worldview, a forest is not a community of living beings; it is lumber. A river is not a lifeline but water for irrigation or hydroelectricity. Animals are reduced to food, labour, or entertainment. Even conservation often follows this logic: protect the forest because it provides oxygen, not because it is a living system with value of its own.

This reductionist lens has had devastating consequences. Entire ecosystems have been razed, species driven to extinction, and climate systems destabilized. But the damage does not end there. Anthropocentrism has also fuelled social injustice. Those deemed "closer to nature" — Indigenous peoples, women, communities in the Global South — have historically been excluded from decision-making, their knowledge dismissed, their lands violated. The very myth that elevates humans above nature has also been used to justify domination within humanity itself.

Climate Action Without Justice

This legacy is alive in today's climate policies. Mainstream solutions are presented as bold, but they are often little more than extensions of the same logic that caused the crisis in the first place. Carbon markets commodify pollution. "Green growth" promises endless economic expansion powered by renewables — ignoring the

extractive mining required to build them. Conservation efforts displace Indigenous peoples in the name of "pristine" wilderness.

Such approaches may reduce emissions on paper, but they fail to address the deeper crisis of disconnection. They treat symptoms while ignoring the disease. And in doing so, they reinforce global inequalities. Communities in the Global South — who contribute the least to emissions — face the worst impacts of droughts, floods, and food insecurity. Women in rural areas bear disproportionate burdens as water sources dry up and crops fail. Yet global climate negotiations continue to sideline these voices, preferring the authority of Western science and corporate interests.

The result? A climate discourse that looks radical but remains deeply conservative. A politics of management rather than transformation.

A Crisis of Spirit and Culture

The truth we avoid is that the environmental crisis is not only ecological or political. It is spiritual. It reflects a severed relationship with the living world.

To strip-mine a mountain or poison a river is not simply to extract resources; it is to violate a relationship. For Indigenous cultures around the world, land is not property but kin. The Earth is not an "it" but a "who." A being with rhythms, needs, and spirit. To act otherwise is to forget our place.

This is why purely technological solutions feel hollow. They promise efficiency without humility, progress without reflection. They do not ask us to change who we are or how we live. But that is precisely what is needed.

Learning from Other Ways of Knowing

Alternatives to the myth of supremacy already exist. Indigenous knowledge systems, ecofeminist perspectives, and anti-colonial traditions have long emphasized relationship, reciprocity, and care. They insist that we are not separate from the Earth but enmeshed in its living fabric.

Indigenous teachings remind us that rivers, animals, and plants are relatives, not commodities. Ecofeminist thought links the domination of nature with the domination of women, showing how hierarchies of power perpetuate both exploitation and inequality. Anti-colonial frameworks highlight how ecological destruction is inseparable from colonial conquest — and how true justice requires dismantling both.

These perspectives are not relics of the past. They are urgently relevant today. They challenge us to see the Earth as alive, to understand that responsibility is not optional but inherent to being part of the web of life.

The Radical Act of Slowing Down

Here is where slow living enters the conversation. Too often dismissed as a lifestyle choice for the privileged, slow living is, at its core, a rejection of the logic of speed, consumption, and endless growth. It calls us to live more deliberately, to honour

the time it takes for a tree to grow, for soil to regenerate, for relationships — human and ecological — to flourish.

Slow living aligns with Indigenous teachings: to listen to the land, to live in rhythm with its cycles, to take only what can be replenished. It is not about withdrawing from the world but about engaging more fully, with mindfulness and respect. In this way, it becomes a political and ethical stance — a quiet rebellion against the culture of extraction.

Towards a New Relationship

What would it mean to take these lessons seriously? For individuals, it could mean practicing reciprocity in daily life — giving back to the Earth, not just taking. It could mean supporting Indigenous land stewardship, learning from traditional ecological knowledge, or cultivating practices that honour the sacredness of the living world.

For policymakers, it would mean shifting the centre of gravity: elevating Indigenous leadership, valuing relational ethics over economic growth, and designing policies that prioritize justice as much as carbon reduction. It would mean recognizing that environmental justice and social justice are inseparable — that we cannot heal the Earth without addressing inequality.

This is not about returning to some romanticized past. It is about building a future grounded in humility, reciprocity, and connection.

Conclusion: Choosing Belonging

The environmental crisis is not only a call to action but a call to belonging. We must dismantle the myth that we are the centre, the managers of Earth, the rulers of life. We are participants in a vast, intricate web.

The path forward is not paved with guilt but with responsibility. Not with endless innovation but with humility. Not with domination but with reciprocity.

The question we must ask is simple: how can we live in ways that allow the Earth to flourish, not merely survive us?

If we can learn to live as kin rather than conquerors, as stewards rather than rulers, perhaps there is hope — for the Earth, and for ourselves.

Ice cores don't lie: why Earth's deep past demands immediate climate action

For hundreds of thousands of years, Earth has kept meticulous records of its own history. Locked deep within the ice sheets of Antarctica and Greenland are frozen archives of past atmospheres snapshots of temperature, carbon dioxide, methane, and environmental change stretching back nearly a million years. For decades, the climate debate has been clouded by a convenient myth: the idea that the methane currently heating our atmosphere might just be a "natural" release from the Earth, simply leaking from melting permafrost or deep-sea hydrates. If the Earth is doing it to itself, the logic goes, why should we change our economy? But thanks to groundbreaking research from an international group of researchers led by Vassilii Petrenko of the University of Rochester, with contributions from ANSTO environmental scientists, that excuse has officially evaporated. By "turning to the past," scientists like Dr. Andrew Smith and Quan Hua have tapped into Earth's most honest witness: the Taylor Glacier in Antarctica. This ice doesn't just hold frozen water; it holds a 12,000-year-old diary of our atmosphere. Their findings, published in the journal Nature, provide a sobering reality check. When researchers looked at the Younger Dryas–Preboreal period, a time of abrupt natural warming 11,600 years ago, they found that natural geological leaks were minimal, averaging no more than 15.4 teragrams per year. What does this tell us today? It proves that the massive clouds of methane currently surrounding our planet aren't coming from natural seeps or ancient permafrost. They are coming from us. Because Carbon-14 decays over time, methane from fossil fuels which has been buried for millions of years contains zero radiocarbon. By using Carbon-14 (radiocarbon) as a tracer in ice cores, scientists can distinguish between "living" methane (from wetlands) and "dead" fossil methane (from ancient underground deposits). The "fossil" methane we see today is the fingerprint of industry leaking pipelines, coal mines, and gas wells. By measuring the absence of natural emissions in the past, scientists have inadvertently found the smoking gun for human impact in the present. The implication is devastating for the fossil fuel industry: If natural geological leaks were that low during past warming events, then the massive levels of fossil methane we see in our atmosphere today cannot be natural. Ice cores are more than just frozen cylinders; they are chronological archives.

Figure 1: Methane age vs mean in years before present (1950) – ANSTO ice core ancient climate data.
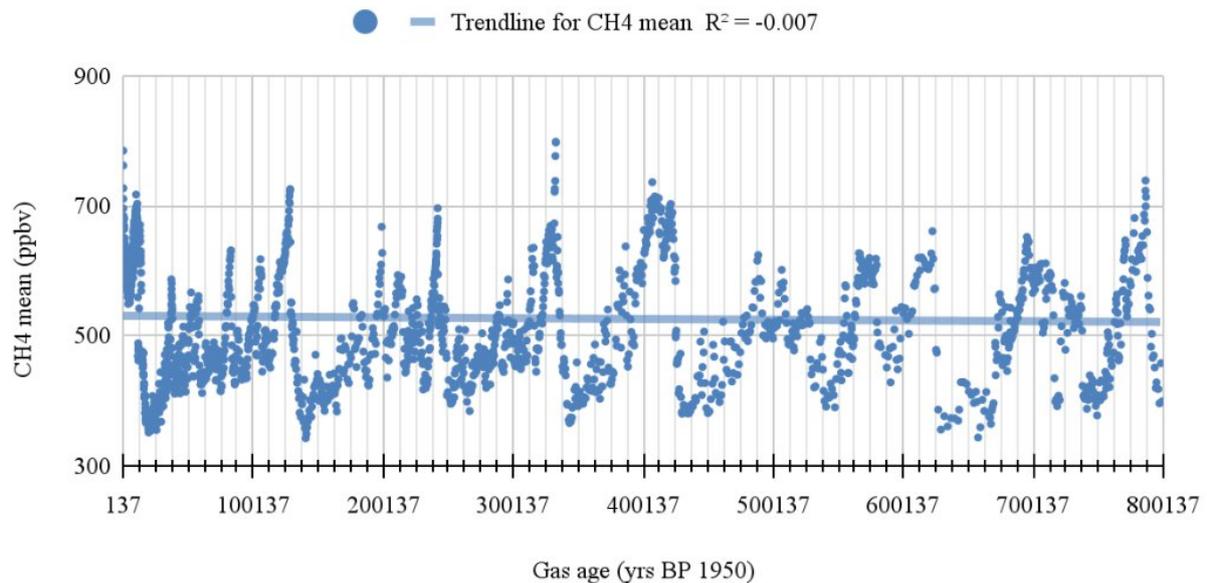

Figure 1 shows methane mean concentrations (methane mean in PPBV (parts per billion by volume) derived from ANSTO's ice core data, spanning roughly 800,000 years BP to 137 years BP (pre-industrial). The data points fluctuate significantly, indicating natural variations in methane over glacial-interglacial cycles. The fluctuations of various increases and decreases stay a consistent trend throughout the data, with data points never exceeding a methane mean above 700 ppbv-800 ppbv alongside a trend line that does not drastically increase, suggesting past climate cycles had stayed relatively stable over 800,000 years without disruption. When comparing Figure 1 to Figure 2 , a graph showing the ANSTO ice core data of ancient methane levels integrated with data that NASA refers to as "planet vitals" of current methane levels, a core feature of notable difference is present. Figure 2 reflects the unprecedented increase in methane concentrations within recent years (indicated by the small negative age value, -75 years BP, i.e 2025). This increase holds no fluctuations of decrease unlike the data points representing past atmospheric methane levels in ice cores, to coincide with this the steep upward slope of the trendline suggests a disturbance in the past averages and fluctuation trends of atmospheric methane levels due to the introduction of industrial processes and anthropogenic sources. The integration of recent atmospheric levels with past methane mean levels compares visually how low methane was naturally unlike the recent increase as well as numerically the drastic difference between past increases, which as previously stated was no higher than 800ppbv (797 ppbv at most) and is now at a great height of 1935 ppbv, meaning methane levels have increased by 1138ppbv. Furthermore, the highest past methane level presented by the data supports the statement that anthropogenic sources are contributing more methane to the environment than natural sources due to the assumption that current natural emissions have not changed and that the only difference is anthropogenic activity. The past highest peak being 797ppbv leads to an inference based on current levels being 1935 ppbv that humans are contributing 58.81% to the global atmospheric methane levels, while 419% comes from the

environment. Furthermore, the steep vertical cluster of data points on the far right of Figure 2 clearly reflect this "dramatic increase in greenhouse gases caused by human use of fossil fuels" (Australian Antarctic Program, 2020).

Figure 2: Methane age vs mean in years before present (1950) – integration of current climate NASA data.
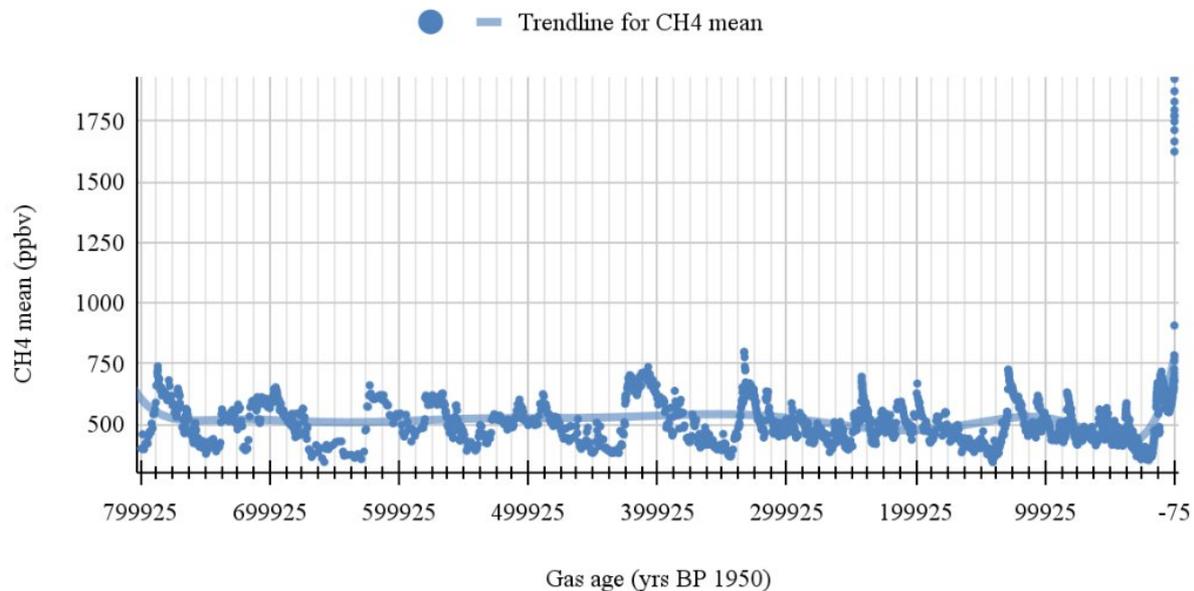
The comparison of Figures 1 and 2 clearly distinguishes between long-term natural variations and the recent, abrupt, short-term anthropogenic impact. The long-term trend in Figure 1 shows natural oscillations, whereas Figure 2 displays an exponential rise in recent decades that has no historical precedent within the 800,000-year record. This supports the view that "the rate at which carbon dioxide is increasing has no comparison to the rate recorded in the past by ice cores," a perspective equally applicable to methane as a greenhouse gas first present through anthropogenic sources during the industrial revolution just as carbon dioxide. The shift from natural sources, primarily wetlands in past warming events like the Younger Dryas-Preboreal to significant anthropogenic fossil methane emissions in the industrial era is visually evident in the contrasting difference between the past and recent methane levels shown in Figure 2 . The ice shows us that while the Earth is capable of change, it has never seen a disruption this fast or this human. If we choose to ignore the archives written in the Antarctic ice, we aren't just ignoring science we are ignoring our own history. These ice cores are not abstract scientific curiosities. They are warnings. And today, they are telling us something unmistakable: the rapid climate change we are experiencing now is not part of Earth's natural rhythm, it is a human-driven disruption with consequences unlike anything seen in the geological record. If the natural world isn't the primary source of these gases, then the "natural world" cannot be expected to fix it. Current estimates suggest that natural geological methane emissions are three to four times lower than we previously thought. This means our own anthropogenic footprint is much larger, and our responsibility much heavier than we ever admitted. The ice cores do not lie, and they do not have a political agenda. They show us that we are currently on a high-emissions pathway

that could lead to a 4°C increase by the end of this century. We have moved beyond the stable boundaries that allowed human civilization to flourish. The question is no longer whether we are changing the climate the ice has proven we are. The question is whether we have the courage to stop acting as a planetary-scale anomaly and start living within the rhythms that the ice cores tell us are safe.
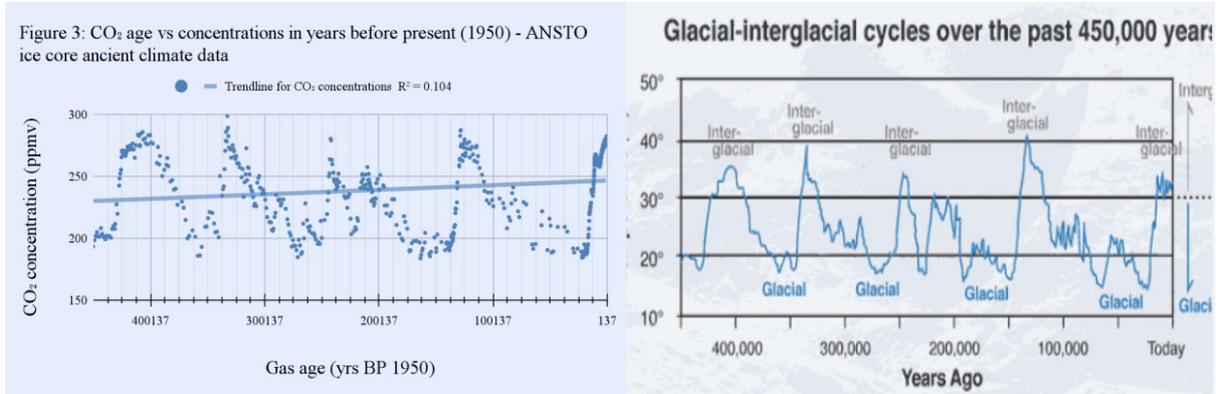
Figure 3 shows carbon dioxide concentrations (ppmv) ranging from 400,000 years BP (before present - 1950) to 137 years BP, when this data is zoomed in on to represent the carbon dioxide concentrations between 450,000 years ago (BP) and 137 years ago (BP), it can be compared to data showing glacial-interglacial cycles over the same specific time frame to highlight the clear relationship between the two variables. The trendline in Figure 3 has a low R^2 (proportion of variance) of 0.104, indicating natural oscillations in carbon dioxide concentration rather than a strong linear trend over 800,000 BP. The comparability of these graphs suggests a relationship between the naturally frequent carbon dioxide concentration and periods of warming and cooling, giving insight into causes for past climate conditions, allowing for future predictions of the implication elevated carbon dioxide levels will have on earth's temperature.

Figure 4: CO_2 age vs concentrations in years before present (1950) – integration of current climate NASA data.

Figure 4 integrates ancient ANSTO ice core data with modern NASA carbon dioxide data, extending to near present (-75 years BP). While the historical data on the left reflects the cyclical patterns seen in Figure 3, the most prominent feature is the unprecedented increase i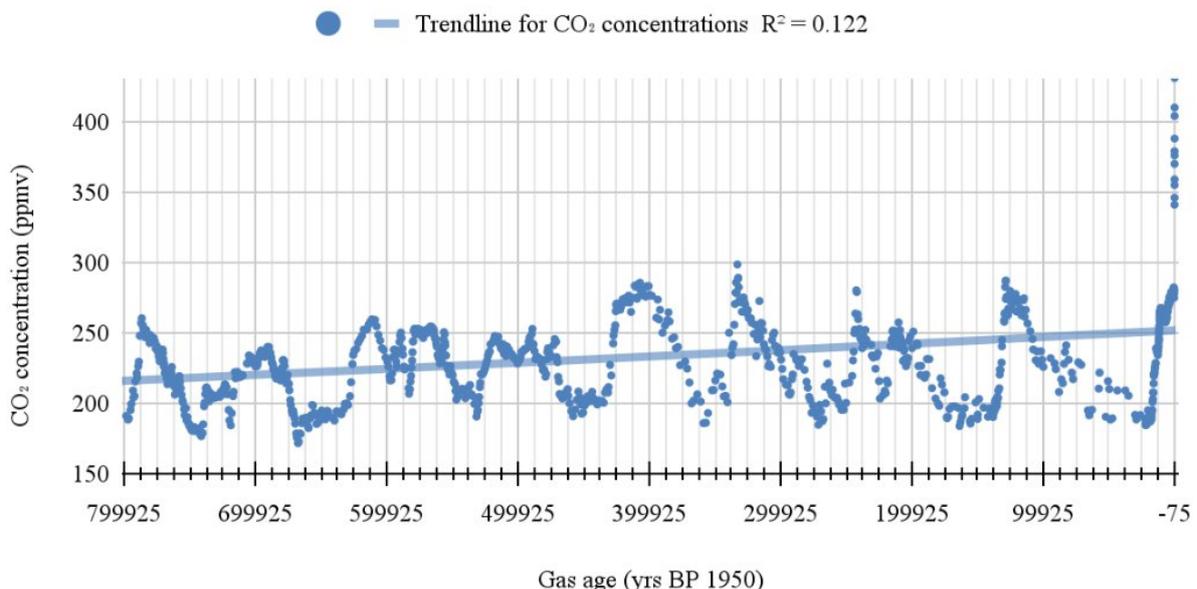n carbon dioxide concentrations in the modern era. Recent carbon dioxide levels on the far right escalate beyond 350ppmv, reaching over 400ppmv (approx 431ppmv), a level graphically supporting the assertion that atmospheric carbon dioxide is "completely unprecedented in the past 800,000 years"(Henley and Abram, 2017). This rapid rise is clearly visible as a vertical cluster of data points, directly linking to "the dramatic increase in greenhouse gases caused by human use of fossil fuels" (Australian Antarctic Program, 2020). Figure 4 not only reflects the long-term natural glacial-interglacial cycles and their associated carbon dioxide fluctuations but also vividly demonstrates a clear, sharp deviation from this natural pattern in recent history. This difference highlights the impact of "Anthropogenic emissions such as the burning of fossil fuels" (Henley and Abram, 2017) in driving current climate change at a rate faster than ever seen before in past climate proxies. The frozen testimony within the Antarctic ice sheets offers more than just data; it presents a definitive boundary between the Earth's natural resilience and our current industrial path. The evidence captured in these ancient air bubbles has stripped away the last remaining excuses for inaction. We now know, with isotopic certainty, that the methane and carbon saturating our atmosphere are not the result of a planet warming itself, but the direct fallout of a global energy system we chose to build. We are currently standing at the edge of a precipice that the geological record has been warning us about for a million years. To dismiss these findings is to ignore the most stable climate history our species has ever known. For the first time, we aren't just reading the story of the Earth's past, we are writing the ending of its future. As today's air slowly compresses into tomorrow's ice, our generation will be remembered by the chemical signature we leave behind. The question is no longer whether we understand the danger, but whether we possess the collective will to prevent our own era from being recorded as the moment the Earth's climate system finally broke. Once these glaciers vanish, we lose more than just a warning; we lose the only archive of how to survive on a stable planet.

Research sources:

Figure data taken from public ANSTO ice core data and NASA 'vital signs of the planet': https://drive.google.com/file/d/1-wpkRzL3DlObAeyh_I0qFJpKUHNT8Ioe/view

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Figure 1: Methane age vs mean in years before present (1950), ANSTO ice core ancient climate data - (ANSTO, University of Bern, LGGE in Grenoble, 1999)

Figure 2: Methane age vs mean in years before present (1950), integration of current climate NASA data - (ANSTO, University of Bern, LGGE in Grenoble, 1999, NASA 2023)

Figure 3: CO_2 age vs concentrations in years before present (1950), ANSTO ice core ancient climate data - (ANSTO, University of Bern, LGGE in Grenoble, 1999-2005) - glacial-interglacial cycles over the past 450,000 years - (Energy Education, 2018)

Figure 4: CO_2 age vs concentrations in years before present (1950) - integration of current climate NASA data - (ANSTO, University of Bern, LGGE in Grenoble, 1999 - 2005, NASA, 2025)

Climate change anxiety and what to do about it

This chapter can be referenced as "Stangret, S. (2026). Climate change anxiety and what to do about it. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

You really don't have to work too hard to find something in the news or on social media about climate change. I won't sugarcoat it because the outlook is grim and there's no way getting around that.

The effects of climate change are already making an impact on society. Just off the coast of Australia, large parts of the Torres Strait Islands are likely to be uninhabitable in the next 30 years.[1]

The more I learn about the current state of the climate and the models for where we are headed, the more anxious I become. I'm constantly worried about the large parts of Earth that will be uninhabitable, and how this will affect society and the world's economy.

What we do know is that the outlook is grim. However, it doesn't mean that there is no hope. There is plenty that us as individuals can do to help with climate change. It's important that we look for ways to exert our own feeling of control over the future. This is the best way to help manage our anxiety of climate change and what the future holds for those that we leave behind.

You are not alone

While it may feel like you are experiencing climate change anxiety alone, there are many others out there like you who also feel it. For example, in 2021 a global survey published in the Lancet Planetary Health reported that out of a cohort of more than 10,000 young people, 60 percent described themselves as very worried about the climate, with almost 50 percent states the anxiety affected their daily functioning.[2]

Why it's so difficult

The task seems so unsurmountable. It almost seems impossible to have any impact as one person amongst 8+ billion. Sometimes it seems like governments around the world are refusing to properly deal with climate change. It becomes very easy to feel like there's nothing you can do to stop the potential damage that may come as a result of climate change.

Where to from here?

What we do know is that there are a lot of people like you around the world that care about the impacts of climate change. We also know that we have a massive task in front of us. It can be easy to allow the anxiety to disable us from focusing on what we can do.

One of the best antidotes to anxiety is to focus on actions that give you a higher sense of control over the situation. This is why the remainder of this article is focused on the actions we can take to help us feel more in control.

These strategies are more of a chose your own adventure than a recipe for reducing your climate change anxiety. Have a read through them and pick one or two and explore how well they help you. It's certainly not an exhaustive list but it's enough to get you started.

Take it easy on yourself

Personally, I have a habit of judging myself far more harshly than anyone else would. If you are anything like me, then you may too be criticising yourself for not doing more about climate change and this will make the anxiety worse. Try to remember that ultimately, everyone does their best and that includes you.

Secondly, if you are anxious about climate change then this likely also means that you understand how current actions and behaviours can have a significant impact on others and how those actions can have significant impacts in the future.   In my view, those are very beneficial ways of thinking and it also shows that you care about others and the environment.

Calculate your carbon footprint

Calculating your carbon footprint can be a really useful exercise for working out the best bang for buck strategies you can incorporate to reduce your emissions. There are a number of different websites you can use to help you determine your carbon footprint.

Personally, I like the carbon footprint calculator at https://www.footprintcalculator.org.

Most carbon footprint calculators take you through a number of questions, and you can add in extra details to get a more accurate picture of your carbon footprint. If you don't have specifics or answering the questions, there's no problem. Just do your best to estimate your answer to the questions.

At the end where you get your results, most of these carbon footprint calculators will give you some resources for reducing your carbon footprint.

Do your best not to be too alarmed by the results. I know for me personally, it was quite shocking. However it's always better for our mental health to focus on what we can change, and to accept the things that we can't change.[3]

Actions we can take to reduce our carbon emissions

If you've taken the chance to use the footprint calculator above or have used a different one, you may already have a good idea of some of the actions you can take.

Note that some of these strategies are not for everyone. My hope is that one or more of these strategies will resonate with you.

1. Reduce your energy use and/or switch to renewable energy sources

If you're a renter like me, then this is a tough strategy to implement. However, if you do own your home, consider investing in renewable technologies such as solar

panels and/or batteries. Otherwise if you do rent, you may have the option to utilise a renewable energy provider.

In addition to the above, it can be useful to increase the energy efficiency of your home. The Victorian Government has a useful guide to help you reduce your power usage at home.

2. Change your diet

Not everyone is open to changing their diet which is understandable as diet is typically linked quite heavily with culture and identity. However, if you are willing to increase your intake of plant based foods in your diet, this can have a significant impact on your carbon footprint.

There are a number of studies that have been conducted that show the positive environmental impact of a plant-based diet.   For example, research shows that you can reduce your diet-related carbon footprint by 25% from replacing half of your intake of red and processed meats with plant protein foods.[4]

If you are open to incorporating more plant-based foods in your diet, there are several resources to help you make the transition. Otherwise, my recommendation is to get a consultation with a dietician to ensure you are getting all the nutrients you need from a plant-based diet.

3. Leave the car at home

Unsurprisingly, reducing the amount you drive your car can have a great impact on your carbon emissions and your wallet!

Consider some of the following ideas for reducing how often you drive your car:

- If your trip is less than 15 minutes, consider the possibility of walking or riding a bike
- If it is not too inconvenient for long trips, consider using public transport or ride sharing

Otherwise if you do need to drive your car, the RACQ has some great tips on "eco-driving" which means what you'd expect – strategies for reducing emissions while you are driving.

4. Have a think about the sustainability involved in the things you buy

I can appreciate that this can be a particularly onerous strategy to implement. I imagine that there are plenty of suppliers that may not want their consumers to know the carbon emissions involved in delivering their products.

However, what can be relatively straightforward is to do some research on companies that sell foods/products that you regularly purchase and to see if you can find options with better sustainability practices.

As someone who has spent over 15 years working for big chain supermarkets while completing my university studies, I have first hand experience in how much food is thrown into the bin everyday. It is quite disheartening.

There are some companies such as Farmers Pick that work with farmers to purchase produce that would otherwise be rejected by the big supermarkets, and sell them to consumers.

Learning about and spend time in nature

Out of all of the strategies for managing climate change anxiety, this one is my favourite. The more I learn about the way that ecosystems work, the more amazed I am at the number of moving parts involved in life thriving on Earth. The more I learn, the easier it is for me to connect with nature.

I am luckily enough to have a backyard at my rental, and I really enjoy spending time out there noticing all the life in my yard. From the blue-tongued lizard I see once a year, the occasional brush turkey, skinks, weird bugs, spiders and birds. I enjoy watching them and considering how they survive and function in the ecosystem.

It's very easy for us to feel disconnected from the natural environment. Most of the food and resources we use have been obtained by someone else and we buy it from the store. So we don't get first hand experience of the impact of hunting and collecting on the ecosystem that we take from.

There are several studies that show that spending time in nature is good for anxiety in general.[5] My view especially for climate change anxiety is that it is especially helpful. You could go for a walk in a nature reserve or along a walking path with lots of nature, and take the time to observe all the different animals, bugs and plants working together in harmony. It's an insanely complicated beautiful system worthy of appreciation. As a side benefit, this may even motivate you further to take action to reduce your carbon footprint since you can see what we stand to lose.

Final thoughts

Whilst it can be burden dwelling about the challenges that climate change may bring to us, the most important thing we can do is to be optimistic. Without hope and optimism, there is no opportunity for us to take action. There are a lot of smart people working very hard on climate change adaptation and mitigation strategies. Renewable energy projects are on the rise worldwide.

I suggest focusing on the positive news coming out of climate change initiatives. Sites like Happy Eco News can help you focus on the good developments happening around the world.

Otherwise, my best advice is to focus on what you can control and make sure to spend some time in nature and take the time to appreciate its beauty.

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3. https://www.psychologytoday.com/au/blog/from-trial-to-triumph/202305/how-to-improve-your-mental-health-focus-on-what-you-control

4. https://www.mcgill.ca/newsroom/channels/news/small-changes-can-cut-your-diet-related-carbon-footprint-25-355698

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Women and the climate: the critical importance of an ecofeminist approach to climate action

This chapter can be referenced as "Strickland-Wilkinson, A. (2026). Women and the climate: the critical importance of an ecofeminist approach to climate action. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

No one person is experiencing this pressing time the same way, and building communities of support and kinship is critical in not only tackling this problem together, but ensuring that no one is left behind. To do so, we must first recognise our differences. An unassuming intersection, women and the climate. As we move quickly towards growing climate concerns, it is critical that the way in which we talk about the climate is all encompassing. The effects of environmental degradation is felt differently by everyone, with vulnerable groups more susceptible to increased risk at a larger, more rapid scale. This includes women, and the ways in which women are disproportionately impacted by climate disasters. The need for stronger, gender-focused policies and structures in the face of the changing environment is of paramount importance, as is the need for increased conversation about how climate change shapes our futures differently.

This phenomenon has been largely studied under the term 'ecofeminism' . From its beginnings in the 1980s, the relationship between patriarchal structures, women and the environment has been explored by feminist and environmental scholars, dissecting the interweaving relationships between how the environment and women are treated. Varying schools of thought have emerged as a result of this ideological framework, which delve into other aspects of women's connection to the natural environment on a holistic level, as well as the differing relationship between women and nature across different cultures. Whilst there are divulging perspectives within ecofeminism, there is one clear message underpinning the research: the parallelled oppression of the environment and women will continue to cause both degradation and discrimination unless we take serious action towards rectifying the system of oppression itself. Ideologies such as domination, exploitation and hegemonic masculinities underpin the functioning of governance mechanisms as well as the perceptions of the public. It is this framework that needs to shift in order to move towards environmental prosperity.

An example of these disproportionate impacts can be seen when looking at rising sea levels. In Australia, the recent National Climate Risk Assessment report found that over 1.5 million Australians will be at risk from rising sea levels by 2050, with remote communities particularly vulnerable. This statistic alone is cause for significant action, however, once the intersection between women in these communities and rising sea levels is taken into account, it becomes incredibly clear that the climate crisis is not something to be ignored. Women in smaller rural, coastal regions have been found by multiple scholars, which I have cited below, to face increased vulnerabilities including food insecurity, poverty, employability issues, accessibility restrictions to healthcare, as well as increased prevalence of domestic violence. Academic Andi Misbahul Pratiwi researched this phenomenon,

and found that in places where gender inequality already exists, the structures are exacerbated by climate change and rising sea levels to drive further inequality. However, in Australia, there are currently no policy frameworks which directly address this issue. If we are going to continue head on towards the findings of the Risk Assessment report, this must be rectified, with structures put in place to safeguard the lives and livelihoods of women in these areas which directly address the existing inequalities.

It's important to take a further look now into gendered violence as a result of climate disasters. As the climate crisis worsens, it is hard to not feel overwhelmed by the other societal and political issues which, due to unprecedented access to the rapid global news cycle, continuously flood our senses and screens. One of these issues being gender based violence, which Australia is no stranger to, with more than 100 women being violently killed last year alone. Entrenched hegemonic masculinities work to form the patriarchal pillars of Australian society, found in the 'toughen up' mentality, as well as the ever-growing presence of the manosphere online. These structures contribute to a culture in which violence against women is not only accepted, but expected. As a young Australian woman myself, there is not one of my peers who haven't experienced some form of sexual harassment or gender discrimination. Unfortunately, this is only expected to worsen as the prevalence of climate disasters does. Respect Victoria has found that following climate disasters, gendered violence and gender-norms increases significantly, examples ranging from Hurricane Katrina in the US seeing a 98% rise in violence against women, to a 53% rise in domestic violence following the 2011 Canterbury earthquake in New Zealand. Opposite sides of the globe- parallel implications. And yet, these problems remain discussed and governed separately. Until we can acknowledge the fundamental flaws within the very structures we live in- structures of domination which work to oppress both women and the environment- we can't expect either to flourish.

These links to discrimination also seep into the employment sector, in particular the science and marine conservation. The inclusion of women within the marine conservation field have globally been seen to increase the sustainability outcomes, as well as combat the profit-driven nature of the fishing and conservation industry. This is beneficial for everyone, as a more sustainable industry supports the longevity of the blue economy, including job security and potential eco-friendly development opportunities, as well as supporting women in the science sector. However, women remain underrepresented, and the work done by women undervalued. The language used within existing Australian marine conservation policies, such as "development", "management" and "enhancement", inherently work to foster pre-existing patriarchal values, and drive anthropocentric, or human-centred, environmentalism. These policies also neglect or diminish the inclusion of women or Indigenous Australians in neither the development of the legislation themselves, nor the expected outcomes and implementation strategies. To work towards the mitigation of climate change, working with these critical voices is just another branch of an ecofeminist approach to sustainability which benefits everyone. The marine conservation sector, as well as the ocean and all the life within deserve a community wide effort, including the knowledges and perspectives from a true cross-section of people from all backgrounds.

And yet, the tide is turning. At a time where it would be easiest to dig our heads in the sand, catastrophise our future and give up, there remains so much to be hopeful for. Everywhere I look, people are turning towards nature. For comfort, clarity, community- people are forming genuine connections to the world around us. Not only that, but the environment is once again becoming the setting for building deeper connections with each other, from morning ocean swimming groups to run clubs. The more our lives become intertwined with nature- not only what we can take from it, but what we gain from being in it, the more it feels we move towards a future which values its safeguarding over exploitation. After years of isolation during the loneliness of the pandemic, the importance of community building in and amongst the beautiful environment we are so privileged to live within began to grow rapidly in momentum. Not only that, but the proposed Draft Australian Ocean Plan 2025, reflects this shift. Prioritising the voices of First Nations people and women, the drive towards sustainability and equality is prominent. We can keep this going, keep our voices loud, keep pushing the conversation. Having kindness and empathy with each other during this frightening time is critical in order to demand more. More from each other, the government and the industries that threaten our future.

Links to further information:

- Climate risk assessment discussion:

https://www.climatecouncil.org.au/resources/briefing-paper-national-climate-risk-assessment-ncra/

- Andi Misbahul Pratiwi's Conversation piece on gender inequality and climate change:

https://theconversation.com/the-climate-crisis-is-making-gender-inequality-in-developing-coastal-communities-worse-212740

- Draft Sustainable Ocean Plan:

https://www.dcceew.gov.au/environment/marine/sustainable-ocean-plan

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Environmentalism through community, empathy and optimism

This chapter can be referenced as "Strickland-Wilkinson, A. (2026). Environmentalism through community, empathy and optimism. In B. Goodsell (Ed.), Climate Perspectives (pp. X-XX). The Climate Centre."

Empathy and hope are of paramount importance in our ability to continue to fight for climate justice. The resilience needed to actively choose to embody these mental frameworks and strive to maintain optimism throughout the incredibly turbulent period we're living in is significant. However, these ideologies are some of our greatest strengths to combatting the climate crisis, by building communities in and around the environment and including positivity we can work to foster more powerful, sustainable environmental change.

There is a beautiful symbiosis between our ability to connect with each other and the world we live in. When people spend time in nature, the landscape transforms into more than a backdrop, but an active participant in important moments. Camping trips by the river with friends. The backyard of a family home, strewn with frisbees and games. Sitting in the car watching the ocean on a stormy day. The world around us has never just been a silent observer but is there with us through each day. Somewhere along the way, through urbanisation and the creation and push towards a technological future, taking the time to actively appreciate all we have has gotten lost. By building communities in nature, it builds empathy for these spaces, giving us something we want to protect and feel a sense of obligation too. If, for instance, your happiest memory with friends is throwing yourself into the ocean, the health of the ocean subsequently becomes more important. Across large enough numbers, this builds a movement. For those of us who don't feel naturally connected to the environment, this is such a critical step in building that connection.

The importance of building empathy for each other, and the world, also helps to contribute to the growing idea of imperfect environmentalism. Whilst there are growing online movements towards more sustainable daily practices, a common roadblock for people is the pressure to commit fully to something and stick to it. An example of this is vegetarianism. I have been an 'on and off' vegetarian for around a year now, and it feels as though in a time where everything is categorised and labelled, once you have given yourself that title there is no going back- that if you 'fail', all the animals, water usage and other countless benefits up until that moment become obsolete. Not only is this inaccurate, but also drives people away from making more sustainable lifestyle changes. Having empathy for others, and yourself, is critical. There is no benefit in letting the fear of being imperfect prevent individual environmental action, especially if the major corporations and governments actively generating mass amounts of harm, aren't being held to these same impossible standards of perfection. If greater overall progress is our collective goal, being accepting of the human nature to contradict ourselves and make mistakes is pivotal. For example, being accepting that someone might frequently pick up rubbish, but occasionally use single use plastics. To be accepting and removing the 'all or nothing' stigma associated with environmentalism, it not only creates a more

welcoming and forgiving space for everyone, but also drives greater overall progression towards a cleaner planet and a more inclusive movement.

The prominence of cancel culture and the voices of strangers online, is influencing not only the reliability of information surrounding environmentalism but also our collective ability to understand the nuance behind accessible environmental activism. Opinions of "eco" influencers", who have much greater financial access to buy and influence others to shop expensive, 'sustainable' brands at the rate of fast-fashion cycles, as well as the privilege of greater amounts of time to allocate to environmentalism than the average person, puts the onus on the average consumer to invest in clothing and other sustainable-marketed products, and does not take into account the privilege that comes with being able to actively make these choices. Additionally, with the rise of 'green-washing', companies are actively falsely promoting themselves as sustainable and 'eco-friendly', working within the grey-area of weak environmental governance laws, making it even more complicated for consumers to find truly sustainable options. Whilst we need people and organisations to be loudly advocating for sustainability, there are detrimental effects when we start to point the fingers at each other and away from the companies and governance systems allowing the climate crisis to worsen. There is good reason for environmentalism and eco-friendly being an uncomfortable and inaccessible choice: the system is designed so that being environmentally conscious is harder. By demonstrating that making sustainable choices is inherently uncomfortable and, in some cases, inaccessible, in practice by living through the discomfort, it reflects that the problem lies within with the system itself and demonstrates the urgency of systemic change- if we're loud enough about it. Shopping sustainably can be more expensive, switching to green energy is harder for renters, opting for public transport instead of driving takes a significantly longer time: each of these examples of how a capitalist system locks us in environmentally detrimental cycles for the promise of convenience and affordability. Understanding that 'eco-influencers' and members of the upper class have greater fiscal access, as well as increased time and resources, thus enabling these choices to be significantly easier, is an example of how critical thinking regarding environmental activism is so important. Every person who actively chooses to do what they can, even if it seems insignificant, should be shown empathy and understanding. The major corporations, fossil fuel companies and governance systems, however, should not.

However, there is no point in empathy without optimism. The unprecedented access to information online is changing the way people interact with the climate crisis, with the news cycle quick to discuss the many problems we are facing, without noting the positives. Whilst there are advantages to being critical, allowing for deeper analysis of the climate crisis, it is equally important that we pay equal attention to the good things people and states are achieving every day. Without optimism, catastrophism takes hold and, as explored in the book 'Catastrophism: The Apocalyptic Politics of Collapse and Rebirth' by Sasha Lilley, can be weaponised by both the right- and left-wing groups, subsequently weakening the plight for climate justice. The bottom line: when people don't think there is any point, we give up. This is also reflective of the weight put on convenience, in that it will always be easier to default to negativity, especially in the face of such daunting times. It's understandably easier to find communities in fear. The large-scale and widely

spread multitude of conflicts, environmental crises, geopolitical tensions and humanitarian disasters should be discussed, criticised. We have access to more information and footage of real-world events than ever before, and for a large amount of us, discussing these events is a significant aspect of navigating this time, finding support systems and working together to comprehend this new reality. It is a privilege to turn away from these events that are actively destroying millions of lives. By drawing attention to the importance of optimism, this should in no way subtract from the outrage a large majority of us feel when we read the news. But by changing the narrative to include optimism, we give ourselves a world that we want to fight for, not just something we're fighting against. Actively seeking out and sharing the 'good' things that is happening does not mean you're ignorant or naive to the 'bad', instead demonstrating the resilience which fundamentally underpins our humanity. There is nothing naïve about hope, it's one of the strongest tools we have.

Furthermore, when we create divisions within our communities, it breeds eco-guilt and isolation, where we should be instead building communities and strengthening our ties to each other. There is an incredible form of creativity which emerges when passionate people can unite and generate new forms of climate resilience together, something that our systems often do not facilitate the time for. Conjoining our voices and creating spaces which allow for the sharing of ideas and lived experiences builds our ability to advocate for change that encompasses people previously unseen and unheard. Vulnerable communities, people of colour, women: all groups which have been, and continue to be, systemically excluded from policy making and conversations surrounding environmentalism, but are simultaneously impacted the most by the climate crisis. Building communities which elevate these voices generates not only more equitable climate activism but strengthens the longevity of the changes themselves. Resilience and hope are some of the strongest forms of defiance we have against the systems which work to make caring about the environment a draining, lonely place.

To see the world as more than a commodity, but a part of ourselves, through empathy and hope is a significant step we must take to defy the systems which oppress both ourselves and the environment. We are united under this oppression and must continue to fight for each other and our environment. Building our compassion for each other, strengthening our bonds and prioritising doing so in collaboration with the incredible world we live in changes not only the way we are able to understand the crisis at hand, but provides the necessary strength needed to be loud enough, for long enough, to make effective change.

Included below is a list of environmental victories and innovations, as well as some studies on the psychological benefits of nature, community and empathy:

Eco-Wins!

- 'Tree bark microbes play a role eliminating greenhouse gases, study finds', Cathy Adams: https://www.abc.net.au/news/2026-01-15/tree-bark-microbes-play-a-role-in-eliminating-greenhouse-gases/106211008
- 'More Children Are Powering Their Own Wheels to School as Part of 'Bike Buses', Tina Deines: https://insideclimatenews.org/news/08012026/bike-bus-programs-reduce-traffic-and-pollution/
- 'Global agreement boosts protection for 70 endangered shark and ray species': https://www.optimistdaily.com/2026/01/global-agreement-boosts-protection-for-70-endangered-shark-and-ray-species/
- 'Norway hits pause on deep-sea mining until 2029 amid growing environmental pressure': https://www.optimistdaily.com/2026/01/norway-hits-pause-on-deep-sea-mining-until-2029-amid-growing-environmental-pressure/

Nature, Community and Empathy

- 'Nurtured by nature', Kirsten Weir: https://www.apa.org/monitor/2020/04/nurtured-nature
- 'Community Building Lessons from Nature', Friendly Nooks: https://friendlynooks.com/blog/community-building-lessons-from-nature
- 'Happiness is where nature, community, and purpose meet', Lisa Bevill: https://cobsinsights.org/2026/01/13/happiness-is-where-nature-community-and-purpose-meet/
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Mitigating the environmental impacts of artificial intelligence: pathways toward sustainable implementation

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Introduction

Born to mimic human intellect, artificial intelligence (AI) has established itself in recent years as a primary agent of the climate change agenda. As AI technologies advance, human convenience is given precedence over environmental concerns. Currently, deep learning technologies have permeated nearly every aspect of modern life – from water use to climate change, they have left their deep-seated, ecological footprints. However, artificial intelligence is a double-edged sword; while it can be used to the detriment of our environment, it boasts the power to be an innovative and useful tool. Via the application of Geographical Information Software (GIS) and remote sensing, AI can be integrated to aid ecosystem modelling, mitigate ecological emissions, and promote biodiversity.

As the uses of AI converge with the boundaries of day-to-day life, it becomes easier to overlook the environmental consequences. Accelerated by the recent deployment of generative AI models, carbon emissions and electronic waste volumes have risen exponentially. More specifically, the integration of deep learning models online has significantly accentuated our carbon footprint and water use. Through an ecological lens, this study synthesises empirical observations and case studies from energy optimisation models to determine the benefits and drawbacks of AI and deep learning models within climate-related domains, specifically their impacts on ecosystem management.

This advocacy piece concludes that the remediation of these ecological consequences requires the careful calibration of AI implementation. Specifically, this review argues that aligning AI advancements with environmental goals requires embedding sustainability thresholds into algorithmic design, particularly in conservation modelling and climate forecasting. In the absence of action, consequences could be further exacerbated.

Expanding the Discussion: AI's Ecological Footprint and Pathways to Sustainability

Artificial intelligence, while transformative, demands immense computational resources that snowball into significant environmental costs. Training a single large language model can emit carbon dioxide levels equivalent to the lifetime emissions of several automobiles. Data centres powering these models already account for roughly 1% of global electricity use, with projections suggesting this figure could triple by 2030 if unchecked. Moreover, AI training often relies on energy-intensive hardware cooled by water, exacerbating local water stress. These statistics underscore the urgency of integrating environmental considerations into AI development.

Energy Demand and Carbon Intensity

The energy footprint of AI stems largely from the need to train and retrain massive neural networks. While hardware efficiencies have improved, the computational scale of state-of-the-art models are growing faster than efficiency gains. Researchers have documented that the carbon intensity of training depends heavily on geographic factors such as the electricity grid's reliance on fossil fuels. Specifically, it is estimated that training GPT-3 on a database of 500 billion words required 1287 MWh of electricity and 10,000 computer chips, roughly equivalent to the energy required to power over 120 homes for a year in the USA. Consequently, the environmental cost of identical training runs can vary by an order of magnitude depending on location. Locating data centres in regions with high renewable penetration and scheduling training during periods of low-carbon electricity availability are emerging strategies to reduce this footprint.

Electronic Waste and Material Impacts

Beyond operational energy, AI systems accelerate hardware turnover. The race for faster GPUs, CPUs and specialized AI chips leads to frequent equipment obsolescence, generating substantial electronic waste. The United Nations estimates that e-waste reached 62 million metric tons in 2022, with less than 20% formally recycled. Moreover, research backed by the Massachusetts Institute of Technology (MIT) suggests that depending on its worldwide adoption rate, generative AI alone could account for up to 5 million metric tons of e-waste by 2030. Fortunately, sustainability experts believe that expanding the lifespan of technologies by utilising equipment for longer periods of time could significantly diminish this e-waste generation.

Additionally, mining for rare earth elements and lithium, critical for AI hardware, causes ecosystem disruption and releases toxic byproducts. As AI systems necessitate reliable high-bandwidth connections to transmit operational data and receive updates, significant environmental strains are established. The byproducts of copper mining for AI purposes have already been detrimental to water ways, farmland, wildlife, and community health. Designing modular hardware, promoting circular-economy principles, and enforcing producer responsibility policies could mitigate such material impacts.

AI as a Tool for Environmental Stewardship

Despite these concerns, AI remains a powerful ally for climate action and biodiversity conservation. Machine-learning algorithms already support real-time deforestation monitoring through satellite imagery, enabling rapid enforcement of logging restriction. In agricultural sector, AI-driven precision farming reduces fertilizer use and greenhouse gas emissions by optimizing irrigation and nutrient delivery. Likewise, reinforcement-learning models are improving the efficiency of renewable-energy integration into power grids, balancing supply and demand while minimizing curtailment.

Remote sensing combined with AI has proven particularly valuable in ecosystem modelling. Particularly, convolutional neural networks have enhanced species distribution forecasts by incorporating complex, high-resolution environmental data. Such models guide conservation planning, helping policymakers identify climate refugia and corridors for wildlife migration.

Embedding Sustainability in AI Design

While swift developments in AI foster innovation while addressing complex challenges, improving efficiencies and offering new developmental opportunities, this scaling is accompanied by significant environmental costs. Training complex AI models such as GPT-3 and AlphaGo involves thousands of petaflop/s-days that consume megawatts of power and accentuate an already sizeable carbon footprint.

A critical pathway toward sustainable AI lies in embedding environmental constraints at every stage of the development lifecycle. 'Green AI,' a framework proposed by various environmental researchers, advocates for evaluating algorithms not only on accuracy but also on computational efficiency. Techniques such as model pruning, quantization, and knowledge distillation can dramatically reduce energy requirements without sacrificing performance. Moreover, open reporting of energy use and carbon emissions during model training fosters transparency and allows researchers to benchmark progress toward low-impact AI.

Policy instruments play a complementary role. Carbon pricing, renewable-energy credits for data centres, and mandatory life-cycle assessments could incentivize firms to prioritize efficiency. The European Union's proposed Artificial Intelligence Act, while focused on ethics and safety, provides a legislative framework that could integrate environmental criteria in future revisions.

Social and Ethical Dimensions

The environmental impacts of AI also raise questions of climate justice. Data centres are often located in regions with cheap electricity or water, potentially transferring environmental burdens to vulnerable communities. Moreso, the benefits of AI-driven climate solutions are unevenly distributed, with wealthier nations more able to deploy advanced systems. Addressing these inequities requires international cooperation, technology transfer, and capacity-building to ensure that AI contributes to global sustainability rather than deepening existing disparities.

Future Research Directions

Several research avenues merit attention to align AI with ecological limits:

- Life-cycle Assessment (LCA) of AI Models: Comprehensive LCAs that capture hardware production, operation, and end-of-life disposal can identify hotspots for emissions reductions
- Renewable-Powered Training Pipelines: Development of scheduling algorithms that align intensive training with periods of excess renewable generation could significantly lower carbon intensity
- Standardized Metrics: Establishing widely accepted metrics for 'compute efficiency per accuracy point' would enable cross-model comparisons and drive competition toward low-energy solutions

- Cross-sector Integration: Collaborative projects between AI developers and ecologists can tailor machine-learning approaches to conservation priorities, ensuring that AI advances complement planetary boundaries

Conclusions

Artificial intelligence stands at a critical juncture. Its dual capacity to exacerbate or alleviate environmental challenges demands deliberate stewardship. By embracing energy-aware design, fostering circular hardware economies, and leveraging AI's analytical power for ecological monitoring, society can channel this transformative technology toward planetary well-being. The path forward is neither purely technological nor purely regulatory; it requires a holistic synthesis of innovation, governance, and ethical responsibility. Without such alignment, the rapid acceleration of AI risks entrenching unsustainable practices and undermining the very environmental stability upon which human progress depends.

Flexible and inorganic

I mimic

Flexible and inorganic

Floating along the many streams

Across the river, lake and sea

Consumed, barely

I am obscene

Seeping into the bloodstream

An invention once prized

Now inescapable

Such great demise

In 1907, Leo Baekeland discovered the first fully synthetic plastic.

By 2050, there will be more plastic in our ocean than fish.

Across recent years, the issue of plastic pollution has seen wide-scale, concerning effects upon not only the environment, but the livelihood of humanity. From developing countries drowning in coastlines of non-degradable material, to microplastics being found in the human body, the synthetic material that was once worshipped is now one of our planet's most concerning issues. Plastic is inescapable. It's in our packaging, our clothing, our water. It conceals our personal care products, our groceries and our deliveries. It's in our oceans, our walkways, our environment and even in the air we breathe. As the problem begins to worsen, its solution seems to become further and further away.

- 400 million tonnes of plastic are produced annually (Lai, 2024)
- An estimated 11 million tonnes enter the ocean every year (Take 3 For the Sea, 2022)
- The equivalent of 2 000 garbage trucks of plastic enter the ocean daily (Lai, 2024)
- Annually, 100 000 marine mammals & 1 million seabirds die from plastic pollution (Surfers
- Against Sewage, 2025)
- By 2050, 99% of seabirds will have ingested plastic (Surfers Against Sewage, 2025)
- An average person may ingest 70 000 microplastics each year (Take 3 For the Sea, 2022)

Plastic is an enormous problem. What Can You Do To Help?

- Email Chocolate Wrapper Companies to petition against their plastic packaging (Seabin Foundation, 2024)
- Volunteer for the Seabin Foundation (Seabin Foundation, 2024)
- Adopt a Beach and protect it against plastic pollution (Surfrider Foundation Australia, 2025)
- Clean-up Sydney Harbour by joining HarbourCare (Harbour Care, 2024)

In Other News …

From Single-Use to Singled-Out.

Following REDCycle's collapse in November, 2022, Australians were left without a means to recycle soft-plastic waste. But now, soft-plastic recycling programs have re-entered Australian Supermarkets, as of June 2025 (Miles, 2023).

According to the DCCEEW, over a million tonnes of Australia's annual plastic consumption is single-use plastic and 13% of soft-plastics are currently being recycled (DCCEEW , 2025).

iQRenew received 9.1 million in state and federal funding to expand facility capabilities (Hughson, 2025). Their Soft Plastics Engineered Commodity (SPEC) Facility, serves to sort and process 100% soft plastics. The processing plant has been built solely for post-consumer soft-plastic processing, and holds promise to improve Australia's plastic waste management, since iQRenew currently processes 24 000 tonnes of post-consumer soft plastic annually (Soft Plastics Taskforce, 2025).

Now, the newest government funded system aims to process around 300 000 tonnes of soft plastic annually, to avoid landfill.

The general manager of iQRenew Waste Facility, Graham Knowles, claims that "If we could get more of Australia's plastic in a receptacle we can work with, the nation would repurpose so much waste" (Totino, 2025).

However the question remains. Will this ensure soft-plastics recycling in Australia, or will this merely be another incident of 'greenwashing' and false promise that our waste is being managed correctly?

Organisations Doing a Good Thing

Many companies are making considerable efforts to step into the spotlight.

Some are collecting plastic.

For example, The Ocean Cleanup is working to remove ocean plastic, and has projections to clean the entire Great Pacific Garbage Patch (a patch of ocean garbage twice the size of Texas), by 2050. Aussie company Seabin has developed a maritime trash can that filters plastic and debris from marinas and harbours, and has begun expanding globally. Plastic Bank collects waste from impoverished communities in exchange for currency to foster social and environmental value.

Others are focusing on repurposing it.

Based in Florida, 4Ocean sells bracelets made from recycled ocean plastic material, using their profits to fund ocean and coastline cleanups. Patagonia makes new jackets from recycled plastic fibres. Green Toys manufactures toys from recycled plastics. And Angirus India creates the sustainable "Wrick", an alternative to bricks, fashioned from recycled single-use plastic and industrial waste.

With hope and action from powerful companies, there is hope that plastic might one day become more cyclical.

A Word from Erin Rhoads

My research into the zero-waste influencer, campaigner and educator Erin Rhoads, held great resonance which I also hope to impart. Her words highlight that plastic management is crucial for Australia.

"We use a lot of plastic in this country and the scale of our soft plastic waste can be shocking. It really underscores how pervasive plastic has become in our lives", says Ms Rhoads.

Greater Sydney's landfill capacity is projected to run out by 2030 (CSIRO, 2025). Further, the average Australian uses approximately 2.5kg of plastic waste per day.

Rhoads says that, "Plastic itself isn't the villain, it's how we use, design, and dispose of it Mitigating plastic waste will be the first necessary step Australians can take to stand against the overconsumption and mismanagement of plastic.

The goal isn't a plastic-free nation, but a smarter, more sustainable one".

8 Tips for Zero Waste

The zero-waste lifestyle is crucial in order to mitigate your personal plastic usage.

Rhoads ensures that zero waste starts with small, simple steps.

"I try to carry reusables, compost food scraps, repair what breaks, and say no to single-use items whenever I can. For me, zero waste works best when it's shared, built on community, kindness, and collective action." (Rhoads, 2025)

There are both big and small ways zero waste can be implemented, but the key thing to remember is that it is possible!

1. Join the community! Find a Zero Waste Facebook group (e.g. Zero Waste Sydney or Zero Waste Australia) to get in touch with likeminded people

2. Choose reusable hygiene and care products. Buy from a bulk-supply store or make your own — from dental care and body wash.

3. Aim to shop for products with minimal to no packaging. Bring your own reusable tote and mesh/produce bags.

4. Avoid single-use plastics. When out of the home, use travel mugs, metal water bottles, cutlery, containers and cloth napkins.

5. Equip your kitchen. Build an inventory of reusable versions of frequently used items such as food covers, paper towels, beeswax wraps, sponges and silicone baking mats.

6. Waste less food. Shop smarter, sharpen food-storage skills and create an "eat me first bin" for your fridge. Make the most from your food scraps. Start up a compost and aim to plan meals.

7. Get creative in 'reuse'. Use mason jars for storage and bulk store shopping. Regift and wrap gifts without gift wrap.Shop for dry goods in bulk at stores that are either zero waste or allow packaging food in your own containers. (Rhoads, 2025) (Totino, 2025)

…& Avoid Microplastics

Microplastics are all around us. From the utensils we use for cooking, to the clothing we wear day to night, the containers our foods reside in and the inescapable single-use nature of all packaging. Here are some tips to apply to your daily habits:

At Home:

- Use reusable containers: These can be glass, metal or bamboo alternatives.
- Reconsider your kitchen: Avoid non-stick/Teflon pans. Use wooden or stainless steel utensils and chopping boards to prevent microplastic shedding.
- Filter your water: Using a quality water filter will remove microplastics from your tap water. Don't drink pre-bottled water, due to its high content of microplastics. (Fleming, 2023)

Garments & Personal Care:

- Wear natural fibers: Such as cotton, wool or silk, as opposed to micro-plastic shedders, like polyester or nylon.
- Microfibre filter: Wash synthetic clothes in cold water and add a microfiber filter to trap this form of microplastic.
- Choose care products wisely: Look for natural, plastic free alternatives. Avoid products, like body scrubs, that may contain plastic microbeads. (Hirschlag & Henriques, 2025)

Food and Drinks:

- Be selective with seafood: Fish and shellfish are microplastic prone, so limit your intake.
- Eat whole foods: Try not to choose highly processed foods, packaged in plastic.
- Storage: Avoid storing in plastic containers, so it doesn't leach into food over time.
- No plastic wrap: Limit packaged foods, such as take-away plastic containers or wrap. (Fleming, 2023)

Closing Statement

Whilst the issue itself is worsening, there is still ample time to reverse it. Humanity is powerful, and so much can be accomplished if we work together, show genuine care and combine our many forces.

One day, future generations might see a world that acts in harmony with its own creation.

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Racing for AI, ignoring the consequences – lessons Australia hasn't learned

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Australia's AI boom is outpacing environmental safeguards

Australia's push to become a global leader in artificial intelligence is outpacing the environmental policies designed to manage its impacts. Australian governments celebrate AI as a driver of productivity, innovation, and global competitiveness (DISR, 2025). But the infrastructure that powers this boom is anything but abstract. Large data centres are sprouting across the country, drawing heavily on electricity and water systems while locking in decades of environmental demand (Parliament of Australia, 2024). In this race for digital glory, accountability is lagging far behind.

Environmental approval frameworks were never designed for systems that run continuously, at massive scale, with complex cumulative impacts (Productivity Commission, 2024). Ministers speak confidently about "ethical" and "responsible" AI, yet the material costs – electricity draw, water consumption, land use – remain largely absent from public scrutiny (Ayres, T. 2025). If AI is to support Australia's clean-energy transition rather than undermine it, this blind spot can't continue. Australia's digital future is being built on outdated planning rules and regulatory blind spots disguised as progress.

The environmental cost of AI is material, not abstract

AI lives in data centres that never sleep. Thousands of servers operate around the clock, consuming electricity on a scale comparable to small towns and generating constant heat that must be aggressively cooled (Climate Council, 2025). Cooling systems alone can require millions of litres of water each year – water that would otherwise support households, agriculture or local industry (Taylor & Stock, 2025). In regions already experiencing drought stress or tightening water allocations, this is not a technical detail. It is a direct threat to everyday life. Yet in Australia, there is no consistent public reporting on data centre energy use, water draw, or lifecycle emissions. Governments are effectively flying blind.

Australia's electricity supply is cleaner than many countries, but it is not infinite. Industrial-scale AI demand risks intensifying grid stress during heatwaves and peak periods (O'Malley, 2025). Extreme weather continues to test the grid in parts of Victoria, narrowly avoiding blackouts (Mercer, 2026). Imagine that pressure multiplied by AI workloads. Land use impacts compound the problem. The sector is scaling rapidly, yet we are lacking transparent data on environmental impacts (Stevens, 2025). This pattern is familiar. The fossil fuel era taught us what happens when industries scale first and regulators scramble later. Communities and ecosystems absorb the damage. If Australia repeats that mistake with AI, the costs will be locked in long before the full consequences are understood.

Policy still treats data centres as harmless tech, not industry

Despite their scale, data centres are largely treated as benign technology infrastructure rather than industrial facilities. Planning systems at both state and local levels assess projects individually, with little consideration of cumulative effects on the environment. Environmental approvals focus on construction impacts, not decades of continuous operation. Critically, there is no national requirement for data centres to publicly report ongoing electricity consumption, water use or emissions. Projects can be approved without binding efficiency benchmarks, water-use limits or clear obligations to contribute to grid upgrades. Even where developments claim renewable energy sourcing, regulators lack clear rules governing how much shared infrastructure can be drawn down and at whose expense. This regulatory fragmentation mirrors past failures in energy and resource policy. Industrial demand is welcomed, while oversight lags. Allowing large AI infrastructure to expand without consistent national oversight risks repeating the same mistakes under a digital banner.

Communities are bearing the burden of AI's footprint

The costs of AI are not spread evenly. They fall most heavily on local communities hosting infrastructure they had little say in. Increased electricity demand can push up prices and threaten local grid reliability (Cumbo, 2025). Water-intensive cooling systems compete with households and small businesses during periods of scarcity. Land-use is another hidden cost. Data centres can dominate regional sites, alter the character of towns, and limit future development opportunities. Local communities are being left in the dark. Consultations are a formality, announced only once approvals are signed and construction is underway. Residents are presented with outcomes, not choices. This isn't environmental oversight, it's neglect. It echoes past failures on climate policy where urgency and investment bulldozed local voices aside. Have we really learned nothing?

Australia can align AI growth with environmental accountability

Australia doesn't have to choose between AI growth and environmental responsibility. But doing both requires rules that match the scale of the industry. National standards for data centres could set enforceable benchmarks for energy efficiency, cooling technologies and water use. Mandatory public reporting of electricity consumption, emissions and water draw would allow governments to plan infrastructure proactively rather than reactively. Environmental approvals should assess cumulative impacts, not just individual projects.

Planning and energy policy must be integrated. Large digital infrastructure should be explicitly incorporated into state and national energy, water and climate strategies, with clear expectations that major users contribute to grid resilience rather than undermining it. Just-transition principles matter here: communities should not subsidise private digital growth through higher bills or degraded services. Internationally, governments are beginning to move. The European Union has introduced mandatory sustainability reporting for data centres, while countries like Ireland have imposed restrictions on new developments where grid capacity is constrained (CRU, 2025; European Commission, n.d.). Australia can learn from these approaches rather than reinventing the wheel. Clear rules do not deter

investment. They provide certainty for industry, for communities, and for governments tasked with meeting climate targets.

AI's physical footprint is real, and the warning signs are here

AI may feel virtual, but its footprint is unmistakably physical. Data centres draw from the same electricity grids, water supplies, and land as any other industrial facility. Treating them differently is a recipe for avoidable risk. Australia's push for AI-led growth has overtaken policy. Without stronger oversight, Australia risks undermining its climate commitments and reshaping communities with little scrutiny. Sustainable digital innovation demands environmental accountability from the start. Progress that ignores its material cost isn't forward-looking — it just kicks the problem down the road.

> "While billionaires die alone in their mansions talking to their A.I. wives,
> I will live and die for my friends and family and global community."

— Frances Cannon, Instagram, 10 October 2024

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The gender blind spot in climate science: why our models overlook gender inequity

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When discussing climate change, people often regard it as a serious challenge facing humanity as a whole. That is true; however, when you project this problem onto individuals, you will easily find that this statement has limitations and that the impacts of climate change on different genders are averaged out. When catastrophic floods submerged one-third of Pakistan in 2022, the disaster revealed more than rising waters—it exposed how climate science fails to see gender. Nearly 650,000 pregnant women suddenly lost access to maternal healthcare, with thousands expected to give birth in displacement camps or under the open sky (Flood-Affected Women in Pakistan Need Urgent Help | Human Rights Watch 2022). More than 1,000 health facilities would be destroyed, leaving women without emergency obstetric care during a humanitarian crisis (Zaigham et al. 2023). Yet the climate models that predicted increased flooding couldn't predict this—that's because climate models, the sophisticated computer simulations the result of billions of dollars of adaptation funding that guide policy decisions worldwide, don't account for gender. Natural disasters disproportionately reduce female life expectancy compared to males, with the gender gap widening in contexts of low women's socio-economic rights (Neumayer and Plümper 2007). This isn't because floods or heatwaves discriminate. It's because our societies do, and our climate science is blind to it. It's a fundamental flaw that makes our climate science less accurate and our climate policies less effective—or worse, actively harmful to the people most vulnerable to the impacts. What's worse is that climate change may contribute to gender inequity if we continue neglecting gender-related topics when making climate policies with neutral predictions from climate models.

Gender Inequity Meets Climate Crisis

The vulnerability of females under climate change comes from the current unsolved gender inequity, which has deep roots in human society. These structural inequalities operate across multiple, interconnected dimensions, including limited educational opportunities, restricted mobility, exclusion from economic resources, disproportionate care responsibilities, and systematic exclusion from decision-making.

Although literacy rates vary across areas, the literacy rate for females globally is lower than that for males globally (Evans et al. 2021). With limited educational resources, most women must rely on low-paying jobs, like agriculture, to earn a living (Yamamoto et al. 2019). This can sometimes lead to early marriage, resulting in a heavy burden of caring for their families, lower income, and a reduced chance to participate in decision-making processes. Care responsibility is an issue faced by

females no matter what their education level is since this is a part of the core of patriarchal society. On the one hand, unpaid care, domestic work, and giving birth can limit their availability for full-time or higher-paying jobs (Zhang et al. 2024). On the other hand, the gender pay gap due to career interruptions for childcare drives women's higher poverty risk, and it often widens as women get older (Zając et al. 2025). Some of the females who have the chance to pursue higher education often still choose fields with lower earnings or avoid majoring in STEM fields due to gender stereotypes, creating an economic disadvantage from the start of their careers and limiting their impact on STEM fields (Quadlin et al. 2023).

All aspects are connected organically to limit females' influence on society, causing gender inequity in every field, including climate-related issues. Climate change directly impacts females' earnings and health. Low-income workers are the most vulnerable group under climate change, and most of them are women. They have low access to adaptation and recovery resources, their jobs may be more physically exposed to climate hazards such as extreme weather, and they have relatively weak resources and decision-making power (Tigchelaar et al. 2020; Bryan et al. 2024; UN Women – Headquarters 2025). Due to biological, geographical, and socioeconomic factors, females in low- and middle-income countries are facing an increasing risk of low birth weight, preterm birth, congenital anomalies, cardiovascular diseases, and mental health disorders under a changing climate (Kılavuz et al. 2025). Climate change also indirectly increases the care burden (Poddar, n.d.) and the risk of educational disruption (Kahomwe and Muzingili 2025; Pham 2025). In addition, the low impact of women in making climate policy due to unbalanced major selection means that women's needs are hard to see and address, leading to climate adaptation and resilience mechanisms (such as financing, technology, land, and insurance) often being less accessible to women (Pinho-Gomes and Woodward 2024).

In conclusion, gender inequalities stem from social structures that have institutionalized conceptions of gender differences. Climate change does not create these inequalities, but it weaponizes them. Every climate projection that fails to account for these structural constraints will underestimate harm to half the population.

The Models That Shape Our Decisions

Climate models are not only tools for predicting the future; they can also shape it. They are virtual earths that allow us to run experiments on them without impacting our real planet or waiting very long for results, making them the best tools for predicting the climate and helping inform policy. From the 1950s, models of the atmosphere, ocean, and land began to develop separately. The current development of climate models focuses on combining atmospheric, oceanic, and land models (called Earth System Models) and increasing their resolution. After decades of development, models in each field have matured, providing Earth System Models with a solid foundation. At the same time, as supercomputers' computing power grows, scientists focus on increasing the spatio-temporal resolution of the models. It provides us with an unprecedented understanding of small-scale dynamics. It will also give us a deeper understanding of how multi-scale movements interact, which can efficiently reduce simulation biases.

These simulations for academic exercises also serve as the foundation for global climate action. Based on global and regional climate simulations, governments will adjust or formulate policies to address economic losses and casualties from natural disasters. International public financing for climate change adaptation in developing countries increased from approximately US$22 billion in 2021 to US$28 billion in 2022 (United Nations Environment Programme et al. 2024). To address the predicted extreme weather, floods, droughts, sea-level rise, and other climate impacts, the Australian government has published a plan to mitigate economic losses and casualties from future disasters (Noble 2025). NOAA announced that as of 2022-2023, the United States had allocated approximately $223.6 million to coastal resilience projects ("Bipartisan Infrastructure Law Awards," n.d.). Europe is also accelerating its investment in adaptive infrastructure to address risks such as floods, extreme storms, and sea-level rise caused by climate change ("Climate Adaptation," n.d.). These decisions, affecting trillions in infrastructure investment and millions of lives, rest entirely on climate science. The models that project where floods will reach, how intense storms will become, and which populations face the greatest exposure shape everything from where governments build shelters to how high they raise levees. But here's what's missing from these projections: current models are systematically gender blind.

The gender-blind result is incomplete, and even dangerously misleading. They ignore that women often cannot make decisions about evacuation or adaptation, even when they're most affected by the consequences. They assume equal access to recovery resources that gender inequality systematically denies to women. They rely on aggregated data, such as average incomes, which mask the compounded disadvantages women face. Overall forecasts received by policymakers ignore implicit assumptions, and insufficient female voices in policymaking have led to climate change adaptation funding flowing to solutions inaccessible to women and enforcing the very inequalities.

At the same time, our current modelling efforts are primarily focused on improving the accuracy of natural processes. If our model can't account for who will be affected and how they will actually be affected under climate change, then the predictions are fundamentally flawed.

What's Missing: The Data and Methods We Need

If current climate models are gender-blind, what would gender-responsive climate science actually look like? The answer requires changes at three levels: the data we collected and simulated, the methods we use to model human behaviour, and the metrics we use to evaluate the success of simulation and policy. These changes require climate science to expand its focus to better represent the impacts of climate change on human society.

First of all, we need comprehensive gender-climate data catalogues that systematically link climate hazard data with the social factors that determine who is vulnerable and why. These catalogues should integrate climate hazard data (flood zones, drought frequency, heat exposure, sea-level rise projections), gender-disaggregated socioeconomic data, and intersectional data that captures how gender intersects with poverty, age, disability, ethnicity, and other factors that

compound vulnerability. Critically, these catalogues must be interoperable with existing climate models to promote the use of data. Imagine assessing extreme-rainfall risk in coastal Bangladesh: modelers map flood risk using rainfall forecasts, drainage capacity, infrastructure location and historical floods. Then by adding gender-sensitive data — female-headed households, women's land-ownership, women's access to early-warning systems, movement-restrictions on women — you realise that two zones with equal physical rainfall risk can have very different real risk: in one zone women own land and move freely, while in the other women face insecure tenure, male-dominated information channels and constrained mobility, making them far more vulnerable.

Better data should be assisted with better representation of human behaviour in models to improve our gender-wise climate simulations. When we want to understand human responses, simulations rely on economic models that assume people are rational actors with equal capabilities who make optimal decisions based on available information. Modelling frameworks need to be co-designed with social scientists, gender experts, and the communities most affected by climate change. Participatory modelling processes enable communities to define which variables are most important and incorporate local knowledge about social constraints into the model structure. Qualitative data, such as ethnographic insights into adaptive constraints, documentation of gender norms, and narratives of past climate responses, can serve as model inputs.

Finally, we need to change how we evaluate simulation accuracy when assessing the climate risk to human society and the impact of climate policies. Currently, climate interventions are primarily evaluated using techno-economic indicators, which fail to distinguish between climate policies that benefit everyone and those that concentrate benefits on those with existing resources while leaving the most vulnerable behind or even worsening their situation (Sauer and Stieß 2021; Jernnäs 2025). We need to adopt a feminist and human rights framework when evaluating model results and climate policies to include gender equality as an explicit criterion in scenario assessments (Sauer and Stieß 2021). We need not "50,000 farmers planted drought-resistant crops," but "50,000 farmers planted drought-resistant crops: 35% women and 65% men—due to persistent land tenure insecurity, women farmers are concentrated on less productive plots." These indicators make visible what is currently invisible: whether climate action reduces or exacerbates gender inequality.

All of these changes are technologically possible. Agent-based models, gender-disaggregated data, participatory methods, and feminist evaluation frameworks exist (Alonso-Epelde et al. 2024). What's missing is not capability but priority: the institutional commitment to make gender-responsive climate science standard practice rather than an exceptional effort. That commitment must come from the institutions that shape climate science and policy—and from the funders and policymakers who have the power to demand it.

A Call for Collaboration

Transforming climate science to be gender-responsive requires coordinated action across the entire ecosystem of climate research, policy, and funding. Every major

actor in this ecosystem has concrete levers they can pull, but it will only work if they pull together. We need research institutions to provide technical capacity and scientific credibility, funders to create incentives and resources, and policymakers to generate demand and set standards.

Climate research centres and the IPCC must co-design modelling frameworks with social scientists, gender experts, and affected communities, investing in data catalogues that link climate hazards to gender-disaggregated vulnerability indicators and training scientists in gender analysis as a core competency. While the IPCC's Sixth Assessment Report improved author gender balance and included cross-chapter analysis on gender, these considerations remained siloed rather than systematically integrated—a pattern the Seventh Assessment Report must break (Sixth Assessment Report — IPCC, n.d.).

Climate funders hold the most direct power to accelerate change. Institutions like the Green Climate Fund and Adaptation Fund must mandate gender-responsive approaches in projects above meaningful thresholds, requiring vulnerability assessments that demonstrate how projections account for gendered vulnerabilities and ensure substantive integration throughout project design. Critically, funders must invest in gender-climate data systems and modelling tools to encourage the consideration of gender differences under climate change. The funders could lead by updating investment criteria to explicitly require gender-responsive scenario planning with clear compliance metrics.

Policymakers must demand that climate science reflects the populations they serve, asking directly when presented with assessments: Does this account for gender-specific vulnerabilities? Who benefits and who gets left behind? National adaptation plans should be grounded in disaggregated analysis, not aggregate statistics that mask inequality.

I'm starting to work on a framework for gender-responsive climate modelling and actively seeking partnerships with researchers, institutions, NGOs, and policymakers committed to ensuring that climate science serves fairness and accuracy. This isn't just about improving models; it's about ensuring that science, which influences trillions of dollars in decisions and millions of lives, truly serves the people it's designed to serve. Climate science must consider gender, not as an optional extra, but as a fundamental requirement for accuracy and fairness.

Climate science is not neutral. It's rooted in assumptions about who matters and whose experiences have value. We have the power to change these assumptions. The question is whether we have the will.

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