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Science-policy-practice gap – Tourism emissions in Queensland

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1. Introduction

Research into the carbon footprint of tourism began in the early 2000s, receiving a boost when the Sustainable Tourism Cooperative Research Centre in Australia produced a comprehensive emissions inventory for its tourism sector (Dwyer et al., 2010). This research and the associated political process laid a foundation for subsequent work and the growing recognition of tourism as a major contributor to global (Sun et al., 2024), national (Demeter et al., 2021), and sub-national greenhouse gas emissions (Pham et al., 2022). Research on tourism's carbon footprint was accompanied by early calls for dedicated tourism-climate change policies (Becken & Clapcott, 2011).

Meanwhile, the risks of climate change are becoming increasingly evident through infrastructure destruction, loss of ecological assets, effects on human health, rising business costs, and shifts in visitation patterns (Tourism Panel on Climate Change, 2023). Tourism's dual role as a major carbon emitter and precarious dependence on healthy ecosystems has prompted governments and industry to develop strategies that integrate climate change into decision-making and practice (e.g., Gössling et al., 2023; UNFCCC, 2024; von Briel & Dolnicar, 2025). Responding to both aggravating climate impacts and mounting pressures to reduce carbon risk, governments worldwide have increasingly sought to measure tourism emissions and integrate tourism with wider climate strategies. In Australia, the State of Queensland has invested in a

“Carbon Inventory for Tourism” (Pham et al., 2020) – the anchor of this commentary – to support its climate goals of reducing emissions 35 % below 2005 levels by 2030 and reaching ‘net-zero’ by 2050 (Queensland Treasury, 2025).

Despite progress in Queensland and elsewhere, Higham et al. (2024) highlight a persistent science–policy gap in tourism, where responses to climate change lag behind the pace of emerging scientific knowledge. Strengthening the links between research, policy design, and practice is essential for targeted and effective climate interventions. Understanding where gaps exist can improve the potential of research to influence policy and practice (Volgger et al., 2025). This commentary reflects on the impact of a research paper by Pham et al. (2022) on tourism emissions in Queensland that followed several interconnected research contracts commissioned by the Department of Environment and Science (DES)¹ to advance climate action in the Queensland tourism sector.

2. Theoretical framing of research impact

The influence of research on decision-making is difficult to determine, partly because it is diffuse, rarely linear, and not immediate. The concept of a science–policy–practice gap encapsulates the reality that even when knowledge is produced, it does not always translate directly into policy design or changes in practice (Leeuw et al., 2008; Weiss, 1977). In the social sciences especially, “evidence suggests that government

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¹ The Department of Environment and Science (DES) was established in 2017, evolving from the earlier Department of Environment and Heritage Protection. It was renamed to the Department of Environment, Science and Innovation (DESI) in 2023, and expanded to the Department of the Environment, Tourism, Science and Innovation (DETSI) in 2024.

officials use research less to arrive at solutions than to orient themselves to problems” (Weiss, 1977, 534). Thus, research on contemporary issues, such as climate change and tourism, may be less instrumental, but more conceptual or symbolic in its use by decision-makers (Volgger et al., 2025).

Leeuw et al. (2008) propose several theoretical models for the science-policy-practice gap. For research specifically commissioned by government or industry, the ‘Utilitarian Evidence’ model is helpful. It focuses on the usefulness of research and its direct applicability to real-world issues. Key attributes in this model include salience, credibility, and legitimacy (Weichselgartner & Kasperson, 2010). This model can be complemented by the ‘Blurring the Boundaries’ approach, which recognises that researchers, policymakers, and practitioners increasingly collaborate around shared goals, values, and language. Policymakers with a research background, for example, are better equipped to interpret the science and recognise its value. Researchers with policy or industry experience will connect more effectively with ‘what matters’ when they pitch (Weiss, 1977) their idea or collaborate with sector stakeholders. The better the mutual understanding across these communities, the more effective the translation of knowledge.

A key aspect of this dynamic is the process of agenda setting, as a critical step in the policy cycle (Becken & Loehr, 2025). Change can happen when multiple factors align to create an opportunity. Known enabling conditions include committed individuals who champion ideas, institutional agility to pivot under changing circumstances, and adequate resourcing to provide ongoing implementation support. Constraining conditions include political turnover, competing priorities, and funding crises (Becken & Clapcott, 2011). In tourism, the longstanding tension between growth imperatives and environmental concerns adds further complexity. This tension helps explain why the science-policy-practice gap persists. Taken together, rather than expecting a direct causal link between paper publication (an output), uptake of findings, and lasting impact, it is more productive to trace how the paper shifted agendas, narratives, capacities, and networks over time. Impact here is nonlinear, slow-burning, and contingent; yet nonetheless real

and consequential.

3. Interwoven activities and research influence

The Queensland Government engaged with the issue of tourism and climate change through the *Tourism Sector Adaptation Plan*, which formed part of the broader Queensland Climate Adaptation Strategy. Shown as an input in Fig. 1, the Department of Environment and Science (DES)¹ provided funding and facilitation, but the plan itself was industry-led and co-developed with the Queensland Tourism Industry Council and sector representatives. Griffith University was commissioned to provide scientific expertise (Becken et al., 2018). One recommendation from the Sector Action Plan was to calculate the carbon footprint for Queensland tourism. This was delivered two years later, again with Griffith’s involvement (Pham et al., 2020). The report for the government was complemented by a paper published in *Annals of Tourism Research Empirical Insights* (Pham et al., 2022) (outputs in Fig. 1).

The paper presented a top-down method that integrated Tourism Satellite Accounts with the National Greenhouse Accounts, whereby emissions were calculated for all 13 tourist destinations in Queensland. Importantly, an extension was delivered to capture emissions resulting from visitors’ travel to Queensland, including those related to international aviation. The information was intended to inform mitigation policies tailored to the specific context of each destination. The paper recommended that future marketing campaigns and development of air links should consider the significantly higher carbon footprint of international markets, compared with domestic visitors. It recommended better policy integration with transport planning and decarbonisation to address the significant domestic emissions related to mobility and concluded that emissions accounting should be seen as a starting point for ongoing policy modelling and regular updates.

The release of the tourism carbon footprint was soon followed by a complete halt in tourism due to the COVID-19 pandemic, pausing also any conversations around reducing tourism emissions. In early 2022, the

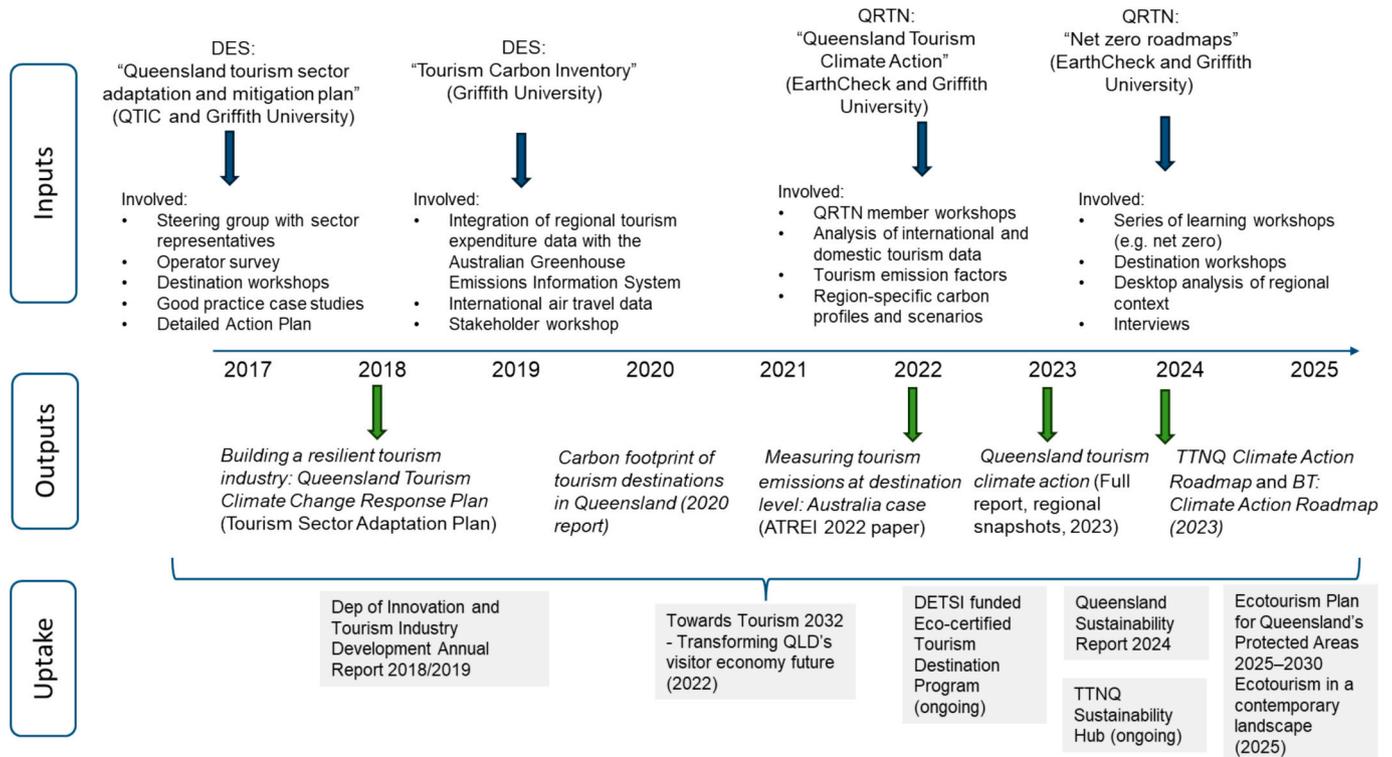


Fig. 1. Timeline of climate change-related initiatives and outputs in the Queensland tourism sector.

Queensland Premier announced that the “government would invest \$100 million matched dollar-for-dollar by the state’s largest four airports to secure flights and rebuild Queensland’s \$6 billion international tourism industry” (Queensland Government, 2022, p. 1). Thus, recovery took priority over reducing aviation emissions. Despite this, the Queensland Regional Tourism Network (QRTN) secured strategic funding from Tourism and Events Queensland to measure, benchmark, and forecast regional tourism emissions (another input in Fig. 1). This time, a bottom-up methodology was added to Pham et al.’s work, linking regional tourism expenditure with sector-specific carbon coefficients. The Brisbane-based consulting and certification organisation EarthCheck, in partnership with Griffith University, led the work, supported by a Steering Committee of sector representatives. The approach aimed to engage businesses in carbon monitoring and included tailored decarbonisation actions.

Building on this, Net Zero Roadmaps were developed for two pilot regions: Tourism Tropical North Queensland (TTNQ) and Bundaberg Tourism (BT). Griffith University provided the relevant science (including several educational presentations) and participatory development of the roadmap, and EarthCheck worked directly with businesses to promote uptake of a free carbon calculator. In both destinations, local government and other key stakeholders were involved in the research and roadmap delivery. Whilst TTNQ has made some progress on implementing the roadmap, for example, evidenced in its online Sustainability Hub featuring business support tools and engagement of a local sustainability coordinator, a change in local government and deprioritisation of net-zero targets in Bundaberg slowed progress. Nonetheless, the regional tourism organisation (BT) continues to promote sustainability certification and carbon monitoring with its members. Queensland-wide, the government continues the financial support to businesses for carbon monitoring and certification through a sustainable destinations programme.

There is evidence that these projects have informed government policy, though recognition has been inconsistent. Fig. 1 shows uptake in the 2022 strategy for Queensland tourism *Towards Tourism 2032*, which demands a “clear industry pathway towards net zero emissions” (Department of Tourism, Innovation and Sport, 2022). Similarly, the State’s *Ecotourism Plan* emphasises the critical role of ecosystems in mitigating climate change through carbon sequestration (Department of Environment, Tourism, Science and Innovation, 2025). The most recent tourism strategy for Queensland, however, does not mention climate change or tourism emissions (Queensland Government, 2025). Elsewhere, the climate-tourism nexus remains visible, for example, in the *Advocacy Plan* by the Queensland Tourism Industry Council (QTIC, 2025) and recognition of nature-based tourism in the State’s *Clean Economy Pathway* (Department of Energy and Public Works, 2024).

4. Reflections

The Pham et al. (2022) paper emerged during a period of heightened commitment to include tourism in Queensland’s climate change agenda. Since then, political change and crises have shifted politics and narrowed the policy window for tourism-specific climate policy and action. This explains why an earlier Queensland strategy explicitly embraced net-zero emissions, while a later one appeared less ambitious. Rather than signalling failure, such back-and-forth illustrates how ideas can retreat temporarily but remain available for reactivation when conditions change. The science–policy–practice triangle (Leeuw et al., 2008) provides a useful framework for reflections (Fig. 2).

The research on Queensland’s tourism carbon footprint has been central in shaping awareness and discourse related to climate change mitigation. Detailed analysis of greenhouse gas emissions from tourism in Queensland, using a top-down and bottom-up approach, provided quantification of the magnitude of the challenge, as well as pertinent areas for action. For example, it highlighted the significant impact of international aviation on projected decarbonisation pathways.

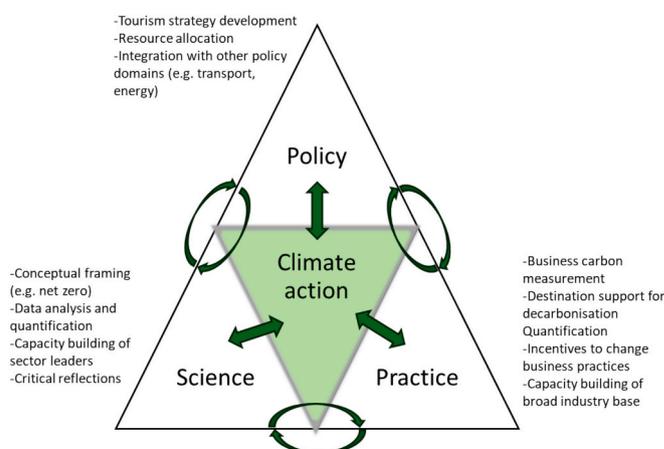


Fig. 2. Science-Policy-Practice triangle with blurred boundaries around the middle triangle to indicate shared values and language.

However, pilot projects with two destinations to develop net-zero roadmaps made clear that stakeholders were not ready to include aviation emissions in their targets. This is an important finding: the act of quantifying impacts helped define the boundaries of what was politically and practically acceptable. At the same time, the active engagement of the research team with sector leaders and key institutions helped put climate change on the tourism agenda. Significant capacity was built, including in relation to key concepts such as net-zero and carbon sequestration.

On the policy side, the role of individuals inside government emerged as crucial. Champions have carried the issue forward, even as political priorities shifted and departmental structures changed. Some continued their advocacy after moving into new organisations, providing consistency and backbone to the agenda. Government commissioning of work, and its uptake into strategies at certain times, has helped position climate change as a legitimate tourism policy issue. The available science made it credible. Yet there have also been setbacks. The most recent Queensland tourism strategy is dominated by an economic growth and investment agenda, with sustainability mainly framed through the expansion of ecotourism. This omission illustrates how political positioning can depart sharply from scientific evidence (Volgger et al., 2025). It is important to recognise that tourism governance in Queensland is institutionally separate from the parts of government responsible for climate change, even though the (now) Department of Environment, Science and Innovation brings tourism and environment under the same roof (this may not guarantee integration). The State maintains commitment to its climate targets, suggesting that the present science–policy gap is specific to tourism (Becken & Loehr, 2025).

Ultimately, changes in tourism practice are critical to reducing sector emissions. Industry and destination-level practices have both shaped and been shaped by this work. Stakeholders actively participated through surveys, pilot projects, steering committees, and regional workshops. They learned to interpret emissions inventories and to understand which levers of change were within their control. Recognising that aviation emissions were “too big to tackle” at the local level helped crystallise a focus on what destinations *could* act on, including reducing emissions through waste management and restoring natural carbon sinks. Industry bodies were pivotal in building business capacity and climate literacy, and regional tourism organisations emerged as important connectors and leaders. Their close relationships with businesses position them well to keep climate action alive at the grassroots. As a direct result of this work, *Tourism Tropical North Queensland (2024)* reported new performance measures: 15 % of businesses measured and offset their carbon footprint, 32 % generate or use renewable energy and 14 businesses are involved in waste reduction programmes. Localising

action is one way of sustaining commitment when state-level commitment is fluctuating.

The strength of this body of work, beyond the specific paper in *Annals of Tourism Research Empirical Insights* that triggered this commentary, lies in the bridges across the different communities of the triangle, visualised through arrows in Fig. 2. Individuals who championed the cause, regardless of institutional affiliation, ensured continuity. Organisations such as Griffith University and EarthCheck provided stability around climate action in tourism, despite political shifts. The interwoven activities visualised in Fig. 1 created an ‘ecology of ideas’ (Bateson, 1972) that combined government commitment (evidenced in resources allocated at times), formal scientific outputs, embodied knowledge and experience carried by individuals, and on-the-ground action to sustain momentum even when contextual conditions represented structural headwinds. The existing network of climate-literate individuals and organisations can be activated anytime to reintegrate tourism into the State’s broader climate strategies. In the meantime, local action continues, and so does research across an emerging cluster of researchers from both Griffith University and the University of Queensland.

5. Concluding thoughts

Re-engaging with the Pham et al. (2022) paper and the projects that preceded and succeeded the carbon footprint analysis, underscored that research impact is complex, challenging to trace, and often a ‘slow burn’. This holds true even when research is commissioned by the Government and supported by private sector organisations. Clearly, the initial climate action plan and tourism carbon inventory did not translate into tangible action at the State level. The economic shock of the pandemic, changes in political leadership, and the systemic inertia of a hard-to-mitigate sector all contributed to this outcome; perhaps most evident in the *Destination 2045* strategy, which omits climate change altogether (Queensland Government, 2025). Whilst this is disappointing, it is not all about failure. Substantial groundwork has been laid, including with other parts of the Queensland Government that recognise tourism’s role in achieving State climate goals.

The experience of undertaking and reflecting on the research highlights that ongoing commitment and presence are critical factors in achieving long-term change. Working alongside partners from government and industry, sometimes in varying roles and constellations, ensures continuity when headwinds emerge. Importantly, learnings cannot be unlearned. Those involved in the process carry forward an enhanced understanding of the urgency to reduce tourism emissions. Even if climate action within the tourism sector slows, ongoing global, national, and state-level commitments to climate change provide a foundation for re-engagement. When the policy window widens again, the carbon footprint inventory will serve as a vital baseline for renewed action.

I do not have a conflict of interest with this commentary paper.

Declaration of generative AI in scientific writing

Help improve readability of draft text.

CRediT authorship contribution statement

Susanne Becken: Writing – review & editing, Writing – original draft, Visualization, Investigation, Data curation, Conceptualization.

Declaration of competing interest

None.

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Susanne Becken research focus is on the tourism-climate change interface and its links to policy making, tourism management, business operations and consumer behaviour.