Crossing the line: Australian insights in establishing basin boundaries for the Mekong Basin

Andrew Little[1], Tarek Ketelsen[1], Tien Le[1], Rory Smith[1] and David Winfield[1]

1 Alluvium Consulting, East Melbourne, Victoria, Australia 3002. Email: andrew.little@alluvium.com

Key points

- Planetary boundaries provide ecological limits, though have faced challenges when trying to downscale to a local context
- The Mekong River Basin is facing environmental collapse linked to hydropower development, altered flow regimes, and sediment disruption
- Reflection on the Murray Darling Basin provides example of how downscaling boundaries thinking can be successful when it includes collaboration, time and reflection of the implementation boundaries

Abstract

Global environmental governance faces a fundamental challenge: the frameworks best suited to understanding planetary-scale ecological limits are often poorly suited to the jurisdictional realities through which societies actually manage their environments. The planetary boundaries framework, developed to define a safe operating space for humanity across nine Earth system processes, has proven a powerful conceptual tool for communicating the scale and urgency of environmental degradation. Yet its application at the global scale limits its direct utility for water managers, whose jurisdiction is typically national and sub-national, not global.

This paper argues that river basins offer a critical intermediate scale at which planetary boundary concepts can be meaningfully operationalised. As contiguous, geo-hydrophysical systems, river basins better align scientific understanding of environmental limits with the jurisdictional boundaries through which riparian states govern water, land and energy. We illustrate this argument through a critical review of Australia's Murray-Darling Basin experience, where the 1995 Cap on surface water diversions — and its subsequent evolution into Sustainable Diversion Limits under the 2012 Basin Plan — represents a practical, if unintentional, example of downscaling a freshwater planetary boundary to a basin-level governance response.

We then apply these lessons to the Mekong, a river system facing accelerating environmental collapse driven by two decades of unplanned hydropower development, altered flow regimes, sediment disruption and deteriorating delta systems. We argue that a basin-boundaries framework offers the Mekong countries a transformative new approach to water governance — one that grounds inclusive societal prosperity within the environmental limits of the river system itself.

Keywords

Planetary boundaries, River basin management, Transboundary water governance, Downscaling global frameworks, Mekong River, Murray Darling

Introduction

This paper examines whether the planetary boundaries framework might provide a conceptual basis for a more substantive approach to environmental governance in the Mekong. Introduced by Rockstrom et al. (2009), the planetary boundaries framework identifies nine Earth system processes whose integrity underpins a safe operating space for human societies. Its core logic — that biophysical thresholds exist beyond which ecological change may become non-linear and difficult to reverse, and that governance should be oriented towards maintaining conditions safely within those thresholds — is directly applicable to the problem of managing a shared river basin. We explore whether this logic, developed for the global scale, can be operationalised at the scale of a river basin and translated into actionable governance instruments.

Efforts to apply the planetary boundaries concept at sub-global scales have been ongoing since shortly after the framework's introduction. Dearing et al. (2014) developed frameworks for safe and just operating spaces for regional social-ecological systems. Nykvist et al. (2013) examined national-level allocations of the global safe operating space. Cole et al. (2014) applied a downscaled safe and just space framework at national scale in South Africa. The SOS Water research programme has developed basin-level hydrological boundary frameworks for major river systems (Artuso et al. 2025). These efforts have demonstrated the conceptual feasibility of sub-global boundary applications while also revealing substantial methodological and governance challenges, particularly in translating quantitative biophysical limits into enforceable policy instruments.

To assess what basin-scale boundary governance requires in practice, this paper examines the Murray-Darling Basin in Australia — the only large, multi-jurisdictional river system for which a legally enacted system of basin-scale diversion limits, derived from ecological science, has been developed and partially implemented. The Murray-Darling Basin's trajectory from unregulated extraction to the Sustainable Diversion Limit (SDL) system established under the Basin Plan 2012 provides a detailed case study of the institutional, scientific and political conditions under which the concept of a system boundary can be translated into governance practice. The analysis draws lessons from this experience that are relevant to the development of improved environmental governance frameworks for the Mekong.

The planetary boundaries framework

The concept and its governance influence

The planetary boundaries framework was introduced in 2009 by a group of 29 Earth system scientists (Rockstrom et al., 2009). The framework identifies nine Earth system processes that collectively regulate the stability and resilience of the Holocene state — the climatic and ecological conditions that have characterised the past ten thousand years of Earth history and within which human civilisation has developed. For each process, a boundary value was proposed, defined as a quantitative limit set at a safe distance from a threshold beyond which non-linear or abrupt change in Earth system state becomes more probable.

The framework represented a departure from earlier formulations of global environmental limits. The Limits to Growth analysis (Meadows et al., 1972), the most widely cited predecessor, focused primarily on the finite availability of material resources and projected system failure when stocks were exhausted. The planetary boundaries approach shifted the analytical focus from resource stocks to Earth system process dynamics, characterising the feedbacks and threshold behaviour of biophysical systems rather than their depletion trajectories. This reframing allowed for the possibility that productivity improvements and technological change could reduce material throughput, provided that the underlying Earth system processes remained within defined operating ranges (Biermann and Kim, 2020).

The framework also shifted the basis of environmental governance from a reactive, harm-mitigation logic to a precautionary, threshold-based logic. Under conventional environmental governance, regulatory intervention typically follows documented evidence of harm using tools like environmental impact assessments (EIAs) to establish causality, quantify impact and prioritise measures to avoid, reduce or mitigate adverse impacts. The planetary boundaries approach inverts this: it asks whether human activity remains within a defined distance from a threshold beyond which harm could become irreversible, rather than waiting for harm to be demonstrated. The precautionary orientation is a direct consequence of the non-linearity and potential irreversibility of Earth system threshold responses.

Limitations of the planetary boundaries framework

Several well-documented limitations constrain the direct application of the planetary boundaries framework to environmental governance. The most significant is the scale mismatch between the framework and governance institutions (Rieutor et al., 2025). The framework characterises processes operating at the global scale, whereas environmental governance operates at national, subnational and catchment scales. Steffen et al. (2015) explicitly cautioned that the framework is not designed to be downscaled or disaggregated to smaller scales such as nations or local communities. This is not merely a technical issue of spatial aggregation: the systemic properties that define the boundaries — including non-linear feedbacks and threshold dynamics — are properties of the global Earth system and may not be preserved when the framework is applied to sub-global units. Attempts at national and regional downscaling have had to address this conceptual tension, with varying methodological approaches (Hoff et al., 2015; Dao et al., 2018).

Other important issues identified include:

- The governance legitimacy of science-defined boundaries. The planetary boundaries are determined through quantitative Earth system modelling by expert scientists, and the normative choices embedded in the framework — including the selection of processes, the placement of boundary values, and the weighting of risks — are not fully transparent and have not been subject to wider democratic deliberation (Stirling, 2015; Dryzek and Pickering, 2019).
- The framework does not address questions of allocation. Defining a global safe operating space does not specify how that space should be shared among nations, communities or sectors. The absence of an embedded allocation framework has limited the political uptake of the planetary boundaries concept in multilateral governance contexts (Kalfagianni et al., 2023)
- The framework is diagnostic rather than prescriptive in its governance implications. As Steffen et al. (2015) noted, the framework does not provide guidance on the institutional arrangements, policy instruments or behavioural changes required to remain within or return to the safe operating space. Identifying a boundary transgression does not, in itself, indicate what governance response is appropriate. This gap between the scientific characterisation of limits and the institutional design required to enforce them is where much of the practical difficulty lies.
- Finally, there is also a geospatial mismatch between the scales at which thresholds are understood and measured (i.e. the planetary scale) and the scales at which humans are competent at managing (i.e. national and sub-national).

Downscaling planetary boundaries to the river basin

We explore whether downscaling to a river basin scale can function as a practical intermediate scale to address these challenges. River basins are coherent hydro-geophysical systems with process dynamics that are, in principle, measurable and modellable at the basin scale. Water, sediment, nutrients and energy move through basins according to hydrological and ecological processes that can be characterised using basin-scale monitoring and modelling. The effects of human interventions — dams, diversions, land clearing, groundwater extraction — can be traced through the basin system, and basin-scale analogues to planetary boundary control variables — inter-annual flow variability, sediment flux, flood pulse characteristics, water quality parameters — can be identified and quantified (Vörösmarty et al., 2010; Dearing et al., 2014).

River basins also have existing governance relevance. Major river systems have functioned as units of administrative and legal organisation in many jurisdictions, and water law, catchment management institutions and planning frameworks are commonly organised around basin boundaries. At the transboundary scale, basin commissions — including the Mekong River Commission, the International Commission for the Protection of the Rhine, and the Murray-Darling Basin Authority — provide institutional structures for coordinating governance across jurisdictional borders, providing a potential foundation for more substantive boundary governance.

The principal challenge in basin-level applications of boundary logic is not the scientific characterisation of limits but their translation into enforceable governance instruments. The concept of a flow regime requirement, for example, can be specified in scientific terms as a range of flows within defined parameters of volume, timing, frequency, duration and rate of change. Translating that specification into a legally binding allocation decision that is implemented across multiple jurisdictions, monitored with adequate precision, and enforced against non-compliance requires institutional capabilities and political conditions that are substantially more demanding than the underlying science.

The Mekong River in crisis

The Mekong River Basin is experiencing a well-documented process of environmental degradation. It is a crisis in the making. The basin supports approximately 70 million people, contains more than 1,300 freshwater fish species, and sustains inland fisheries estimated to produce between two and three million tonnes of fish annually (Hortle, 2007; Baran and Myschowoda, 2009). Evidence of systemic ecological change is substantial: documented declines in fish biomass and catch across the lower basin over the past two decades (Ziv et al., 2012), progressive modification of the seasonal flood pulse that underlies basin productivity (Holtgrieve et al., 2013), collapse in basin-scale sediment transport and measurable delta subsidence attributable to reduced sediment delivery from the upstream basin (Kondolf et al., 2014; Schmitt et al., 2017). These changes have direct implications for food security, livelihoods and land stability across the lower basin states.

The primary driver of ecological change in the Mekong has been hydropower development. A cascade of large dams in both the upper basin (Yunnan Province, China) and more recently the Lower Mekong Basin (Laos) has materially altered the downstream hydrological regime affecting the transport of water, sediment, nutrients and aquatic biota, significantly undermining both the integrity and fertility of the vast Mekong floodplain and delta. These pressures are compounded by other resource extraction pressures (agricultural water abstractions, groundwater depletion, deforestation and land use changes); and the vulnerabilities of an over-utilised, fragmented and degraded Mekong system is further exacerbated by global climate change which is altering the hydrological regimes, elevating sea levels, and increasing the frequency of floods and droughts.

The Mekong is a large, biologically productive and socio-economically significant river system undergoing documented ecological change across multiple dimensions. The relative contribution of individual drivers varies by change type: hydropower development is the dominant driver of hydrological regime modification and sediment depletion, while climate change plays a proportionally larger role in altering flood and drought frequency, and agricultural abstraction and groundwater exploitation are increasingly significant in sub-basin areas but increasingly with basin wide impacts. These drivers interact in ways that can compound individual effects — for example, reduced dry-season flows resulting from dam regulation may be exacerbated by increased dry-season abstraction, and delta land loss is accelerated by the combined effect of reduced sediment supply and groundwater-induced subsidence.

As the Mekong seeks to address these issues, it is possible that the scaling of planetary boundaries can provide a framework for approaching the problem. With the limitations to the approach noted earlier, lessons for overcoming those challenges may be drawn from the experiences in Australia.

Understanding system boundaries in the Murray-Darling Basin

Overview

The Murray Darling Basin (MDB), located across the south-east of mainland Australia, is the combined drainage basins of the Murray River and Darling-Baarka River and is Australia's most important river system and the agricultural heartland of the nation. It spans over 1 million square kilometres, around one-seventh of the Australian continent, is home to 2.4 million people and is the nation's most significant agricultural watershed with an annual output of over $30 billion, or 1.7% of Australian GDP

(MDBA, 2026). It encompasses major river systems including the Murray, the Darling, the Murrumbidgee and the Goulburn, and their tributaries across Queensland, New South Wales, Victoria, South Australia and the Australian Capital Territory.

Importantly, the MDB encompasses the legislative areas of six governments at a state/territory and Commonwealth level, adding to the complexity in the way the basin is managed and understood. Management of the water resources available in the MDB prior to the 1980s focused on enhancing irrigation and mining growth and the economic benefits that would come with those industries. This 'build and supply' phase consisted of creating storage and delivery systems across the basin, most of which were government funded. As industry grew and water access became more competitive, water systems became over committed, at the expense of downstream users and the environment (Doolan et al, 2016).

Though the planetary boundaries concept was not the explicit driver of change in the MDB, it became obvious that a limit of human operation had been met, which necessitated a response. That action occurred through the cap on extractions in 1996 (the Cap) and the Sustainable Diversion Limit (SDL) that was introduced as part of the Murray Darling Basin Plan (the Basin Plan).

The Cap, the Water Act, and the Basin Plan

Acknowledgement of boundaries or thresholds in water availability within the Murray Darling Basin was first recognised in the 1990s through the adoption of a cap on surface water extraction known as "the Cap". As settlement increased across the MDB, freshwater extraction grew, a trend that increased sharply from the 1950s and 60s, tripling in the 50 years to 1994 (MDBC, 1998). Increased extractions were placing a noticeable strain on the system, with the Striking the Balance Report for Water Year 1997/98 (MDBC, 1998) identifying Lower Murray salinity, native fish populations, wetland and red gum forest health and the 1000km blue-green algal blooms among the key impacts of reduced freshwater availability, with median annual flow from the entire basin to the sea dropping to 27% compared to pre-development levels (Doolan et al, 2016).

These pressures were also coupled with the threats to agricultural productivity and security of the freshwater supply, and as a result, the Council of Australian Governments (COAG) commissioned a review into water resource management. This cross-jurisdictional review was followed up by a moratorium on increases to diversions in 1995, and a permanent cap on diversions (the Cap) in 1997. The Ministerial Council agreed (as quoted in MDBC, 1998) that the Cap be "the volume of water that would have been diverted under 1993/94 levels of development", albeit with some options for adjustment.

The development and agreement of a cap on extractions signalled recognition that the flows within the MDB had a threshold that human activity could impact on before the system begins to either no longer be able to support the current level of activity or collapse. Although all of the states and territories did not initially agree to the Cap (Queensland did not agree until 1998), this was a fundamental change in the way water was managed in the MDB, with the Ministerial Council (being the collective of Ministers responsible for water from across the MDB) acting on the information and data available about the system's thresholds.

While the Cap acted as a signal that a threshold was passed, it was not in itself the solution. Rather than reducing diversion, the Cap aimed at preventing diversions from increasing, attempting to arrest any further decline in river health or security of supply (MDBC, 1998). With diversions continuing to grow at unstainable levels, the Cap was "seen as an essential first step" towards establishing the systems required to manage consumptive use at levels that are sustainable for healthy rivers, water security and agriculture (MDBMC, 1996).

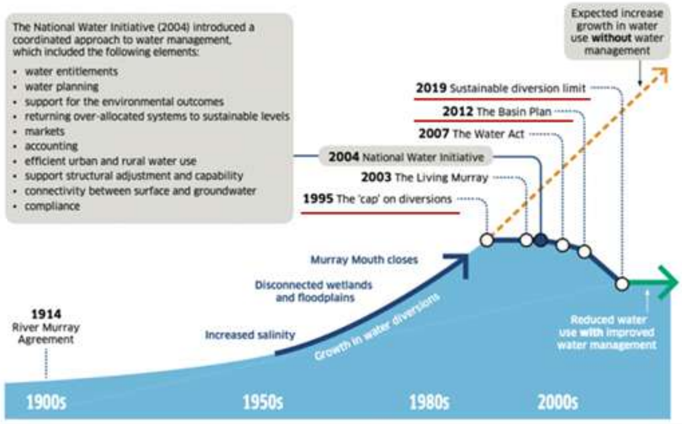

Figure 1 History of water reform in the Murray–Darling Basin (MDBA, 2026)

An Independent Audit Group (IAG) was convened to review the needs of the basin and the Cap itself, and the IAG agreed that the Cap was a pathway towards responding to over-extraction but not the end point. The IAG asserted that the overall objectives of balancing a healthy basin with security of supply and agricultural use could only be achieved though the establishment of management support systems and the institutional frameworks required to implement the changes required.

Following the recognition of the limits of the MDB and the subsequent 'cap' on extraction, momentum would build over the following years and coincide with the Millenium Drought, a period of unprecedently dry conditions lasting from between late 1996 to 2010. These extreme dry conditions would reach a peak in 2006, reinforcing the need for change in the way that water resource management was considered across the country (DELWP, 2016; Doolan et al., 2016). COAG would continue to facilitate collaborative efforts across borders, with the Cap serving as a steppingstone towards a longer-term solution, leading to the development of funding and governance arrangements that basin-wide reform required (Connell and Grafton, 2011). Recognition that a threshold was passed and the push from multi-jurisdictional efforts, allowed energy to build towards the *Water Act 2007* (Cth) and *Basin Plan 2012* (Cth) (the Basin Plan). These two Commonwealth Acts aimed to develop a basin wide framework for the sustainable management of its water resources (Connell and Grafton, 2011).

One of the core elements of the Basin Plan was the development of Sustainable Diversion Limits (SDLs) that would replace the Cap in time. The SDLs were intended to represent an evidence-based environmentally sustainable level of water use across the basin, setting limits on domestic, urban and agricultural use within catchments and across the basin to ensure the long-term water availability to meet environmental needs (MDBA, 2011).

When viewing this change through the prism of planetary boundaries, it is important to identify that the change from the Cap to SDLs shifted the focus from identifying that a boundary had been passed towards determining where the boundary lies and how to move back towards it. However, this threshold is affected by more than a simple balance of freshwater within the rivers of the MDB; rather, the boundary of water availability must ensure key environmental assets, essential ecosystem functions, productivity and environmental outcomes are not compromised (MDBA 2010b). With the MDB overallocated towards economic endeavours, SDLs require a reduction in diversions across the basin, and water recovered.

Though the Basin Plan held bipartisan support, the Basin Plan and its intention to recover large volumes of basin-wide water for the environment from consumptive use was met with concern from the communities that relied on it for their livelihoods. The reaction to the changes led to a revision of the plan, ultimately lowering the volume of water that was to be recovered for environmental purposes, with the intention of protecting those communities in the MDB (NMA, 2026). Notably, the MDBA knew that the transition from the existing level of extraction under the Cap to the reduced amount under the

SDL would have social and economic impacts at a scale proportionate to the scale of the reduction, so it established efforts to mitigate those secondary consequences (MDBA, 2010a).

The Guide to the Basin Plan also recognised the imperfections in the SDLs, such as the difficulties in measuring floodplain harvesting activity. Again, when considering the SDLs through the prism of the planetary boundaries framework, the chosen approach to developing the Basin Plan seems to have suffered similar issues to those the Rieutor et al. (2025) review identified. The most prominent example is the approach to developing a shared understanding of the plan, given the reaction to the plan across the MDB communities and the subsequent revision of the plan.

Insights for the Mekong and scaling boundaries

Consideration of the Cap and SDL as managing localised boundaries can provide insights into how similar thinking could be used in the Mekong River System. Given that the MDB and Mekong River Basin do not face the same challenges regarding freshwater resource management, and the manifestation of the localised boundary is different, key takeaways relate to conceptual issues of how to respond to the challenges, rather than the specific solutions themselves.

Lesson 1: Change takes time

The primary lesson from the MDB and the review of its responses to localised boundaries is that effective change takes time. When the Australian state and Commonwealth governments recognised that a boundary had been surpassed in the early 1990s, in the form of overallocation of freshwater, an initial response was put in place to help prevent the issue from getting worse (the Cap) but was not the ultimate answer. As has been discussed, the Cap was the first step towards a SDL, a process that remains ongoing over 20 years later. This is not to say that nothing has been achieved, quite the opposite. The path taken with the MDB shows that the initial action does not need to be the perfect solution, given that the perfect solution may not exist. Rather, an initial step is part of a longer journey towards a resolution.

Lesson 2: Choice of boundary type is important, doubly so

The most cited issue identified in the review conducted by Rieutor et al. in 2025 related to the selection and scale of the downsized or localised boundary (e.g., what scale the boundary should be downsized to and whether the borders should be geographical or jurisdictional). This issue raises similar questions in the context of the MDB and the Mekong, where the geographic watershed border of the basin covers multiple jurisdictions. When deciding which border to use, the lesson from the MDB is to use both. The geographic boundary of the basin will provide an understanding of the physical area that the issues are located in, giving a tangible scope to the boundary area; identifying the jurisdictional areas within the geographic area allows an immediate link to be formed to the groups that will be able to drive the change. Allowing both elements to support the understanding of the localised boundary creates the best setting possible to overcome the lack of political buy-in issues that have been highlighted in the Rieutor review.

Leson 3: Collaboration is key

With a dual boundary approach that links the natural world with the political, the MDB shows that once the political and legislative areas are identified, developing a collective response is key. By acting together, political buy-in challenges can be minimised, and transparency regarding individual impacts and responses may limit disagreement in the pathway to action. While it is recognised that having all Mekong Basin legislators working towards a solution will be a challenge, starting with those willing and able to collaborate initially is valuable, in combination with Lesson 1.

Lesson 4: Effective communication is vital

Collaboration within the MDB and its stakeholders has been shown to be an important tool for progressing change; however, it can also offer examples of the impacts of ineffective communication throughout the process. The review of the approach taken to develop the Cap and shift towards the SDL recognised that moving to restore the balance between the communities and economies that had been built on the over-allocation of the rivers was going to have social and economic ramifications that needed to be limited through other methods. However, when the first guide to the new plan was released, the reception was poor, including burning of the plan in one of the MDB towns (NMA, 2026), implying that ineffective communication of how the social and economic impacts were considered and planned to be mitigated contributed to the negative response.

Allowing collaboration with decision makers is important, and at least offering the opportunity to be involved can be important for ensuring the buy-in of the collective. Communicating these opportunities clearly and broadly is needed to ensure that the messages are received. Otherwise, there is the risk that the efforts are seen as disingenuous, or the benefits of the efforts are simply not realized.

Lesson 5: Crossing the line — scaling planetary boundaries is possible

The lessons from the MDB show that the planetary boundary framework can be downscaled, but elements of the boundaries thinking need to be refined to the specific scenario. For example, there are artificial jurisdictional borders that do not always align with the scaled boundary, which influences the approach to managing the system. While all the boundaries are likely to be best approached based on the natural borders, understanding the jurisdictional borders is vital for translating boundary science into policy and operational change. This nexus of planetary and localised boundaries with jurisdictional borders is where the breakdowns between scientific advancement and operational change are likely to occur but where the opportunities exist for collaborative change.

The MDB also demonstrated that when scaling the concept to a local area, it is the ‘safe operating space’ that is key and not the retrofitting of the boundary. The management of the MDB has not tried to rigidly apply the boundaries themselves that have previously been developed, rather accepted the limitation and tipping points of human activity which led to efforts to reduce that impact.

Conclusions

This paper set out to explore whether the systems thinking embedded in the planetary boundaries framework can be productively downscaled to the river basin scale, and what the Murray-Darling Basin experience reveals about what this requires in practice. The answers to both questions are cautiously positive, but with important qualifications. The investigation has been able to find that previous efforts to scale the planetary boundaries concept, and the representation of the safe operating space at a local level, has been attempted on numerous occasions with little to no success. The lack of success has been seen to be primarily in the transition from the scaled version of the concept to an outcome of the changes needed to respond – although we note that this issue may exist within the broader planetary boundaries concept given seven boundaries remain transgressed.

When applying the concept retrospectively to the responses in the Murray Darling Basin since the early 1990s, the approach of scaling the boundaries to a localised area provides a test case in the potential to scale the boundaries concept and how some of the challenges may be overcome.

The river basin does offer a promising scale for translating planetary boundary logic into actionable governance. Basins are coherent hydro-geophysical systems with measurable dynamics, governance-relevant boundaries, and existing institutional frameworks. The concept of a system boundary — a limit on human intervention beyond which irreversible ecological change becomes likely — can be operationalised at basin scale in the form of environmental flow requirements, sustainable diversion limits, and equivalent constraints on other components of basin system integrity. The planetary boundaries framework provides the conceptual logic; what is needed are the basin-specific science and governance instruments to give that logic institutional form.

Ultimately the MDB has shown the potential for the boundaries idea to be scaled down, with the work through the Cap and the SDL showing the recognition of a ‘safe operating space’ of freshwater usage even if not explicitly referenced. These measures show that the idea that human activity has a window or tipping point in which to operate is an idea that can be applied at a local scale, though as the interactions with other boundaries will still exist at other scale. Issues such as climate change and the planetary water cycle still exist, but the localization of the boundary is possible and potentially more beneficial approach.

The previous studies into the scalability of the boundaries showed limitations in transferring the concept to action, but even with the issues that action in the MDB faces, it is also an example of great possibilities. By applying the concept of the boundaries rather than the boundaries themselves the specific needs of the region are more likely to be understood, and the alignment with the non-geophysical boundary of the relevant jurisdictions creates the buy-in and involvement of policy makers that the actual change requires. Additionally, the involvement of the various stakeholders over the journey is an important element, with the early iterations of the Basin Plan demonstrating the risks of a lack of involvement and poor communication.

This study therefore supports the idea that planetary boundaries can be scaled to a local level. Boundaries can be scaled through the concept of a safe operating space and a tipping point boundary, with some adaptation needed to the local context. - with time, engagement, adoption of local dynamics and customs to develop a regionally relevant solution set that matches the regionally relevant challenges being faced. Additionally, the scaling of the planetary boundaries will be best placed to facilitate meaningful change if a second, jurisdictional boundary is considered concurrently. The geophysical boundary that aligns with the planetary boundary will help to identify and articulate the challenge, but the jurisdictional boundaries that the geophysical area lies within will be vital to ensure the successful implementation of the changes required.

The Mekong is not the Murray-Darling. Its ecological complexity is different, its governance fragmentation is more severe, its geopolitical environment is more challenging, and the communities that depend on it are more vulnerable. But the fundamental challenge is the same: to shift the governing logic of a river system from one that asks how much can be extracted towards one that asks what limits must be respected. The planetary boundaries framework provides the conceptual foundation for that shift; the Murray-Darling experience provides a practical demonstration of what it takes to make it real.

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