Alam Cipta Int. J. Sustain. Trop. Des. Res. Pract. 19 (2): 1-6 (2026)

ALAM CIPTA

Sustainable Tropical Design Research and Practice

Journal Homepage: http://alamcipta.upm.edu.my/

Editorial

At the Nexus of Science and Society: The Critical Role of Social Science in Translating Knowledge into Action

May Ling Siow[1]

[1]*Editor-in-Chief of Alam Cipta*

[2]*Department of Landscape Architecture, Faculty of Design and Architecture, Universiti Putra Malaysia*

Contemporary societies face increasingly complex challenges that cut across environmental, technological, economic, political, and social domains. These multifaceted global social-ecological challenges, ranging from climate change and biodiversity loss to public health crises like the COVID-19 pandemic can neither be comprehensively understood nor properly addressed through a single disciplinary or sectoral lens (Deutsch et al., 2025). In vulnerable coastal regions, for example, these challenges manifest as severe extreme weather events, storm surges, coastal flooding, landslides, and tidal erosion, which directly threaten local infrastructure, tourism, and marine habitats (Meulenberg et al., 2022). Because these pillars are fundamentally interconnected, the efficient and joint management of these resources is a critical prerequisite for maintaining ecological integrity, economic viability, and social stability (Tosiliani et al., 2026).

While advances in science and technology have significantly improved the capacity to generate evidence, model risks, predict outcomes, and develop potential solutions, the existence of scientific knowledge does not automatically lead to effective societal action. This "science to action" gap is heavily perpetuated by deep structural and cultural divides between the natural and social sciences, which directly hinder their integration into policy and practice (Fox, 2008). Rather than being a simple matter of research funding, these challenges are rooted in a stark disparity of professional authority and authoritative expertise between disciplines (Fox, 2008). Successful integration, depends more on strategic management and leadership that can successfully bridge these distinct academic cultures (Fox, 2008).

Policy Translation and Shifting Priorities

This lack of translation is compounded by a stark disconnect in operating environments and timeframes between science and policy (Halliday et al., 2025). Environmental science often works with long research horizons, while policymakers operate in highly dynamic political landscapes driven by short-term priorities, shifting jurisdictions, and election cycles (Halliday et al., 2025). Because policy processes are often compressed and reactive, decision-makers frequently develop and implement policies before scientific

e-ISSN: 1823-7231

research has the opportunity to be aligned, delivered, or fully digested (Halliday et al., 2025). This mismatch leads to underutilized or outdated evidence informing critical governance strategies (Halliday et al., 2025).

Even when policy is successfully formulated, there remains a structural theory-practice and operational readiness gap in environmental governance (Tosiliani et al., 2026). A stark contrast between theoretical and empirical studies reveals a coverage gap, in which conceptual work articulates the governance, equity, and ecosystem-integrity dimensions of the nexus much more fully than empirical work is able to measure them (Tosiliani et al., 2026). Consequently, what the field can conceptualize in theory, it often cannot operationalize in practice, and governments rarely measure whether complex resource management plans are actively implemented and enforced rather than merely adopted on paper (Tosiliani et al., 2026). A clear, real-world illustration of this is the systemic lag in educational policy translation; for instance, while a country like Malaysia has identified a critical shortage of Science, Technology, Engineering, and Mathematics (STEM) experts despite attracting major high-tech investments, the higher education institutions tasked with delivering these services face significant structural inertia (Jeevita, 2026). Transitioning established academic curricula and shifting resources to add or switch programs is a slow, complex process that requires substantial time, organizational restructuring, and backing from supervisors who are often constrained by rigid institutional parameters (Deutsch et al., 2025). Historically, reorganizing university curricula has always been a contested and highly decentralized process requiring the disruption of deeply entrenched disciplinary silos, meaning educational institutions cannot adapt instantaneously to top-down national mandates (Fox, 2008)

The Societal Adoption Readiness Gap

Ultimately, even the most scientifically robust and well-designed policies will fail if the general public lacks the readiness to adopt them, leading to a "societal adoption readiness gap" (Elmor et al., 2025). This is driven by "sustainability neglect" among consumers, who systematically overlook environmental sustainability during everyday purchase and lifestyle decisions (Elmor et al., 2025). In Malaysia, this societal adoption readiness gap is clearly visible within the built environment sector, where a stark disconnect exists between sustainable engineering developments and market-level adoption (Hassan et al., 2026). Although the Malaysian government and industry stakeholders have launched innovative rating frameworks, such as the Green Building Index (GBI) and the Malaysian Carbon Reduction and Environmental Sustainability Tool (MyCREST), to incentivize environmentally conscious practices, the transition from conventional construction remains heavily bottlenecked (Hassan et al., 2026). Widespread adoption of essential

Green Building Features (GBF), such as solar photovoltaic (PV) systems, natural ventilation, and daylighting systems is hindered by a lack of knowledge, familiarity, and public awareness regarding their long-term benefits and certification processes (Hassan et al., 2026).

Just as everyday consumers neglect sustainability due to competing attributes, property developers, contractors, and buyers systematically deprioritize GBFs due to high perceived upfront development costs and a lack of immediate financial aid or credit resources (Hassan et al., 2026). This cognitive neglect is further exacerbated by a deep-seated "resistance to change" conventional, resource-inefficient property development practices (Hassan et al., 2026). Without active efforts to raise public awareness and retrain professionals, the market continues to favour cheaper, conventional building methods that generate high carbon emissions and resource inefficiencies (Hassan et al., 2026).

Fragmentation and Enforcement in Urban Kuala Lumpur

This translation gap is equally pronounced at the municipal scale, as illustrated by the challenges of retrofitting green infrastructure in Kuala Lumpur (Nizarudin & Zakariya, 2025). While urban green spaces and nature-based features are vital for mitigating the urban heat island effect, controlling floods, and improving air quality, Kuala Lumpur's actual urban green space coverage stands at a low 7.5%, falling significantly below international benchmarks (Nizarudin & Zakariya, 2025). This deficit is driven by rapid urbanization and ineffective policies that have accelerated urban expansion, leading to severe green space fragmentation across the capital (Rasli et al., 2019).

Malaysia has no shortage of high-level national policies advocating for ecological networks, including the National Urbanisation Policy 2 (2019), the National Landscape Policy 2.0, and the Kuala Lumpur Structure Plan 2040 (Nizarudin & Zakariya, 2025). However, these frameworks exhibit critical policy-to-practice disconnects: they lack comprehensive enforcement mechanisms, suffer from decentralized governance, and offer inadequate financial incentives to encourage private-sector or citizen-led retrofitting (Nizarudin & Zakariya, 2025). Indeed, critiques of municipal frameworks like the Kuala Lumpur Structure Plan have long pointed out that green space conservation is highly uncoordinated and suffers from a lack of tenacious monitoring on the ground (Rasli et al., 2019). This institutional stagnation is a broader regional issue; cross-country studies on climate adaptation governance reveal that devolved responsibilities, overlapping jurisdictions, and uneven local capacities frequently lead to reactive, fragmented policy translation rather than proactive, long-term implementation (Halliday et al., 2025).

Furthermore, within the Malaysian built environment, the integration of sustainable, nature-based design features remains heavily bottlenecked by inadequate building codes, financial constraints, and a lack of structured governmental incentives to de-risk green investments (Ahmad et al., 2025; Hassan et al., 2026). Consequently, without strict, enforceable regulatory frameworks and financial incentives, green spaces are treated as passive spatial additions rather than interconnected green infrastructure. This leaves most climate adaptation guidelines as unrealized "paper-only" mandates, a systemic issue in environmental governance where institutions frequently focus on policy design and adoption while failing to measure or enforce active, long-term implementation on the ground (Tosiliani et al., 2026).

Conclusion: From Knowledge Generation to Knowledge Translation

The growing complexity of contemporary social-ecological challenges demonstrates that generating more scientific knowledge, although essential, is insufficient to produce societal change. The persistent gap between scientific evidence and effective action is not located at a single point in the decision-making process. Rather, it emerges across a chain of translation, from the production of scientific knowledge to its incorporation into policy, from policy formulation to institutional implementation, and ultimately from implementation to societal acceptance and behavioral change. Breakdowns at any one of these stages can substantially weaken otherwise scientifically robust solutions.

This is where the social sciences assume a critical role, acting not merely as a complementary component to technological research, but as an essential translational bridge between knowledge and action. While natural and technical sciences explain *what* is occurring and identify technically viable solutions, social science helps explain *how* those solutions interact with human behavior, institutional dynamics, cultural norms, and competing political priority structures (Fox, 2008). Crucially, cross-field alliances are often hindered by a historical hierarchy of fields, where natural and physical sciences command high professional authority and define what is "taken for granted" in society, while social sciences are marginalized as "lay" observers, even on fundamentally social, behavioral, and ethical policy matters (Fox, 2008). To systematically analyze these behavioral dynamics, social scientists leverage integrative frameworks such as Albert Bandura's Triadic Model of Reciprocal Determinism, which examines how individual behavior, personal characteristics, and the external social and physical environment dynamically and reciprocally influence one another (Siow et al., 2023).

The Malaysian examples discussed throughout this paper illustrate this multi-level translation challenge particularly clearly. Strategic national ambitions exist, yet practical implementation is continuously constrained by fragmented governance, institutional inertia, and resistance to change. This mismatch between top-down planning and real-world

results is a consequence of uncoordinated conservation, lack of tenacious monitoring, and policy guidelines that operate as paper-only mandates devoid of enforcement mechanisms (Rasli et al., 2019; Nizarudin & Zakariya, 2025). These are not deficiencies of biophysical knowledge, but are failures of governance, institutions, behavior, and enforcement, all areas where social science provides critical tools (Tosiliani et al., 2026).

The science-society nexus must therefore move beyond conventional interdisciplinary collaboration towards a more integrated model of knowledge co-production and translation (Deutsch et al., 2025). Natural scientists, social scientists, policymakers, and communities must engage together throughout the research process rather than after scientific models are already finalized (Deutsch et al., 2025). This integration must center on the co-evolution of traditional sciences with citizen science and the lived experience of local communities (Meulenberg et al., 2022). Translating evidence into policy requires the institutionalized use of knowledge brokers and boundary organizations to build the trusted, bidirectional relationships necessary to navigate political uncertainty and competing electoral timeframes (Halliday et al., 2025). Furthermore, to ensure these efforts are socially equitable, participatory planning methods like storytelling and community mapping must be leveraged to incorporate environmental justice, distributional, procedural, and recognitional. This is so that resilience initiatives address systemic inequities rather than reinforcing them (Eisenhauer et al., 2024). The objective is not simply to produce better science, but to build the institutional and societal conditions through which evidence can become actionable (Deutsch et al., 2025).

Ultimately, the measure of scientific progress in addressing complex societal challenges cannot rest solely on what society knows; it must also consider what society is able and willing to do with that knowledge. Generating robust evidence is futile if we ignore the "societal adoption readiness gap" driven by cognitive sustainability neglect, where consumers systematically overlook environmental footprints in favor of face value attributes.

REFERENCES

Ahmad, A., Rahman, N. A., & Ahmad, S. (2025). Exploring the key factors driving the adoption of biophilic design in affordable environments: Perspectives from experts and designers. *Planning Malaysia*, *23*(6), 519–538. https://doi.org/10.21837/pm.v23i6.1601

Deutsch, L., Pohl, C., Bresch, D. N., & Hoffmann, S. (2025). Creating favorable conditions for inter- and transdisciplinary integration – An analytical framework and empirical insights. *Global Environmental Change*, *91*, Article 102963. https://doi.org/10.1016/j.gloenvcha.2024.102963

Eisenhauer, E., Maxwell, K., Kiessling, B., Henson, S., Matsler, M., Nee, R., Shacklette, M., Fry, M., & Julius, S. (2024). Inclusive engagement for equitable resilience: community case study insights. *Environmental Research Communications*, *6*(12), Article 125012. https://doi.org/10.1088/2515-7620/ad9773

Elmor, L., Ramos, G. A., Vieites, Y., Andretti, B., & Andrade, E. B. (2025). Environmental sustainability considerations (or lack thereof) in consumer decision making. *International Journal of Research in Marketing*, *42*(4), 1203–1228. https://doi.org/10.1016/j.ijresmar.2024.08.003

Fox, M. F. (2008). Collaboration between science and social science: Issues, challenges, and opportunities. In *Integrating the sciences and society: Challenges, practices, and potentials* (Research in Social Problems and Public Policy, Vol. 16, pp. 17–30). Emerald Group Publishing Limited. https://doi.org/10.1016/S0196-1152(08)16001-X

Halliday, A., Fountain, J., Wreford, A., & Cradock-Henry, N. A. (2025). Four propositions to narrow the gap between science and policy for climate change adaptation: Insights and evidence from Aotearoa New Zealand. *Environmental Science and Policy*, *173*, Article 104239. https://doi.org/10.1016/j.envsci.2025.104239

Hassan, P. F., Samsuddin, N. M., Zaini, A. A., Abidin, M. Z. Z., & Siang, C. W. (2026). Navigating environmental sustainability challenges: Identifying key green building features and mitigating barriers in the Malaysian property sector. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, *61*(5), 174–187. https://doi.org/10.37934/araset.61.5.174187

Jeevita, J. (2026, April 15). 'M'sia facing STEM talent shortage'. *The Star*. https://www.thestar.com.my/news/nation/2026/04/15/msia-facing-stem-talent-shortage

Meulenberg, C. J. W., Hawke, S. M., Cavaion, I., Kumer, P., & Lenarčič, B. (2022). Understanding interdisciplinarity through Adriatic maricultures and climate change adaptation. *Visions for Sustainability*, *18*, 11–36. http://dx.doi.org/10.13135/2384-8677/6945

Nizarudin, N. D., & Zakariya, K. (2025). Retrofitting green infrastructure in Kuala Lumpur: A document analysis of policy gaps and climate resilience. *Planning Malaysia*, *23*(1), 555–568. https://doi.org/10.21837/pm.v23i1.1578

Rasli, F. N., Kanniah, K. D., & Ho, C. S. (2019). Analysis of fragmented green spaces in Kuala Lumpur, Malaysia. *Chemical Engineering Transactions*, *72*, 457–462. https://doi.org/10.3303/CET1972077

Siow, M. L., Ramachandran, S., Tahir, O. M., & Shuib, A. (2023). Sustainable Development Goal 2: Exploring Bandura's Triadic Model for behavioural change among urban primary school students. *International Journal of Business and Society*, *24*(3), 1030–1045. https://doi.org/10.33736/ijbs.6399.2023

Tosiliani, D. D., Vasileiou, M., Kyrgiakos, L. S., Abdelradi, F., Kleisiari, C., Kechri, K., Kleftodimos, G., & Vlontzos, G. (2026). Mapping the Water-Energy-Food-Ecosystem (WEFE) nexus: Insights and limitations from a systematic literature review on interconnected resource management. *Agricultural Water Management*, *333*, Article 110650. https://doi.org/10.1016/j.agwat.2026.110650