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Using a multi-level perspective to advance the financing of biodiversity

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1. Introduction

This paper summarizes the discourse surrounding the policy responses to the climate emergency, looking at how public and private capital has been mobilized to respond to this challenge. The aim is to examine how such investments have been directed towards biodiversity action, and in this context, we are motivated by the observation that great expectation has been placed on private capital to provision the necessary actions with a now long-standing assumption that such actions cannot be funded by public means. We begin by summarizing the development of the climate and biodiversity funding system, and then report on its relative impact to date, before introducing and describing how contributions from social-technical transitions theory could be helpful to policy planning in this area.

2. The "billions to trillions" agenda

Since the early 2000s, opinion in the international community has consolidated around two interconnected political agendas: one is the necessity to respond effectively to the growing climate emergency, and the other is the requirement to facilitate human development in a sustainable and equitable manner (Jäger & O'Riordan, 2019). Once these political objectives had been broadly established and accepted, attention shifted to solving how they could be delivered and, crucially, how such actions could be paid for (Weikmans & Roberts, 2019).

Following the 2015 Financing for Development Forum in Addis Ababa, the Summit on the SDGs in New York, and COP21 in Paris, the OECD estimated that the amount of financing required to deliver all committed actions by 2030 and beyond would be in the tens of trillions of dollars (OECD, 2018). Within OECD countries, there was widespread recognition that national political appetites would limit the public provisioning of contributions to some hundreds of billions of dollars annually. To make up the shortfall, attention switched to the promise of using available public funds to catalyse the necessary trillions of dollars of investment from private capital sources (Mawdsley, 2018).[1]

As the International Monetary Fund (IMF) explained in 2015:

> *Achieving the SDGs will require moving from billions to trillions in resource flows. Such a paradigm shift calls for a wide-ranging financing framework capable of channelling resources and investments of all kinds – public and private, national and global. There is no substitute for concessional resources, especially for the poorest, most fragile or conflict-torn countries. But marshalling other types of financing at the levels needed will demand greater efforts to unlock, leverage, and catalyze more public and private flows. Financing from private sources, including capital markets, institutional investors and businesses, will become particularly important. Countries also need to improve their institutional and policy environments to attract more private investment and financing, at the same time as they pursue truly sustainable and inclusive growth, so prosperity translates into poverty reduction and social progress. (IMF, 2015).*

So, we can see a problematic contradiction between the established aspirations of a consolidated political agenda, and the capacities of national governments and international agencies to coordinate and finance its delivery. The solution identified to this conundrum was, primarily, to draw on a market-economy approach which views government's primary function as being limited to facilitating the appropriate and efficient use of the market to deliver desired outcomes. From this perspective, investments of public capital would largely be limited to acting as a catalyst for private capital and, where necessary, political

1 The OECD estimated in 2018 that $95 trillion would be required globally by 2030 to address climate change, of which 60-70% would be needed in developing countries.

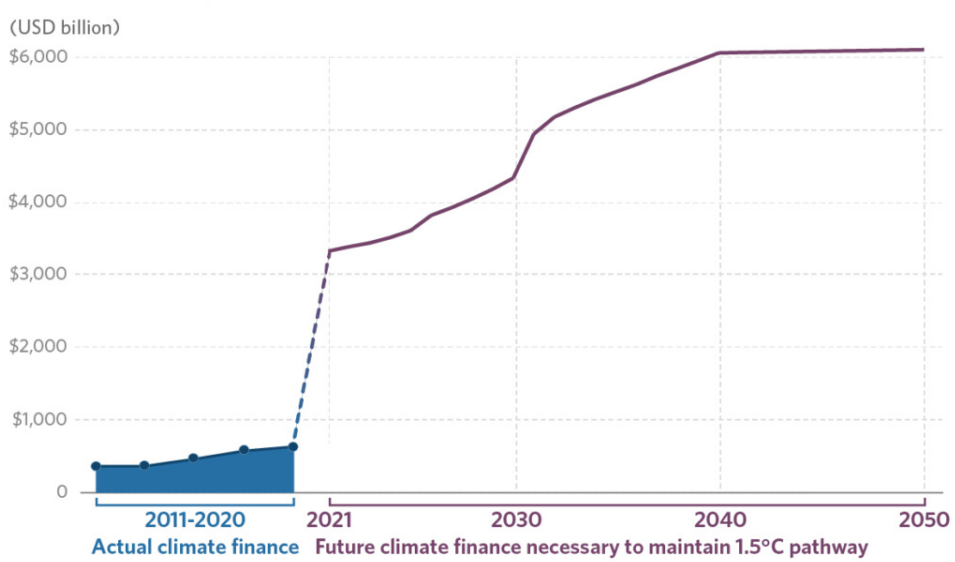
capital would be invested in liberalizing institutions to encourage the flow of private capital investment into identified climate and SDG investments, which could produce public goods in addition to returns on private capital (Osberghaus et al., 2010; Pauw et al., 2022).

3. Promise and delivery

Looking specifically at climate financing and taking the OECD's (2021) *Climate Finance Provided and Mobilised by Developed Countries* report as a guide, the amount required to limit global temperature rise to 1.5oC is estimated to be USD 4.5 trillion annually.

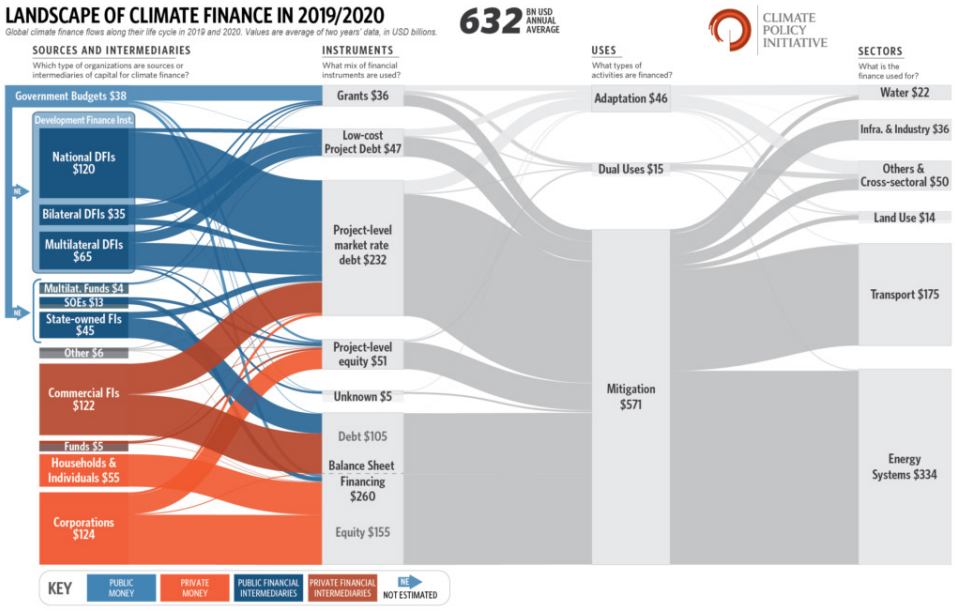
Currently, the combined global contributions to climate finance reported in the latest round of data available was USD 632 billon, or 14% of the total required (Climate Policy Initiative, 2021).

Figure 1. Future climate finance necessary to hit 1.5°C target.



Source: Climate Policy Initiative (2021).

Figure 2. Landscape of climate financing



Source: Climate Policy Initiative (2021).

While the Paris Agreement required that climate mitigation and adaptation finance would become equally balanced, the graphic above shows how far away this ambition is from being realized – with as little as 7% of the total being directed to adaptation and biodiversity actions. Of this amount, we see that only USD 1 billion (or 2%) came from private adaptation spending. Furthermore, there is significant concern over the geographic and sectoral allocation of this climate finance, with the majority being spent in developed countries and primarily on domestic renewable energy initiatives (Clark et al., 2018; Buchner et al., 2019). Looking forward, it seems that the degree of inequity in financing will be further exacerbated as the total estimated financial needs for climate adaptation and biodiversity action in low-income countries is set to increase to between USD 140 billion and USD 300 billion by 2030, and to USD 500 billion by 2050 – with little commensurate increase in funding being predicted (UNEP, 2021).

In summary then, we see a significant degree of variation in the efficacy of the proposed market economy approach to financing the combined climate and SDG goals. On the one hand, we see some success in combining public and private capital to fund climate mitigation action, most clearly seen in investments in renewable energy markets in the global north.[2] On the other hand, the funding of climate adaptation activities has been far less impactful, with only about half a US dollar of investment being realized for adaptation programmes for every one US dollar of equivalent investment in mitigation activities. When we look specifically at biodiversity actions it is hard to conclude anything other than the model has been almost universally unsuccessful at provisioning investment in this area.[3]

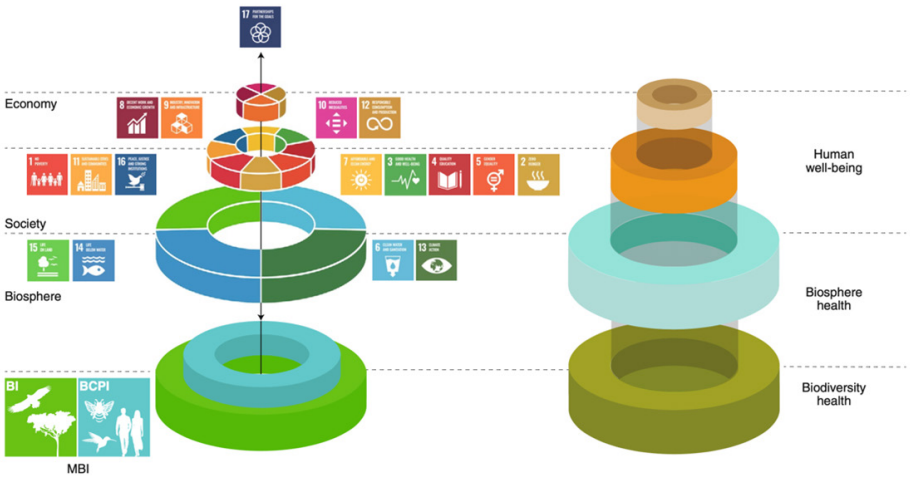
2 Latest data shows that in the US and Canada there was a USD 4–79 billion division between public and private capital investment in climate mitigation and adaptation initiatives, a clear exemplar of the "billions to trillions" agenda (CPI, 2021).

3 Publicly financed contributions to fund global biodiversity funding were USD 3.3 billion in 2019, or the equivalent of 0.006 of a US dollar for every one dollar invested in mitigation programming (SEI, 2022).

4. The challenge of financing biodiversity

Why has this model of investment delivered such poor outcomes for biodiversity? It is certainly not because of a perception of biodiversity's relative unimportance when compared with mitigation or adaptation actions, and a vast body of academic research and policy prescriptions highlights its importance for human well-being (Brörken et al., 2022).

Figure 3. The role of Biodiversity health in underpinning human well-being and sustainable development.



Source: Soto-Navaro et al. (2021).

Some commentators have pointed to the relative complexity of the concept of biodiversity when compared with climate mitigation and adaptation activities (CALL OUT IF NECESSARY). As an idea, it is often confused with other related and yet distinct theories and practices within the environmental sciences, such as conservation, ecosystem services, and nature-based solutions (Bigard et al., 2017). Wider criticism comes from concerns about issues surrounding distributive and procedural climate justice (Colenbrander et al., 2018; Khan et al., 2020); the necessity to challenge the assumptions of neo-classical economics and explore the opportunities presented by evolutionary economics (Fama, 1970; Mazzucato, 2011; Hiremath & Kumari, 2014; Mazzucato & Semieniuk, 2017); requirement to move from the (mis)conceptualization of "sustainable finance" (Migliorelli, 2021); and wider questions about the maladaptive impacts of climate finance on local equity and vulnerability (Ginty, 2021; Kemerink-Seyoum et al., 2018; Work et al., 2019); as well as concerns over climate finance governance and its dilution on the moderating role of endogenous intra-state institutions (Christophers, 2017; Bracking & Leffel, 2021; Magbondé & Konté, 2022).

At the same time, and perhaps more relevant for our analysis, is the recognition that policymaking is often determined by economic imperatives, and yet biodiversity suffers from a poor translation of its dynamic, multidimensional, and non-exclusive characteristics to the typical fundamentals used to inform the analysis of market economics (Soto-Navarro et al., 2021).

So how can we help to resolve these inconsistencies and challenges to effective climate financing, particular the financing of biodiversity actions? One positive contribution could be found in social-technical transitions theory, which makes use of an analytical framework called multi-level perspective (MLP), to help both the understanding and planning of systemic transitions. While MLP has not previously been applied to

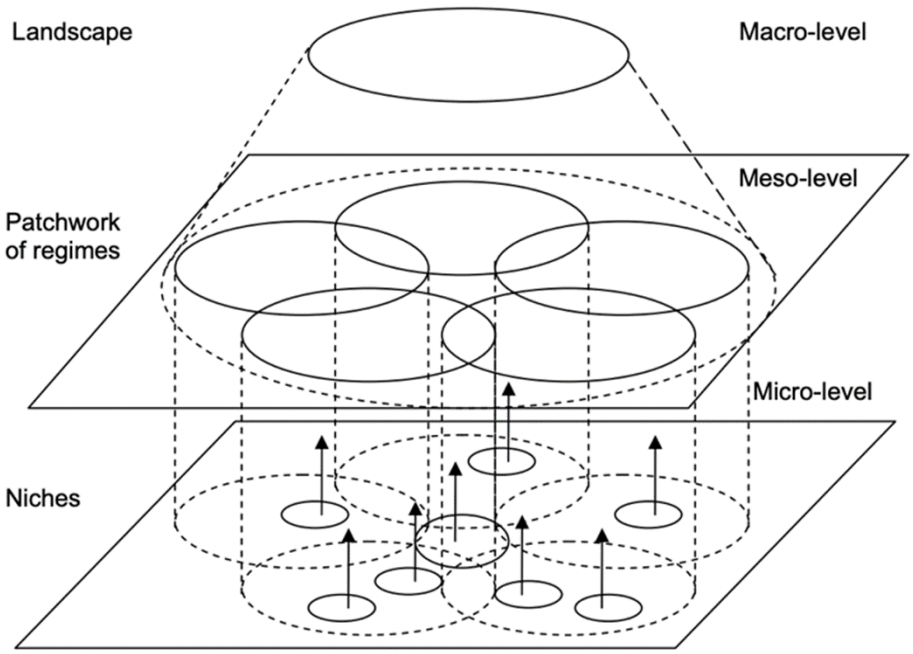
considerations of how to promote more impactful financing for biodiversity, as will be demonstrated, it has the potential to move the discourse forward by helping to overcome some of the identified challenges.

5. Multi-level perspective

Whether or not we agree with the sceptics who question the probability of delivering the vast sums of climate finance required through catalysing investments from private finance, the current approach has, to date, proven inadequate at realizing this aspiration (Gabor, 2021; Nykvist & Maltais, 2022). In response, researchers have drawn on lessons from transition theory and proposed the need to engage with the dynamics and interactive nature of the logics and structures that build the current climate finance system (Geddes & Schmidt, 2020; Geels et al., 2017; Hafner et al., 2020). Similarly, transition theory argues that since industrial societies are fundamentally underpinned by various socio-technical systems, radical and coordinated change is required to modify their basic operations. In the last decade it has become increasingly applied to explore "sustainable transitions" – how to steer the "directionality and goals" of socio-technical systems (Smith & Stirling, 2008).

Socio-technical systems themselves refer to a configuration of actors, rules and technologies for the fulfilment of a particular societal function, such as energy provision, food production or transportation (Geels, 2005). This configuration encompasses the dimensions of science and engineering, economy, policy, everyday life and culture. Within transitions studies, analysis of socio-technical systems is typically conducted by applying MLP, which is a prominent approach that synthesizes insights from evolutionary economics, structuration theory and institutionalism (Geels, 2010).

Figure 4. Multi-level perspective (MLP) construction.



Source: Genus & Coles (2008).

The focus is not simply to map and understand how a system currently operates; rather, it is a way of organizing thinking and proposing insights and opportunities about how future change can be encouraged and directed towards an identified objective. As Kanger (2021) describes:

> *MLP proposes that transitions come about through interrelated processes on three levels: niche, regime and landscape. Socio-technical 'regime' is defined as a shared, fairly stable and aligned set of rules directing the behaviour of actors in a particular system. These rules are embedded in various elements of the socio-technical system, and they shape innovative activities towards a specific trajectory of incremental innovation (e.g. increased fuel efficiency for cars). Radical alternatives to regimes are developed in spaces called 'niches'. These are application areas dominated by specific selection criteria that shield the emerging new and unstable technologies from direct market pressure (e. g. military applications prioritizing performance over costs). Finally, 'landscape' represents exogenous macro-level forces such as wars or demographic changes that shape niches and regimes but are not shaped by them (in short and medium term).*

6. Multi-level perspective and climate finance

While previously MLP has been used to consider physical and service transitions, it is possible to apply it as a framework to analyse the systemic structure in which the "billions to trillions" agenda has been operating. From an MLP perspective, we could describe the current financial disbursements (the rationalities and path dependencies that reinforce and explain current levels of investment) as the product of the current financial "regime". This regime is internally logical and consistent, but because of its socio-technical arrangements its effect is to severely constrict the space for private finance to be directed toward adaptation and biodiversity actions.[4]

The wider "landscape" can be seen as the dominant political economy existing in the world's richest countries. Here, the current political reality is that while countries are willing to use public money to subsidize fossil fuels at a rate of USD 555 billion (in 2019), there is a political limit to the amount of public money that can be mobilized to support climate finance targets, despite a growing awareness and exposure to the impacts of climate change (Timperley, 2021). At the same time, the supported and organic biodiversity practices, businesses, and actions – or in our context "niches" – currently have not matured to a point where their profitability (or concept of value) has the momentum to disrupt and usurp the dominant logic which underpins the calculations of financial regime above them.

By exploring the financial shortfall "problem" in this way, MLP, and the field of sustainable transitions more generally, can help us to approach the challenge in a broader and more coordinated manner: first, by expanding the focus from sector-specific studies to policy mixes crossing administrative sectors, and second, by focusing on broader policy strategies in addition to specific instruments. This means increased attention to the sequencing of policy instruments and other elements of the mix, as well as the need to combine policies operating at regional, national, and international levels – most likely through coordinating the activities of different institutional stakeholders.

4 The foundational logic of the system is explored in greater detail in the companion paper by Duma (2022).

7. Coordinated policy action

Recent academic studies from the sustainable transitions literature have concentrated on linking identified political objectives or targets with specific policy instruments within an MLP analytical framework (Kanger, 2021; Trotter et al., 2022; Werners, Sparkes, et al., 2021). Broadly, there is acceptance that to promote an identified objective – in our case this might be increasing financing for biodiversity actions in Least Developed Countries (LDCs) – actions need to be taken that influence all levels of the socio-technical system in a coordinated and purposeful manner. Although there are a number of proposals for achieving this, Kanger et al. (2020) set out six tangible "policy intervention points for sustainable transition" (see Table 1).

Table 1. Applying MLP to drive transitions – six intervention points for sustainable transition

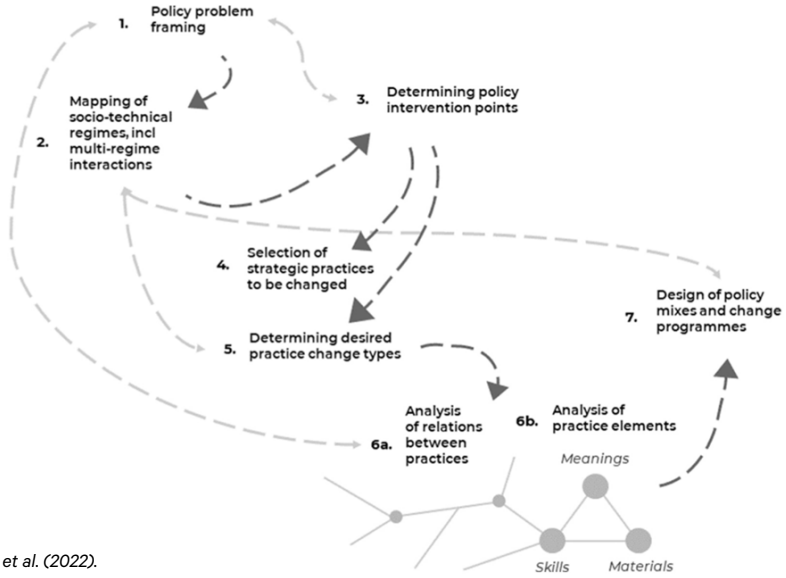
Intervention point	Description (Kanger et al. 2020)	Bidoiversity focused
1. Stimulate different niches	From the evolutionary-economic perspective, variety in different niches plays an important role as it presents a pool of alternative solutions for challenging and transforming the incumbent. At the same time, emerging niches also need to become mature enough to enter the market: therefore, for a certain amount of time some regulatory shielding is often required.	Examples of niche stimulation could focus on, e.g., developments in agro-ecological/organic farming, alternate food networks (e.g. insects), eco-tourism, payment for ecosystem services.
2. Accelerate the niches	Emerging technologies need to cross the valley of death between R&D activities and market entry. Furthermore, transitions are about systemic changes, including the combination of technological, organisational, and institutional innovations, new user practices and changing cultural meanings. This means that both the scale-up of single niches and the alignment of niches need to be supported to achieve systemic change.	Enabling biodiversity niches to compete directly with established regimes requires (public financial) support to enter the market, investing in capacity development of actors, networks, and financial and political subsidies for value- and information-chain production to link producers with market.
3. Destabilize the regime	Transitions do not happen merely when niches are present, even if they are mature and inter-linked to a certain degree. The incumbent regime also needs to become destabilized to allow niches to break through. Measures to destabilize regimes include taxes for putting economic pressure on the regimes, banning of specific technologies and practices, removing subsidies for certain industries, or balancing the involvement of incumbents in policy advisory councils with niche actors.	Increased taxation or outright ban on production processes causing biodiversity loss, removing and reallocating subsidies from fossil fuels to global biodiversity public goods, enforcement of biodiversity preservation laws and conventions to apply to financial services as well as industrial production. Mainstreaming of "fair trade" systems of labelling on primary products for international consumption. Imposition of "environmental safety standards" on products.
4. Address the broader repercussions of regime destabilisation	Systems do not exist in isolation but are socio-spatially embedded in their surrounding environment on multiple scales (regional, societal, global) and in multiple ways, such as physical infrastructures, existing skills, and networks between actors, as well as shared cultural back- ground. This means that policy action should also be aimed at dis-embedding the system from its environment while anticipating and alleviating possible unintended consequences of this process.	Increased transparency (and ultimate removal) about regime actors and their membership of and influence on institutional structures. Legislation to advance biodiversity/cultural ambassadors into market bodies and company boards. Regulatory frameworks to be developed in concert with local biodiversity champions/entrepreneurs. Sectoral market systems and political economy analysis to be conducted to facilitate transition and anticipate negative externalities.
5. Provide coordination to multi-regime interaction	The trajectories of socio-technical systems are not only internally created; they also result from the mutually reinforcing developments in multiple systems. For example, the combination of suburbanized housing and individual privately-owned petrol-based cars reinforces both the current housing system (cars enable easier access to more remote locations) as well as the mobility system (car ownership is practical in the context of urban sprawl, especially when public transport is not easily available). To break this feedback loop, urban sprawl and car-centred mobility need to be jointly tackled.	The current financial operations of institutions in global north countries need to be better aligned with the requirements of financing global public goods (biodiversity reservoirs) in global south countries. This could include changes in taxation policy, ring-fencing budgets, ombudsman influencing bonus structures in the global north. In conjunction in the global south, investment in biodiversity science that can reliably and cheaply provide baseline data/metrics that can support biodiversity market construction. Generate longitudinal data to facilitate biodiversity credit markets.
6. Tilt the landscape	Although MLP has often treated the landscape as an exogenous force that shapes niches and regimes but is not shaped by them, newer literature has started to address the landscape-making impacts of socio-technical systems. These works direct attention to the need to address broader factors extending beyond specific niches and regimes. It includes participation in international and global negotiations to arrive at collectively binding agreements that would create broader framework conditions for changing the directionality and dynamics of a broad range of socio-technical systems.	Strict adherence to international biodiversity agreements such as the CBD and CITIES. Banning of damaging practices, and reallocation of fossil fuel (and other damaging) subsidies. "Ring-fencing" of overseas development aid to support biodiversity preservation. Mobilizing government action/ legislation to encourage better environmental policies among financial actors.

Source: Adapted from Kanger et al. (2020).

The MLP framework can therefore be used to guide a better understanding of the dynamic interactions between actors and institutions in a particular system, and in so doing can support the development of a coordinated plan for driving an identified transition. These ideas have recently been further developed by researchers who have combined the MLP framework with theories drawn from social and political theory that explore questions of path and practice dependency, as well as the role of power relationships between different actors and institutions (Keller, Sahakian, et al., 2022; Werners, Wise, et al., 2021). Keller et al. (2022) argued that "certain policy intervention points require consideration of specific social practice change strategies to make progress" and proposed combining the MLP framework with ideas drawn from social practice theory to build a more tangible and effective transition pathway.

We can see very real progress in efforts to apply MLP, and other theoretical approaches, to guide and facilitate real-world sustainable transitions – and this example could also be applied when considering funding necessary biodiversity actions.

Figure 5. Combining MLP and SPT in policy processes



Source: Keller et al. (2022).

8. Summary

There are major challenges to financing climate and global development action. As the impacts of climate change are more immediately felt across the globe, demand for action is increasing among populations throughout the world, particularly in the global north. At the same time, the working assumption that a market economy approach would provision the required finances has largely failed, especially in regard to investments in climate adaptation and biodiversity action in the global south. Critical perspectives that refute the promise of private capital to fund necessary biodiversity actions are now comprehensively supported by more than a decade of empirical evidence on action – or inaction – in this area.

When we look at biodiversity financing specifically it is impossible to conclude anything other than that the current financial system is failing to deliver what is required to meet our current and future investment needs. A significant first step is to recognize that we face a systemic rather than an operational problem, which requires a system-wide transition if we are to avoid the worst, potentially catastrophic, impacts of climate change. Research within the sustainable transitions can support the development of solutions to this challenge, and it is in this context that the MLP framework's contribution may be significant.

References

Bigard, C., Pioch, S., & Thompson, J. D. (2017). The inclusion of biodiversity in environmental impact assessment: Policy-related progress limited by gaps and semantic confusion. *Journal of Environmental Management, 200*, 35–45.

Bracking, S., & Leffel, B. (2021). Climate finance governance: Fit for purpose? *Wiley Interdisciplinary Reviews: Climate Change, 12(4)*, e709.

Brörken, C., Hugé, J., Dahdouh-Guebas, F., Waas, T., Rochette, A.-J., & de Bisthoven, L. J. (2022). Monitoring biodiversity mainstreaming in development cooperation post-2020: Exploring ways forward. *Environmental Science & Policy, 136*, 114–126.

Buchner, B., Clark, A., Falconer, A., Macquarie, R., Meattle, C., & Wetherbee, C. (2019). *Global Landscape of Climate Finance 2019*. Climate Policy Initiative.

Christophers, B. (2017). Climate change and financial instability: Risk disclosure and the problematics of neoliberal governance. *Annals of the American Association of Geographers, 107(5),* 1108–1127.

Clark, R., Reed, J., & Sunderland, T. (2018). Bridging funding gaps for climate and sustainable development: Pitfalls, progress and potential of private finance. *Land Use Policy, 71,* 335–346.

Climate Policy Initiative. (2021). *Global Landscape of Climate Finance 2021*. CPI. https://www.climatepolicyinitiative.org/wp-content/uploads/2021/10/Full-report-Global-Landscape-of-Climate-Finance-2021.pdf

Colenbrander, S., Dodman, D., & Mitlin, D. (2018). Using climate finance to advance climate justice: The politics and practice of channelling resources to the local level. *Climate Policy, 18(7)*, 902–915.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance, 25(2)*, 383–417.

Gabor, D. (2021). The Wall Street consensus. *Development and Change, 52(3),* 429–459.

Geddes, A., & Schmidt, T. S. (2020). Integrating finance into the multi-level perspective: Technology niche-finance regime interactions and financial policy interventions. *Research Policy, 49(6)*, 103985.

Geels, F. W. (2005). The dynamics of transitions in socio-technical systems: A multi-level analysis of the transition pathway from horse-drawn carriages to automobiles (1860–1930). *Technology Analysis & Strategic Management, 17(4)*, 445–476. https://doi.org/10.1080/09537320500357319

Geels, F. W. (2010). Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective. *Research Policy, 39(4),* 495–510.

Geels, F. W., Sovacool, B. K., Schwanen, T., & Sorrell, S. (2017). Sociotechnical transitions for deep decarbonization. *Science, 357(6357),* 1242–1244.

Genus, A. & Coles, A. (2008). Rethinking the multi-level perspective of technological transitions. *Research Policy*. https://doi.org/10.1016/j.respol.2008.05.006

Ginty, A. (2021). *Climate Change Solutions and Environmental Migration: The Injustice of Maladaptation and the Gendered 'Silent Offset' Economy*. Routledge.

Hafner, S., Anger-Kraavi, A., Monasterolo, I., & Jones, A. (2020). Emergence of new economics energy transition models: A review. *Ecological Economics, 177*, 106779.

Hiremath, G. S., & Kumari, J. (2014). Stock returns predictability and the adaptive market hypothesis in emerging markets: Evidence from India. *SpringerPlus,* 3(1)*,* 1–14.

IMF. (2015). *From Billions to Trillions—Transforming Development Finance Post-2015 Financing for Development: Multilateral Development Finance: Statement by the Heads of the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, the European Investment Bank, the Inter-American Development Bank, the World Bank Group and the International Monetary Fund*. IMF.

Jäger, J., & O'Riordan, T. (2019). The history of climate change science and politics. In *Politics of Climate Change* (pp. 1–31). Routledge.

Kanger, L. (2021). Rethinking the multi-level perspective for energy transitions: From regime life-cycle to explanatory typology of transition pathways. *Energy Research & Social Science, 71*, 101829. https://doi.org/10.1016/j.erss.2020.101829

Kanger, Laur & Sovacool, Benjamin K. & Noorkõiv, Martin (2020). Six policy intervention points for sustainability transitions: A conceptual framework and a systematic literature review. *Research Policy*. https://doi.org/10.1016/j.respol.2020.104072

Keller, M., Noorkõiv, M., & Vihalemm, T. (2022). Systems and practices: Reviewing intervention points for transformative socio-technical change. *Energy Research & Social Science, 88*, 102608.

Keller, M., Sahakian, M., & Hirt, L. F. (2022). Connecting the multi-level-perspective and social practice approach for sustainable transitions. *Environmental Innovation and Societal Transitions, 44*, 14–28.

Kemerink-Seyoum, J., Tadesse, T., Mersha, W., Duker, A., & De Fraiture, C. (2018). Sharing benefits or fueling conflicts? The elusive quest for organizational blue-prints in climate financed forestry projects in Ethiopia. *Global Environmental Change, 53,* 265–272.

Khan, M., Robinson, S., Weikmans, R., Ciplet, D., & Roberts, J. T. (2020). Twenty-five years of adaptation finance through a climate justice lens. *Climatic Change, 161(2),* 251–269.

Magbondé, G. K., & Konté, M. A. (2022). Developing countries' economic fundamentals and FDI inflows: The moderating role of institutions. *Cogent Economics & Finance, 10(1)*, 2028976.

Mawdsley, E. (2018). From billions to trillions' Financing the SDGs in a world 'beyond aid. *Dialogues in Human Geography, 8(2)*, 191–195.

Mazzucato, M. (2011). The entrepreneurial state. *Soundings, 49(49),* 131–142.

Mazzucato, M., & Semieniuk, G. (2017). Public financing of innovation: New questions. *Oxford Review of Economic Policy, 33(1),* 24–48.

Migliorelli, M. (2021). What do we mean by sustainable finance? Assessing existing frameworks and policy risks. *Sustainability, 13(2),* 975.

Nykvist, B., & Maltais, A. (2022). Too risky – The role of finance as a driver of sustainability transitions. *Environmental Innovation and Societal Transitions, 42*, 219–231.

OECD. (2018). *Financing Climate Futures*. OECD. https://www.oecd.org/environment/cc/climate-futures/policy-highlights-financing-climate-futures.pdf

OECD. (2021). *Climate Finance Provided and Mobilised by Developed Countries: Aggregate Trends Updated with 2019 Data*. OECD.

Osberghaus, D., Dannenberg, A., Mennel, T., & Sturm, B. (2010). The role of the government in adaptation to climate change. *Environment and Planning C: Government and Policy, 28(5)*, 834–850.

Pauw, W., Kempa, L., Moslener, U., Grüning, C., & Çevik, C. (2022). A focus on market imperfections can help governments to mobilize private investments in adaptation. *Climate and Development, 14(1),* 91–97.

Smith, A., & Stirling, A. (2008). *Social-Ecological Resilience and Socio-Technical Transitions: Critical Issues for Sustainability Governance*. STEPS Working Paper 8. Brighton: STEPS Centre.

Soto-Navarro, C. A., Harfoot, M., Hill, S. L. L., Campbell, J., Mora, F., Campos, C., Pretorius, C., Pascual, U., Kapos, V., Allison, H., & Burgess, N. D. (2021). Towards a multidimensional biodiversity index for national application. *Nature Sustainability, 4(11),* 933–942. https://doi.org/10.1038/s41893-021-00753-z

Timperley, J. (2021). Why fossil fuel subsidies are so hard to kill. *Nature, 598(7881),* 403–405.

Trotter, P. A., Mannan, I., Brophy, A., Sedzro, D., Yussuff, A., Kemausuor, F., & Mulugetta, Y. (2022). How climate policies can translate to tangible change: Evidence from eleven low-and lower-middle income countries. *Journal of Cleaner Production,* 131014.

UNEP. (2021). *Adaptation Gap Report 2021*. United Nations Environment Program. https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/37312/AGR21_ESEN.pdf

Weikmans, R., & Roberts, J. T. (2019). The international climate finance accounting muddle: Is there hope on the horizon? *Climate and Development, 11(2),* 97–111.

Werners, S. E., Sparkes, E., Totin, E., Abel, N., Bhadwal, S., Butler, J. R., Douxchamps, S., James, H., Methner, N., & Siebeneck, J. (2021). Advancing climate resilient development pathways since the IPCC's fifth assessment report. *Environmental Science & Policy, 126,* 168–176.

Werners, S. E., Wise, R. M., Butler, J. R., Totin, E., & Vincent, K. (2021). Adaptation pathways: A review of approaches and a learning framework. *Environmental Science & Policy, 116,* 266–275.

Work, C., Rong, V., Song, D., & Scheidel, A. (2019). Maladaptation and development as usual? Investigating climate change mitigation and adaptation projects in Cambodia. *Climate Policy,* 19(sup1), S47–S62.

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