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Putting Climate Finance into Context: A Global Public Goods Perspective

Inge Kaul*

Introduction

In *The Economics of Climate Change*, Nicholas Stern (2007:1) refers to atmospheric quality as a global public good (GPG) and to climate change as "the greatest example of market failure we have ever seen." Amid the burgeoning social-science literature on climate finance, however, studies that use the GPG concept as their analytical lens remain rare.

This chapter explores whether considering the GPG properties of climate change provides added value when examining issues of climate finance.[1] Could the GPG lens improve our understanding of climate finance? More importantly, would it allow us to discover new ways to meet the challenge of climate change by fostering global sustainable growth and development, as stipulated in *Agenda 2030* and the *Paris Agreement*?[2]

These questions are explored below in two stages. Section I introduces the GPG concept, highlighting some of the ways GPGs differ from national public goods

[1] Given that the United Nations Framework Convention on Climate Change (UNFCCC) does not offer a definition of "climate change," the 2015 report of the UNFCCC's Standing Committee on Finance (SCF) offers a definition that, in the words of its authors, tries to capture the common elements among the definitions adopted by data collectors and aggregators. According to this definition, climate finance "aims at reducing emissions, and enhancing sinks of greenhouse gases and aims at reducing the vulnerability of, and maintaining and increasing the resilience of, human and ecological systems to negative climate impacts" (ibid: 5). As elaborated on the "Climate finance" page of the UNFCCC website, climate finance may include local, national or transnational financing and be drawn from public, private, and alternative sources of financing. See http://unfccc.int/focus/climate_finance/items/7001.php/ (accessed April 24, 2016).

[2] *Agenda 2030* was adopted in September 2015 by all 193 Member States of the United Nations. It sets forth 17 main goals that the international community decided to pursue over the next 15 years to end extreme poverty, fight inequality and injustice, and protect the planet. For the full text of *Agenda 2030* see http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E/ . The *Paris Agreement* was adopted in December of the same year. It is the outcome document of the 21st session of the United Nations Framework Convention on Climate Change (UNFCCC). In its opening paragraphs, the *Agreement* emphasizes "the intrinsic relationship that climate change actions, responses and impacts have with equitable access to sustainable development and eradication of poverty" (ibid.: 21)

(NPGs), as those could indicate possible inhibitors and facilitators of climate finance. Against this background, Section II presents four issues that come into focus and appear in a new light when examining climate finance through the lens of GPGs: (1) the differences and synergies between climate finance and development finance; (2) the risk of market *and* state failure in pursuing and financing climate change mitigation; (3) the importance of intra-generational fairness; and (4) the current lack of integrated provision-path analysis and management.

Two main findings emerge from the analysis. *First,* international *public* climate finance (IPCF) is an important inhibitor of overall climate finance.[3] *Second*, many of the factors constraining climate finance are not climate-specific but rather GPG-specific. They affect GPGs across the board and reflect a basic problem of institutional lock-in, whereby national and international governance systems have not yet been adjusted to address GPG-type policy challenges efficiently and effectively.

The final section thus concludes that enhancing climate finance might require a two-pronged approach—developing the incipient effort in this paper to apply the GPG lens to climate issues while building a general theory of GPG provision and finance, of which only the initial stage is underway.

Therefore, the task of clarifying GPG characteristics is taken up next.

I Introducing Global Public Goods

Scholars commonly define a GPG simply as a good that differs in geographic and/or temporal reach from an NPG, the type of public good (PG) on which conventional public economic theory focuses. Such a definition misses two important points, however. First, as Meghnad Desai (2003) argues, we cannot take the generic PG definition of public goods as settled; second, the wider reach of GPGs' benefits and costs is but one of several dimensions in which NPGs and GPGs differ. Moreover, as the discussion below makes clear, the other, neglected features appear to be precisely those that might explain why many GPGs, including climate change, are allowed to linger for so long in well-documented

[3] The term "international public finance" refers to public revenue channeled to bilateral or multilateral climate-related programs and projects.

states of worsening underprovision, even though possible courses of corrective action are known but adopted only hesitantly.

It is therefore useful to, first, discuss the generic PG concept and, second, identify the key distinguishing features of GPGs.[4]

1—THE GENERIC DEFINITION OF PUBLIC GOODS: According to standard economic theory, PGs are marked by non-rivalry and/or non-excludability in consumption. When possessing both these properties, they are said to be "pure public in consumption;" when exhibiting only one such characteristic, they are described as "impure public in consumption." Goods that are fully or partially rival and/or excludable are referred to as "pure private" or "impure private" goods.

Besides agreeing on these basic elements of the definition of PG, scholars also agree that, generally, a good's publicness or privateness in consumption is not an innate property but a social construct—the result of a socio-cultural or political choice. However, they differ about how impure public a good can be and still be considered public and which of the two properties (non-rivalry or non-excludability) matters most in classifying a good as public. Another open question is whether to attach a value connotation to PGs. While some scholars, including textbook authors, still refer to PGs as "beneficial" or "to be enjoyed by all," others take a more empirical, value-neutral position, recognizing that, as people's living conditions tend to vary widely, their preferences for certain PGs are also likely to vary.

The definition of generic PG used in this paper is the value-neutral two-tier definition presented in Box 1. This definition distinguishes between a good's potential for being in the public in consumption (i.e., available for all or for anyone to be affected by it) and its actual publicness (i.e., being de facto non-excludable or non-exclusive).

Box 1 close to here

Conventionally, PGs have been considered mainly from their consumption side. Due to their publicness in consumption, they have been seen as one of the conditions that cause market failure and may thus justify state intervention in

[4] For a more detailed discussion on these different types of PG, see, among others, Kaul et al. (2003) and Kaul et al. (2016).

the economy.[5] However, this conclusion rests on the assumption that individual actors are selfish and rational and would therefore free-ride in the presence of a public good (i.e., let someone else provide the good and enjoy it for free). As a result, PGs became an integral component of the theory of the state and the economics of the public sector. For a long time, only limited attention was paid to their production.[6] The state was expected to take care of that and did, in fact, play a relatively significant role in PG production from the 1950s to the 1970s, when the foundations of conventional public economics and, as one of its core elements, those of conventional PG theory were laid.[7]

Advancing privatization and economic liberalization have turned PGs into multi-actor, sometimes even voluntarily or privately provided, products. It is now quite common for scholars to differentiate among PGs according to their consumption properties and their "social aggregation technology," depending on whether their production is a summation, weakest-link, or best-shot process.[8] Increasingly, scholars not only consider the overall supply technology of a good but also examine the good to identify its various building blocks and any external forces that may impact its availability. Public goods are now accepted as being public in consumption *and* provision.

2— KEY FEAUTURES OF GLOBAL PUBLIC GOODS: As mentioned, many scholars assume that the difference between NPGs and GPGs lies mainly in their different geographic and temporal reach. The benefits and costs of GPGs are viewed as spanning the world and, in many instances, several generations as well. This explains why the terms "*inter*-national PG," "*trans*-national PG," and "GPG" are often used interchangeably. However, the implications of a PG's worldwide and multi-generational reach reveal that the difference between NPGs and GPGs is

[5] The conditions that make markets fail usually include (besides public conditions) imperfect competition, externalities, incomplete markets, imperfect information, and macroeconomic disturbances (Stiglitz and Rosengard 2015: 93). Externalities arise when individual actors take an action that generates spillover effects into the public domain for which they do not bear the full costs or from which they do not reap the full benefits. Thus, externalities are important inputs into PGs and are explicitly referred to here only when the context warrants it.

[6] Public good provision can be viewed as composed of two different though closely interrelated policy processes: (i) the political process of deciding which goods to provide, which policy paths to follow, and how to share the costs and benefits; and (ii) the implementation or production process of mobilizing and assembling all requisite inputs, including the required financial resources.

[7] For example, for early contributions to the state-centric approach to PG provision, see, among others, Musgrave (1969, 1989 [1973]) and Samuelson (1954, 1955). Notable early contributions on private and voluntary PG provision include Buchanan (1954, 1975). On these contrasting visions, see also Buchanan and Musgrave (1999).

[8] The concept of "social aggregation technology" was introduced by Hirshleifer (1983). For its further refinement and application, see Cornes and Sandler 1996[1986] and Sandler (1998).

more profound and that the terms "*inter*-national" and "*trans*-national" may be inadequate, and may even conceal the essential differences.

To elaborate, a good's being global public in consumption implies that it confronts different countries and population groups with the sameness and indivisibility of supply, ignoring any differences in living conditions and preferences, which also tend to be wider in a global than in a national context. Moreover, in many instances, GPGs penetrate countries without asking for permission. They are not just waiting at the *inter*-national level and spanning across countries, patiently waiting like Weisbrodian option-value goods to be accessed, should potential users wish to do so.[9] Rather, they just transgress national borders, affecting, for better or worse, the welfare and well-being of countries or particular population groups within them. Thus, GPGs may be perceived as running counter to one of the basic principles on which the current world order is based: non-interference by outside forces in internal national affairs.

Moreover, GPGs run counter to a second fundamental world-order principle: national policymaking sovereignty. Like their national counterparts, GPGs are public in provision, yet publicness in provision means that, if a country wants to alter the supply level or the design and shape of a GPG, unilateral action or forming a small group of like-minded states may not suffice. The country may be compelled to seek the cooperation of others; GPGs that follow a summation process confront states with a compulsion to engage in effective international cooperation.

Moreover, a good's global publicness in consumption often affects not only countries but also areas beyond national jurisdiction, including many global natural commons such as the high seas and the atmosphere. The systemic integrity requirements of these commons may demand more in terms of corrective action than all states together are willing to do for them.

Further, some GPGs are stock-variables, whose availability changes slowly over long periods of time so that their present supply level depends on what

[9] Examples of Weisbrodian option-value goods are public parks and hospitals. While people may be uncertain about when or whether at all they may use these goods, should they ever wish to do so, the goods are there for them. For a more detailed discussion of this type of goods, see Holtmann (1999) and Weisbrod (1964).

happened in the past, and their future supply may be determined by policy actions taken today (Nordhaus 2006).[10]

Thus, as Box 2 illustrates, GPGs have a horizontal (geographic and temporal) dimension and a vertical (border-transgressing and interdependence-generating) dimension. To capture both, and as many global challenges have national and international or transnational dimensions (and often inter-temporal ones), it seems appropriate to refer to them as *global* public goods (GPGs) and to use "global" to denote the goods' multi-dimensional and (by implication) complex nature: they span the world and, possibly, also several generations, cutting across several levers of governance and are thus most likely of concern to a number of diverse actor groups.

Box 2 close to here

That said, however, what does the fact that climate change is such a GPG-type issue tell us about climate finance?

The next section will examine this question.

II Climate Finance Seen Through the Lens of Global Public Goods

The fact that both climate change (the problem) and climate change mitigation and adaptation (the policy outcome to be achieved) possess GPG characteristics has important implications for our understanding of and policy practice for climate finance. This is evident from the following analysis, which shows concerning four aspects of climate finance that employing the GPG lens makes a difference. The four aspects pertain to (1) climate finance as distinct from development finance; (2) the risk of market and state failure in providing climate finance; (3) the importance of intra-generational fairness as a means of strengthening actors' willingness to "get the price of international cooperation right;" and (4) the need for a more genuinely global, integrated, and comprehensive approach to the analysis and management of the provision and financing of climate change mitigation and adaptation.

[10] Important is that stock variables like climate change raise not only inter-generational equity issues but also inter-country issues, as we can see from the discussions on the principle of common but differentiated responsibilities and respective capacities (CBDRRC) and the linked issue of who ought to take leadership in addressing this challenge. See, Brunnée and Streck (2013); CESR and TWN (2015) and Pauw et al. (2014).

1 CLIMATE FINANCE AS DISTINCT FROM DEVELOPMENT FINANCE

In their classic book, *Public Finance in Theory and Practice*, Richard A. Musgrave and Peggy B. Musgrave (1989 [1973]) distinguish between an efficiency branch and an equity branch of national public finance. While the former is concerned with the efficient allocation of resources to the provision of NPGs, including the management of externalities, the latter concerns how to support society in realizing what it considers a fair or just state of distribution. In line with this distinction, one could say that IPCF constitutes the international component of the efficiency branch of global public finance and that external official development finance (EODF) is the international extension of the equity branch of national public finance.[11]

One could say this because climate change and its mitigation are global-public in consumption and production, concerning virtually all countries and all people. When actors come together to discuss and agree on how to address this issue, the *good* to be produced ought to be at the center of their debates, including questions such as which strategy to choose to get to the desired policy outcome and how to share the costs and benefits of taking corrective action among the concerned parties. In contrast, when actors come together to discuss development, their focus would need to be on a particular *country or group of countries* like, for example, least developed countries, considering that country conditions vary and, as past experience has shown, effective development assistance requires taking national circumstances into account.[12]

Table 1 displays the significant differences between IPCF and EODF, which, if ignored, could lead to misallocations and negatively impact both branches.

[11] For listings of the finance streams counted as 'public' and 'private' in the field of climate finance, see CPI (2015); OECD and CPI (2015); and UNFCCC/SCF (2014); and for the categorization of development finance according to these criteria, see https://data.oecd.org/drf/other-official-flows-oof.htm/. EODF includes official development assistance (ODA) and other official flows (OOF), which have a grant element of less than 25% and, therefore, do not qualify as ODA. See, OECD (2016). Other official flows (OOF) (indicator). doi: 10.1787/6afef3df-en (Accessed on 28 April 2016). Simply put, the public component of IPCF and EODF are flows that have budgetary implications for the contributing country.

[12] A country-specific approach to development assistance does not preclude policy dialogue between the national authorities and their external partners about what are the most promising approaches to fostering the country's national development. It just implies avoiding over-standardized policy prescriptions. Yet, when actors demand or offer to supply inputs to a GPG like climate change mitigation and adaptation, it would be important to be specific and, even, prescriptive about the quantitative and qualitative dimensions of the input in question in order to facilitate a smooth functioning of exchanges such as the trading of certified emission-reduction credits. We will revert to this issue below, in point II.3.

Undoubtedly, synergy effects, too, appear between the two branches. As also shown in Table 1, effective development depends on effective climate change mitigation and adaptation, which, in turn, depend on effective development. Precisely due to the benefits of these synergies, however, it is important not to promote one goal at the expense of the other, as happens at present.[13]

Table 1 close to here

For example, OECD/DAC makes special efforts to document the increasing amount of EODF from its member states that flows into supporting climate change mitigation and adaptation projects and programs. In 2013-14 bilateral climate-related ODA commitments reached on average per year US$ 25 billion or 18% of total bilateral ODA up from 4% in 2003-4 (OECD/DAC 2015). This is justified by the argument that, at the country level, it is difficult to distinguish between development assistance and climate finance. True, at the country level, the IPCF and EODF streams often come together and are, even, pooled with domestic public, private and other types of finance.

Nevertheless, in order to ensure that each funding stream flows to where it can best be used and to demonstrate that IPCF consists of new and additional resources, as repeatedly stipulated in international agreements, it would be desirable and possible clearly to distinguish between them – upstream. When preparing their national budget, all donor countries could allocate IPCF to one budget line and EODF to another line. Development assistance could be distributed, via bilateral, multilateral and other channels, to qualifying countries according to defined allocation criteria; and it would be the recipient developing country, who would, as called for in Agenda 2030,[14] report on the progress it has

[13] It is perhaps useful in this context briefly to discuss the increasing use of EODF for purposes that are not directly related to the conventional goal of laying a basic development foundation into countries to enable them to promote their own national development and contribute to various regional and global policy goals. Besides the allocations to climate-related purposes these non-conventional uses of EODF include, among others: fighting poverty in middle-income countries (MICs); undertaking projects linked to military interventions and peace-keeping; and paying for the cost of asylum-seekers from developing countries in industrial countries. These expenditures are, in many instances, aimed at addressing cross-border spillover effects of human neglect, war and conflict. They are thus GPG-related and should be charged to the budget of the concerned ministry/department of the 'donor' countries, like, for example, the ministry/department of defense, environment or interior and home security affairs. See, on these points: the OECD/DAC High Level Meeting Communiqué of 19 February 2016, which endorses the use of ODA for these various non-conventional purposes (available at http://www.oecd.org/dac/DAC-HLM-Communique-2016.pdf/) ; for voices arguing for ODA to continue focusing on the least-developed countries and cooperation with MICs to be funded from alternative sources, see, among others, Glennie (2011) and Tomasi (2015), as well as the categorization of 'development support' suggested by Lin and Wang (2015).

[14] See on Agenda 2030 again note 2 above.

achieved in national capacity building and advancing towards the Agenda goals, including an overview of related expenditures, as and if appropriate, broken down by funding source. In contrast, IPCF should be programmed on an issue basis, for onward channeling to actors (countries, firms, civil society organizations, individual experts), who appear to be the relatively best providers for a particular input to the good to be produced.[15]

To avoid inefficient intertwining of climate finance and development finance, it could also be useful to establish an OECD/DAC sister organization to which governments would report GPG-related expenditures, including climate finance allocations.

Initially, in the early 1990s, when the growing importance of GPGs became increasingly apparent, it was perhaps a pragmatic move to address urgent global challenges by tapping ODA resources, but why does this practice continue? Why not recognize climate finance as distinct from development assistance?

The next section provides one answer to this question.

2 THE RISK OF MARKET *AND* STATE FAILURE IN ENSURING ADEQUATE CLIMATE FINANCING

Standard economics assumes individual actors to be rational and selfish, primarily interested in improving their own material welfare. As such, they are predicted to free-ride on PGs, a behavior that is seen to cause markets to fail and potentially call for the state to step in with corrective action through its coercive powers of regulation and taxation. However, the institution of the state has no international equivalent. In fact, at the international level, states are also individual actors, and their representatives in international negotiations are likely to pursue national interests.

Many scholars therefore assume that, just like any other individual actor, states are rational, primarily self-interested and, in the presence of GPGs, tempted to free-ride, notably when viewing the issue under negotiation as not a national priority. Put differently, GPGs are seen as facing the risk of dual (i.e., market and state) failure.

[15] For a more detailed discussion on these resource allocation processes, see Kaul et al. (2015).

More recent research has shown that this risk, like the free-riding risk generally, may be overstated and that states are likely to be mixed-motive actors, possibly more so than individuals, because their policy positions tend to be a mixture of the interests of their various national constituencies. Moreover, states' reluctance to cooperate can reflect not free-riding but a rejection of an agreement proposal perceived as unattractive.

For a variety of reasons, then, dual-actor failure in the presence of GPGs may occur, especially concerning finance issues such as IPCF. A government may view national revenue as "theirs," a good that they can mobilize, appropriate, and control in terms of the uses made of it. National public revenue is one of the power bases of states, but this has weakened in recent decades, as various tax rates have lowered, and states have relied on debt financing of their budgets (see, Ostry et al. 2015).

Could these factors explain why, for example, many donor countries promise to move towards the 0.7 ODA target but repeatedly fail to do so and, in addition, even tug climate finance into the ODA envelope? [16] Or, why they are keen to mobilize private finance for climate purposes without precisely clarifying what the comparative advantages of different actor groups and funding sources in this field are? If discussed at all, the role of public finance that is mainly mentioned is that of catalyzing private finance. Yet, especially in policy areas such as climate change, which call for transformative change, states, individually and collectively, would need to play a pro-active, entrepreneurial role that goes far-beyond leveraging private finance, however important, perhaps even indispensable this is.[17]

Enhancing the efficiency and effectiveness of climate finance might thus require further empirical and theoretical research aimed at developing an economic theory that explains under which conditions particular state and non-state actor groups contribute or fail to contribute to GPGs and what their comparative advantages are in their contribution to various types of financial and non-

[16] At the writing of this chapter, only five out of 29 OECD/DAC member states have met the ODA target of 0.7 percent of their national income on a continuing basis. See http://www.oecd.org/dac/stats/ODA-history-of-the-0-7-target.pdf/ . Yet, about 18 percent of total bilateral ODA (amounting to an annual average of US$ 25 billion) were already flowing to climate-related initiatives in 2013-14. See http://www.oecd.org/dac/environment-development/Climate-related-dev-finance-ENG.pdf/ . This amount is relatively modest compared to the total amount of climate finance, which CPI (2015:1) estimates to amount to around US$ 390 billion in 2014. Therefore, its strategic use would be all the more important.

[17] On the role of the entrepreneurial state, see Mazzucato (2015).

financial inputs. The experiences such as those gained with public-private partnerships and the analyses of the current flows of climate finance, such as the limited amounts of resources so far allocated to adaptation purposes, suggest that the funders and their interests may matter: Neither private finance nor voluntary finance are perfect substitutes for public finance. It would thus be important systematically to clarify the specificity of the roles played by different actor groups in climate financing.

In this context, it would also be important to reexamine the nature of international cooperation, notably multilateral (i.e., inter-state) cooperation, and to explore whether it is just the joint, collective endeavor (as we tend to view it) or whether it might be more appropriately viewed as a market transaction—an exchange between a country (group) A and a country (group) B, in which A's commitment to reform is being traded against matching policy commitments and/or financial transfers to be provided by B. This question poses itself since, with the rising trend towards multi-polarity, conventional power politics is increasingly giving way to "smart power" politics. In light of this trend, it seems reasonable to conjecture that the top–down policy pressure that often enforced international agreements in the past is being replaced by exchange-type interactions between states.

Therefore, to what extent is international cooperation functioning as an international political market, and how efficient is this market?

This brings us to the next issue.

3 THE IMPORTANCE OF INTRA-GENERATIONAL FAIRNESS

As Stern (2015) points out, many researchers, policymakers, and experts in the field of climate change emphasize concerns about inter-generational equity. Yet, so Stern, given that scientists warn us that corrective action is urgently required if we are to avoid crossing the 2˚ limit of global warming and, preferably, even stay below this threshold, strong emphasis must also, if not primarily, be placed on intra-generational equity within and across countries as a means of fostering the requisite willingness to contribute among all the concerned parties. This is especially urgent where actors' preferences vary across countries and population groups (as is undoubtedly the case concerning many facets of climate change mitigation) and where decisive corrective action is required *now* (see also

Rübbelke 2011). In these cases, implementation strategies would need to aim at producing mixed-benefit results—clear near-term net benefits (e.g., clean-energy security for all), which, as co-benefits, contribute to the "climate change mitigation" stock variable.

We are living in a multi-polar world, and fairness and justice in international cooperation can no longer mean just offering any type of side-payment, a "carrot," as game theorists say. Nor can it mean that the conventional powers wield "sticks" (another game theory term) such as trade sanctions that threaten to make non-compliance with a proposed agreement more expensive than compliance. Rather, current global power balances call for more systematic, transparent, and disaggregated cost–benefit assessments and, importantly, bargains that are perceived as worthwhile and fair—that get the "price" right.

As Box 3 shows, each of the main cooperation strands—joint, collective action, and policy-commitment exchanges—involve several types of financial transaction that need to be calculated transparently and according to established fairness principles. This is especially important for exchanges where the suppliers of inputs are often developing countries and developed countries figure on the demand side as financiers. For bargains or sales to be concluded, it is important that the suppliers see that a reasonable amount of fairness has been factored into the prices being offered by the countries on the demand side of the bargain. Similarly, the "financiers" must have clear output indicators so that they can without too much effort or cost determine whether the good they financed is being delivered and meets all agreed-upon quantitative and qualitative criteria.

Thus, fairness and enhanced contracting may have to move in tandem.

Box 3 close to here

Interestingly, as can be seen from the Agenda 2030 and the Paris Agreement,[18] we appear to have progressed further on indicators and result measurement than on fair pricing, considering that the very definition of "climate finance" has remained unsettled, incremental costs are often viewed as too complicated to determine, and considerable amounts of IPCF are being charged to ODA accounts. Expected results are usually being defined with great precision. When

[18] See, for the reference to the agreements again note 1 above.

it comes to finance, however, matters are left open-ended and vague. For example, Article 9 of the Paris Agreement just states that developed countries shall provide financial resources to developing countries in continuation of their obligations and encourages other parties to provide support voluntarily.

Does this vagueness indicate that international political markets are suffering from conditions similar to those that make economic markets fail, such as power concentration and information asymmetries, and is the growing attention being paid to the formation of "clubs of the willing" introducing further distortions and preventing the enhanced efficiency in these international political markets that could come from pricing fairly and transparently and in a way that respects agreed-upon principles such as the CBDRRC principle?

4 INTEGRATED PROVISION PATH ANALYSIS AND MANAGEMENT

Most of us might take for granted that a producer of a simple private good such as a pencil or paper clip had undertaken a production path analysis to determine the required inputs, from where best to procure them and when, and when and how to feed them in the production process. However, though innumerable studies have examined many relevant scientific, technological, economic, socio-cultural, and ethical facets of GPGs, we still lack for these goods provision path sketches indicating, in broad-brush strokes, the major types of public/private and national/international inputs that might be required, their proper sequence, and the appropriate speed at which to move towards producing them.[19]

Such a provision path sketch could serve several purposes. For example, it would clarify which actor groups might be best suited to provide which inputs, thus indicating the desirable balance between public and private finance. In this case, it would not be the availability or supply of certain types of money that would drive implementation. Rather, money would follow, and serve, the identified policy paths.

[19] The report of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2014) is a case in point. It presents an impressive overview of the various facets of climate change mitigation but discusses them one-by-one without taking the next step of drawing up a provision path map. Other studies (e.g. Edenhofer et al. 2015) refer to the importance of creating links between various building blocks of the good but do not yet indicate what linking could entail.
However, most of the more comprehensive provision path analyses take the form of graphs, as in Kaul et al. (2006) and Kaul et al. (2016), for example. Nevertheless, these studies, as well as many of those that provide micro-analyses of isolated facets of GPG provision provide a rich source that could be tapped to prepare more comprehensive provision path analyses, though some of the findings might need reexamination to ascertain whether they are applicable to the GPG context.

Of course, preparing such sketches requires clear goal-setting. For example, should climate change mitigation be achieved primarily through scarcity management such as the establishment of quantitative global and national pollution-reduction targets or by aiming at goals like, for example, 'clean-energy security for all' or 'equal access for all to opportunities for sustainable growth and development"? Obviously, clarifying the goal is the starting point of any provision path analysis, and the strategy chosen and financed will matter to intra-generational equity and the mobilization of the requisite willingness to cooperate and pay among all concerned parties. Is it, then, because of the still-lacking process and output fairness that, despite the warnings that time is running out, climate governance is still highly fractured and haphazard?[20]

Provision path sketches would also allow a systematic exploration of subsidiarity issues and the identification of opportunities for economies of scale and scope and for the more efficient use of non-rival goods such as green technology.[21]

However, we lack provision path sketches not only for climate change mitigation and other GPGs but also for the existence of agents and agencies who could function as central nodes of what would in many cases be undoubtedly highly complex (i.e., multi-actor, multi-sector, multi-level) provision networks. Such an agent or agency would be required to change provision path analyses from being mere studies into a living document—an instrument for introducing a sense of direction into GPG production processes. In the field of climate change, such a facilitation mechanism exists for the political dimension (i.e., international negotiations) but not for the production dimension. This governance void needs to be filled.

Recognizing GPGs, preparing GPG provision path sketches, appointing GPG network facilitators, and introducing "global" to national and international governance entities as a new organizational criterion could go a long way towards facilitating a more integrated and efficient implementation process, as well as an enhanced financing of these goods. While not involving any major change, it would introduce an important paradigm shift in research and

[20] The notion of 'process fairness' refers to parties having an effective say in matters that concern them; and output fairness refers to the parties, who are involved in a cooperative effort, to consider the resulting policy output as fair.

[21] See, Stiglitz (2014) on the management of global knowledge stock; and Maskus and Reichman (2005) on technology transfer and the global intellectual property rights regime.

policymaking by replacing actors such as governments, states, firms, civil society, or individual households at the center of the analysis with the good, the policy outcome—the GPG to be achieved. This shift in focus would facilitate the often sorely lacking integration of the myriad dimensions that typically characterize complex issues like climate change.

Conclusion

This paper has explored whether there is added value in examining climate change mitigation and adaptation through the analytical lens of GPGs. The discussion indicates that this question can be answered in the affirmative. We noticed, by looking through the analytical lens of GPGs, that international public climate finance (IPCF) and, thereby, overall climate finance seems to suffer from theoretical and institutional lock-in—a continued reliance on theories and policy practices that fit neither the GPG nature of climate change nor current policymaking realities. The discussion points to a rich agenda for further research and debate on how to improve the organization and governance of climate finance.

The analysis also shows, however, that the constraints facing climate finance are, by and large, not climate-specific but GPG-specific, affecting GPG-type challenges across the board. Yet, a general theory of GPG provision and finance has not yet been developed.[22] Therefore, it would seem useful to pursue a two-pronged approach to overcoming the current lock-in problems: developing the incipient effort made in this paper to apply the GPG lens to climate issues while concurrently building a general theory of GPG provision and finance, which could offer robust policy advice on the cross-cutting institutional reforms that might be required. Such a two-pronged strategy suggests itself, because it seems unlikely that policymakers and other actors would support reform steps such as fairness or a mutually considerate and respectful exercise of national policymaking sovereignty in one particular issue area—say, climate—and not in other areas such as global health and finance, or managing the global natural commons, outer space, and cyber security.

In fact, developing such a general theory of GPG provision could go a long way towards avoiding the risk of considering all financial resources, irrespective of their source, as mutually substitutable. It would allow us to determine more

[22] Beginnings of such a theory can be found in: Atkinson 2006; Kaul et al. (2006); and Sandmo (2007.

clearly the specificity of the roles that different actors are best poised to assume in the provision process of a particular good. To be clear about that is especially important in today's multi-actor, in which international cooperation endeavors such as climate change mitigation and adaptation can benefit from public, private and voluntary resource flows but in which the role of public finance, notably that of IPCF is especially important in order to ensure that the ultimate policy outcome is not only global-public in consumption and provision but also generally perceived as fair and just.

Moreover, the time for developing a general GPG theory appears to be ripe. In most global-challenge areas, innumerable studies offer highly specialized micro-analyses of a particular facet of a global challenge. Many of their insights will undoubtedly remain valid and provide a foundation on which to build further research. As many of their findings pertain only to either the national or international level, however, they may require reexamination from a GPG perspective, notably from the perspective of how to provide and finance GPGs in today's world, marked by increasingly interdependent, multi-polar and multi-actor world.

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Box 1 – Defining public goods

Public goods are goods whose properties are non-rival in consumption, non-excludable, or both. If a good has both properties, it is said to be "pure public;" if it has just one of these characteristics, it is referred to as "impure public."

Thus, public goods are defined as opposites of private goods, which, according to standard economic theory, are rival and excludable.

However, being public or private is, in many cases, not an innate property of the good but a social construct, reflecting either a deliberate social choice or inaction due to a lack of scientific knowledge or information about the good.

Accordingly, it seems useful to distinguish between goods that have the potential to be public in consumption and those that are actually in the public domain, as does the following two-tier definition:

Definition 1: Goods have a special potential for being public if they are non-excludable and/or non-rival in consumption.

Definition 2: Goods are de facto public if they are non-exclusive and available for all.

The advantage of this definition is that it encourages analysts to ask whether and according to which criteria it is socially desirable for non-rival goods not to be fully or, at least, partially non-exclusive, for fully or partially rival goods to be non-excludable, and for potentially excludable goods to be left or placed in the public domain.

Source: This box draws on Kaul and Mendoza (2003).

Box 2 – Defining global public goods

Global public goods (GPGs) share with other public goods (PGs) the key property of publicness in consumption: being fully or partially non-rival and non-excludable. What distinguishes them from other PGs is the reach of their publicness in consumption, which: (i) spans several geographic regions or even the globe as a whole; and may also (ii) penetrate into countries, areas beyond national jurisdictions, or both, with variable levels of impact; and (iii) be of long-term duration, affecting, for better or worse, several generations. Thus, while criterion (i) is the prerequisite for a good to be defined as a GPG, the publicness in consumption of GPGs could potentially comprise three dimensions:

- A spatial dimension: being of worldwide span;
- An impact dimension: affecting countries and areas beyond national jurisdiction;
- A temporal dimension: having long-term effects.

In most cases, global publicness in consumption along any of these three dimensions will not be an innate property of the good but reflect a policy choice or the lack thereof.

In addition to being public in consumption, many GPGs, like other PGs, are also public in provision: their provision involves a large number of actors and compels countries to seek the cooperation of others.

Source: Kaul et al. (2016), Introduction.

Box 3 – Possible uses of international public climate finance

International cooperation among states consists of two main sets of inter-action that tend to be supported by international public climate finance (IPCF): (1) national-level policy reform commitments by one country or set of countries *in exchange* for IPCF transfer commitments by others; and (2) joint efforts of countries in support of the production of intermediate GPG-type goods that require pooled IPCF financing. Each of these cooperation strands requires different financial mechanisms and characteristics, according to which the concerned parties may consider them as being in line with intra-general fairness.

1 Exchange-type transactions

This type of transaction occurs when states meet each other on opposite sides of the international political market and seek to match the demand for and supply of domestic reform steps that would help generate inputs to a goal such as climate change mitigation and adaptation. The financing from the demand to the supply side could include

- *Incentive payments*—provided to poorer developing countries to strengthen their national financial scope for undertaking mitigation-related domestic policy reform and capacity-building initiatives that would otherwise not be possible to the extent or at the speed that their external partners consider desirable from a global perspective
- *Compensatory finance*—made available to poorer countries for domestic adaptation measures in line with the international commitments undertaken by the developed countries, including in …of the Paris Agreement (see UNFCCC 2015).
- *Adequate pricing of climate*-related goods and services—which can, in turn, take two forms:
    - Payments to a particular developing country for the generation of diffuse positive climate-related externalities (e.g., by preserving or expanding tropical-forest areas in its jurisdiction), provided on demand from the international community or parts thereof in excess of what the country would have done had it been motivated solely by its own national interests; these are also referred to as “reimbursements of incremental costs;” and
    - Payments for climate-related goods and services of a private good nature (e.g., certified emission reductions) provided by a developing country on demand from a particular other country.

2 Collective production of intermediate regional or global public goods

In this case, all interested countries would engage in the production of regional public goods (RPGs) and global public goods such as early warning and weather forecasting systems, research and development as well as deployment of knowledge and technology for facilitating the tackling of climate change-related and associated goals such as energy

security for all, or weather and crop insurance. The financial arrangements that might support such joint or collective endeavors could include

- *Cost-sharing arrangements*—for which the cooperating parties would need to decide the most appropriate principle to follow: ability-to-pay, beneficiary/user to pay, or any other principle;
- *Pooled subsidy payments*—from richer to poorer countries to enable the latter to establish national capacity and measures to access these goods; and
- *Pooled subsidy payments*—from richer countries to third parties such as private insurance providers, to encourage them to offer differentiated prices so that poorer countries could also afford their insurance products.

In respect to both, for each main type of transaction and each payment arrangement, it would be important to establish clear and transparent methods of calculating costs and benefits, as well as simple criteria and indicators that would allow policymakers and experts to determine whether a proposed transaction qualifies as a fair and mutually beneficial bargain. While precise cost–benefit calculations may sometimes be difficult, it should nevertheless be possible for the concerned parties to agree on payment and product-delivery arrangements that all perceive as "vaguely right" and hence acceptable, so that, in type 1 exchanges, bargains would be concluded and, for type 2 collective endeavors, the desired intermediate RPGs and GPGs would emerge as promptly and adequately provided as possible.

Source: Author

Tabelle 1: Climate finance ads distinct from development finance

Dimension	International public finance (IPCF)	Official development support finance (ODSF)
Main rationale	*Efficiency considerations,* motivated by self-interest or mixed considerations (self-interest and other-regarding concerns)	*Concern about others,* notably developing countries and poverty reduction in these countries
Main focus of the intervention	The *GPG* (global public good) to be produced	A particular developing *country* or developing countries more generally
Cooperating parties	*Interested state and nonstate actors* from all or several parts of the world	*Rich and poor countries,* plus perhaps their respective partners

Note: See continuation of the table on the next page.

Table 1 (continued)

Nature of the intervention	*Multiple policy approaches,* depending on the input to be provided and the implementation strategy chosen: o joint, collective international-level action (e.g. global norm setting or creating a co-sponsored operational or finance mechanism) o quid-pro-quo exchange of national or regional policy reform commitments o market-type exchange involving national delivery of an input against payment of a 'price' o compensatory payment for adjustment measures and other climate-related loss and damage incurred by poorer countries	*Transfers* of financial and non-financial resources from richer to poorer countries
Main intended beneficiaries	*One's self* and, in the case of mixed-motive or altruistic actors, possibly also future generations and the Earth as a whole	*Developing countries*, possibly also their poor people
Determinants of an effective intervention	*Fairness* and justice in international negotiations and expectation of intra- and inter-generational outcome fairness plus willingness and *capacity* (i.e. development) on the part of all concerned countries	*Development-compatible provision of relevant GPGs,* including climate change mitigation and adaptation

Source: Author