
What's in a Concept? Global Public Goods, International Law, and Legitimacy

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Abstract

Although the terminology of global public goods may be new to international law scholarship, many of the principal features and implications of global public goods are familiar: global public goods are externalities writ large; they create incentives to free ride; and in many cases, they require international governance to provide. Nevertheless, the global public goods literature has been valuable in highlighting that global public goods come in different types, with different 'production technologies'. Some depend on the aggregate effort of the entire group, while others depend on a 'single best effort' or on the 'weakest link'. These different types of global public goods raise different governance issues and hence different challenges for international law.

The recent interest in global public goods and international law raises several questions. First, why the sudden interest in the concept of global public goods? Secondly, what is its value-added for the study of international law? Finally, what is the role of international law in the provision of global public goods? The first question is historical, the second theoretical, and the third instrumental.

This article focuses on the theoretical question, although it touches briefly on the other two. It argues that the literature on public goods is valuable for international law scholarship by highlighting that global public goods come in different types, with different 'production technologies'.¹ Some depend on the aggregate effort of the entire

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¹ These different production technologies were first elaborated by Victor Hirshleifer in his article, 'From Weakest-Link to Best-Shot: The Voluntary Provision of Public Goods', 41 *Public Choice* (1983) 371. For an excellent exposition of the different types of public goods, on which the discussion in sect. IV relies, see S. Barrett, *Why Cooperate? The Incentive to Supply Global Public Goods* (2007).

group, while others depend on the ‘single best effort’ of an individual actor or on the ‘weakest link’.² These different types of public goods raise different governance issues, and hence different challenges for international law.

This article also focuses on the issue of legitimacy. At first blush, global public goods might seem to offer a basis of legitimacy for international law. Since global public goods cannot be adequately provided by the market, we need international institutions and international law to provide them. The problem is that global political goods do not provide us with an Archimedean vantage point from which to assess international law. Instead, they raise governance questions of their own about which global public goods to produce, in what quantities, and who pays – and ultimately about who should decide these questions – questions that we need a theory of legitimacy to answer.³

The article proceeds as follows: Section I provides background on the concept of global public goods, and its growing prominence in international discourse. Section 2 introduces the governance issues raised by global public goods. Section 3 asks what value-added the concept of global public goods provides for the study of international law. Section 4 analyses the different types of global public goods. Section 5 concludes with a discussion of the legitimacy issues raised by the provision of global public goods.

1 Background on Global Public Goods

Although the basic concept of public goods was understood by thinkers such as David Hume and Adam Smith,⁴ it was first given rigorous economic expression by Paul Samuelson in the 1950s,⁵ and was applied to political science by Mancur Olson in 1965 in his seminal book, *The Logic of Collective Action*.⁶ A public good is defined by two characteristics: non-rivalry and non-excludability. First, there is no rivalry between potential users of the good: one person can use it without diminishing its availability to others. Secondly, people cannot practically be excluded from using the good. Thus it is available to everyone, whether they contributed to producing it or not.

² Hirshleifer uses the example of a team marksmanship contest to illustrate the difference between these three production technologies for public goods: ‘[s]uppose that the payoff in the form of glory goes as a public good to all the members of the winning team, collectively. Now, it is perfectly easy to imagine that . . . the formula for calculating a team’s score might be . . . any one of . . . three [possibilities]: the team declared the winner might be the one with the best total score, or the highest minimum score (the best of the individual marksmen’s worst shots), or the highest maximum score (the best single shot)’: Hirshleifer, *supra* note 1, at 372.

³ These governance issues are discussed at length in Barrett, *supra* note 1.

⁴ Adam Smith, e.g., wrote about goods ‘which, though they may be in the highest degree advantageous to a great society are, however, of such a nature that the profits could never repay the expenses to any individual or small number of individuals, and which it therefore cannot be expected that any individual or small number of individuals should erect’: quoted in Musgrave and Musgrave, ‘Prologue’, in I. Kaul *et al.* (eds), *Providing Global Public Goods: Managing Globalization* (2003), at p. xii.

⁵ Samuelson, ‘The Pure Theory of Public Expenditure’, 36 *Rev Economics and Statistics* (1954) 387.

⁶ M. Olson, *The Logic of Collective Action: Public Goods and the Theory of Groups* (1965).

The non-rivalrous and non-excludable aspects of public goods create a tension. On the one hand, because public goods are non-excludable, they tend to be under-provided, since people can free ride on the efforts of others. On the other hand, because public goods are non-rival, efforts to encourage their production through exclusion are inefficient, since they prevent people from getting the benefit of goods the consumption of which involves no marginal cost.

The concept of public goods is an ideal type. Few, if any, goods are fully non-rivalrous and non-excludable. National defence is sometimes cited as a public good; but if one part of the United States – say, Alaska – failed to contribute to the national defence by paying taxes, the federal government could choose not to defend it against attack. Similarly, goods long thought to be non-rivalrous, such as fresh air, in fact have a rivalrous quality, as modern-day pollution illustrates. Goods that do not fully meet the tests of non-rivalry and non-excludability are usually termed 'impure' public goods. A commonly-used terminology refers to goods that are non-rivalrous but excludable (for example, cable television signals) as 'club goods' and goods that are non-excludable but rivalrous (for example, high seas fisheries) as 'common pool resources'.

Although the terms 'global' and 'public' modify 'goods' in the phrase 'global public goods', they pertain not to the thing itself but to its effects. Most goods have multiple effects, some of which may be global and others regional or local; some public and others private. Diplomatic immunity provides private benefits to the 'sending' state and to its diplomats, but it also might be considered a global public good by enabling international diplomacy. Similarly, human rights norms provide a private benefit to the individuals concerned, but they also provide public benefits to the international community – at least that is the theory behind international human rights law.

Projects to mitigate climate change illustrate the multiple qualities of a single good. Wind farms provide local, private benefits in the form of electricity; but they also provide a global public benefit if they take the place of a coal-fired power plant that would have emitted greenhouse gases. These different private and public benefits provide the basis for the allocation of costs for climate finance used by the Global Environment Facility (GEF).⁷ In building a wind farm, the GEF requires the host country to pay what it would have cost to build a basic power plant to generate electricity, and funds only the additional ('incremental') costs associated with building a wind farm instead.

Although international law does not recognize the category of 'global public goods', several international law concepts bear a close relationship to it. First, in the *Barcelona Traction* case,⁸ the International Court of Justice recognized that international law includes obligations owed to the international community of states as a whole rather than to particular states. One way of conceptualizing these obligations *erga omnes* is in terms of global public goods: if an obligation primarily relates to the provision of a global public good or the prohibition of a global public bad, then the obligation

⁷ Streck, 'The Global Environment Facility – A Role Model for International Governance?', 1 *Global Environmental Politics* (2001) 71.

⁸ *Barcelona Traction, Light and Power Company, Limited* (Belgium v. Spain) [1970] ICJ Rep 3.

protects a ‘collective’ or ‘common’ interest and should be owed to the international community of states as a whole.⁹

Secondly, international law recognizes that certain resources are part of the ‘common heritage of mankind’ or are of ‘common concern’. Areas beyond national jurisdiction, such as the deep seabed¹⁰ and the moon,¹¹ fall within the first category, and climate protection¹² and biological diversity¹³ within the second. Of the two concepts, ‘common concern’ seems more closely related to global public goods than ‘common heritage’.¹⁴ Climate change and biodiversity are of common concern because they provide non-excludable and non-rival benefits. The deep seabed, in contrast, is characterized as part of the common heritage of mankind in order to ensure that the private benefits of the resources are equitably shared.

2 Governance of Global Public Goods

The concept of public goods was first applied to international relations in the early 1970s,¹⁵ but the concept of *global* public goods assumed a prominent role in international politics only during the last decade, primarily as a result of the entrepreneurial work¹⁶ of the United Nations Development Programme (UNDP), which took up the banner of global public goods in three books published in 1999,¹⁷ 2002,¹⁸ and 2006.¹⁹ More or less concurrently, an International Task Force on Global Public Goods was established at the instigation of France and Sweden, co-chaired by Ernesto Zedillo, the former president of Mexico, which issued its report in 2006.²⁰ Through these and other activities, the concept of GPGs became so prominent in international development discourse that one commentator has called it the ‘buzzword’ of the last decade, like the New International Economic Order in the 1970s, good governance in the 1980s, and sustainable development in the 1990s.²¹

⁹ International Law Commission, Commentary to the Draft Articles on Responsibility of States for Internationally Wrongful Acts, Art. 48, paras 6–7, II *Yrbk of the ILC*, (Part II) (2001), at 126 (discussing ‘collective interests’ and ‘common interests’).

¹⁰ Declaration of Principles Governing the Seabed and the Ocean Floor, and the Subsoil Thereof, Beyond the Limits of National Jurisdiction, GA Res. 2749 (XXV), 17 Dec. 1970, 10 *ILM* (1971) 220.

¹¹ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, 5 Dec. 1979, Art. 11(1), 1363 *UNTS* 3.

¹² Protection of Global Climate for Present and Future Generations of Mankind, GA Res. 45/53, at para. 1.

¹³ Convention on Biological Diversity, 5 June 1992, preamble, at para. 3, 1760 *UNTS* 79.

¹⁴ Brunnée, ‘Common Areas, Common Heritage, and Common Concern’, in D. Bodansky, J. Brunnée, and E. Hey (eds), *The Oxford Handbook of International Environmental Law* (2007), at 550.

¹⁵ Russett and Sullivan, ‘Collective Goods and International Organization’, 25 *Int’l Org* (1971) 845; Olson, ‘Increasing the Incentives for International Cooperation’, 25 *Int’l Org* (1971) 866.

¹⁶ On norm entrepreneurs see Finnemore and Sikkink, ‘International Norm Dynamics and Political Change’, 52 *Int’l Org* (1998) 887.

¹⁷ I. Kaul, I. Grunberg, and M. Stern (eds), *Global Public Goods: International Cooperation in the 21st Century* (1999).
¹⁸ Kaul *et al.*, *supra* note 4.

¹⁹ I. Kaul and P. Conceição (eds), *The New Public Finance: Responding to Global Challenges* (2006).

²⁰ *Meeting Global Challenges: International Cooperation in the National Interest* (2006).

²¹ Carbone, ‘Supporting or Resisting Global Public Goods? The Policy Dimension of a Contested Concept’, 13 *Global Governance* (2007) 179, at 185.

Why has the concept of global public goods become so attractive to supporters of global governance? The basic reason seems obvious. Just as the state is needed to provide public goods at optimal levels nationally,²² international governance is needed to provide the optimal level of global public goods.²³ For international organizations, global public goods thus provide a response to the growing questions that emerged in the 1990s about their legitimacy.²⁴

This argument for the legitimating role of global public goods plays off the double meaning of 'good' in the term 'global public good'. In economics, a public good can be normatively good or bad. In referring to something as a public good, economists mean only that it is non-rival and non-excludable. In the argument regarding legitimacy, in contrast, the term 'good' is assumed to convey a normative evaluation. 'Global public goods' are contrasted with 'global public bads', rather than seen as encompassing them. That is why global public goods help to provide legitimacy to international institutions: because they are normatively desirable. And that is why the term 'global public goods' has undergone inflation. Recasting an issue in terms of 'global public goods' gives it greater status and thus serves a useful rhetorical function.

What this line of reasoning glosses over is that people may disagree about whether a global public good is good or bad, or about which of several global public goods to produce, given limited resources, or about who should pay.²⁵ In such cases, we need a system of governance to make decisions about which global public goods to produce, in what quantities, and paid for by whom. And that, in turn, requires some theory about what a legitimate decision-making process would entail.

Why might people disagree about the desirability of a global public good? First, global public goods may have differential impacts. Consider, for example, climate change mitigation, which many would consider to be a quintessential global public good. Slowing global warming would certainly be good for small island states, which are in danger of being submerged by rising seas. But it would be costly for states that stand to benefit from global warming – for example, because it would provide a longer

²² As Mancur Olson argued, '[T]he provision of public or collective goods is the fundamental function of organizations generally. A state is first of all an organization that provides public goods for its members, the citizens': Olson, *supra* note 6, at 15; see generally W.J. Baumol, *Welfare Economics and the Theory of the State* (1952); Hardin, 'Economic Theories of the State', in D.C. Mueller (ed.), *Perspectives on Public Choice: A Handbook* (1997), at 21.

²³ See generally T. Sandler, *Global Challenges: An Approach to Environmental, Political and Economic Problems* (1997), at 43.

²⁴ See generally Bodansky, 'The Legitimacy of International Governance: A Coming Challenge for International Environmental Law?', 93 *AJIL* (1999) 596. Most discussions of legitimacy focus on the inputs to decision-making, including factors such as transparency, participation, representation of relevant stakeholders, reason-giving, procedural fairness, and, more generally, accountability and deliberation. See, e.g., Esty, 'Good Governance at the Supranational Scale: Globalizing Administrative Law', 115 *Yale LJ* (2006) 1490. To the extent that international institutions supply global public goods – goods that are under-provided by the market – then this provides an 'output-based' source of legitimacy to justify their existence and authority. See Scharpf, 'Economic Integration, Democracy and the Welfare State', 4 *J European Public Policy* (1997) 18 (distinguishing between 'input' and 'output' based legitimacy).

²⁵ These roughly correspond to what James Buchanan refers to as the problems of allocation, financing and distribution: J. Buchanan, *The Demand and Supply of Public Goods* (1968).

growing season – or that depend on oil exports for their national income. Or consider that paradigmatic example of a public good, the lighthouse. The light from the lighthouse is a benefit for passing ships, but for those living in the vicinity of the lighthouse it may be considered an eyesore. This has certainly been the reaction of some environmentalists to the building of wind turbines (the modern-day equivalent of lighthouses) off Cape Cod. Even coordination norms, which everyone agrees provide a public good, have distributive consequences, so different actors will have different preferences about which norm to choose.

Secondly, people may have different tastes or values. Some may like the look of wind turbines, others not. Some may love the red sunsets likely to result from injecting sulphur aerosols into the atmosphere to reflect sunlight and slow global warming, while others may abhor them as ‘unnatural’.²⁶

Thirdly, uncertainties may exist about the effects of an ostensible global public good. Everyone would agree that a giant asteroid pulverizing the earth would be a global public bad. But would shooting a missile to deflect the asteroid necessarily be a global public good? The answer would be yes if we knew for certain that the asteroid would otherwise hit the earth. But what if the asteroid collision and the efficacy of the missile were in doubt, and what if there was also a risk that the missile would misfire and cause damage?²⁷ Vaccinations are seen by most people as producing a public good, but they raise risks as well, to which some people may object.

The net result is that people may disagree about whether something is a global public good or a global public bad – and, hence, whether international law should seek to promote it or prohibit it. Climate engineering provides a good illustration. Some have argued that it would be benign, and could even have positive effects apart from slowing climate change.²⁸ Others see it as not only dangerous but immoral.²⁹

Even if everyone agreed that a global public good was, indeed, good, this would not resolve the governance issues, since we would still need to decide, given limited resources, how much of the public good to provide. The answer depends on its benefits and costs relative to other public and private goods that we could choose to provide. From an economic perspective, the optimal level of production of a public good is the level at which the marginal benefit of the good (calculated over all of the actors that enjoy it) equals its marginal cost (including the opportunity cost of producing the public good rather than something else). Ordinarily, we rely on the market to reveal preferences and to equilibrate costs and benefits in order to reach efficient outcomes. But when we provide public goods through government action, then we need some decision-making process to determine preferences and decide how much to produce.

²⁶ For general background on climate engineering, see *infra* notes 52–59 and accompanying text.

²⁷ For an excellent discussion of the asteroid example see Barrett, *supra* note 1, at 2–3, 23–30.

²⁸ E. Teller et al., *Active Stabilization of Climate: Inexpensive, Low Risk, Near-Term Options for Preventing Global Warming and Ice Ages via Technologically Varied Solar Radiation Forcing* (2003).

²⁹ Gardiner, ‘Is “Arming the Future” with Geoengineering Really the Lesser Evil? Some Doubts about the Ethics of Intentionally Manipulating the Climate System’, in S.M. Gardiner, S. Caney, D. Jamieson, and H. Shue (eds), *Climate Ethics: Essential Readings* (2010), at 284.

Consider, again, the international effort to combat climate change. Even among people who agree that climate change mitigation is a global public good, there are still widely divergent views about how much to reduce emissions – about the level at which the marginal benefit of further reductions equals the marginal cost. Should a successor regime to Kyoto aim to reduce global greenhouse gas emissions by 50 per cent by 2050, as many countries argue, or by more or less? And who should bear the burden of achieving those reductions? We can analyse these questions from the perspective of efficiency, and there is now a large body of economic work along these lines.³⁰ But the question of who should pay involves issues of equity as well. Should the burden of reducing emissions be based on a country's historical contribution to the climate change problem? On its ability to pay? On its current emissions levels, either overall or *per capita*? Or on some other criterion? Many developing countries have been reluctant even to discuss the overall level of global emissions reductions without some agreement first on the burden-sharing issue.

As these controversies suggest, the issue concerning global public goods is not simply: How can we provide more? There are also questions about which public goods to provide and who pays. And, from the perspective of governance, there is the question: Who should decide these questions? Global public goods thus raise, rather than answer, the question of legitimacy.

3 Does the Concept of Global Public Goods Provide Value-added for the Study of International Law?

International law has been a relative late-comer to global public goods discourse. As Greg Shaffer notes in his contribution to this symposium, law was largely missing from the three UNDP volumes on global public goods.³¹ And database searches turn up only a handful of articles published in the last decade with the terms 'global public goods' and 'international law' in the title or abstract.³²

By failing to engage in a significant way with the concept of global public goods, what – if anything – has international law scholarship been missing? Does recasting issues such as human rights, international security, or environmental protection in the language of global public goods provide any value-added, any analytical leverage that can help us understand these issues better?

³⁰ See, e.g., R. Cornes and T. Sandler, *The Theory of Externalities, Public Goods, and Club Goods* (1996).

³¹ Shaffer, 'International Law and Global Public Goods in a Legal Pluralist World', this issue, at 669, n.3.

³² A Westlaw search for the term 'global public good(s)' in the titles of articles contained in the Journal and Law Reviews database found only two articles published in the last 20 years. A similar search on LexisNexis of the US Law Reviews database found only one article published during the last 10 years. The few published articles on international law and global public goods largely appeared in a symposium issue on international public goods and the transfer of technology in the *J Int'l Economic L*. These include Maskus and Reichman, 'The Globalization of Private Knowledge Goods and the Privatization of Global Public Goods', 7 *J Int'l Economic L* (2004) 279, and Shaffer, 'Recognizing Public Goods in WTO Dispute Settlement: Who Participates? Who Decides?', 7 *J Int'l Economic L* (2004) 459.

In at least some cases, the answer is no. An essay in the UNDP volume, *Providing Global Public Goods*, about the role of NGOs and civil society provides an illustration.³³ The chapter surveys the rise of non-state actors, their role in global governance, and the legitimacy issues that NGOs raise. Although the article uses the terminology of global public goods, the concept does little analytical work. Indeed, if the authors had been asked to contribute an essay for a volume on, say, global governance or international regimes, they could have contributed much the same piece, only with the phrase ‘global public goods’ omitted.

Global public goods involve externalities writ large, and thus raise the familiar problems associated with externalities. To the extent that a good provides uncompensated benefits to the international community, it tends to be under-provided. Since states cannot be excluded from receiving the benefits of a global public good, whether they contributed to its creation or not, they are able to free ride on the efforts of others. Conversely, to the extent that a global public good is bad – to the extent that it produces negative rather than positive externalities – then it tends to be over-provided. This aspect of global public goods theory is extremely important, but is not new to international law scholarship.

Consider again the issue of climate change. As discussed earlier, reducing emissions of greenhouse gases can be understood as a global public good. Left to their own devices, states will tend to under-provide it – that is, they will not reduce their emissions as much as economic theory says they should. Hence the desirability of developing an international climate change regime like the Kyoto Protocol that requires states to act. All of this is true, but it does not add much to the familiar analysis of the climate change issue as a collective action problem.

The idea that international law can be a tool, not only for co-existence among states but also for the production of global public goods, is also extremely important. But, again, this is a familiar idea in international law scholarship, dating back at least to the 1960s, when Wolfgang Friedmann wrote his path-breaking book, *The Changing Structure of International Law*,³⁴ in which he argued that international law had become a ‘law of cooperation’ as well as a ‘law of coexistence’.

What the public goods literature does contribute to the study of international law is an appreciation that public goods can involve different ‘production technologies’ with different incentive structures. In the next section, I will explore how these different production technologies raise different governance challenges for international law.

4 Providing Global Public Goods

A Aggregate Effort Problems

Most discussions of public goods assume that the total supply of public goods depends on the aggregate efforts of all of the actors involved. For example, climate change

³³ Edwards and Zadek, ‘Governing the Provision of Global Public Goods: The Role and Legitimacy of Nonstate Actors’, in Kaul *et al.*, *supra* note 4, at 200.

³⁴ W. Friedmann, *The Changing Structure of International Law* (1964).

mitigation is a function of the total level of greenhouse gas emissions reductions achieved by all of the countries in the world. Although individual countries can contribute to the goal of limiting climate change, the degree to which the problem is solved depends on the overall efforts of the global community.

As is well known, aggregate-effort public goods raise collective action problems that are very difficult to resolve. The global benefit of a public good may be higher than the global cost of producing it. But, from the standpoint of each individual country, a country may not receive enough individual benefit from the provision of a public good to justify the costs.³⁵ In such a situation, contributing to the production of the public good makes sense only if it is premised on reciprocal action by others, so that, in taking action, each state gets the benefit not only of the public goods it provides, but of the public goods that other states provide in exchange.

Consider again the climate change problem. Since climate change mitigation depends on the aggregate level of global emissions reductions, emissions reductions by an individual state make sense from a cost-benefit standpoint only if they are part of a global deal that requires emissions reductions by the major emitting countries. This was the rationale behind the Byrd–Hagel Resolution,³⁶ adopted by the US Senate immediately before the conclusion of the Kyoto Protocol negotiations, in which the Senate unanimously declared that it would not accept any climate change agreement that required the US to reduce its emissions but not developing countries.

Aggregate-effort public goods pose a huge challenge for international law, because they require participation and compliance by the big players – the ones whose contribution has the biggest effect on the overall level of the public good. What role can international law play in promoting the provision of aggregate-effort public goods? A number of answers have been given:

- International institutions can provide a forum for negotiations and thereby help to reduce transaction costs.
- International law can promote a learning process, through which countries change their evaluation of the costs and benefits of providing the global public good. For example, if a state decided that the costs of inaction were greater than those of action, regardless of what others do, this would convert the public goods problem into a game of chicken, which is easier to solve than a prisoner's dilemma game.³⁷
- International law can change the incentive structure that states face by lowering the costs of participating in an agreement, raising the costs of staying out, or some combination of the two. As Scott Barrett shows, this has been the winning

³⁵ Of course, this need not be true of aggregate-effort public goods. Protecting the stratospheric ozone layer, e.g., is an aggregate-effort public good: it depends on the overall level of global effort to reduce the use of ozone-depleting substances. Nevertheless, according to Scott Barrett, the benefit for the US of reducing its use of ozone-depleting substances substantially outweighed the costs: S. Barrett, *Environment and Statecraft: The Strategy of Environmental Treaty-Making* (2003), at 228–230. As a result, the US would have had an incentive to reduce its consumption of ozone-depleting substances even if no one else in the world had acted.

³⁶ S. Res. 98, 25 July 1997.

³⁷ On games of chicken see Sandler, *supra* note 23, at 38–39.

formula of the Montreal Protocol on Substances that Deplete the Ozone Layer, widely considered the most successful environmental agreement to date.³⁸ On the one hand, it lowered the costs of participation by establishing a multilateral fund to assist developing countries in implementing their commitments. Developed countries have been willing to invest in the fund presumably because the benefit they think they get from restoration of the ozone layer is greater than the costs of assistance. On the other hand, the Montreal Protocol also raised the cost of non-participation by imposing trade restrictions on non-parties.³⁹

- International institutions can promote norms favourable to the provision of global public goods⁴⁰ – for example, the taboo against the use of nuclear weapons.⁴¹
- International law can help to empower domestic supporters of a public good, thereby changing the political and legal dynamic within a state.⁴² The existence of an international obligation gives domestic actors both within and outside government a ‘hook’ for their arguments. If an international obligation is incorporated into national law, the hook is legal in nature and can potentially be applied by courts. But even if not, international norms can provide a useful argument for domestic supporters.
- International law can help to legitimize action by those who have an interest in producing a public good (possibly because it also provides private benefits) to put pressure on others to participate in supplying the good. This has been the approach of the international oil pollution regime, which relies significantly on the interest of port states in ensuring that oil tankers meet the global standards.⁴³

All that said, international law has had only intermittent success in addressing aggregate-effort public goods. On the one hand, international law lacks strong enforcement powers, as is often emphasized. On the other, it still has only limited legitimacy in the eyes of both states and the public. In cases where a powerful state like the US has a strong individual interest in supplying an aggregate-effort public good, it may be able to promote a cooperative regime to do so, like the Montreal Protocol system. But this was an exceptional case. If every global public good depended on aggregate effort, we would face a chronic problem of undersupply.

B *Weakest-link Problems*

Fortunately, the provision of global public goods does not always depend on aggregate effort. Sometimes, it turns instead on the actions of the community’s ‘weakest link’.

³⁸ Barrett, *supra* note 35. On the Montreal Protocol see generally E.A. Parson, *Protecting the Ozone Layer: Science and Strategy* (2003).

³⁹ Under Art. 4 of the Montreal Protocol, parties are prohibited from importing controlled substances from non-parties, as well as products containing controlled substances: Montreal Protocol on Substances that Deplete the Ozone Layer, 16 Sept. 1987, 1522 UNTS 3.

⁴⁰ This is the argument of constructivist international relations scholars.

⁴¹ Barrett, *supra* note 1, at 135.

⁴² This is the argument of the so-called ‘liberal’ approach to international law. See Slaughter, ‘International Law in a World of Liberal States’, 6 *EJIL* (1995) 503.

⁴³ R.B. Mitchell, *Intentional Oil Pollution at Sea: Environmental Policy and Treaty Compliance* (1994).

In such cases, it does not matter how much effort others make; a single weak link will undo their work. Eradicating smallpox and maintaining dykes are often given as examples of weakest-link problems: the efforts of the vast majority of actors can be undone by a single actor that fails to do its part. Similarly, the taboo against nuclear weapons could be conceptualized as a weakest-link global public good, to the extent that, if the taboo were broken just once, it would lose its power. Other examples of weakest-link public goods include accountability for international crimes and secure maritime transport, which can be undermined, respectively, by a single country that gives criminals impunity or fails to control pirates operating from its shores.

In the case of a weakest-link public good, the benefit of the public good ($B(pg)$) is provided only if all countries participate. If a single weakest link fails to do so, then $B(pg) = 0$. In describing something as a weakest-link problem, the assumption is that, for most countries, the benefit the country derives from the public good exceeds its costs of producing the good – that is, for each individual country, $B(pg) > C(pg)$. If so, producing weakest-link public goods is an assurance game.⁴⁴ Countries have an incentive to provide the public good so long as they are confident that everyone else will do so too. Moreover, once cooperation has been achieved, countries have no incentive to defect, since for each country the benefit it receives from the public good exceeds its costs of production. For this reason, solutions to assurance games are self-enforcing.

Consider, for example, the discovery of an ecosystem in the Antarctic that has never suffered any human contamination. Each country might prefer to keep the ecosystem unspoiled. But, if there is to be human contact, each country might prefer to be the one that gets the benefit of the ecosystem's resources. This would be an example of an assurance game in which, once the norm of non-interference was established, no one would have an incentive to defect.

Why might a country be a weakest link? As Scott Barrett explains, there are two quite different possibilities.⁴⁵ First, a country might agree that the benefit it would receive from the public good exceeds the cost, but lack the material or administrative resources to provide the public good. It might lack the law enforcement capabilities to hunt down terrorists or pirates, for example, or the medical expertise needed to provide mass vaccinations. Or, given limited resources, it might believe that its resources would get a better return if invested in something else – in food production, say, rather than smallpox eradication.

In cases where a country is a weakest link because it lacks the capacity to provide the public good, then trying to force it to do so will be fruitless. Instead, weakest link public goods call for assistance to enable countries to contribute to the provision of the public good (or, perhaps, for direct action to provide the public good in the weakest link's place, as in the case of the international effort to combat Somali pirates).

Who will provide the assistance? In the posited scenario, assistance is usually a single-best-effort public good – the aggregate level does not matter, only whether there is enough assistance to strengthen the weakest link. If the weakest link is poor

⁴⁴ Sandler, *supra* note 23, at 47.

⁴⁵ Barrett, *supra* note 1, at 47 ff.

and requires a relatively small subsidy to provide the public good, a single prosperous country may have an incentive to provide foreign aid, regardless of what others do. The benefit it receives from the public good may exceed the sum of its production and assistance costs.⁴⁶ In this case, a weakest-link public goods problem could potentially be solved through unilateral action and would not require international governance.⁴⁷

So far we have been considering countries that are weakest links because they lack the capacity to provide the public good. Alternatively, a country may be a weakest link because it affirmatively does not wish to contribute to the production of the public good. In some cases, the reasons may be understandable (fear of getting a vaccination, for example); in others reprehensible. The Taliban regime in Afghanistan was a weak link in the fight against terrorism not because of a lack of capacity, but because it was a rogue state that supported al-Qaeda's aims. Similarly, Saddam Hussein was a weakest link with respect to the taboo against chemical weapons.

Regardless of whether the reasons are understandable or repugnant, the 'unwilling' weakest link raises greater governance challenges than the 'unable' weakest link. In some cases, it might be possible to buy off a rogue state, as the international community has tried to do with respect to North Korea, to dissuade it from acquiring nuclear weapons. But if bribery is impossible, the only other option is coercion of one kind or another, such as economic sanctions or military action, which tends to be more costly than financial assistance and hence will be supplied less frequently. Consider, for example, the problem of protecting world heritage sites such as the Great Pyramids or the Taj Mahal. Maintaining a world heritage site is an example of a weakest-link public good, since it depends almost entirely on the host country. When a host country lacks the resources to protect a site, then this can be addressed comparatively easily through assistance, as occurred in saving the giant statues at Abu Simbel in the 1960s.⁴⁸ But when a host country affirmatively seeks to destroy a world heritage site, as the Taliban did with the Giant Buddhas at Bamiyan, then the only effective response is coercion.

Sometimes, it may be possible to organize a broad coalition in support of coercion (for example, to oust Saddam Hussein's forces from Kuwait or to combat Somali pirates), but more typically coercion is undertaken only when an individual state or small group of states has an incentive to do so, which is unusual. In such cases, international law can play several roles. It can provide institutional mechanisms through

⁴⁶ But, as the history of smallpox eradication illustrates, financing may be difficult even in very favourable circumstances. According to Scott Barrett, although financial assistance for smallpox eradication provided a benefit to cost ratio of 483 to 1, the WHO found it very difficult to raise money from wealthy countries to finance its smallpox eradication efforts: Barrett, *supra* note 1, at 50–51.

⁴⁷ Of course, if more than one country had an incentive to provide assistance, this would raise a question about which country should do so, or whether the states concerned should reach some cost-sharing arrangement. But since each country would still have an individual incentive to provide the public good regardless of what the others do, a solution would not necessarily depend on international governance. The problem would be more difficult if no single country had an incentive to provide the assistance – that is, for every country, $B(\text{pg}) < C(\text{pg}) + C(\text{a})$. Then the potential donor countries would need to act collectively to provide the assistance, and decisions would need to be made about who contributes what.

⁴⁸ The World Heritage Convention also seeks to bolster the private benefits that host countries receive from world heritage sites, by giving the sites an official status that is useful in promoting tourism.

which pressure can be exerted – for example, mandatory dispute settlement procedures (as in the pending case brought by Australia against Japan in the International Court of Justice challenging Japanese whaling). It can establish norms that provide legal underpinnings for coercive acts (as in the case of the developing law regarding the right to protect). Or it can authorize or approve of coercion by individual states (as in the case of the UN Security Council's authorization of NATO air strikes in Libya).

C Single-Best-Effort Problems

Like weakest-link problems, single-best-effort problems do not depend for their solution on the aggregate effort of a group. Instead, they depend on the single best effort of an individual actor or small group of actors. Examples of public goods that depend on a single-best-effort include scientific and medical discoveries, the deflection of an asteroid about to pulverize the earth, and the efforts of an individual champion in battle. Enforcement of international law can be understood as a single-best-effort public good to the extent that it can be accomplished by a single state forcing another to comply – for example, by bringing an action in an international tribunal. What ties these cases together is that a single threshold level of effort produces the public good, and further efforts above that threshold produce no further benefits. For example, once an asteroid has been deflected away from the earth by an interceptor missile, there is nothing more to do.

The benefits function of a single-best-efforts public good could take two forms. First, the public good might provide a benefit only if it was provided at a certain threshold level. In this case, the threshold would represent both a minimum level that needs to be provided (as with a weakest-link public good) and a maximum level above which further effort does not provide additional benefits. Deflecting an asteroid would appear to have this either–or character: either the effort is sufficient to deflect the asteroid, in which case nothing more needs to be done, or it falls short, in which case it provides no benefit.

Alternatively, the benefits function could have a positive slope up to the threshold level, above which additional efforts produce no additional return. In this case, the public good is an aggregate-effort public good up to the threshold level, but becomes a single-best-effort public good once the threshold is reached. Injecting sulphur aerosols into the atmosphere to reflect sunlight has this character: the cooling effect is a function of the amount injected. Up to a certain point, injecting more sulphur aerosols would provide additional benefits in remediating global warming. But above the level at which sulphur aerosol injection fully offset the effects of anthropogenic warming, further injections would provide no further benefits (and would raise considerable risks).

Why might a state supply a single-best-effort public good? Unless it is motivated by altruism, the answer is the same as for other types of public goods, namely, when the private benefits the state receives from the public good exceed the costs of providing the good. In the case of aggregate-effort and weakest-link public goods, the benefits side of the equation is a function of what others contribute, so benefits typically exceed costs only if a state's efforts are reciprocated by others – or, to put it differently, only if a state's efforts help to buy action by others. In contrast, single-best-effort public goods

do not have this element of interdependence. The benefits of providing the public good are the same whether or not other states contribute.⁴⁹ For example, a state that takes action to enforce compliance with international law receives the same benefit (compliance) regardless of whether any other state attempts to take enforcement action as well. The same is true of deflecting an asteroid, destroying a nuclear facility being used for weapons development, or making a scientific breakthrough.

Single-best-effort public goods would seem to raise the fewest issues of international governance, since they can be supplied by a single actor or small group of actors. As a result, they involve neither the collective action problems raised by aggregate-effort public goods nor the coercion problems associated with weakest-link public goods. But single-best-effort public goods raise a different kind of problem, namely, the prospect of unilateralism.⁵⁰

One of the key characteristics of global public goods is that they are non-excludable. The usual meaning of non-excludability, in economic theory, is that producers are unable to exclude others from the benefits of a public good. The lighthouse owner, for example, cannot exclude ships from seeing the beam of light. This is one of the reasons why public goods are under-provided: they produce positive externalities. But 'non-excludable' can have another meaning: it can refer to the inability of members of the public to exclude themselves from consuming the good.

If everyone agreed that a global public good was normatively desirable, then the non-consensual character of consumption would, perhaps, be unproblematic. But, as we discussed earlier, tastes and values differ, so people may find themselves forced to consume things that they do not want.

Consider a simple example: playing music in a public park. This is a public good, since consumption of the music (i.e., listening) is non-rival and non-excludable. But, in this hypothetical, not only is the producer unable to exclude the public from consuming the good, users of the park are unable to exclude themselves from listening (short of using ear plugs). Since musical tastes vary, it is likely that some people will like the music and others not. Some will view it as a public *good*, others as a public *bad*. But because the music is a public good (in the economic sense), everyone must listen, whether they like the music or not. In effect, the producer of the music is imposing uncompensated costs – that is, negative externalities – on others.

Ordinarily, we think that public goods produce positive externalities, and are hence under-provided. But to the extent that public goods produce negative externalities, economic theory suggests that they will be over-provided.

Thus, single-best-effort public goods do not avoid the issue of governance.⁵¹ There is still a need for a decision about whether something represents, on balance, a global

⁴⁹ In cases where more than one state is able to provide the public good, a single-best-effort public good becomes like a game of chicken. Each state is better off providing the public good itself (i.e., swerving) than not having it provided at all. But a state is best off if another state swerves first and provides the public good.

⁵⁰ Barrett, *supra* note 1, at 29–30.

⁵¹ This is one of Scott Barrett's key points in his discussion of single-best-effort public goods: Barrett, *supra* note 1, at 30, 40–41.

public good that should be encouraged or a global public bad that should be discouraged. In the former case, the job of international law is to promote action by states. In the latter case, the job of international law is to limit action by states that might otherwise be inclined to make a single best effort to provide the public good.

Consider, for example, climate engineering – a broad concept that encompasses a variety of different approaches to counteract the effects of greenhouse gas emissions, either by limiting how much sunlight reaches the earth or by removing carbon dioxide from the atmosphere.⁵² The climate engineering technique that has received the most attention to date involves injecting sulphur aerosols into the stratosphere to reflect incoming sunlight. There is reason to think this approach would work to combat global warming because it mimics the cooling effect of volcanoes.⁵³ According to some calculations, stratospheric aerosols injection could be done at an astonishingly low cost, putting it within the reach of individual states or even very rich individuals.⁵⁴ As David Victor notes, this ‘turns the politics of climate protection upside down’.⁵⁵ In contrast to emissions mitigation, which is an aggregate-effort public good, stratospheric aerosols injection is a single-best-effort public good, which could be supplied by a single country.⁵⁶

This feature of climate engineering, which is its biggest virtue from a governance standpoint, is also its biggest vice.⁵⁷ The prospect of individual countries taking unilateral action to remake the planet brings to mind, for some, images of technology gone awry – of climate scientists acting like Dr Frankenstein or Dr Strangelove.⁵⁸ The hope is that climate engineering would be purely positive. But it also poses risks. Some are known – such as the potential effects on the ozone layer or regional weather patterns. But the ‘unknown unknowns’, to use Donald Rumsfeld’s memorable phrase – the dangers that ‘we don’t know we don’t know’ – are what worry many people most.⁵⁹

In the case of climate engineering, then, the issue for international law is less about whether to encourage the production of global public goods than about whether to impose limits. Should individual countries be allowed to weigh the potential benefits and risks of climate engineering on their own, or should this require a collective decision? And, if the latter, what international body should have this responsibility?

⁵² See generally Royal Society, *Geoengineering the Climate: Science, Governance and Uncertainty* (2009).

⁵³ The eruption of Mt Pinatubo, e.g., cooled the earth by an estimated 0.5° C: *ibid.*, at 29.

⁵⁴ Barrett, ‘The Incredible Economics of Geoengineering’, 39 *Environmental & Resource Economics* (2008) 45.

⁵⁵ Victor, ‘On the Regulation of Geoengineering’, 24 *Oxford Rev Economic Policy* (2008) 322.

⁵⁶ As Thomas Schelling argues, this transforms the climate issue ‘from an exceedingly complicated regulatory regime to a simple . . . problem in international cost sharing’: Schelling, ‘The Economic Diplomacy of Geoengineering’, 33 *Climatic Change* (1996) 303 – although even this may be an overstatement since, if the costs of climate engineering prove sufficiently cheap, international cost sharing may not be necessary.

⁵⁷ Barrett, *supra* note 1, at 40.

⁵⁸ Hamilton, ‘The Return of Dr. Strangelove: The Politics of Climate Engineering as a Response to Global Warming’ (2010), available at: www.clivehamilton.net.au.

⁵⁹ Bunzl, ‘Researching Geoengineering: Should Not or Could Not?’, 4 *Environmental Research Letters* (2009).

5 Global Public Goods and Legitimacy

The different production technologies for global public goods pose legitimacy concerns to differing degrees. Clearly, cases in which one actor imposes requirements on another raise the question: does the actor exercising authority have a right to rule? Does the government, for example, have legitimate authority to require people to be vaccinated or to pay taxes? Coercing a weakest-link actor to participate in providing a public good, or a single-best-effort actor to forego doing so, would clearly raise legitimacy concerns. So too would the establishment of international institutions that could require states to contribute to the provision of an aggregate-effort public good – a global environmental organization with legislative and enforcement powers, for example, which some have suggested.⁶⁰

At the other extreme, providing assistance to a weakest link to enable it to produce a public good does not raise legitimacy concerns. In such cases, no one is exercising authority over anyone else, so the issue of legitimacy does not arise.

How about a state that voluntarily provides a public good? To the extent that other states can decide whether or not to consume the good, then there is no problem. No one is making decisions for anyone else; both producers and consumers are free to do as they like. True, the state that provides the public good cannot choose to exclude others from consuming it, but this is due simply to lack of capacity, not to any kind of domination by others.

The more difficult case arises when one state, in providing a global public good, imposes negative externalities on others. Clearly, this raises concerns from the standpoints of efficiency and fairness. But does it also raise an issue of legitimacy? Is there a meaningful difference between this case and the first, where one actor imposes requirements on another? In both, an actor makes decisions that affect others. But in the externalities case, people are ‘merely’ being acted on – they are suffering from negative effects – while in the other case they are being made to act. Is this a distinction without a difference? Or does one case raise a legitimacy issue and the other not?

Traditionally, most discussions of legitimacy confine the concept to situations where one actor exercises authority over, rather than merely affects, another. Imposing negative externalities certainly raises moral questions, but it does not implicate the kinds of questions that are central to the concept of legitimacy. There is no issue of compliance, for example, since there is no directive with which to comply.

Nevertheless, something akin to legitimacy seems at play here, if not legitimacy itself. Although cases involving negative externalities do not raise the issue of compliance, they raise an analogous issue, namely, whether the victims of the negative externality, not to mention the international community more generally, will accept

⁶⁰ E.g., in 1989, 17 heads of state adopted the Hague Declaration, which called for ‘new institutional authority’ to combat climate change, involving non-unanimous decision-making procedures: Hague Declaration on the Environment, 11 Mar. 1989, 28 ILM (1989) 1308; see also Palmer, ‘New Ways to Make International Environmental Law’, 86 *AJIL* (1992) 259.

that the state that imposed the externality was entitled to act. Note that the issue here is not whether the state's decision was substantively correct, but rather whether it had a right to decide, given that many of those affected by its decision are not represented in its decision-making process and cannot hold it accountable.

Currently, international law addresses the concern about potentially self-serving behaviour by states through norms requiring assessment, notice, and consultation, which help to ensure that the views of those affected by a decision are represented.⁶¹ But to allow the interests of the international community to be fully represented, international institutions rather than individual states would need to make decisions regarding the production of global public goods, in much the same way that the UN Charter collectivizes decisions about the use of force by giving the Security Council decision-making authority.

Attempting to invest an international organization with authority to make decisions regarding the provision of global public goods would raise difficult questions. What should be the composition of the decision-making body, for example? Should institutions related to global public goods be like the General Assembly, that is, open to any state, reflecting the global nature of the public goods? Or should they have more limited membership, like the Security Council, to promote more efficient decision-making? What is the appropriate decision-making rule? Should consensus be required, which has proved problematic in the UN climate change regime? Or should institutions be able to make decisions by qualified majority vote?

These issues are largely for the future, however. For the time being, most decisions regarding the provision of global public goods will continue to be made, *de facto*, by individual states in cases where they have a strong interest. This will definitely raise concerns, both normative and descriptive, whenever a single-best-effort public good produces negative externalities. It is less likely to do so in cases involving the coercion of a weakest link, because a weakest link is almost by definition an outlier. Most countries have an interest in providing the public good that the weakest link is preventing. So it may be possible to get agreement internationally on a multilateral response – for example, through the Security Council, as in the case of the effort to combat Somali pirates.⁶² And when this is not possible, and an individual country (or small group of countries) makes a single best effort to provide a public good (if necessary through coercion), then the legitimacy of the effort will tend to be evaluated after the fact, in terms of whether it was successful in providing the public good. Examples include the reaction to the NATO intervention in Kosovo, which was widely seen as 'illegal but legitimate',⁶³ and to the overthrow of the Taliban by the US in the aftermath of 9/11.⁶⁴

⁶¹ See, e.g., Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, adopted 25 June 1998, 2161 UNTS 450447.

⁶² See, e.g., SC Res. 2015, 24 Oct. 2011.

⁶³ R. Murphy, *UN Peacekeeping in Lebanon, Somalia and Kosovo* (2007), at 76.

⁶⁴ To the extent, however, that the US's action was conceptualized in terms of self-defence, then its aim was to provide a private rather than a public good.

6 Conclusion

Although the terminology of global public goods may be new to international law scholarship, the principal features and implications of global public goods are familiar. Global public goods are externalities writ large. They create incentives to free ride. And in many cases, they require international governance to provide.

But although analysing international law through the prism of global public goods may not shed entirely new light on the subject, it does allow us to see familiar phenomena in different ways. Unilateral action, for example, may be motivated by the desire for individual gains, but it can also provide global public goods in the process, either by coercing a weakest link or providing a single best effort. International governance is needed not simply to help provide global public goods that would otherwise be under-supplied, but to guard against self-serving behaviour by states that, in providing a global public good, give short shrift to the negative externalities that may result. Above all, the global public goods literature highlights that public goods come in different varieties, which raise different governance challenges and different issues of legitimacy for international law.