

Defining International Public Goods: Conceptual Issues

by

Oliver Morrissey, Dirk Willem te Velde and Adrian Hewitt

Overseas Development Institute, London¹

¹ Draft of chapter 2 in M. Ferroni and A. Mody (eds), *Strategies for International Public Goods* (Kluwer, forthcoming). The authors are Research Fellows at the Overseas Development Institute. They thank Marco Ferroni, Ashoka Mody, and Simon Maxwell, Sheila Page and other colleagues at ODI for helpful comments. All opinions and interpretations are those of the authors alone and should not be attributed to any institutions. The authors are grateful to the World Bank for funding. Correspondence to oliver.morrissey@nottingham.ac.uk.



Overseas Development Institute

111 Westminster Bridge Road, London SE1 7JD, UK

1. Introduction

The specific concern of this chapter is with answering the question ‘What are international public goods?’ That is, our concern is with defining and classifying types of public goods and identifying which of these can be considered to provide benefits on an international scale or with an international scope. Other chapters in this volume address issues relating to methods of financing public goods, deriving criteria for determining contributions to the cost of provision and how these should be made and shared (Chapters 3 and 4), and discussions of particular types of global public goods (e.g. Chapter 6). While we may comment, where appropriate, on such matters, they are tangential to our main focus. In particular, we want to ‘operationalize’ the concept and provide a basis for Chapter 5, which quantifies how much of donor aid can be said to have financed the provision of public goods by developing countries (including public goods that benefit these countries, and contributions of such countries to the provision of international public goods). In this chapter, we begin with very broad concepts, distinguishing national and international spatial ranges and identifying the types of benefits that give rise to public goods (and therefore aid classification). We then proceed to refine these to identify types of expenditures in various sectors that contribute to the provision of public goods.

The concept of global public goods achieved prominence with the UNDP publication *Global Public Goods* (Kaul *et al*, 1999). This adopted a broad and wide-ranging definition, that has subsequently been refined (e.g. Kanbur *et al*, 1999). Most recently, GDF (2001) distinguishes between ‘core’ and ‘complementary’ activities associated with the provision of international public goods. The essential point here is that international public goods provide globally available benefits; providing these benefits is therefore the ‘core’ activity. However, it may also be necessary to help people or countries to actually avail of the public goods (to consume them, as it were). Such enabling expenditures are ‘complementary’ to the public goods. This is discussed in some detail below (section 3) where we also consider another form of complementarity – expenditures (on national or local public goods) may be required to enable countries, especially poor countries, to contribute to the provision of international public goods. It is important also to draw a clear distinction between contributing to provision (production) as against contributing to the cost of provision (financing); we are primarily concerned here with the former, although we make some comments regarding the latter in the final section.

The concept of international or global (the terms tend to be used interchangeably) public goods is not as clearly defined as one would wish. There is now a large literature and while there is a broad consensus regarding what is at stake and what is being discussed, the nuances of writers differ. Many of the differences are essentially semantic, and should be dispelled at the outset. Each of the three words can be questioned. Does 'international' really have to mean that the benefits are completely global, in the sense that everybody on the globe benefits? In a broad sense yes, but in a narrow sense no. Almost everybody would agree that, for example, eradication of a disease (say malaria) is an international public good. In principle, everybody can benefit because the risk of contracting the disease is eliminated. In practice, one could identify many people for whom the initial risk of contracting the disease was effectively zero. They derive no discernible (or measurable) benefit, but the benefit exists nevertheless (the initial risk may have been imperceptible, but it was non-zero and is now zero). Thus, the benefit should be available to all even if some do not actually avail of the benefit. This relates to the willingness of beneficiaries (in this case the global public) to contribute to the cost of providing the public good.

A directly related issue is the spill-over range to which the benefits apply (Sandler, 2000, provides a detailed discussion). One can envision a range over the spectrum from global to local, with international, regional and national arrayed in between. There is no clear delineation of each point on the spectrum. The least evident distinction is between global and international public goods; it is expedient and reasonable to treat them as essentially synonymous. We use the term international largely for convenience, and to signify that while the benefits extend well beyond national boundaries they may not apply everywhere on the globe. National-level education would be considered a national public good, as the benefits accrue largely to the nation collectively. If educated people can migrate does this imply cross-border effects? The answer is no, because the individual migrant derives a private benefit; if this is fully recompensed in the destination country, there is no public good to that country. More importantly, it is not the provision of

education in one country that provides a benefit to the other, but the act of migration.² A national public good would be defined where the public benefits accrue to the public of the nation. Similarly, a regional public good would be defined as where the benefits accrue to the public of nations with contiguous borders (adjusting for specific issues that may arise regarding islands); see Ferroni (2001) for a discussion. A local public good is where the benefits are inherently and in large proportion sub-national. For our purposes, it is sufficient to distinguish national public goods from those with cross-border ranges. This leads to our first premise: *an international public good is where the benefits are inherently international in range.*

One could also question the precise meaning of ‘public’ in the context of public goods. This is at the heart of the economic concept (discussed in the section 2 below) and means in essence that ‘there are benefits that are not private in nature’ so that the benefits accrue to everybody (within the spill-over range). In essence, the benefits are shared by all (GDF, 2001). In the same way that global benefits do not imply measurable benefits to everybody on the globe, public benefits do not imply that every member of the public actually derives a measurable benefit. More precisely, it does not require that everybody derives the same level of utility from the presence of the public good. This leads to our second premise: *benefits are public if in principle every member of the public can derive benefit from provision without necessarily implying that all people derive a measurable benefit.* As we will see below, the economic concept adds another condition: that the same level of benefit is available to everybody. This gives rise to a distinction discussed in section 3 below, that between consumption and production. Most discussion of public goods is about producing them, or making the benefits available (in fact, much of the

² A different example may make the point more forcefully. Consider somebody from a poor country who is educated in a rich country. The individual derives a private benefit. Assume that person then works for a global research institution. The contribution to global knowledge is an international public good, but the education received by the individual is a complementary activity that helps them to contribute to the core activity of producing global knowledge. Assume, alternatively, that the person returns to the poor country and assists that country in utilising or accessing global knowledge. Again, their education is a complementary activity, enabling the poor country to ‘consume’ the international public good. In either case, the education itself is complementary and, as it provides external benefits in enhancing human capital, education provides a national public good within a country. Education itself is not an international public good, but it is a complementary activity.

discussion is about contributions to the costs of provision). The case for provision can be made independently of the issue of whether every potential beneficiary actually derives the benefit (i.e. consumes, or avails of, the public good), although this will relate to their willingness to contribute to the cost of providing the public good (see section 5). However, utility is derived from consumption therefore to maximise utility (total benefit) it is desirable to enable everybody who wants to benefit. If the condition of being poor prevents such people benefiting from public goods, then measures to reduce poverty increase the utility derived from public goods. This is one reason why poverty reduction is desirable, but it does not imply that poverty reduction itself is a public good.

The final semantic issue to dispense with is the word ‘good’ itself. This is relatively straightforward – it means benefits that provide utility or satisfy wants. It does not mean merchandise (as in ‘goods and services’) nor should it be interpreted as normative (as in ‘for the good of the public’) even if it is. In this sense, the elimination of a public bad (e.g. disease or pollution) is itself a public good, where bad here means disutility. Thus, our third premise is that *a public good is a benefit that provides utility to the public*. The distinction between a private and public good brings us back to the discussion of ‘public’ above (see section 2 below).

The three premises stated above can be combined into a definition. *An international public good is a benefit providing utility that is in principle available to everybody throughout the globe*. An international public good does not imply measurable benefits for everybody in every country or nation; it does require that the benefits are available to the global public. The utility derived by individuals will depend both on their preferences and on their capacity to consume (e.g. the uneducated are constrained in their ability to benefit from global knowledge). In the case of a true international public good, the same level of benefit is available to everybody. This does not imply that everybody derives the same utility from the public good. The eradication of malaria may provide more utility to somebody living in Uganda than to somebody living in Iceland, for example, but the benefit of eliminated risk is provided equally to everybody. Those living in Iceland,

however, may be less willing to pay for the costs of eradication (see section 5 below). Eradication of a disease is an international public good because it eliminates the risk. On the other hand, reducing the prevalence of a disease (reducing the risk) may more appropriately be defined as a regional public good. The reduction in risk benefits those living where it is prevalent. Those living far away initially faced an imperceptible risk, and still do; in effect they do not benefit.

The definition above provides an answer to the question ‘what is a public good’ (it is not a unique answer, as others have provided equally accurate if slightly different definitions). In the remainder of this chapter we attempt to add flesh to the definition, to operationalize the concept. We attempt to answer the question ‘is a particular benefit an international public good’ or, more generally, to establish the characteristics of a benefit that render it a public good. Section 2 discusses the economic concept of a public good. This is the source literature and helps to establish the fundamental characteristics. The ‘geographical’ ranges of different types of public good are discussed elsewhere (Sandler, 2000) and receive only brief mention here. In Section 3 we identify the types of benefits associated with public goods and use this to address the relationship between international and national public goods. This includes a discussion of the related distinction between core and complementary public goods (GDF, 2001). A classification of public goods according to sectors – environment, health, knowledge, governance and peace – is provided in Section 4. Section 5 concludes, relating our classification to implications for financing the provision of international public goods in poor countries.

2The Economic Concept of Public Goods

A classic economic definition of a public, or social, good is one ‘which all enjoy in common in the sense that each individual’s consumption of such a good leads to no subtraction from any other individual’s consumption of that good’ (Samuelson, 1954: 387). In economics, a *pure* public good must exhibit two characteristics. First it should be *non-excludable*, implying that once the good is provided nobody can be prevented

(excluded) from consuming it (enjoying the benefits of the good). This implies that charging a market price is not effective (as free-riding can not be prevented), hence provision would not be attractive to the private sector. If excludability is difficult or costly, there is a case for public provision of (or contribution to the cost of providing) the good so that the social level of provision will be attained. Second it should be *non-rival* in consumption, which means that consumption by one person does not diminish the amount available to others. ‘When benefits are non-rival it is inefficient to exclude anyone who derives a positive benefit, because extending consumption to more users creates benefits that cost society nothing’ (Kanbur *et al*, 1999: 61). In practice, goods will be impurely public, as neither characteristic may be exhibited completely. Many goods may be quasi-public or mixed public/private, in the sense that they are non-rival or non-excludable but not both.

The degree of ‘publicness’ refers to the extent to which people can be prevented from benefiting once the good is provided. In the case of a pure public good, nobody can be prevented from enjoying the benefits – they cannot be excluded nor do the benefits enjoyed by others reduce the benefit available to anybody else. A lighthouse is a practical example – passing ships cannot (practically) be prevented from benefiting simultaneously from its presence. A similar point could be suggested regarding air traffic control or satellite communications but there is an important difference: it is technically practical to prevent some from benefiting (from receiving signals). This possibility of exclusion means that such goods are not purely public (they are described as club goods – only members of the club are granted the benefits).

A related concept is what has been termed the spatial range (GDF, 2001) or spill-over range (Sandler, 2000) – over what geographical range does the good have the features of publicness? Kanbur *et al* (1999) distinguish three types of spill-over range – national, regional and global. These distinctions are not precise and, as discussed above, we conflate regional and global as international. A lighthouse benefits only ships within sight of it – in this sense it is a local public good. Similarly, clean water or air are public goods

in a localised area. This area may well spread across national boundaries and could in some circumstances have a global range. A pure global public good would have to be globally *non-excludable* and *non-rival*. This is a demanding requirement, and perhaps unduly restrictive. However, many will have effects across national boundaries, hence it is reasonable to treat global and international as operationally equivalent, encompassing the sub-set of regional public goods (which are also international but with a narrower range). These can be distinguished from national public goods whose range of effects corresponds to national boundaries.

As international public goods have a spatial range across borders and continents, provision and financing should be co-ordinated, if not actually delivered, at an international level. By implication, some of the financing for international public goods would be provided to an agency or agencies with a global remit (see section 5). In contrast, national public goods are inherently national such that they are delivered at the national level, some proportion (usually substantial) of the benefit accrues only at the national level, and financing would be at the national level (e.g. health and education). There is of course a grey area, as national goods can have spill-over effects. We will not be concerned about precisely when national public goods become regional, or regional become international (and whether the latter are truly global). Some common sense is justified in practice.

Whilst a clear distinction can be made between public goods and externalities in theory, the practical distinction is limited. The essential feature of a public good is that, once provided, the same quantity is available for 'consumption' by all individuals within the spatial range and this quantity is the total. In the case of a private good, by contrast, the total quantity is the sum of the amounts consumed by each individual. An externality, however, does not refer to the quantity available but to an interdependence between agents. In particular, it refers to 'an interdependence that occurs outside of the price mechanism' (Cullis and Jones, 1992: 41). That is, consumption or production by one agent has effects on other agents (either as consumers or producers). It will help to develop a common example.

Cigarettes are private goods: consumption is excludable and rival, and total consumption is the sum of consumption by individuals. However, the smoke and smell emitted by an individual smoking a cigarette creates a disutility to others. This disutility is a local public bad within the spill-over range. One response could be to try and internalise (bring within the price mechanism) the externality by taxing cigarettes. The idea is that the tax prices the disutility and reduces consumption, therefore reducing the external bad. However, this does not eliminate the bad, and those suffering the disutility may seek

regulation, such as banning smoking in certain areas (which provides excludability). While the reduction of smoke pollution is a (local) public good, banning smoking is not itself a public good in the economic sense. Thus, there is a distinction between public goods and externalities.

In practice it may not be helpful to pay too much attention to the distinction. For example, pollution generated as part of a production process is an externality (an external bad). Standard public intervention to reduce this externality could be through taxation or regulation. As pollution accumulates over time, and spreads across borders, what was an externality effectively becomes an international public bad (e.g. ozone depletion or global warming). There then emerges a case for contributing to providing an international public good, reducing ozone depletion or greenhouse gas emissions.

Similar arguments apply in the case of external goods. For example, vaccinating somebody against a disease is a private good. Because the person is not going to catch the disease, and therefore not going to spread it, there is an external good – the interdependence of contagion is reduced. This external good provides a public good, reduced risk of catching the disease. Thus, in practice there is no precise distinction between the externality or the public good. There may be implications for how one provides the public good, and of how to finance such provision (e.g. polluter pays or free vaccinations), but these are not concerns of this chapter.

Essential to the concept of a public good is that everybody within the spill-over range derives an equal ‘amount’ of the public good provided. Although in principle everybody benefits from public goods, some will derive more utility from the good than will others. The fact that nobody can be prevented from benefiting from a public good does not imply that people gain equal utility from the benefits. Few people ever derive benefits from lighthouses, but that does not alter their public good nature. Reducing greenhouse gas emissions would appear to be a global public good as it reduces the climatic risk associated with global warming and this is a benefit to all. However, some may not perceive the benefit (or may not rank it high among their preferences) and therefore do not derive utility. This is distinct from the case where some people feel that the cost of provision exceeds the benefit. It may be the case that the private disutility from contributing to the cost exceeds the private utility from the benefit. This does not alter the fact that the benefit is a public good, which should be provided as long as the sum of disutilities is less than the sum of private and social benefits. Barrett (2000) discusses these issues relating when the benefit of a public good ‘justifies’ the cost (see section 5).

3 Types of Public Benefits and Public Goods

One can identify three types of benefit that tend to be non-excludable and non-rival, hence give rise to public goods – risk reduction, enhancing capacity, and direct provision of utility. Each is discussed in turn, although they are inter-related (and a particular public good may provide all three types of benefit). Gradations within each of these types of benefits define the spatial range. Thus, it is the range over which the benefits apply, rather than the good itself, that determines whether a public good is international or national. As elaborated in this section, if the benefit is to reduce risk or provide direct utility the public good tends to be international (in principle, everybody can benefit). On the other hand, if the benefit is to enhance capacity it is more likely that the spatial range is limited. Table 1 provides an illustrative classification of international public goods (using the premises in section 1) by the nature of the benefit.

Many public goods arise by providing a benefit that is in the form of reducing or eliminating risk, where the risk is a disutility (or, in general, a public bad). As mentioned previously, the elimination of a global risk, such as from contagious diseases, benefits everybody and is a global public good. The reduction of a risk is also a public good, but is only international if the benefit is equally available to everybody at an international level. For example, reducing greenhouse gas emissions reduces the risk of global warming for everybody. Reducing the risk associated with pollution or exploitation of a common property resource, such as an ocean, lake or forest, is also a public good but may have a limited spatial range depending on who shares the resource. For example, reducing the acid rain ‘produced’ by Britain has benefits limited to other European countries (Barrett, 2000). Pollution of the oceans imposes disutility at an international level, so reduction is an international public good. The same argument can apply to reduction of any airborne pollution. Reducing pollution of a lake, or degradation of any common property, will be regional or national, depending on whether or not countries share the resource.

Table 1. A Classification of International Public Goods by Type of Benefit

| Type of Benefit -> | Risk Reduction | Capacity | Utility |
|---|-----------------------------|--------------------------------|-------------------------------------|
| ‘publicness’ | | | |
| International in range (cross continents) | Reduce climatic risk | Global governance institutions | Conserve biodiversity |
| Limited range (e.g. regional) | Reduce acid rain | Regional institutions | Protecting forests or lakes |
| Benefit available to all in principle | Eliminate risk of disease | Global knowledge generation | Knowing poverty is reduced |
| Restricted benefits | Reduce incidence of disease | Research on arid agriculture | Knowing a disease is less prevalent |
| Provides utility to public | Prevention of conflict | Peace-keeping | Peace and security |

Note: The examples in each cell are illustrative and not necessarily unique to the cell. For example, the provision of soldiers for peace-keeping enhances capacity whereas peace-keeping itself reduces risk and provides utility.

Reducing, rather than eliminating, the risk associated with a disease gives the greatest benefit to those in areas where the disease is prevalent, therefore tends to be a regional public good. Improving security, and related issues of peace-keeping and reducing international crime, are also public goods. If the reduction in the risk of conflict (or, more generally, insecurity) applies globally, it is an international public good. Given the prevalence of ‘international terrorism’ and the spill-over of refugees, many conflicts can be said to have an international dimension. Often, however, the benefits will be regional or, on rare occasions, national.

Another set of public goods arises because the benefit is to enhance capacity to produce goods (which may be public or private), where the enhanced capacity is the benefit available to all. It is the enhanced capacity that constitutes the public good, not necessarily the goods that may be produced as a result. Knowledge is a general example; in principle, knowledge is available to all equally. Although some may be constrained in their ability to access or use the knowledge, implying the need for complementary public goods, knowledge itself is nevertheless an international public good. Education enhances national capacity, and therefore is a national public good. It also enhances the capacity to produce global knowledge, and is therefore an activity complementary to providing the international public good. A more specific example would be research. In fact, it is the inherent public nature of research that gives rise to the market failure that encourages private companies to seek protection of intellectual property rights. Education and health care generally, insofar as both enhance capacity, have public good elements. Governance could also be included here, as it enhances capacity and 'good governance' does, in principle, provide utility to all. Institutions relating to global (regional) governance would contribute to global (regional) public goods, although in most cases governance is a national public good.

A final set of benefits gives rise to public goods because they provide utility directly. Reducing environmental degradation of a common property resource, such as an ocean or forest, improves the quality of the natural resource. This provides a benefit and everybody can derive utility from the knowledge that the benefit has been provided. Examples include conservation, preserving biodiversity or wildlife. The increased quality can enhance the productivity and sustainability of the resource, and this generates externality benefits (capacity enhancement) that can be enjoyed by all. Reducing poverty has a public good element in the same sense, i.e. everybody can derive utility from the knowledge that poverty has been reduced. However, it is the knowledge that poverty has been reduced rather than the reduction of poverty *per se* that provides the public good.³

³ Reducing poverty itself is not evidently a public good, i.e. increasing the incomes of poor people is both excludable and rival.

Furthermore, higher incomes (lower poverty) may enhance the ability of governments to provide public goods and of individuals to consume them. Thus, poverty reduction can be seen as a complementary public good.

Obviously, these three sources of benefit can be inter-linked and mutually reinforcing. For example, reducing global warming may provide benefits of all three forms. The core/complementary distinction is relevant here. In each case the provision of the public good provides direct utility, and can be considered as a core activity. Complementary activities can relate to production or consumption. Consider some definitions (GDF, 2001: 133):

Core activities aim to *produce* international public goods. These activities include global and regional programs undertaken with a transnational, or multicountry, interest in mind, as well as activities that are focused in one country but whose benefits spill over to others.

Complementary activities, in turn, prepare countries to *consume* the international public goods that core activities make available—while at the same time creating valuable national public goods. Traditional country-based financial flows to support domestic policy and institutional reform and investment in infrastructure are primarily motivated by the benefits expected within the country. But these flows and the national public goods they help create may also enhance the country's ability to absorb the benefits of international public goods.

Core refers to the provision of the global benefit, or in other words the production of the international public good. Complementary refers to assisting the provision or assisting the ability to derive utility from the presence of the public good. This is the production/consumption distinction. For example, eliminating malaria would be a core international public good. Knowledge, and the research generating such knowledge, would contribute directly to the core public good. However, individual countries would have to contribute to provision through, for example, control of mosquitoes; such control would be a complementary activity (that may be a public good), necessary to ensure provision of the core.⁴ Consider knowledge, the availability of which is an international

⁴ The complementary activity need not itself be a public good. For example, vaccines are essentially private goods, but their provision is complementary to disease eradication. Education has strong private good elements (it is excludable and congestion implies rivalness), but is complementary to knowledge. The

public good. To avail of this knowledge, however, requires education, thus education is a complementary public good (to facilitate consumption). Furthermore, to contribute to global knowledge requires education and research effort, hence education is also a complementary activity to contribute to provision (production) of the core.

4Classifying Public Goods

Having identified the types of benefit giving rise to public goods, it is possible to identify ‘sectors’ for public goods – environment, health, knowledge, security/peace and governance. Three of these categories are largely associated with a benefit from reducing risk (environment, health and security) and two are primarily associated with enhancing capacity (knowledge and governance). All international public goods are core activities (to the generality of public goods); these are the benefits that should be provided to optimise global welfare as they provide utility equally to all. Core public goods also tend to be international in range. The terms core and international are synonymous in practice, although this need not be so. For example, the provision of ‘Health’ and ‘Peace’ are core public goods, and this applies equally at an international or national level. If these core public goods are provided at all national levels, this provides the international public good (although there may be additional elements, such as co-ordination, at the global level). More relevantly, if some countries do not provide the good nationally, this will diminish (and may even negate) provision at the global level. In this sense, national public goods are complementary to international public goods. Where this complementarity is on the production side, i.e. national public goods contribute to the provision of international public goods, then both can be considered core, but with a different spill-over range. Where the national public good is relevant more to consumption or utilisation of the international public good, then it is a complementary activity. It is easiest to elaborate by example, considering the five categories of public goods.

externalities contribute to a national public good.

Environment – the core public good or activity is to provide environmental quality. As most aspects of environment have international dimensions, this is a core international public good. The benefits are mostly of the risk-reduction or direct utility form, at least one of which (if not both) will tend to have an international spill-over range. For example, reducing industrial pollution around a city will improve air quality (and reduce the risk of illnesses) in the locality. However, the reduced emissions may contribute to reducing global pollution (and is thus a complementary activity) and this provides a utility benefit to all. Conservation or preservation activities in, for example, forests or nature reserves are basically national or local public goods, but they do provide potential utility to all and therefore have an international dimension. Such activities may be core at a national or local level, but complementary at an international level (in particular, they do facilitate consumption of environmental public goods).

Health – the core public good is to increase health quality, and this applies at the national and international level. Eradication of disease is the core activity for the international public good. Research on how to eradicate or control the disease is a complementary activity to producing the public good, and may be at a national or international level. If disease is contagious, each afflicted country has to be able to contribute to control and reduction. This implies a health service, a national public good that is a complementary activity to providing the international public good. Similarly, if a health care system exists (clinics, personnel, drugs, etc.) this facilitates consumption of the public good.

Knowledge – knowledge itself is an international public good. Core activities at the global level would include international research centres. For example, the International Agricultural Research Centres (IARCs) contribute both to global knowledge and to research on how to provide environmental public goods. Research centres are a core knowledge activity but are also complementary activities to providing other categories of public goods. Complementary activities would also include those that contribute to disseminating knowledge, such as maintaining internet sites and global networks (e.g. the Global Development Network). The provision of schools and teachers (a national public

good in the form of education) and access to information are complementary activities that facilitate the use of knowledge.

Security – global peace would be an international public good. Activities that contribute to peace or security are core activities, such as conflict prevention. Peace keeping could be classified as a core activity, although is as appropriately deemed a complementary activity that contributes to the production of conflict prevention. Similarly, institutions such as the UN Security Council would be complementary activities at an international level, while policing is complementary at a national level. Reducing poverty is a complementary activity as it helps the consumption of utility from peace and security.

Governance – stable good governance is a public good, both in providing utility and enhancing capacity (and potentially in reducing the risk of insecurity). The core activity would be establishing global institutions to co-ordinate the provision of, if not to directly provide, international public goods. Thus, the UN system and the Global Environment Facility, for example, are core activities. At the national level, good government would be a core activity but providing government capacity would be complementary to this.

Table 2 provides a summary of the discussion, with examples of public goods classified by sector and activity. Many of the classifications are imprecise as activities can contribute to different types of public goods. For example, international research centres are a core Knowledge activity whereas IARCs are complementary activities to providing environmental public goods. Similarly, as a global institution the UN Security Council is a core governance activity whereas it is a complementary activity for providing security. Peace keeping is another example: in providing regional (or national) security it is a core activity, but it is a complementary activity to providing global security.

In general, the core activity is the provision of the international public good, or of a national public good with significant spill-overs. The complementary activities in production are mostly national public goods, which enable a country to contribute to the

provision of international public goods. In cases where the publicness of international activities is limited (i.e. excludability is possible) they have been classified as complementary activities. For example, countries can be excluded from receiving international peace keeping services but when provided these contribute to the core activity. Similarly, research on disease is a complementary activity that has to be ‘put into practice’ to contribute to eradicating disease. The core activity provides the public good; complementary production activities contribute to provision. Complementary activities in consumption increase the ability of all people to benefit from provision, and so contribute to maximising the utility provided by public goods (as distinct from providing the optimal quantity).

Table 2. Classifying Public Goods by Sector

| Public Good | Core Activity | Complementary Activity | |
|--------------------|------------------------|--------------------------------------|---------------------|
| | | Production | Consumption |
| <i>Environment</i> | | | |
| International | Reduce emissions | Research | |
| National | Conservation | Agriculture support | Poverty reduction |
| <i>Health</i> | | | |
| International | Eliminate disease | Research on disease | |
| National | Preventive health care | Health care system | Health clinics |
| <i>Knowledge</i> | | | |
| International | Research centres | Internet services | Global networks |
| National | Education service | Universal education | Schools |
| <i>Security</i> | | | |
| International | Conflict prevention | Peace-keeping UN Security Council | |
| National | Crime-reduction | Policing | Reduce poverty |
| <i>Governance</i> | | | |
| International | Global institutions | Research | Financial stability |
| National | ‘Good government’ | Government capacity | Equity |

In Table 2, poverty reduction and financial stability are classified among complementary consumption activities. As GDF (2001: 134) notes, providing public goods makes a potential contribution to reducing poverty. Reducing poverty may be a moral imperative, and an aspiration for that reason. This does not imply that it is a public good. For

example, those who remain poor derive no benefit from the reduction in the poverty of others (they are excluded). The increase in income that brings some out of poverty is rival, in that it is not available as an equal benefit to others. On the other hand, as public goods are available as benefits to all, their provision increases the potential welfare (utility) of the poor. However, it is the poor who may be the least enabled to derive benefit from public goods. Thus, reducing poverty allows more people to benefit from public goods, and is therefore a complementary activity (that increases social welfare). Furthermore, reducing poverty may reduce pressures on the environment or sources of conflict.

The argument regarding financial stability is similar. Institutions to co-ordinate and monitor the global economy, such as the WTO, can contribute to global stability and support core activities. These monitor and enforce agreements that support the provision of international public goods (Barrett, 2000). Financial instability, and macroeconomic instability in general, are bad for individual countries but do not have equal effects on all people. Consequently, providing financial stability in one country is not an international public good. However, stability in one country contributes to overall stability and to governance in that country, hence is complementary. In a similar vein, greater equity may allow more people to share in the benefits of good governance, and is complementary.

5 Conclusions and Financing Implications in Developing Countries

In this concluding section we consider how the classification of public goods provided here relates to financing the contributions of poor or developing countries to the provision of public goods. In this context, the essential feature of poor countries is their limited ability to pay for the cost of provision, whether the public goods are international or national. Our discussion is intended to complement rather than replicate that of other chapters. Sandler (chapter 4) discusses the importance of ‘aggregation technologies’ for producing public goods. In general, ‘best shot technologies’ imply that provision should be by rich countries or international institutions, for example research effort to provide knowledge. In contrast, ‘weakest link technologies’ are more likely to imply provision in poor countries, for example reducing risks associated with disease or conflict. Knowing where (contributing to) provision should be ‘located’ does not resolve the issue of financial contributions. The latter is discussed in some detail by Barrett (chapter 3). As

developing countries are constrained in their ability to pay, there is a case for richer countries making a disproportionate contribution to the costs of provision, for example through aid (see chapter 5). As rich countries derive a benefit from the provision of international public goods, there is an incentive for them to contribute to costs incurred by poor countries (Kanbur *et al*, 1999; Sandler, 2000).

Our classification is most similar to that in GDF (2001), although we add the distinction between production and consumption complementarities and are more specific on how these relate to national public goods. The core and complementary distinction has implications for financing the provision of international public goods in low-income countries. A core activity has its own cost to which should be added the components of complementary activities. For example, ‘reducing global warming’ is a core activity. To provide this one first needs to identify how to reduce global warming (research), then the ‘solution’ or program needs to be applied (implementation); linking and monitoring these is a co-ordination role. Research, co-ordination and implementation can be identified as three separate cost components of providing the public good. The first two can be considered core activities whereas implementation requires complementary activities (which will tend to involve national public goods). In general, it is complementary implementation costs that are most relevant to low-income countries, but these are also the countries with the least ability to contribute to the costs.

Other contributors are more concerned with classifications of public goods according to spatial range and production technologies (Kanbur *et al*, 1999; Sandler, 2000). Regarding the former, we have adopted the most simple national/international distinction. The latter corresponds roughly to our ‘types’ of benefits. Risk reduction tends to be constrained by the weakest link, hence implementation should be concentrated at the source of risk. Capacity enhancement is associated with best shot, so the core activity would be where initial capacity is greatest. In general, direct utility benefits tend to be of a summation nature, and provision has to be widely spread. Aggregation concerns are most relevant to where provision should be, rather than being inherent to the definition of public goods.

Sandler (2000) notes that financial implications relate to three dimensions of publicness – excludability, rivalry and aggregation technologies. The last has already been mentioned, the others relate to defining public goods. Benefits in the form of direct utility tend to be purely public, both non-rival and non-excludable. Impure public goods may be rival but non-excludable, such as enhancing capacity by providing peace-keeping (the peace-keeping is rival but the benefit is non-excludable). Alternatively, they may be excludable but non-rival, such as research knowledge (the knowledge is inherently non-rival but access can be denied). Where excludability is feasible, one talks of club goods. These have been excluded from the discussion here, but may correspond to a regional spatial range. Central to financing is excludability, as this determines the incentives to contribute to provision. This does not help to determine the level of provision.

The choice of whether or not to provide an international public good depends on some cost-benefit calculus (Barrett, 2000, provides an extensive discussion). If the benefit is less than the cost, globally and for each country, then the public good should not be provided (as resources are scarce and would be better used elsewhere). The cost-benefit calculation is very difficult to make, and can be manipulated. Often, the costs of provision are easier to calculate than the benefits, especially as the benefits are a future flow subject to uncertainty. In fact, a problematic feature of many international public goods is that the benefits are to a large extent intangible. This is most evident where the benefits are of the form of providing a direct utility (such as knowing that there is less poverty or more biodiversity). Equally, it is difficult to quantify in a money metric the benefits of enhanced capacity. In principle, benefits of risk reduction are the most amenable to cost-benefit analysis, but in practice the calculus is imprecise and rather subjective.

The stance of the US on global warming provides an example. They promoted ‘carbon sinks’ as a low cost means of absorbing carbon dioxide (lower cost than reducing emissions), although scientific evidence suggests this is ineffective. Furthermore, they argue that the extent of global warming, at least due to greenhouse gas emissions, is exaggerated (therefore the benefit of reducing emissions is exaggerated). Consequently, their cost-benefit analysis comes out against reducing emissions by the amount or in the manner proposed in the Kyoto agreement. Others disagree, and place greater emphasis on reducing emissions. We only make this point to illustrate the fact that there will always be disagreements about the correct cost-benefit calculus.

The more interesting cases are where the benefits exceed costs in total, but not necessarily for all countries. Specifically, what if the benefit to others of a low-income country’s contribution to providing an international public good exceed the cost of provision, but the benefits to the country are less than the cost? This could be the case under ‘weakest link’ aggregation technologies associated with risk reduction. For example, African countries, even collectively, may not be able to afford the cost of eradicating AIDS (or another disease such as malaria). While developed countries derive some benefit from the eradication of disease in Africa, these benefits may well be less than the costs. However, if any one country fails to eradicate a contagious disease (the weakest link) then the global public good is not provided. Providing an international public good requires collective action but ability to pay suggests that some should contribute a relatively greater share of the costs than others. In fact, the inherent nature of international public goods – the broad range, many actors that need to co-operate and difficulties of monitoring compliance – combined with the absence of powerful supra-national authorities, makes the supply of such public goods especially difficult (Barrett, 2000). The distinction of cost components provides some guidelines.

Costs of Providing International Public Goods

The first component is research, and most public goods will have a knowledge component (developing the method to provide the good), which is a 'core' activity. This will generally have a 'best shot' technology, and would be provided wherever research effort is greatest (Sandler, 2000). A considerable amount of the publicly funded research in developed countries does contribute to providing international public goods. Furthermore, most of the funding for international research centres comes from governments and Foundations in rich countries. Thus, most core knowledge activities provide benefits that enhance capacity and are funded by those with the greatest ability to pay.

The second cost component is co-ordination – i) setting priorities and reviewing how the core activity can be delivered, ii) mobilising resources and allocating funding for the provision, and iii) monitoring contributions to provision. This requires funding for agencies, or global institutions. Co-ordination of provision (setting priorities and monitoring what various actors do) is not the same as co-ordinating funding, and need not be in the same agency. The World Bank already acts as a co-ordinator of funding (GDF, 2001). Trust funds administered by the World Bank contribute about \$0.8 billion annually to finance international public goods. However, a specialist agency (or even just an advisory committee) comprising experts in the field should be established to set priorities and guidelines on how the core activity should be delivered. This is what has normally happened – an agency is established that combines global expertise, sets priorities and identifies the actions necessary to provide the international public good. This agency is then housed in, or offered institutional support by, an established organisation that assists on the 'financial side' of provision. As in the case of knowledge activities, the financing of global institutions reflects ability to pay in contributions to the cost and also relates to enhancing capacity.

The case for global co-ordination of actions to address global problems does not imply global financing of the actions, although it may imply global financing of the co-ordination agencies. Thus, a distinction can be made between the financing of co-ordination and the financing of provision. Where provision is by complementary activities, contributors should meet the provision costs (subject to ability to pay criteria). For example, IARCs provide an international public good of knowledge and contributions to the cost would be at an international level. This also applies to the institution that co-ordinates their activities. However, using the knowledge, for example to promote high yield sustainable agriculture in a particular country, requires complementary activities at a national level. Agricultural support services are in principle private goods, although the associated externalities justify a public subsidy to provision.

The individual country should finance the complementary activities. They may be given financial support by donors. If they are, this is because they are poor and is not because the activity itself should be financed by contributions at an international level.

Another example of this distinction is reducing financial instability, often treated as an international public good. An international organisation that monitored and regulated capital flows, and that provided advice to countries on how to manage instability, would be providing a public service (although excludability is possible therefore it is more like a club good). However, if a loan was provided to a country to help it address financial instability, this money is effectively a private good to the country. Thus, the co-ordinating agency may exhibit features of an international public good but funds to particular countries do not. A similar argument can be applied to debt relief. Debt relief is not itself a public good (it is excludable, and relief to one country does not provide a benefit to all). However, it may be a means of contributing to the cost of providing a public good, if the saving in interest payments were used to finance provision (for example, of health and education services). This is, in effect, what Poverty Action Funds associated with HIPC debt relief aim to achieve.

The third cost component is what can be termed the implementation costs. In general this requires complementary activities, usually national public goods, and relates to actions that reduce risk (usually weakest link) or enhance capacity (usually best-shot). For example the international public good ‘cure for AIDS’ is of little use if it is not actually delivered to those who need it. More precisely, the core activity ‘eradication of a disease’ is not provided unless those suffering can avail of the cure, or those susceptible can be vaccinated. This requires that each country has a functioning health care system (a complementary or national public good, that relates to both production and consumption). Barrett (2000) makes the point that a simple, and relatively cheap, vaccine for measles exists, but in poor countries many still die from measles.

Disease eradication provides the best example of cases where the costs of providing the international public good exceed the ability to pay of the countries (weakest links) in which provision is most needed. The Global Alliance on Vaccines and Immunisation (GAVI) addresses this problem explicitly – donors contribute to a procurement fund for vaccines (and companies may donate vaccines) and also to the costs of immunisation programmes. Public-private partnerships are only part of the solution. Even if the drugs

for AIDS treatments were provided free to African countries, there would still be very high costs in providing treatment. As another example, SmithKlineBeecham (now GlaxoSmithKline) in 1997 launched its initiative to eradicate lymphatic filariasis (LF, the cause of elephantiasis), providing the drug Albendazole for free. Similar free drug offers have been made in other public-private initiatives such as against polio. However, the drugs are only part of the cost of implementing the treatment; the support costs of the 'eradicate LF' initiative are estimated as \$1 billion over 10 years (*The Guardian*, 15/2/01). This highlights the linkage between national (health care systems) and international public goods. Private companies can help, but there are still considerable costs that have to be met.

Eradicating disease poses a specific problem as the vaccine that allows one to do so is a private good – it is rival and excludable. An argument can be made for public funds to support research for a cure, but if private companies develop the vaccine they will then sell this as a private good. This is the source of the tension between African (and other) governments and pharmaceutical companies regarding the provision of AIDS drugs in Africa (and the related issue of generic drugs and protecting intellectual property rights). We cannot resolve the dispute here, but use it to illustrate many of the problem issues and the various roles that aid, public and private funding can play. In the context of the basic research, there is a need for a mechanism by which private companies compensate the public purse for their use of publicly funded research in developing vaccines that are then privately owned. Pricing to market, providing the drug at low cost to those with limited ability to pay, is one way in which companies recognise this.

In the context of implementation costs, a variety of funding mechanisms are possible (and all can be used). Public-private partnerships are useful for providing private goods that contribute to the provision of the public good. The example of drugs and vaccines has been discussed above. A similar example can be provided in the case of technologies that reduce pollution or greenhouse gas emissions, thus contributing to providing environmental public goods. Charitable Foundations, or aid donors, can also contribute funds to help low-income countries finance complementary activities; the use of aid in this way is considered in Chapter 5. One would also expect that developing countries would make contributions from their own resources, subject to ability to pay considerations.

To summarise succinctly, whatever way one cuts it, the definitions of public goods are broadly consistent. Our 'types' of benefit can be related to Sandler's dimensions of publicness, and the core/complementary distinction relates to international/national activities. The fundamental feature of international public goods is their non-excludable and non-rival nature over a global spatial range. Non-excludability is the source of co-ordination and financing problems, as there is always an incentive to free-ride. As all countries benefit, all should contribute to the cost of providing international public goods. As the ability to contribute varies, so too should the level of contributions. This issue of financial contributions, however, is independent of the classification of international

public goods. Non-rivalry is the source of problems in providing the optimal quantity of the good. Some form of cost-benefit calculus is required to determine how much of particular public goods should be provided. In this chapter we have sought to provide a coherent classification of public goods, and suggested links to issues of provision. Subsequent chapters address the supply and financing issues.

References

Barrett, S. (2000), 'Supplying International Public Goods', draft background paper submitted for *Global Development Finance 2001*. World Bank, Washington, D.C. Revised version as Chapter 3 in this volume.

Cullis, J. and P. Jones (1992), *Public Finance and Public Choice: Analytical Perspectives*, London: McGraw-Hill Book Company

Ferroni, M. (2001), 'Strategies for Regional Public Goods', Chapter 6 in this volume.

GDF(2001), 'Effective Use of Development Finance for International Public Goods', Chapter 5 in *Global Development Finance*, World Bank.

Kanbur, R., T. Sandler, with K. Morrison. 1999. *The Future of Development Assistance: Common Pools and International Public Goods*. Policy Essay 25. Washington, D.C.: Overseas Development Council.

Kaul, I., I. Grunberg and M. Stern (eds) (1999), *Global Public Goods: International Cooperation in the 21st Century*, New York and Oxford: OUP for UNDP.

Samuelson, P. (1954), 'The Pure Theory of Public Expenditure', *Review of Economics and Statistics*, 36:4, 387-9.

Sandler, T. (2000), 'On Financing Global and International Public Goods', World Bank, Washington, D.C. Processed. Revised version as Chapter 4 in this volume.