

# 8. EQUAL PER CAPITA ENTITLEMENTS: *A Key to Global Participation on Climate Change?*

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## **Introduction: The Kyoto Baggage**

Ensuring broad participation among countries—including developing countries—is necessary to effectively address global climate change. Countries spanning the political divide acknowledge this, and almost all policy research carried out on the subject bears it out. Building on the principles agreed to under the 1992 United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol stipulates a framework for the reduction of greenhouse gases (GHG) by the developed (Annex I) countries, while allowing the developing (non-Annex I) countries space to increase their emissions. At the same time, the Protocol charts a pathway for global cooperation via market-based regulatory instruments, especially international emissions trading (see Chapter 2 in this volume).

The Kyoto Protocol framework has two implications particularly relevant to any discussion of broad participation in climate mitigation. First, the Protocol uses in part the grandfathering principle by recognizing the 1990 emission levels of the developed countries as a basis for determining emission limitation targets. Grandfathering enabled national targets to be negotiated without any discussion of a long-term, environmentally sound, collective target. Second, no clear rule emerged to help differentiate targets *between* Annex I countries.<sup>1</sup> Targets were overwhelmingly shaped by the sheer force of bargaining power, exhibiting a system based on “negotiated justice” (Bierman 1999). However, what the Protocol fails to provide is a replicable framework based on any rationally defined criteria. This severely limits the ability of the Protocol to extend participation to developing countries in the future.

Current emissions of developing countries, as Chapter 1 points out, are very low compared with those of industrialized countries, but are rising rapidly. This places developing countries at a severe disadvantage when it comes to negotiating emission control targets that are based on a grandfathering system (which tends to establish targets in relation to a base year). Even in endeavoring to establish emission rights based on negotiated justice, the developing countries are handicapped by well-known global power imbalances: The developed world dominates the major controls on global capital, military prowess, and human capital. To the extent that the pure force of bargaining power has its way, the prospects that climate change negotiations will reach an equitable outcome are dubious. Thus, the Kyoto framework carries certain “baggage,” which adversely bears upon many proposals for global participation.

The absence of an acceptable framework for expanding participation within the Kyoto Protocol—coupled with the necessity of involving developing countries for any future success of the climate regime—has compelled researchers to develop a variety of proposals attempting to expand participation while honoring the underlying Climate Convention principle of “differentiation” among countries. One of the most debated and controversial of the approaches focuses on equal per capita entitlements. A large bloc of developing countries steadfastly supports this approach.

Against this backdrop, the following sections describe the conceptual basis of an equal per capita entitlements approach and trace out the historical evolution of the idea. The analysis then gauges the strengths and weaknesses of the approach, as well its future applicability at the global level. Finally, the conclusion attempts to carve out a new proposal, a variant that attempts to keep per capita integrity while adding traits that neutralize or reverse traditional weaknesses.

## I. Defining Per Capita Indicators and Entitlements

Generally speaking, “per capita” implies a number divided equally between a certain number of individuals. “Per capita” has two basic applications—as an indicator and as an entitlement. Most widely used, per capita is an *indicator* to represent, for example, the economic output or emissions of each individual in a particular country. As an *entitlement*, per capita is used as a measure to determine how much each country should be allowed to emit.

### *Per Capita Indicators*

Dividing total economic output (i.e., gross domestic product), income, national debt, number of schools, and so on by the total national population generates indicators for use in comparing performance among countries. Such indicators have many uses; within the environmental sector, per capita indicators have been applied to the management of natural resources, such as freshwater and energy.

Within the climate regime, per capita indicators are used in various ways. First and most generally, per capita indicators help evaluate emissions disparities among countries. For example, the 2001 Marrakesh Accords state that industrialized countries “shall implement domestic action...with a view to reducing emissions in a manner conducive to narrowing per capita differences between developed and developing country Parties” (UNFCCC 2002). Second, per capita indicators are often used in policy debates relating to the *timing* of commitments to be taken by countries. For example, a per capita emissions indicator could be used to define a threshold for initiating developing-country participation into an emission control regime (much like the Montreal Protocol’s staggered commitments for controlling ozone-depleting substances). Third, per capita emissions (and per capita GDP) are often proposed as an indicator for differentiating emission commitments between countries (Table 8.1). In brief, per capita indicators (emissions or GDP) can help facilitate an acceptable emissions-related burden-sharing agreement among countries.

As mentioned above, per capita indicators have already been incorporated into a number of proposals. Table 8.1 outlines proposals made by Parties during the Kyoto Protocol negotiation process<sup>2</sup> and evidences wide acceptance as well as use of this indicator in the negotiation process.

Although proposed per capita indicators as a “trigger” for participation and as part of burden-sharing schemes have remained relatively uncontroversial and uncontested, proposed “resource-sharing” schemes for shaping emission entitlements have stimulated intense debate and controversy, especially across the North-South divide. Under this approach, the global atmosphere—or, more precisely, the “limited assimilative capacity” of the Earth’s atmosphere with respect to GHGs—is considered a global resource to which every human being is equally entitled. The remaining sections of this paper investigate this particular approach.

**Table 8.1.** Proposals from the Kyoto Protocol Negotiations

Proposal	Date of Proposal	Main Feature	Emission/ capita	GDP/capita
France	December 1996	Convergence	Y	
Switzerland	December 1996	Convergence	Y	
European Union	March 1997	Convergence	Y	
Norway	November 1996	Multi-criteria	Y	Y
Iceland	January 1997	Multi-criteria	Y	Y
Australia	January 1997	5 Indicators		Y
Japan I	December 1996	Indicator choice	Y	
Japan II	October 1997	Indicator choice	Y	Y
Poland	March 1997	4 Indicators	Y	Y
Estonia	March 1996	2 Indicators		Y
South Korea	February 1997	3 Indicators		Y

**Source:** Ringius et al. (2000).

**Notes:** Negotiations are from the Ad Hoc Group on the Berlin Mandate, prior to the Kyoto Protocol adoption. The table indicates that the per capita GDP indicator has been used as one of the indicators in some multi-criteria proposals.

### *Resource Sharing: Per Capita Entitlements*

This approach first establishes an allowable level of global emissions, termed an emissions budget. The emissions budget (i.e., the total “environmental space,” as Tynkkynen (2000) terms it) reflects the ultimate level at which to stabilize GHG concentrations over time, or the amount of GHGs that can be safely emitted in the atmosphere while meeting the ultimate objective of the UNFCCC.<sup>3</sup> This emissions budget is then distributed equally among the global population, thereby implying an equal right to the atmosphere, with each country getting an entitlement proportional to its population. These global budgets and the subsequent per capita entitlements can also be changed over time as new scientific information becomes available (Table 8.2).

Although there are some operational variants of this pure per capita approach,<sup>4</sup> this chapter focuses attention on the “convergence” scheme, which, in political and research circles, has become synonymous with this approach. In any case, all notable variants of this idea follow the generic approach outlined above.

The convergence scheme suggests that all countries participate in the emissions commitment scheme after the first commitment period of the Kyoto Protocol, with the ultimate objective of converging to equal per

**Table 8.2.** Emission Budgets and Per Capita Entitlements for Various Concentration Targets

Atmospheric Concentration Target (CO <sub>2</sub> , parts per million by volume)	Emissions Budget 1991–2100 (millions of tons of carbon)	Average Annual Budget (millions of tons of carbon)	Per Capita Entitlement (tons of carbon)
350	300–430	2.7–3.9	0.5–0.7
450	630–650	5.7–5.9	1.00
550	870–890	7.9–8.1	1.3–1.4
650	1030–1190	10.3–10.8	1.7–1.8
750	1200–1300	10.9–11.8	1.8–2.0

Source: Adapted from Agarwal et al. (1999).

capita emissions over a stipulated time. As stated earlier, population size is a proposed criterion for determining how many entitlements each country is allocated. This scheme was first introduced by the nongovernmental Global Commons Institute (GCI) in 1990<sup>5</sup> and has been refined further into what is popularly termed “contraction and convergence.” The approach has been consistently advocated at the sidelines of climate politics and, over the years, has received increasing support from some NGOs and governments.<sup>6</sup> However, to date, it has not been successful in breaking into mainstream climate negotiations.

GCI’s approach starts off by defining a tolerable level of climate change based on the scientific assessments of the Intergovernmental Panel on Climate Change (IPCC),<sup>7</sup> which could be adjusted in the future to respond to improved scientific information. Based on such an ecologically sustainable target, a yearly global carbon budget is devised, which “contracts” gradually over time. This contraction continues toward a level where the per capita emission levels of participating countries “converge” toward an equal level. Thus, convergence claims to allocate shares of the budget to the emitting nations on an equitable basis (GCI 1999), whereby the per capita entitlements of the developed countries decrease while those of most developing countries increase. After reaching convergence, all countries would contract their emission entitlements equally until the requisite global emissions budget is reached. According to GCI, it is not possible to tackle the climate issue without adhering to these two key elements—contraction (environmental integrity) and convergence (equal per capita entitlements) (Meyer 2000).

The concept of a transition phase aims at softening impacts for Annex I countries. This staggered approach has been advocated by the Center for Science and Environment (CSE), an NGO, as a steady phase-in toward convergence (Agarwal et al. 1999). Gupta and Bhandari (1999), on the other hand, propose a scheme that differentiates between the short and the long term. While equal per capita entitlements are taken up as the long-term scheme, the approach is differentiated in the short term for Annex I countries by allowing them a transition period for adjustment. During this period, Kyoto Protocol commitments are fulfilled (until 2012), followed by targets in proportion to the efficiency of their production until 2025. After 2025, per capita entitlements are established. However, instead of aiming for an equal per capita convergence, Gupta and Bhandari suggest convergence toward a “sustainability corridor” (TERI 1997) of 0.5 to 0.75 tons of carbon per capita, which could accommodate the diversity of participating countries.

All proposed schemes, however, advocate the same underlying egalitarian concept of equal per capita entitlements for all human beings and seek acceptance of the principle within the context of the climate negotiation process. Before proceeding to analyze various aspects of this general approach, the next section briefly traces the evolving history of the entitlements approach.

## **II. History and Evolution of the Per Capita Entitlements Approach**

The idea of equal per capita entitlements is older than the Climate Convention. In its treatment of equity and social considerations, the IPCC's Second Assessment Report (Banuri et al. 1996) cites Grubb (1989), Bertram (1992), Epstein and Gupta (1990), and Agarwal and Narain (1991) as some of the progenitors of the idea. Other early work on the idea includes Bertram et al. (1989), Smith and Ahuja (1990), and Smith et al. (1990).

Interest in equal per capita-based solutions intensified around the time of the initial report of the IPCC in 1990, which indicated the prospect of human interference with the global climate. This marked a watershed for the manner in which the atmosphere was viewed and signaled a rethinking of old paradigms. Whereas the view of the atmosphere as a global commons is not new, this report highlighted the atmosphere's finite assimilative capacity for tolerating GHGs from human activities. Exceeding

the assimilative capacity of the atmosphere was one of the major factors influencing the accelerated changes in global climate patterns.

Thus, it was scientifically realized that there was a certain limit to the expansion of the global economy and attendant GHG emissions into the globally common atmosphere. This realization stimulated the associated debate on the *sharing* of scarce atmospheric resources, that is, establishing equitable access to this limited space, as the right to emit implies scarcity, and therefore economic value. As stated earlier, the suggestions for equal per capita entitlements were voiced. GCI and CSE continue to be the leaders on this front, although there are differences in their approaches.<sup>8</sup>

While the idea of equal per capita allocations was one of the core issues as negotiations began in 1991 to establish the Climate Convention, the time was not yet ripe for this approach. Convention negotiations shifted the focus toward differentiation of commitments within the *developed* countries. Guided by the principles of precaution, differentiated responsibilities, and efficiency, the Climate Convention called for Annex I countries to “take the lead” in controlling GHG emissions and deferred emission limits on developing countries, in recognition of their right to sustainable growth. Annex I differentiation was more fully achieved at Kyoto in 1997, through the ad hoc method described earlier. Many developing countries feared that this would set a precedent that would prejudice any equitable basis for future allocations.

The idea of equal per capita entitlements, however, was refined and developed along the peripheries of the mainstream negotiation process. Various formats, outlined above, evolved over time. The inevitability of developing countries coming into the emissions control regime at some stage and the need for an acceptable strategy for global participation fueled support for and further development of this concept. This includes support within governments. The Indian government was one of the first to officially adopt the equal per capita entitlements approach; at the First Conference of the Parties to the Climate Convention (COP 1) in 1995, the Indian government called for “implementing a program for convergence and sustainable par values for consumption on a per capita basis” (GCI 1999). This was followed by the Africa Group, which presented the Contraction and Convergence proposal in 1997, calling for “reducing the emissions of Annex I” and ensuring a “controlled growth of future emissions of non-Annex I” while being guided by the overall principle objective of “per capita emission rights” (GCI 1999).

The issue of per capita allocations arose repeatedly during the Kyoto negotiations in the context of emissions trading. Some developing coun-

tries argued that the emission entitlement or permit should be clearly defined for an initial global allocation before launching any sort of trading. Quite clearly, the system of emissions trading whereby developing countries participate through the Clean Development Mechanism does not define emission entitlements or establish emission rights. China and India called for “equitable allocations” of emission entitlements on a per capita basis as a prerequisite for allowing trading to commence. Subsequently, the European Parliament has also adopted a resolution on climate change, which advocates a global limit of 550 parts per million by volume (ppmv) of CO<sub>2</sub> equivalent, supported by “progressive convergence towards an equitable distribution of emission rights on a per capita basis by an agreed date in the next century.” The Indian government has recently reiterated its support for this concept by stating that “equal per capita is an equitable norm and the per capita criterion is central to the determination of emission entitlements” (UNFCCC 2000b). Thus, the concept has managed to progressively expand its support base in the years since its introduction.

### **III. Analysis of the Approach: Searching for the Elusive Solution?**

Having outlined the evolution and conceptual basis of the per capita entitlements approach, we endeavor in this section to carry out a dispassionate analysis gauging its future applicability within the climate change arena. This is done by organizing a qualitative framework based on some of the key questions surrounding the perplexing issue and analytically addressing them to draw out some useful conclusions.

#### ***Is the Atmosphere an Allocatable Natural Resource?***

This question forms the conceptual foundation for advocacy of a per capita entitlements approach as well as the basis for establishing and shaping any such entitlement. Thus, the issue merits examination from the outset. Before proceeding to address the issue it is important to clarify the resource in question. Usually termed as the “global atmospheric resource,” what it actually alludes to is the “limited assimilative capacity” of the Earth’s atmosphere with respect to GHGs.<sup>9</sup> As mentioned earlier, the IPCC provides guidelines on defining the tolerable limits that seek to define this resource, or the GHG assimilative capacity of the atmosphere.

The next paragraphs endeavor to assess whether the “global atmospheric resource” in question can also stand up to some defining attributes. A resource is literally defined as “a stock or reserve, which can be drawn on



when necessary.”<sup>10</sup> By inference, a resource should possess a reserve “value” and could be quantifiably “drawn on” in case of need (or should possess the capacity of being quantified and allocated).

The first defining attribute, the reserve “value” possessed by any resource, is also linked to the economic concept of scarcity. In the particular case of the atmospheric resource, this scarcity is driven by the idea of a limited assimilative capacity of the atmosphere for anthropogenic emissions of GHGs that carves out this finite resource. As mentioned above, when the atmosphere is discussed in the context of climate change, what really is being discussed is the capacity of the atmosphere to absorb GHG emissions above pre-industrial levels. Also, through international negotiations and the use of climate science and climate models, it can be agreed what level of GHG emissions and associated impacts we as a global community are willing to limit ourselves to and accept. This limitation extends the “scarcity” reserve value to the atmosphere.

Moreover, this scarcity value has been intrinsically recognized, quantified, and capitalized through the scheme of emissions trading. This scheme enables the “atmosphere” to satisfy the second defining attribute, that is, the capacity of being quantified and allocated.

By definition, allowance trading<sup>11</sup> establishes *de facto* user rights that provide an incentive to protect the environment (Rose and Stevens 1998). Any option to trade is contingent on having first attained this right. Within the climate context, countries are granted the right to consume a certain portion of the limited assimilative capacity of the atmosphere for a certain period of time. The price of emission permits can, thus, be considered as a fee to be paid for the temporary right to use the atmospheric commons beyond its sink capacity. Thus, the price is paid not for owning a piece of the atmosphere in perpetuity, but for obtaining a user right (Ott and Sachs 2000) for a certain predetermined period of time. This user right gives the requisite quantifiable value to the atmospheric resource in question, and implies an ability to support future economic development.

The rights to emit, established by agreements such as the Kyoto Protocol, constitute the practical manifestation of allocating the scarce global atmospheric resource in question and allow it to be quantified for storing, placing in reserve, or banking for future use or sale as and when required. The definitional conditions of a resource thus seem to be met for the global atmosphere. Thus, as outlined above, the global atmosphere can be termed as a resource entailing a “scarcity” value that can be quantified for allocation as well as monetarily capitalized, by utilizing certain economic tools, such as emissions trading.

### *Is the Equal Per Capita Entitlements Approach Equitable?*

Equity may be defined as the “quality of being impartial” or “something that is fair and just” (Banuri et al. 1996). Operationalizing impartiality or fairness in the context of differentiating future GHG limitation commitments has entailed the application of various traditional equity principles.<sup>12</sup> To this end, different overlapping typologies have been used to present relevant equity principles as they apply to questions of distributive justice (IPCC 2001c).<sup>13</sup> As is generally acknowledged, the whole issue of equity cannot be equated only with the principle of egalitarianism, denoting that every human has an equal right to use the atmosphere. Nevertheless, egalitarianism appears consistently in all the research representations, thus establishing it as an important criterion for assessing equity. For instance, Rose and Stevens (1998) include it among five alternate fairness criteria within global warming policy (Table 8.3).

Egalitarianism resonates. It appeals to the hearts and minds of many people the world over. This is why equal per capita entitlements is so consistently recognized. The ethical underpinnings of egalitarian justice are anchored in the international community’s ethical standards and legal codes. Prime examples are the United States Constitution as well as the United Nations Charter and its Universal Declaration of Human Rights. All of these furnish strength to the need and desire for applying the egalitarian principle when dealing with the atmospheric common resource, which lies outside the legal purview of individuals or states (Baer et al. 2000):

- The UN Convention on the Law of the Sea requires *common* ownership of deep-sea resources for the benefit of *all humanity* (Articles 16 and 17).<sup>14</sup> This establishes the principle of *joint sharing* of these resources and their associated benefits across the global population.
- Protocol on Environmental Protection to the Antarctic Treaty (Article 7) prevents appropriation of a region’s mineral wealth by *any individual nation*. This requires that the common rights to the resource should not be usurped by any individual nation.

Although not explicitly extending equal per capita allocations, the above illustrate how strongly the principle of shared rights and responsibilities applies with respect to managing common resources beyond the territorial jurisdiction of any single country. They not only set the foundations for the advocacy of per capita schemes, but make it difficult to ethically justify any unequal or disparate claims to a global commons, such as the atmosphere.

**Table 8.3.** A Selection of Alternate Fairness Criteria for Global Warming Policy

<b>Fairness Criterion</b>	<b>Basic Definition</b>	<b>Operational Rule</b>
Sovereignty	All nations have equal rights to pollute and to be protected from pollution	Cut back emissions in a proportional manner across all nations
Egalitarianism	All people have an equal right to pollute or to be protected from pollution	Allow emissions in proportion to population
Ability to Pay	Abatement costs should vary directly with national economic well being	Equalize abatement costs across nations
No Harm	Some nations should not incur costs	Poor countries should not be required to abate emissions
Ad Hoc	Abatement costs should be sensitive to unique circumstances	Give special consideration to economic, health, fossil fuel dependence, etc.

**Source:** Rose and Stevens (1998).

Overall, equity and fairness principles are indispensable for the establishment and effective sustenance of any global climate change regime. But their practical manifestation has remained uniformly elusive. The absence of a universally established equity doctrine—coupled with the varying economic implications of applying alternate equity principles across countries—has confounded negotiators and advocates with regard to what really is just and fair. As mentioned above, the egalitarian principle does remain a key equity determinant, but at the same time it cannot be the *only* determinant. What the many insightful studies demonstrate is that equity cannot be reduced to any single factor: it is rather a complex concoction of sometimes incompatible, but selectively justifiable, principles.

In this regard, the principle of per capita entitlements possesses a strong and easily comprehensible ethical argument, which lends support to its application. Another important conclusion is that the whole issue of judging equity cannot be selectively narrowed down to the egalitarian principle; it remains just one of the many determinants that can be used for assessing equity within the climate change policy process. Finally, although some valid concerns exist regarding the application of the per capita approach, it remains very difficult to *ethically* justify any *unequal claims* to a global commons such as the atmosphere.

### ***What Are the Linkages with International Emissions Trading?***

It is an established fact that the overall cost-effectiveness of international emissions trading is enhanced by increasing the number of participants, and particularly by including those countries (and their private-sector entities) with relatively lower abatement costs. In the context of climate change, this implies that cost-effectiveness is significantly enhanced by, first, using the low-cost mitigation options available in developing countries and, second, committing these countries to emission reduction targets at some future date (Rose and Stevens 1998). In this context, an allocation rule that catalyzes the above as early as possible would improve the cost-effectiveness that emissions trading brings to participants.

In terms of relative benefits, many developing countries generally stand to gain more, as already noted, under a per capita allocation regime than under other approaches. It follows, logically, that they may be much more inclined to join such a regime. Thus, it is likely that a per capita scheme would be able to attract the earliest possible entry of developing countries, thereby allowing emissions trading to maximize net benefits. This has been corroborated by various models, which suggest that per capita (convergence) offers the best opportunities for capitalizing on cost-reduction options as all Parties can fully participate in emissions trading (Berk and Elzen 2001).

Another pertinent observation emerging from various analyses is that trading is not merely *good* for the per capita scheme, but also that an equal per capita entitlements approach is *no good* without trading. A recent modeling study (Bohringer and Weisch 2000) indicates that the per capita approach entails significant global welfare costs that, without trading, can be several times higher than other allocation schemes. Chapter 9 finds similar results when focusing on emission reduction costs instead of welfare costs. Thus, trading has a direct bearing on the efficacy and efficiency of the per capita approach.

Thus, whereas the per capita approach has the potential to maximize the trading benefits through early developing-country participation, the inclusion of trading is also deemed essential for enhancing the relative success and appeal of this approach. Given this finding, the chapter now addresses some other associated questions.

**Concerns about hot air?** Within any trading regime, the potential exists for issuance of excess emission allowances above business-as-usual levels to certain countries (popularly termed “hot air”). Such inflated targets could threaten to undermine the environmental integrity of the system

and allow for reductions on paper rather than actual carbon-reducing trades. However, as stated, this issue is associated with allocation and trading in general, and is not specific to the per capita approach. In fact, the potential for creating hot air in a negotiated regime like the Kyoto Protocol or an approach seeking the voluntary opt-in of developing countries (Aslam 2001) is even more problematic than under an approach like equal per capita entitlements. A number of factors are at play.

First, the per capita approach is an objective one that allocates entitlements according to a formula based on two indicators: population and emissions. Both these indicators are widely used and reported, and there is a limited scope for any major manipulation. Second, the chosen target in the case of a per capita approach is one of annual contraction as well as cumulative convergence that is similar for all the participating entities. Third, hot air is largely viewed as a political incentive that could extend relaxed and generous commitments to developing countries in exchange for early participation. While hot air can be used to provide political incentives for participation within a negotiated or voluntary participation regime, it is at least controlled and limited in an equal per capita entitlements approach seeking simultaneous participation from large blocs of developing countries. Thus, the chance of “negotiated” manipulation is significantly reduced when dealing with a top-down approach like per capita that apportions entitlements based on an indicator and strives for global participation.

Finally, corrective measures can still be undertaken to better manage hot air, such as giving the suspect countries the right to trade away only a certain fixed percentage of their unused emissions while banking the rest for future domestic use (Agarwal et al. 1999).

**Associated obligations?** The inclusion of developing countries in an emissions trading regime would not come without a cost. Trading is a conditional and not an absolute right. Instituting and implementing a domestic system to conform to the dictates of the international trading regime would carry a number of associated requirements and obligations, such as emission measurement and verification. The Kyoto Protocol stipulates most of these requirements, which Box 8.1 outlines.

What is certain is that significant domestic human and institutional capacity would be required in order to conform to these emissions trading requirements. Also, this capacity would need to be supported with available, reliable, and credible emissions data, capable of withstanding international audit and scrutiny. All of this poses a challenging task, even for

### **Box 8.1.** Treaty Obligations for Countries Engaging in International Emissions Trading

**Greenhouse gas emissions target.** The allocation of the right to emit automatically creates an obligation not to exceed that limitation. So, all participating countries would have an emission limit set over specified time frames, and this obligation must include some mandatory consequences for non-compliance.

**National systems for greenhouse gas inventories.** Such systems for inventories need to stipulate institutional arrangements, quality control mechanisms, information management systems, reporting systems, etc. The system must also require the country to accommodate audits and inspections.

**National registries** would be required to record and track the transfers and acquisition of emission allowances.

**Reporting.** Countries would need to submit annual greenhouse gas inventories according to agreed international standards. In addition, countries need to supply other important information, such as descriptions of their national inventory systems and national registries as well as transactions undertaken through international emissions trading or project-based mechanisms.

**Review of information.** Countries would need to provide auditing teams with data and information necessary for assessing whether the country has conformed to technical requirements and international standards of good practice in their national systems, reporting, and registries.

**\*Additional domestic regulations.** To the extent that countries wanted to allow domestic companies to participate in international emissions trading, additional domestic laws or regulations would be required. Participating companies would be subject to emission limitations and corresponding responsibilities to measure and report emissions in a standardized manner.

**Source:** Baumert et al. (2002).

developed countries. This issue is not directly related to the per capita approach but, as stated, becomes relevant owing to the fact that trading is essential to ensure the effectiveness and successful implementation of the per capita approach.

Some of the obligations, however, such as monitoring and reporting of emission inventories under the National Communications, are already obligations for developing countries under the Climate Convention, although with a lower degree of intensity and enforcement. The advent of

emissions trading would naturally raise the requirements for ensuring credibility and transparency.

Finally, emissions trading is firmly established as the instrument of choice within the current climate mitigation architecture, as outlined under the Kyoto Protocol. As such, its application within any other future expansion regime can also be logically expected. Thus, prior to burdening any trading-related liability on the per capita approach, it would be essential to investigate the consequences of avoiding trading under the other possible allocation approaches as well as assessing the comparative data and institutional requirements for them. This has to be an essential consideration for any comparative analysis of the allocation schemes.

In any case, owing to the nascent state of the carbon market and the requirement to build it from scratch, the costs associated with instituting the requisite architecture could constitute a significant barrier in the short to medium term. The capacity to respond to these obligations would depend on a host of factors influenced mainly by national circumstances, such as political will, domestic preparedness, and the possibility, certainty, and extent of any financial benefits. As the analysis has already suggested, there are significant country variations with respect to per capita emissions. Thus, a scheme of temporal graduation could enhance the acceptability and institutionalization of these obligations in the long term.

Overall, this section's analysis testifies first that a successful and effective implementation of per capita-based regime is linked inescapably to international emissions trading, which is deemed essential to ensure cost-effectiveness and environmental efficiency. Secondly, there exist certain issues of concern related to trading per se, which are not solely a challenge for this particular approach. However, given the strong reliance upon trading, any risk of trading failure could be accentuated under this scheme, to the detriment of the environmental effectiveness and cost-effectiveness of the regime.

### *Is the Approach Flexible?*

Owing to the nature of the climate change issue and its associated complexities and uncertainties, any effective approach needs to be flexible to both incorporate any future scientific developments as well as accommodate the disparities among countries. As already discussed, a per capita convergence approach is able to readjust to tighten or relax yearly contraction budgets, as well as realign its overall reduction trajectory (convergence) to respond to any change in carbon concentration target.

However, the per capita approach's flexibility to account for the differing national circumstances is limited. Quantified emission levels, such as the ones used for the per capita approach, do not account for the social quality of these emissions—that is, to distinguish between “luxury” and “survival” emissions (Agarwal et al. 1999). Similarly, such simplified indicators also fail to consider factors such as geographical/climatic conditions or the structure of the respective economy and energy supply, each of which has an important bearing on the variance of emissions among countries. For instance, a high endowment of hydro resources (e.g., in Norway and Brazil), high dependence on nuclear energy (e.g., in France), a high level of industrial efficiency (e.g., in Japan), or an exceedingly cold climate (e.g., in Iceland) can have correspondingly favorable or adverse influences on the per capita emission levels. The per capita approach does not address these disparities, and potentially creates unwanted distortions, such as taxing countries with efficient economies or punishing countries with limited access to renewable resources (e.g., hydropower) that would tend to reduce their emission levels.

In the presence of large differences between countries, this limitation can be a major factor impeding progressive acceptance of equal per capita entitlements. Recognizing this shortcoming, some proposals deviate from the pure per capita convergence approach (Gupta and Bhandari 1999).<sup>15</sup> These proposals adjust the approach through the inclusion of allowance factors, such as those mentioned above, which can allow for country-specific characteristics that contribute significantly to variations in emissions per capita (Ybema et al. 2000). The concept of graduation, which allows increasing participation in this regime, does offer a restrained enhancement of flexibility in terms of different starting points.

### ***Is the Approach Consistent with the Provisions of the Climate Convention and Kyoto Protocol?***

As outlined earlier, the Climate Convention and the Kyoto Protocol provide the policy framework for international cooperation in the field of climate change. Any differentiation proposal, such as the per capita approach, needs to be consonant with the Convention's basic provisions, including the ultimate objective of trying to “stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.” In addition, other pertinent principles of the Convention guiding any expansion of commit-



### Box 8.2. Guiding Principles Established Under the Climate Convention

- All Parties to act “on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.”
- Give full consideration to Parties that “would have to bear a disproportionate or abnormal burden under the Convention.”
- Developed-country Parties to take the lead.
- Right to promote sustainable development.
- Allow for growth of the share of global emissions from developing countries.
- Strive for the widest possible cooperation.
- Account for specific needs and special circumstances of developing countries and vulnerable parties.
- Developing-country Party commitments conditional upon successful developed-country implementation of commitments related to financial resources and technology transfer.

**Source:** UNFCCC (1992, Articles 3 and 4).

ments as well as developing-country participation are summarized in Box 8.2.

The per capita approach begins by setting an ultimate collective target, based on current IPCC estimates. Thus, it endeavors to conform to the ultimate objective of the Convention while retaining a readjustment flexibility, which aims to ensure that the environmental target is ultimately met.

The approach then applies the principles of “common but differentiated responsibilities” and “need for growth of developing country emissions” by allowing most developing countries’ per capita emissions to grow, while demanding a reduction of most developed countries’ per capita emissions. Thus, it also encourages the developed countries to “take the lead” in cutting their emissions while extending space for sustainable growth of the developing countries.

The approach in its pure form, however, falls short when it comes to accounting for particular country circumstances, such as difference in Parties’ “starting points and approaches, economic structures and resource bases, the need to maintain strong and sustainable economic growth, available technologies and other individual circumstances” (UNFCCC 1992,

Article 4.2(a)). As stated earlier, some variants of the approach have endeavored to address this shortcoming by phasing the participation of both developed and developing countries. However, none of these variants has, so far, managed to successfully work across the diversity of country circumstances and enhance the political palatability of this approach.

Thus, as far as the Convention is concerned, the approach adheres to most of the guiding principles but falls short when it comes to incorporation and consideration of particular country circumstances. Along with the Convention, however, it is also important to assess whether it can carry the Kyoto baggage described earlier.

If the Protocol enters into force, the precedent of ad hoc quantitative targets based on politically negotiated justice and the absence of any objective formula is the baggage that would need to be accommodated by any expanding regime. The Kyoto architecture, along with the associated use of international emissions trading, should be practically acceptable, at least in the short to medium term. Thus, any effective regime for expanding participation and commitments should be able to amalgamate this reality.

The per capita approach is not at odds with such an eventuality. In fact, it offers the possibility of a two-track approach.<sup>16</sup> Some have proposed continuation along the Kyoto track for Annex I until after the first or second commitment periods, while allocating per capita-based entitlements to the developing countries. Alongside this, the Kyoto-based allowances, already apportioned to Annex I countries, and the per capita entitlements could be fungible to promote cost-effectiveness through emissions trading. Such a two-track approach allows for a “soft transition” of Annex I countries while also allowing for the possibility of a “phased graduation” for developing countries. Various other adjustments (such as use of an efficiency index) have also been suggested and were elaborated on earlier. Also, as described above, the market-based architecture enshrined in the Kyoto Protocol through the concept of emissions trading can be adopted by an equal per capita entitlements approach. In fact, doing so is essential to the successful implementation of this approach. Thus, it promotes and reinforces the market-based framework, which forms the linchpin of the Protocol.

The per capita approach, thus, has the design capacity to carry the Kyoto baggage and does not necessarily demand a revolutionary revamping of the current architecture, but rather a gradual amalgamation toward eventual equal per capita entitlements.

### ***What Is the Potential for Global Acceptability of the Approach?***

Broad global acceptability is logically considered a prerequisite to the success of any approach for differentiation of future commitments. The potential for acceptability is, however, determined by a combination of factors having political and ethical as well as economic dimensions. Egalitarian equity, as shown above, formulates the ethical basis for this judgment. The other factors are mostly influenced and driven by national interest and circumstance, which may not always be aligned with accepted ethical norms. Negotiation theory, in fact, generally assumes that actor behavior is primarily motivated by self-interest, and suited principles of fairness are selectively invoked in order to defend this interest. Thus, to gauge the potential for global acceptability of this approach, it would be useful to explore the nexus of self-interest and fairness. Doing so can help judge both the diversity among states as well as its influence on their views about equity within climate negotiations.

It is no secret that countries differ greatly in terms of size, resource endowments, population, wealth, GHG emissions, vulnerability, and ability to respond to climate change. Table 8.4 shows some of the disparities between countries, including emissions per capita, which are generally much higher in the developed countries than in the developing ones.

Given these disparities, various studies and models have analyzed the impacts of different burden-sharing rules on a country or regional basis.<sup>17</sup> Although various models use different time frames, parameters, and methodologies, they can nevertheless provide some general indicators of the outcomes. The comparative analyses suggest that benefits are likely to be skewed within the per capita approach. Appendix 8A provides comparative results of three such studies with regard to their application to the per capita approach. Countries with large and growing populations or with low emissions stand to benefit more than the others. In all cases, however, China, India, and sub-Saharan Africa (excluding South Africa) come out as consistent gainers under a per capita approach. The oil-producing and more developed of the developing countries—such as Singapore, United Arab Emirates, Argentina, and South Africa—are relatively disadvantaged among the non-Annex I countries. Chapter 9 shows similar results. It comes as no surprise that some of these developing countries are not vociferous advocates of this approach.

As discussed above, the major proponents of the per capita approach in climate change negotiations have been India, China, and Africa, which also happen to be the major beneficiaries. With less intensity and greater ambivalence, the European Union and France have argued for a long-

**Table 8.4.** Regional Variation in Key Economic and Emissions Indicators, 2000

	Population (millions)	Income Per Capita (PPP, int'l dollars)	Carbon Emissions Per Capita (tons)
<b>World</b>	<b>6,057</b>	<b>7,415</b>	<b>1.1</b>
<b>Annex I</b>	<b>1,170</b>	<b>22,377</b>	<b>3.3</b>
United States	286	33,633	5.6
European Union	378	23,612	2.4
Japan	127	26,755	2.5
Eastern Europe	281	7,926	2.5
<b>Non-Annex I</b>	<b>4,888</b>	<b>3,834</b>	<b>0.5</b>
China	1,269	4,089	0.6
India	1,016	2,358	0.3
Other Asia	1,103	6,225	0.8
South Africa	43	9,401	2.5
Sub-Saharan Africa	659	1,598	0.2
Argentina	37	12,377	1.0
Latin America	512	7,181	0.7

**Source:** Based on data from EIA (2002b) and World Bank (2002).

**Notes:** Includes carbon emissions from fossil fuel combustion only.

**Abbreviation:** Purchasing Power Parity (PPP).

term convergence toward equal per capita entitlements, while Japan has advocated it as one of the two indicator options to choose from, in its proposals at various COP meetings (see Table 8.1). While not beneficiaries vis-à-vis India, China, and Africa, these countries do come out as a relative beneficiaries within the context of Annex I due to their relatively low per capita emissions (about half the per capita emissions of the United States and lower than the Annex I average; see Table 8.4). This makes it relatively convenient for these countries to embrace an otherwise strong ethical position. The main opponents of the scheme would likely be the United States and Russia, as they would carry the brunt of the wealth transfer from any shift to equal per capita entitlements (Table 8.5).

Table 8.5 suggests the presence of a positive nexus between national self-interest and the choice of equity principle. This analysis suggests that each country can be expected to argue for a scheme that suits its national circumstances, which effectively selects the preferred equity. In addition, owing to the fact that some relative beneficiaries suggest this approach, there is evidence to suggest an acceptable ethical foundation of equal per

**Table 8.5.** Self-Interest ~ Fairness Nexus

Country / Region	Advocate of Per Capita approach	Beneficiaries
China	Yes	Yes
India	Yes	Yes
Africa	Yes	Yes
Japan (choice option)	Yes	Relative Yes
France (long-term convergence)	Yes	Relative Yes
European Union (long-term convergence)	Yes	Relative Yes
United States	No	No
Former Soviet Union	No	No
South Africa	No	Relative No
Argentina	No	Relative No

**Notes:** The positions indicated above are based on the Kyoto Protocol negotiation process (Ad-Hoc Group on the Berlin Mandate).

capita entitlements, especially as a long-term guiding principle. In the short term, however, the significant disparities between countries challenges the notion of applying simple, fixed, top-down allocation schemes, such as the per capita allocation. The analysis highlights the difficulty of proposing a single composite formula that can satisfy the strong and diverse national self-interests.

Thus, in the short to medium term,<sup>18</sup> it seems to be politically unrealistic and procedurally difficult to adopt a rule such as equal per capita entitlements. Even with a strong ethical foundation, it runs counter to the self-interest of some pivotal actors, such as the United States, Russia, and parts of the OECD. The potential of its acceptability by a critical mass of actors within the climate negotiations process is, therefore, likely to be limited in the short to medium term. This is especially the case because a few key participants can hold the process hostage. With some key negotiating countries, such as the United States, Australia, and Russia, not likely to be the main beneficiaries under this approach, as earlier indicated, the potential for stalling the process remains threateningly present. This threat becomes all the more potent owing to the *procedural* rule in Climate Convention decision-making, which is based on consensus (i.e., the absence of dissent).

### ***Would Equal Per Capita Entitlements Encourage Population Growth?***

Before closing, it is worth addressing the concern expressed by some critics that equal per capita entitlements would promote population growth. This concern stems from the fact that per capita entitlements, by compensating for large populations, may deliver more entitlements to countries with increasing populations. (To alleviate this concern, proponents advocate the use of a population base year.)

At a fundamental level, this concern seems to be based on flawed assumptions. First, the notion that additional “entitlement dollars” would offset all the other economic repercussions of burgeoning populations is far-fetched. Any effect by allocation of entitlements could be negligible compared to other factors necessitating population control, such as poverty alleviation and resource constraints. Second, any enhancement of the entitlement quota would imply a correspondingly larger number of people sharing it (Agarwal et al. 1999), which could quickly outstrip any associated benefits. Of all the concerns about equal per capita entitlements, this seems the least significant.

## **IV. Conclusions**

As the above analysis shows, the per capita approach endeavors to bring a multidimensional solution to a complex problem. The merits and demerits of the equal per capita entitlements approach are summarized below.

### ***Merits***

- Simplicity of concept
- Strong ethical basis
- Flexibility to accommodate changing scientific evidence
- Enhancement of efficiency of global trading
- Offer of incentives for developing-country participation
- Consistency with the major guiding principles of the UNFCCC
- Amalgamates well with the Kyoto architecture

### ***Demerits***

- Limited global acceptability
- Limited flexibility for accommodating varying country circumstances
- Linkage with trading essential for success
- Associated issues of hot air and obligation costs

Given the above demerits, a number of variants to the pure per capita approach have been suggested. The primary aims of such modifications have been to enhance global acceptability and accommodate varying country circumstances by extending a transition phase or phasing out requisite emission reductions through some “allowance factors” or “soft landing scenarios” (Blanchard et al. 2001). So far, however, none of these adjustment proposals has been able to delicately balance the conflicting interests and ethical philosophies in a politically palatable fashion.

Nevertheless, per capita’s ethical foundation has a strong defining power, which is likely to shape long-term approaches, and we can certainly expect the concept to be invoked with a growing degree of legitimacy in the future. However, its time may not yet have arrived. In the short to medium term, the process may need to be more adaptive rather than immediate (Toman and Cazorla 2000); during this time frame, political realism tends to lead toward a system of “adjusted egalitarianism” (Ott and Sachs 2000). Such a scheme could include explicit provisions for country-specific circumstances, as well as possible amalgamation with some of the other proposals for expansion of commitments, in an effort to enhance global appeal. In the long term, the idea has the potential to be a *guiding principle* toward an eventual convergence of global per capita emissions—if not on an absolutely equal level, then at least within the confines of a defined and globally accepted “sustainability corridor” (TERI 1997).

Given the constraints cited above, it might be possible to constitute a future GHG emissions entitlement by combining some of the merits of the per capita approach with other approaches in an endeavor to overcome some of the stated shortcomings. In this respect, a practical manifestation of an entitlement of the future could be envisioned, as shown in Box 8.3.

Such a compromise could begin by first defining and then quantifying a per capita level of

**Box 8.3.**  
Emission Entitlement  
of the Future?



**VARIABLE**  
portion accounts for  
country-specific  
circumstances and  
other approaches

**FIXED**  
per capita entitle-  
ment portion based  
on allocation of  
“survival” emissions

survival emissions that are required by each human being to sustain a reasonable standard of living. This minimum per capita level could then be distributed across the countries according to their respective populations and would provide the fixed portion of the entitlement. The remaining flexible, varying portion of the entitlement could then be defined by accounting for particular country circumstances.<sup>19</sup> This accounting and quantification would also need to utilize other useful approaches in order to gain maximum political acceptance across the globe. The above are just some preliminary thoughts on what could possibly shape a future emission entitlement—driven by environmental effectiveness, motivated by economic efficiency, and packaged by political compromise.



## Appendix 8A.

<b>Country/ Region</b>	<b>Egalitarian Allocation-1 (2020-Bn of US\$1990)<sup>1</sup></b> <i>estimated minimum cost to implement per capita allocation of carbon emissions in 2020</i>	<b>Egalitarian Allocation-2 (C/pop in %)<sup>2</sup></b> <i>estimated percentage of global per capita allocation of carbon emissions</i>	<b>Egalitarian Allocation-3 (% of 1995 emissions)<sup>3</sup></b> <i>estimated per capita allocation of carbon emissions in 2015</i>
United States	354.5	4	
Japan		2	
Canada/Western Europe	29.9		
European Union		5	
Other OECD	65.3	2	
Eastern Europe/ Former Soviet Union	345.5	2	
China	-109.1	20	145
Middle East Energy-exporting countries	1.1	16	
Africa	-226.3		
Nigeria			466
South Africa			51
Latin America	56.6		
Brazil		3	237
Argentina			102
Southeast Asia Dynamic Asia	37.2	3	
India	-----	16	382
Rest of World		22	

**Sources:** <sup>1</sup>Rose et al. 1998; <sup>2</sup>Reiner and Jacoby (1997); <sup>3</sup>Winkler et al. (2001).

**Abbreviation:** Organization for Economic Cooperation and Development (OECD).

Egalitarian allocation-1 enlists the results of a model that attempts to quantify the minimum cost of implementing the per capita allocation rule. The analyses of the cost allocations were performed for three future years (2005, 2020, and 2035) and the costs were discounted to a 1990 present value. As the table shows, the model indicates widely disparate outcomes, with wealth transfers mainly from the United States and the former Soviet Union to Africa, China, and Asia.

Egalitarian allocation-2 starts by totally discounting historical emissions and then allocating permits according to the per capita approach. How-

ever, even after discounting all historical liability, the model suggests that the United States and OECD countries would receive a small percentage of the global allocation, with the major share going to India and China.

In egalitarian allocation-3, the model compares the outcome of the allocation based on equal per capita across five developing countries in the year 2015 for a global reduction target of 4 percent below 1995 levels. The results are shown as a percentage of 1995 emissions. The outcome suggests a wide variance even among developing countries, with the more developed but less populated countries—South Africa and Argentina—receiving relatively fewer entitlements. (South Africa is, in fact, in deficit compared to its 1995 emissions level.) On the contrary, the more populated countries receive higher entitlements.

## Notes

1. However, the “common but differentiated” and “polluter pays” principles formed a solid basis for differentiation between Annex I and non-Annex I countries.
2. Ad Hoc Group on the Berlin Mandate.
3. To stabilize GHG concentrations at a level that would prevent dangerous anthropogenic interference with the climate system.
4. Such as the “sinks” scheme, advocated by the Center for Science and Environment, which distributes the estimated global GHG absorptive capacity, as well as the “moving” entitlements scheme, which assigns ad hoc an initial per capita entitlement subjected to periodic reviews.
5. Second World Climate Conference.
6. Such as France, Switzerland, and the European Union. See Torvanger and Godal (1999).
7. One the most widely quoted scenarios sets the level at a concentration target of 450 ppmv (parts per million by volume) of CO<sub>2</sub> by 2100.
8. Although both advocate the idea of convergence, there is a difference in the approaches. While GCI counts convergence to an equal level of emissions as the final goal of a per capita framework, CSE views the approach as a means to incentivize a transition to renewable energy technologies in developing and industrialized countries.
9. Thus, the term “global atmospheric resource,” as used in this chapter, always implies the GHG assimilative capacity of the atmosphere.
10. Müller (2001a). The source of definition is the *New Shorter Oxford English Dictionary*.
11. The kind of trading allowed between Annex 1 countries within the Kyoto regime and what is suggested as the associated trading regime with “per capita” entitlements scheme.

12. In the climate change arena, the issue of equity has been focused primarily within the narrow context of the differentiation of future commitments. This focus is inequitable itself, as it unjustly ignores the issue of “adaptation burdens,” which is crucial for a large number of vulnerable developing countries. However, in the context of this analysis, this chapter will focus on the application of equity to the expansion of future developing-country participation and allocation of mitigation burdens as they relate to the per capita approach.
13. This refers to the allocation of collective benefits and burdens among the members of a community on local, national, or global levels. See IPCC (2001c) for a comprehensive listing of the various equity typologies.
14. “Desiring by this Convention to develop the principles embodied in resolution 2749(XXV) of 17 December 1970 in which the General Assembly of the UN solemnly declared *inter alia* that the area of the sea-bed and ocean-floor and the subsoil thereof, beyond the limits of national jurisdiction, as well as its resources, are the common heritage of mankind, the exploration and exploitation of which shall be carried out for the benefit of mankind as a whole, irrespective of the geographical location of states.”
15. The Tata Energy Research Institute (TERI) scheme mixes per capita allocated entitlements to non-Annex I countries with reductions to Annex I countries adjusted by an efficiency index.
16. For instance, TERI, CSE, and GCI all propose this sort of a “two-track” approach.
17. Toman and Cazorla (2000) provide a summary of the various analyses.
18. “Short to medium term” can be taken to mean until the second commitment period.
19. UNFCCC Article 4.2(a) could be used as guidance.