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# Quotas in International Environmental Negotiations

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*A quota in international environmental negotiation refers to a limit or target, designated in units directly related to an environmental problem, chosen by consensus or near-consensus. Limits may be presented as a single figure, or as shares of the total limit. Allocations of shares may be given as percentages of the total or as concrete numbers. Quotas may stand alone as instruments to achieve environmental objectives, or they may form a basis for or be combined with other instruments. Not surprisingly, over time, quotas have become more sophisticated and the range and style of their use have expanded. The most recent instances of quotas underpin key integrated management concepts.*

*In some theoretical literature, quotas are criticized as crude measures relative to incentive based measures for environmental management. However, particularly at the international level, quotas endure for reasons associated both with their inherent qualities and with the fact that management strategies using quotas, like all other strategies at the international level, must be negotiated. Quotas can be simple, yet flexible, and thus suited to the inevitable accommodation of different interests and circumstances.*

*A balanced assessment of how quotas contribute to better long-term environmental policies requires a review of the various forms of quotas and their historical applications, a consideration of quotas against the key criteria of effectiveness, efficiency, and equity, and an examination of the features of negotiated decision making that may favor quotas.*

Negotiation is the principal means of policy making at the international level. It is a painstaking, incremental process, complicated by the complexity and uncertainty of many environmental problems. What is being negotiated is not some state of nature or environmental quality, but the mechanisms through which it is hoped environmental objectives will be realized. Parties negotiate over rules, standards, and practices, with environmental objectives as indirect influences. Many factors – science, economics, politics, practice, beliefs, values, behavioral theories – play a part in the negotiation of quotas. A great deal of attention is directed to the features of a basic environmental management framework.

Negotiators of international environmental agreements know that their decisions will have implications in terms of environmental effectiveness, productive, and allocative efficiency, and ethical and distributional features of effects

and costs (equity) (Organization for Economic Cooperation and Development, 1994). These criteria form a basis for deciding what instruments to use. In general, instruments are classified on the basis of several features: whether the instrument is direct or indirect, freeing or constraining, process- or effect-focussed, and quantitatively or qualitatively based. This last point distinguishes instruments directed to the quantum of an activity from those directed at the qualities, such as rate and the use of best available technology, of an activity. Bearing in mind that environmental instruments are mostly shades of gray, quotas typically are direct, constraining, effect-focussed, and quantitatively based. In comparison with other instruments, quotas have been thought to give greater weight to the implications for environmental effects and less to costs.

Basic quota instruments have two parts. The first part designates the unit of management and the second, a rule. The unit of account is the focus of limits in activity or behavior. Examples of units of account are elephant tusks over 10kg taken by non-native hunters in a given year or tonnes of chlorofluorocarbons (CFCs) emitted by a developed country in a given year. The second part is a statement of what shall be done and may include conditions and eligibility requirements. A corresponding rule in the tusk example might specify that no more than 50 be internationally traded in the given year between approved buyers and sellers. How a quota is to be implemented, monitored and enforced are key issues for the success of the instrument and will have bearing on the choice of units of account and rules.

The simplest type of quota sets a single total limit, and the management rule requires all participating parties to jointly ensure that the limit is respected. Early whaling regulations used this device to set yearly numbers, by species, for whales that could be taken by members of the International Whaling Commission. A single limit may also be indexed. The whale quota evolved into a total allowable catch denominated in blue whale units. This measure was based on the different amounts of oil that could be extracted from different species of whales. For example, two and one-half humpback whales were considered equivalent to one blue whale. In 1945, the quota was set at 16 000 blue whale units. Similarly, rules based on baskets of chemicals are used in ozone layer and climate change agreements. However, in these cases, the baskets are only a basis for more elaborate rules.

Indeed, while total limits on their own are now rare, many environmental agreements make use of total limits in conjunction with allocations of the total among participating parties. Allocations may be expressed either as a percentage of the total or as a discrete number. Many fisheries treaties use a base-year catch, as a proportion of total catch that year, to allocate shares of successive years' total allowable catch. Occasionally, as in the Convention

on Future Multilateral Cooperation in the Conservation of Northwest Atlantic Fisheries (1978), parties will agree on a total catch and divide it up without recourse to a principle or formula. In addition to historical use, formulas may draw on geographic proximity, relative economic development or economic hardship, and traditional use.

Some recent agreements still make use of rather simple quotas. For instance, the Convention for the Conservation of the Southern Bluefin Tuna (1993), essentially set a total allowable catch at the recent catch level in the expectation of subsequent ecologically justified allocations, which, however, have not been achieved. Parties are thus loosely bound to respect an allocation based on their historical catch despite changing conditions. It can be argued that in this instance, the simple quota represents an achievement over open harvest and provides a basis for incremental improvement. In a similar vein, in putting ambient standard pollution agreements into operation approximate measures may be used, due to technology limitations and lack of information. Thus, across the board 50% reduction in total inputs from rivers were called for in the 1987 amendments to the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention, 1974).

Despite the instances already cited, it is sometimes claimed that pollution-related treaties do not make use of quotas. This claim is likely based on the absence of explicit total limits. Many agreements (in pollution and conservation cases) simply set an allocation formula or otherwise assign limits directly to participants. An example is found in the 1985 sulfur dioxide protocol to the Convention on Long-Range Transboundary Air Pollution (LRTAP, 1979) through which countries agreed to curb their emissions of sulfur dioxide by 30% from a base year. In this case, the effect of the rule on the environment is directly linked to the number and emissions of participating countries.

The definition of a quota easily covers not only temporary bans – a quota limit set at zero until some aspect of the ecosystem recovers – but also some rules associated with limit values. Limit values come in the form of emission or ambient (environmental quality) standards for pollutants in a given period and medium. If the intent is to hold aggregate amounts of the pollutant to some set level, that level is a quota. For example, when Mexico and the United States concluded a treaty for managing the salinity of the Colorado (Brownell and Eaton, 1975), a salinity standard was established. Based on a reference salinity at Imperial Dam, and taking into account a required minimum flow of water, water entering Mexico is to have an annual average salinity of no more than  $115 \pm 30$  ppm. The rolling reference value meant that the standard was readily applicable in drought and normal conditions. In addition, in support of this salinity standard, the treaty limits the pumping of groundwater to  $160\,000$  acre feet year<sup>-1</sup> country<sup>-1</sup> (an acre foot is  $1233.5$  m<sup>3</sup>). The salinity standard is a quota-based

standard, since there is a limit value set. The groundwater quota is a resource quota in support of a pollution goal.

Quotas are an essential part of tradeable permit schemes and joint implementation. In both cases initial allocations are made in the form of limits, but bilateral arrangements are permitted to enhance the cost-effectiveness of meeting the established limits.

Given the variety of treaty classification systems in use, it is difficult to estimate the overall incidence of quotas in environmental management. Some evidence is provided in a comprehensive review of the management provisions of 72 treaties concerned with fisheries and the conservation of other resources and 55 air and water pollution agreements (Wolf, 1997). This review showed that quotas were used in 33 conservation agreements. In these applications, quota units are typically individuals of a species, such as whales or elephants, or other biomass measures, such as a tonne of fish. Since agreements often serve several objectives, quotas are frequently combined with other measures. For example, fish size limits may be used in conjunction with quotas in order to protect reproductive-size stock preferentially.

Habitat protection measures may make use of a different sort of quota. The 1991 framework Convention for the Protection of the Alps suggests that imposing limits on leisure and tourist activities that harm the environment is one possible measure. The Convention on Biological Diversity (1992) calls for regulations to limit the introduction of living modified organisms. Such regulations could be expressed as quotas.

Quotas have had a prominent role in air pollution management. The acid rain and ozone layer agreements make extensive use of phased reductions, essentially providing each country, or source emitter, with an emission limit. The Framework Convention on Climate Change (FCCC, 1992) is underpinned by limits on greenhouse gases in the atmosphere. The 1997 Kyoto Protocol to the FCCC sets out a legally binding commitment for countries to meet country-specific quantitative emission limitation and reduction objectives for six greenhouse gases. The limits range from an increase of 10% to a decrease of 8% of 1990 levels to be achieved between 2008 and 2012.

In agreements to reduce water pollution, quotas in the form of ambient standards are used to allocate indirectly the costs of pollution abatement, rather than directly allocating a resource (as in conservation uses). This indirect approach contrasts with the direct allocation of resources in conservation applications. The 1991 revision to the Convention on the Protection of the Rhine Against Pollution by Chlorides establishes an ambient standard for chloride loading in the river ( $15$  kg s<sup>-1</sup>), which may be increased whenever the concentration at the German-Dutch border exceeds  $200$  mg l<sup>-1</sup> of chloride ion (Bernauer, 1995). Ambient standards are also prominent in marine pollution agreements. Lists of banned and restricted substances form the basis of

environmental management. Restricted substances (the gray list) in the Convention for the Protection of the Mediterranean Against Pollution (1979) and protocols, for instance, are to be managed by establishing ambient standards at various locations, depending on factors such as effects on human health, availability of waste technologies and characteristics of the receiving environment. Ambient standards, however, are costly to establish, and in practice may be approximated by rules on emissions. In these cases, the quota basis is not rendered irrelevant, since ambient standards remain an essential component in judging the effectiveness of a management regime. Moreover, because ambient and emission standards draw upon different normative assumptions, the negotiations surrounding a choice of mechanism may make use of the different bases. Emission standards, while technically and administratively simple, cannot take account of varying ambient conditions which may be linked to relevant variables, such as economic development, as the Mediterranean negotiations made clear (Bliss-Guest, 1981).

Over the last quarter of a century, environmental agreements have favored a multi-criterion approach as negotiators seek to balance the costs and environmental and distributional impacts of agreement terms. Once parties agree to jointly seek an environmental outcome (not an insignificant achievement) emphasis shifts to cost and distributional matters. It is in this context that the issue of instrument choice rises to the surface. If quotas are then judged to have a role, either alone or in conjunction with other regulations and incentives, negotiators must address the details of the quota in order to achieve an acceptable balance of effectiveness, efficiency, and equity.

Assuming quotas work as intended, are fully implemented and universally respected, and are not combined with other instruments, then some conclusions are possible about the various types of quotas with respect to the key criteria. Some of the conclusions hinge on the fact that quotas in international agreements must be negotiated giving rise to transaction costs and certain strategic behaviors with respect to setting up terms of agreements. Quotas that set a total limit are more effective than those that do not, since the limit guarantees an environmental effect. In this manner whale quotas (set in numbers of whales) are distinguished from the sulfur dioxide 30% club, since in the latter case the environmental effect is contingent on the number of participating countries. In the absence of an explicit total limit, negotiators' efforts to revise rules may be hampered by the difficulty in projecting the impacts of the existing rules. For instance, the impact of the Montreal Protocol on Substances that Deplete the Ozone Layer (1987) was contingent on the trend in CFC emissions in developing countries, where overall use was allowed to rise to a threshold 0.3 kg *per capita*.

The efficiency of a quota derives from the degree to which it both facilitates the rational use of resources and minimizes the costs of coming to a joint allocation of the regulated units. Thus, a total limit without allocated shares is inefficient, as parties overcapitalize in an effort to exploit the regulated resource before the limit is reached. If the quota mechanism establishes rules or a formula for allocating shares of the limit that stand from year to year, bargaining costs and the costs of delays are reduced. Parties are better able to anticipate their allotment for future years and plan accordingly. They are not required to bargain repeatedly to maintain or increase their share. Of course, if the initial allocation formula contains embedded inefficiencies, then it may ultimately be more efficient to bargain until shares find their most efficient owner.

It is not possible to generalize about the equity objective. This objective may be best met if the mechanism eschews global rules in favor of adjustments in allocations for relevant differences in parties' situations. Allocation formulas, for instance, may make it more difficult to make exceptions on equity grounds. On the other hand, if powerful parties are overly self-serving, the exceptions may flow in the wrong direction. Furthermore, equity is tied closely with effectiveness and efficiency. In the final analysis, only the specific context and details of a given quota mechanism can provide a basis for equity judgements. This is not to say that equity is ambiguous or that it is a wild-card in negotiations.

Experience shows that equity is increasingly integral to successful negotiations. A close examination of a sample of some of the most important treaties negotiated in the 1990s reveals an emphasis on the precautionary and sustainable development principles (see **Precautionary Principle**, Volume 4; **Sustainable Development Policy**, Volume 4). Both principles require a balance of attention to the main criteria of effectiveness, efficiency, and equity. In addition, it is also important diplomatically to build in the highest extent of flexibility feasible, in order to allow individual countries to best tailor their obligations to their domestic circumstances. A final feature of these recent exercises is the move to independently ground quotas (limit values) on the basis of an explicit balancing of criteria. These criteria cover ecology, economic development, and allocation of costs and benefits.

Most importantly, recent quotas exhibit a far greater degree of differentiation in units of account than earlier examples. The critical loads modeling used to help negotiators reach allocations of allowable sulfur emissions is the most clear-cut instance of this trend. There are three general features: (1) the establishment of management cells, such as a grid over space or the determinations of stocks and sub-stocks of living resources; (2) the establishment for each of these cells of a limit based, to the extent possible, on scientific knowledge; (3) the translation of the scientifically justified targets into management targets, for instance by setting a concrete target on the basis of a scientific range

or by adjusting for technical feasibility. The management targets for different cells need not all be based on the same principles. The final determination of targets, which may be thought of as local quotas, is settled in a negotiation, which takes into account costs and distributions of costs. The end result is that scientific targets, modified for pragmatic reasons are approached as closely as possible in light of constraints set by factors such as economic development, costs of various technologies, as well as differences in parties' views of fairness. Essentially management targets are finalized only after significant debate on the relevance and effect of constraining factors.

Experienced negotiators will recognize the generic format of this procedure. Advances in information and modeling have, at least since the well-documented law of the sea (Sebenius, 1992) enabled the approach to be conducted transparently. Further refinements are possible with devices such as indexing (as used in setting ozone depleting potentials for various chemicals and allowing countries to assemble their own baskets). The approach also has conservation applications. Proposals have, at various times, been discussed for managing whales and elephants by subspecies stock and for establishing criteria for the sustainable management of tropical timber, which would allow for quota-based harvests where criteria are met.

In summary, quotas are an integral part of the international management of global environmental change. They are a focal solution in negotiations, based on precedent, on the direct links to environmental impacts, and on the lack of compelling alternatives. When the key features of quotas are borne in mind – rather than a crude caricature – quotas

are revealed as essential components of a rich variety of environmental management instruments. As quantities, quotas are relatively simple to work with – akin to bargaining over a wage rate in labor negotiations – even if agreement is difficult. Quotas facilitate reporting and monitoring in a manner relevant for assessing environmental impacts. In the current globalized economy, quotas are ready currency, needing no exchange rate calculations. State parties to a quota agreement remain free to use a wide range of instruments to meet their obligations. Finally, quotas fit with the incremental and evolutionary process of global environmental management.

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