Appendix 1—Rural Amenities: A Problem in the Private Provision of a Public Good

In economic terms, the provision of rural amenities is largely a problem in the "private provision of public goods." Simply put, rural landowners are not likely to receive compensation for production of rural amenities, hence they may not be motivated to produce them. Moreover, should a consumer go to the trouble of compensating a rural landowner to produce more of a rural amenity, she may not take into account that the unit of the rural amenity she pays the farmer to create will also benefit other consumers. Both of these factors lead to underproduction of the rural amenity.[1]

Following Falkinger, this problem can be formally stated (in economic terms) as follows.

Presume that an individual i with income y_i maximizes utility

i) $U(c_i,G)$

ii) subject to $c_i + p_G\, g_i = y_i$

iii) $G = \sum_{i=1..N}\ g_i = g_i + G_{-i}$

The notion is that each individual produces (or purchases) g_i units of the public good, which then become part of G, the total quantity of the public good. Note that c is a private good with implicit price of 1; the price of $G = p_G$, and G_{-i} is the contribution of all other individuals.

The standard assumption on individual behavior in this setting is based on the idea of a Nash equilibrium; where each individual assumes that G_{-i} is fixed. Thus, the solution of i, subject to ii and iii, yields:

iv) $MRS_i = (du/dG) / (du/dc_i) = p_G$.

That is, the individual equates her own value of an extra unit of the public good against the forgone consumption of the private good (where the cost of producing the public good is measured in terms of less consumption of the private good).

However, since an increase in G will increase the utility of all individuals simultaneously, the Pareto optimum occurs when the "Samuelson condition" (Samuelson) is met:

v) $p_G = \Sigma_{n=1..N}\, MRS_n$

Clearly, iv is less than v, which implies that individuals will choose too low a value of gi, and the public good will be underprovided.[2]

The net effect is that not enough rural amenities are produced—even though all members of society (rural landowners and consumers) could potentially be better off with more of this public good. There may be much to gain by correcting this market failure through the use of private initiatives and government programs.

Ideally, this market failure could be corrected if society could invent and implement mechanisms to induce people to reveal their personal preferences for public goods, and subsequently collect this willingness to pay from each consumer. Such a mechanism could ensure that public goods are provided efficiently (and without governmental intervention) by voluntary private action.

Perhaps the closest mechanism to this ideal is that of charity—individual contributors supporting an endeavor that they believe in. However, although charity may be efficacious (and lead to provision beyond that of the pure market), as evidenced by laboratory work (Ledyard) problems of free (and "easy") riding are likely to limit the potential of purely voluntary provision of pure public goods, including rural amenities.

Collective private initiatives refer to the variety of voluntary organizations dedicated to preserving some aspect of the rural landscape, as typified by private land trusts. Here, a self-selected group agrees to provide rural amenities. In some cases these amenities may be highly localized, so that the good purchased has an "inclusive club good" nature - the flow of benefits can be retained by a limited group, with non-members of this group excluded. Under some circumstances, this will encourage efficient provision of rural amenities. However, to the extent that the rural amenity (e.g., a protected farm) yields benefits to the entire population, the problem of underprovision will remain.

[1] For example, a landowner has little incentive to preserve the rural amenities generated by a scenic farm because all passerbys can enjoy its charms for free. Similarly, a passerby who decides to pay a farmer to improve the scenic beauty of the farm is not likely to fully consider that this improvement also benefits other passerbys.

[2] For a more complete discussion, see Cornes and Sandler.

Instead of depending on private actions, collective public action through governmental processes is often used to provide public goods. Unfortunately, optimal provision of public goods through governmental intervention is complicated by practical and theoretical difficulties in determining a program's size and scope, its administration, and how it will be funded.

For example, one simple mechanism is to use a public referendum combined with simple tax schemes. If individuals hold convex[3] but heterogeneous[4] preferences between the public good and a private good, and the decision rule is majority voting in a population of such individuals, then the level of provision will be that of the median voter (since larger, or smaller, provisions are opposed by a majority of voters; Bergstrom and Goodman). However, unless the median is the same as the mean, the "Samuelson condition" (equation v above) will not be met.

In recognition of the problems associated with simple majority rules, recent years have seen a flowering of economic literature on methods for inducing efficient provision of public goods from private producers (Cornes and Sandler offer a good review). The basic goal is to induce consumers to truthfully reveal their (possibly heterogeneous) preferences for the public good (e.g., maintenance of healthy rural communities), to obtain commitments of funding from these individuals commensurate with the strength of their preferences, and to ensure that these committed funds are sufficient to fund the production of the good.

Most of this literature (for example, Groves and Ledyard, or see Laffont and Maskin for a review) investigates voluntary contribution mechanisms, supplemented by redistribution/refund mechanisms. In general, these mechanisms must balance simplicity of design, information requirements, robustness as preferences vary, and incentive comparability (for example, whether truth telling is dominant, or whether it's a Nash equilibrium). Although recent work is promising (Falkinger et al., Rondeau et al.), in general, one rarely finds formal voluntary schemes outside of the experimental economics laboratory.

In some cases, given information about the shape of preferences and individual incomes, and given a non-uniform tax policy, it is possible to construct a majority decision rule that does lead to a Pareto efficient outcome (Black, Cornes and Sandler, pp. 210). However, given a bundle of several public goods (which is the case for rural amenities supplied by agricultural land), majority voting will typically not yield a unique equilibrium.

In addition to the theoretical problems of designing programs, there are also questions of administration. Economics suggest two (possibly competing) factors influencing an administrator of government programs: service maximization and size of the bureau's budget.[5] Service maximization means increasing the flow of services valued by the public, whereas budget maximization (or maximization of discretionary budget) relates to an increase in the salary and other perquisites of office (Niskanen; Migue and Belanger).

To the extent that service maximization is important, bureaucratic decisions will reflect the underlying preferences of the public. Although the empirical literature is thin,[6] recent work on environmental issues show that public preferences do shape program design. For example:

- Bureaucracies are sensitive to questions of cost and benefit, and to public input (Cropper et al., Yates and Stroup).
- Bureaucracies are responsive to the desires of their constituencies, whether charitable donors (Hewitt and Brown) or legislative bodies (Weingast and Moran).

In summary, despite difficulties in achieving optimal results, the use of government programs, initiated through representative forms of government and administered by bureaucracies, can address the problem of providing public goods (such as rural amenities).

[3] Convex refers to an increasing rate of substitution between two goods. Thus, to hold an individual's overall utility constant when taking away successive units of the first good (the public good) will require ever-increasing increments in the quantity of the second good (the private good).

[4] Heterogeneous refers to preferences that vary across the population.

[5] The analysis of government decisions is closely related to of the economics of public choice, which postulates that voters support programs that maximize their utility (Stevens). When choosing public goods, individuals partially act as if they were making choices affecting their own consumption of goods and services (Reichelderfer and Kramer), and partially as citizens expressing their values (Margolis; Quiggin). In either case, preferences are being acted upon.

[6] Starting with McFadden's analysis of highway routing, the economics literature devoted to the analysis of government programs has tended to abstract from issues of motivation, and has focused on how institutional factors influence bureaucratic choice.