Identifying *In Situ* Conservation Goals: A Safe Minimum Standards Approach

Summary

The safe minimum standard (SMS) decision rule places a bound upon what otherwise might be economically rational actions, whenever such actions threaten irreversible damage to the environment. This is achieved by favouring conservation, unless the social costs of forgone development are unacceptably large.

Applied to the agrobiodiversity context, the basic framework considers that the uncertain benefits of plant and animal genetic resources (PAGR) conservation can be maintained, as long as a minimum viable population of the species, variety or breed is also maintained. The costs of implementing such a safe minimum standard (SMS) are made up of the opportunity cost differential of maintaining the local PAGR rather than improved PAGR. In addition, the administrative and technical support costs of the conservation programme also need to be accounted for. However, as the absolute crop species/variety area to be cultivated or number of indigenous breed animals that needs to be maintained for a SMS to function is relatively small, the cost of doing so is hypothesised to be relatively low.

1. The safe minimum standard (SMS): a conceptual approach

1.1 The development of the concept of a safe minimum standard for biodiversity loss

The loss of biodiversity (including the erosion of PAGR) involves the irreversible destruction of resources whose future value is uncertain. Such losses irreversibly narrow the reservoir of potential resources, creating the possibility of large, though uncertain future social losses. Such uncertainty can be attributed to truly unpredictable changes in social attitudes towards, and knowledge of, environmental resources, as a result of changes in technologies, preferences and institutions (Ciriacy-Wantrup, 1968; Bishop, 1978). Thus, a conserved species, variety or breed might become an important resource in the future, although how valuable it might become is at present unknown. At the same time, conservation may involve costs and forgone development opportunities. Ready and Bishop (1991, p.309) note that ideally, an economic analysis of such issues would focus on the potential Pareto optimal improvement criterion using cost-benefit analysis (CBA). However, this approach is likely to be difficult in practice because of the "inability to assign probabilities to alternative outcomes or even to place bounds on potential pay-offs from preservation."

As a means of explicitly incorporating such uncertainty and irreversibility into project appraisal, Ciriacy-Wantrup (1952) proposed an alternative decision rule by introducing the concept of a safe minimum standard (SMS) of conservation, whereby "flow resources with a critical zone" would be maintained at a level that makes it feasible to rebuild the stock in the future (Bishop, 1978; Ready and Bishop, 1991). As applied to species, variety or breed protection this implies the maintenance of at least a minimum population size sufficient to ensure survival, involving the setting of quantitative and qualitative minimum limits for biodiversity preservation (Crowards, 1998; UNEP, 1995). Here the objective is not to maximise a definite quantitative net gain but to ensure that maximum possible losses are minimised (Ciriacy-Wantrup and Philips, 1970)

The SMS decision rule therefore places a bound upon what otherwise might be economically rational actions, whenever such actions threaten irreversible damage to the environment. This is achieved by favouring conservation, unless the social costs of forgone development – defined as the benefits of development net of the associated environmental costs – are unacceptably large (Crowards, 1998).

1.2 Defining a SMS for PAGR

It was noted above that a SMS, as applied to PAGR, implies that the population under consideration must be maintained at a level that makes it feasible to rebuild the stock in the future. This, in turn, involves the setting of quantitative and qualitative minimum limits (Ready and Bishop, 1991).

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Technical Note 3

For animal genetic resources (AnGR), the FAO categorises breeds as to their risk status on the basis of, *inter alia*, the actual numbers of male and/or female breeding individuals and the percentage of pure-bred females. Seven categories of risk status have been established. These are: "extinct, critical, endangered, critical-maintained, endangered-maintained, not at risk and unknown." A breed is "not at risk" if "the total number of breeding females and males are greater than 1,000 and 20, respectively; or if the population size approaches 1,000 and the percentage of females being bred pure is close to 100% and the overall population size is increasing" (FAO, 1999).

Despite this definition of risk status based largely on population size and trends, a number of additional criteria have also been proposed. For example, although Simianer et al. (2003) and Reist-Marti et al. (2003) give more weight to population size and trends, they also consider:

- geographical distribution;
- evidence of indiscriminate crossing;
- the presence of a breeding infrastructure, breeder's organisation or conservation scheme;
- socio-cultural importance;
- the existence of especially important traits;
- the reliability of the information available; and
- the political situation in the country where the breed is located.

It should nevertheless be appreciated that even when taking such additional considerations into account, it will still be possible to identify a minimum effective population size that is sufficiently large to allow for genetic resource diversity to be maintained and for the animal population to be rebuilt at a future date, if so desired.

In the case of the *in situ* conservation of plant genetic resources, no such equivalent risk threshold has been defined. However, the estimation of a SMS is likely not only to be based on the cultivated area, but also on the amount of seeds available in local systems and their age, the number of farmers of a specific species/variety and the degree of local knowledge maintained. Additional criteria, such as geographical distribution of PAGR and associated agro-ecological factors within those locations, existing seed distribution networks, socio-cultural traditions and market integration could also be taken into account when establishing a workable SMS.

Consequently, it appears that there are many factors and underlying dynamics that would affect the definition of a SMS for PAGR. While it is possible that such goals might be fairly modest (e.g. individual variety conservation area goals might be expressed in hectares or tens of hectares rather than hundreds or thousands of hectares), to the best of our knowledge, existing research of this type is extremely limited and more work needs to be done in this area.

For further reading and full citations see:

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