INTRODUCTION

The benefits and costs of a proposed project are commonly analyzed to determine its worthiness for investment. A project's expected contributions to human welfare are weighed against the sacrifices it would entail. Allowing for the costs of time, judgments are then made as to whether society would be better off with or without the project. As the use of scarce resources in one project precludes their use in another, analyses are framed to produce indices so that various projects can be compared and ranked by their relative merit. The benefit-cost ratio and internal rate of return are two such indices.

Benefit-cost analysis has been used to assess the economic viability of a number of social forestry crops. In recent years, it has been used to assess the potential of social forestry programs in Gujarat and Uttar Pradesh. The yields of social forestry plantations were estimated, valued and compared with the costs to achieve them. "Intangible" benefits, such as erosion and water control and adequate village subsistence, are costs, such as the requirements of village participation, received supplemental consideration. In program justifications thus far, "Intangibles" have outweighed the more easily quantifiable values of direct plantation costs and returns. This reflects the newness of the social forestry field and the consequent difficulty of delimiting the requirements and effects of social forestry projects. "Intangibles" tell us that we have not yet traced the critical features of a project plan, which benefit-cost analyses condense to comparable forms.

B.P. Srivastava and M.M. Pant opened discussion of benefit-cost analysis for social forestry in the January 1979 issue of the Indian Forester. They demonstrated its use in assessing and comparing specific projects. They noted its shortcomings, arguing that its planning criteria were inadequate for forestry programs and projects "meant to bring a social change, to ameliorate distortions in the economy and to ensure a more equitable distribution of income and...decision making powers". If projects and programs are assessed narrowly...

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by the direct measurable costs of and returns to social forestry plantations, critical requirements and effects are neglected.

Other authors have since attempted to define the necessary features of social forestry plans, thus of benefit-cost analyses which summarize them. People's Participation in Social Forestry, Fodder and Pasture Development, the proceedings of a Seminar organized by the Madhya Pradesh Forest Department in February 1979, provides a broad discussion of social, technical, economic, administrative and legal aspects of social forestry, as a mode of rural development. My article in the December 1979 issue of Management and Labor Studies examines the requirements of program and project planning as a process of gradual improvement in departmental performance. Community Forestry Management for Rural Development, edited by R.N. Tewari and O.A. Mascarenhas, contains several alternative planning and analytical schemes, and expands understanding of the requisites of social forestry for village economic growth. In the Second Indian Forestry Congress, January 1980, more than twenty papers on social forestry were presented. Most enlarged upon themes expressed in the Srivastava and Pant paper.

These works give prominence to features of social forestry that deserve incorporation in approaches to project planning:

1. Social forestry projects have two objectives: to improve village wellbeing and to save forest resources. As villagers are relatively more interested in the first objective, and forest departments in the second, project assessments from these two points of view are likely to differ. Project planning must reconcile them.

2. Project outcomes result from shifts in the employment of land and labour that occur with establishment of social forestry plantations on common lands. They are affected by the economic productivity of the plantation and opportunities to process and market plantation produce. For planning purposes, the project includes all land, people and activities affecting and affected by project outcomes, not the plantation alone.

3. The gains and losses from a project cannot usually be distributed equally between government and villagers and among villagers. As the success of a project requires the reasonable satisfaction of all who can affect its outcome, rules and organization may be necessary to secure a distribution that is at least sufficient to insure plantation maintenance. Project planning includes developing arrangements for this purpose.

4. Forest department organization for social forestry is in an early stage. Projects have value as sources of experience from which improved operational practices and skills can be drawn. Project planning includes establishing a sufficient base of information for subsequent evaluation and the operational improvements it can yield.

5. Social forestry projects are long-term enterprises. Their viability over time will be affected by changes in population density, costs and returns of alternative uses of village land and labor, the cost of substitutes for forest
produce, improvements in social forestry technology, the development of irrigation and roads, growth in government budgets and gains in the efficiency of program organization. Project planning includes projections of the effects of these changes on specific site conditions.

Although not exhaustive, this list highlights considerations that many now believe to be intrinsic to social forestry projects.

This paper is an attempt to translate such considerations into a framework of measurable benefits and costs for project analysis. Benefit-cost analysis is a tool of planning and is only as accurate as projections in the plans it summarizes. Nevertheless, a benefit-cost framework is the simplest general expression of what planning is to do: identify and value alternatives, provide relatively clear guides for decisions and consequent actions, and present initial assumptions and information sufficiently to support future evaluations of project outcomes and resulting operational improvements. Modifying the benefit-cost framework in accordance with ideas about social forestry can do more than improve a tool of planning. It can clarify the content of planning itself. In the benefit-cost framework proposed here, project plans are to maximize the gains in village income and savings in forest yields over time, relative to the costs of land, departmental investment, and arrangements for re-distributive transfer of gains and losses between government and village and among villagers.

be benefits and costs of social forestry projects

Benefits

1 Social forestry projects have two objectives. A project is: (a) to improve local economic conditions by intensifying production of wood, fodder and food crops on uncultivated unforested lands, and (b) to do so sufficiently to reduce destructive claims for these products from forestlands.

The objectives can be stated in another way. Social forestry projects are intended to yield two kinds of benefit:

(a) Savings of future forestlands yields that would be destroyed in the absence of a project. Yields may be in the form of a future stream of commodities, such as wood and fodder, and of environmental services, such as water and soil retention.

(b) Gains in income to villagers beyond those attainable in the absence of a project. Gains may be in the form of cash, kind, and security.

These benefits are measurable. Thus, social forestry objectives can be stated in measurable terms, i.e., the degree and composition of local economic improvement sought through a particular project, and the amount of forestland capital values to be protected by this improvement. If a project is intended to protect \( x \) acres from declination over the next thirty years, then village income will have to increase by the equivalent of \( y \) rupees. If village income is raised by \( y' \), \( x' \) acres of forestland will be protected.
2. The objectives of social forestry imply that the larger the gains in village income, the greater are the savings of forestland resources. One unit of forwood cut from a social forestry plantation in one year saves an equal unit of forestland wood and all future growth that unit would have produced. If a 50-acre social forestry plantation protects 660 or 1000 acres of forestland from destructive use, it saves whatever decline from present watershed values might otherwise have occurred from now into the future. A relationship between plantation productivity and forestland savings can be estimated for given ecological, demographic and economic conditions.

3. Gains in village income are related to distances to alternative sources of forest produce. By bringing necessities closer to the village than when they are sought in forestlands, a project saves the labor time required to travel to the forest gather produce, and transport it. The greater the reduction in distance, the greater are the savings in labor. The labor thus saved can be employed in other economic activities or in leisure. The benefit is estimated as the returns obtainable if saved labor were employed in its most productive alternative use. All else equal, project benefits are greater to the extent that current distances to supplies of forest produce are large. A relationship between distance and project benefits can be estimated.

4. The benefits from saved labor depend on the quality of its alternative employment. All else equal, there are greater returns to labor on good than poor agricultural lands. Thus, the quality of village agricultural lands affects the benefits obtainable from a social forestry project. As irrigation improves land quality, benefits are likely to be higher where it is available. If population densities are high, all else equal, the value of saved labor is probably less than when they are low; additional labor is more likely to be redundant. If villages have relatively good access to roads and towns, saved labor is more likely to find non-agricultural employment than if access is poor; project benefits would be higher.

Benefits of a social forestry project include earnings of labor otherwise expended in travelling to, gathering and transporting materials from forestland sources. All else equal, they would be particularly high where villages are distant from sources of forest produce, lands are good, population densities are low, and roads and towns are relatively near.

5. A social forestry project can improve employment opportunities. A plantation with a water harvesting system of trench fences and ponds may increase the returns to labor in agriculture. A project which includes development of village processing and marketing of forest produce can increase returns to non-agricultural employment. A project's benefits rise to the extent that it increases village earnings beyond those of labor otherwise used in forest pursuits.

6. Project benefits depend on the costliness of substitutes for forest produce. If substitutes are relatively cheap or may become so in the future, e.g., fibers, medicinals and radios, the benefits are less. If substitutes are expensive, e.g., kerosene, benefits are greater. If substitutes have alternative uses, e.g., dung for fertilizer, the level of benefits depends on the returns lost by removing the substitute from other uses.
As benefits depend on the costliness of substitutes, they depend on the composition of substitutes a village would require, thus on the composition of village demand from forestlands. If village demand is for products that can be cheaply replaced, benefits will be lower than if demand is for products that can be replaced only at great expense. The benefits of a project are thus related to the composition of villagers' needs and the alternative costs of satisfying them.

7. Project benefits will change over time. If, for example, population density increases but access to alternative employment opportunities does not, the benefits of labor saving will decline if new opportunities are created, by irrigation or road development, for example, the benefits of saving labor from forestland pursuits will increase. If forestlands continue to be demanded, distances and the benefits of being able to avoid them will increase unless population growth is outpacing the growth of alternative employments.

In projecting the benefits of social forestry, thus its viability, trends in population, employment opportunities, and the costs of substitutes must be considered. However, beneficial a plantation may appear in its initial years, its objectives will not be achieved if population growth outruns job creation or if the efficiency of social forestry production does not increase over time. Long-term project benefits will depend, for example, on irrigation development, increasingly productive social forestry systems and the development of market-oriented activities based on them.

8. In sum, social forestry project benefits include (a) the value of plantation produce in terms of the cost of substitute supplies in the forest and market place (b) the gains in village income from employment of labor otherwise used in forest foraging, and (c) additional savings in the benefits of a stream of forestland goods and services that would be destroyed in the absence of a project. The projection of future benefits depends on the rate at which employment is generated relative to population growth, changes in price of forest goods and services and substitutes for them, and the rate of increase in social forestry production and efficiency.

Costs
9. Social forestry involves investments by villagers and by government. These are its costs. Villagers invest land that is otherwise used for common grazing and foraging. They lose the stream of returns these uses would bring if the land were not enclosed for a social forestry plantation. An income decline may result if forage is not replaced. Livestock may be moved to more distant sites. As more energy is expended in movement, lower growth rates, productivity or health losses may be obtained for a given unit of feed. Grazing new areas may be competitive with other villages, so overgrazing or grazing over larger areas than before may result. Movement may involve new encroachments of forestlands, thus reducing the savings of forestland capital a project is intended to achieve. The more a village economy depends on livestock or the less land per animal it has available for grazing, the greater will the costs of social forestry be to it. A measure of the cost of the land investment is the loss of livestock returns to villagers plus the loss in a future stream of benefits caused by deterioration of grazing and forest lands.
10. Village organization for social forestry has its costs. People spend time talking with officials, resolving conflicts, protecting the plantation, arranging and providing labor, and distributing produce. The time is drawn from other pursuits and can be valued by the returns to labor that might otherwise be obtained. In general, if villages are able to cooperate easily, by virtue of unity or leadership, costs of organization will be relatively low. If villagers are factionalized or disruptive, costs of organization will be higher. If government pays villagers to do various tasks, or supplies manpower to supplement or secure village effort, the cost is still part of project investment although no longer born by the village.

In general, where villagers have difficulties cooperating are economically depend on livestock, and occupy relatively poor or limited lands, the costs of social forestry will be relatively high to them and/or to government.

11. The cost of displaced uses of land is not fully measured by shifts in income and expenditure. In the establishment of a social forestry plantation, people are asked to sacrifice common rights of open access to grazing and forage resources, and implicitly to forestlands as well. Unless their rights are replaced by others they perceive as of equivalent value and security, to plantation produce for example, the cost of a project to them may be considerably higher than it appears. What people are willing to pay for the right to graze an area, a usual measure of the cost of withdrawing that right, is probably not as great as what they would demand to sell rights they believe they already hold.

Divergent governmental and village interpretations of land rights, particularly on revenue lands and protected forest, can lead to different assessments of social forestry costs. In many cases, differences can be overcome by agreements which secure the rights and expectations of both parties in the new pattern of land use. The agreement would then have shifted benefit-cost relationships and would have value of its own to the extent that it makes projects feasible that would not otherwise have been so.

12. The costs of social forestry to government take the form of direct expenditures for plantation establishment and protection and indirect expenditures for program administration. Plantation costs depend on site qualities, accessibility, plantation scale, and the level of village contributions. Good, level, accessible land that can be planted over a large area with village assistance will cost less than land of contrary characteristics. The costs of administration largely depend on how efficiently forest department organization can execute social forestry programs. In time, these costs can be expected to decline as the structure of responsibility, promotion patterns, modes of operation and staff skills are shaped to meet social forestry requirements. They will also decline as programs enlarge and economies of scale lower reductions in the overhead costs that each project bears.

13. In sum, project costs include (a) the benefits lost and the costs of resource deterioration caused by enclosure of land for a social forestry plantation, (b) the costs to villagers of time spent on social forestry related matters, (c) direct project costs to government, and (d) pro rata costs of government program administration. Costs can be expected to decline if the value of livestock declines, organization arrangements are
systematised and economies of scale are achieved in program administrations. They cost more than the value of livestock. Population pressures on land increase without compensatory improvements in productivity and program expansion leads to the selection of ever more difficult sites.

**Village and forest department**

14. Thus far the total benefits and costs of a project have been discussed. Totals are necessary but insufficient indicators of project performance. Forest departments and villages have different objectives, resource constraints and time preferences. A project that appears worthwhile for one may be damaging to the other even if its total benefits and costs seem promising. It is necessary to calculate benefits and costs from each perspective.

15. The departmental perspective emphasizes the objective and benefit of saving forests. Departments are more willing to invest in projects where savings are high, regardless of whether forest is near to or far from village or the opportunity costs to a village are high or low. Their dominant resource constraint is manpower and organization. The constraint biases project decisions toward those that will conserve these resources, e.g., toward large rather than small plantations. Departments take a rate of interest that reflects a relatively low opportunity cost for investment capital.

16. Villagers are relatively more interested in the project effects on their income. Their willingness to invest will depend on anticipated gains in income regardless of whether forest savings are high or low. Their dominant resource constraint is land, and their project bias is toward plantations that require as little land as possible. They live close to subsistence levels and strongly prefer the bird in hand. Their discount rate is probably one which guarantees satisfaction of this year's needs.

17. Calculation of benefits and costs from the village and department points of view will generally lead to different assessments of the same project. There is little probability that both the project to be advantageous. If the project does not appear advantageous for one or the other, it will either not be undertaken or not be visible, no matter how favorable an overall assessment of the project may be. If a project is viewed as disadvantageous by one and marginally disadvantageous by the other, selected transfers of cost and benefit between them may produce a viable situation. If a village wants a project, the forest department cannot justify it, it may be willing to absorb costs of protection and management that the department might normally cover. Similarly, the department may place high priority on a project that villagers don't consider beneficial. It may then be willing to provide subsidies at a higher than usual rate or make concessions in its share of plantation produce.

18. Where a project is not favored by village or department arrangements are required to secure necessary transfers of benefit and cost. If disparities of assessment are small, the chances of successful arrangement are presumably greater than if they are large. Where disparities are too large for any arrangement to be possible, projects are better avoided no matter what the overall project assessment indicates.

**Village Groups**

19. A similar complication exists within the villages. The benefits and costs of a project are not likely to be distributed equally among all members of a village. Women
headloaders, for example, may not get a share of net project benefits equal to the gains from forest lands they are expected to forego. Certain grazing communities suffer greater losses from selective enclosure of revenue lands than others, yet given shares of plantation income only equal to those of everyone else. Privileged may gain control of plantation benefits even if their direct needs are little affected by in current patterns of land use.

If a project is to be viable, each group that will be affected and be affected outcome must expect to benefit from it. If a group does not anticipate gains, it has reason to undercut the project. An assessment of benefits and costs for every group must yield a positive result, no matter how favorable an overall village area may be.

If village assessment is sufficiently favorable, after possible transfers of benefits with government, and disparities among groups are reasonably small, any farm transfer among groups may produce a viable project. In many cases, disparities among groups’ expected project benefits and costs are sufficiently great that no arrangement is tenable. A project would have little chance of success, no matter what calculations the village and overall project levels may indicate.

20. Even when all village groups are net gainers, a project is likely to fail disparities in gain among them are too great, and will not sustain any arrangement. If disparities cannot be reduced to within limits that secure the welfare of all groups, a project is unlikely to be viable. Comparison of benefits and costs between groups that will gain most and least in a village may provide a useful index for the distributive viability of a project.

Structure of Assessment

21. The previous discussion suggests that benefit-cost analyses of social projects be undertaken at three levels: (a) the project as a whole, (b) the project from the perspective of village and departmental perspectives, and (c) the project from the separate perspective of the different village groups that may significantly affect and be affected by project outcomes. The level is to determine by how much society will be better or worse off rather than the project. The second level of analysis is to determine whether department and interests are sufficiently satisfied by the project to allow for tenable arrangements among them that it requires. The costs of necessary re-distributive arrangements are included in costs of the overall project. The third level of analysis is to determine how probable distribution of gains and losses within villages is sufficiently equitable groups and beneficial to all to sustain the long-term village cooperation a project.

Costs of re-distributive arrangements among villagers are incorporated among costs village project assessments.

22. At all levels, analysis requires three kinds of information about project changes: (a) the direct benefits and costs of the plantation, (b) the benefits and costs of plantation caused changes in land and labor use,
Assessing the Benefits and Costs of Social Forestry Projects

(c) effects on the above of long-term trends in population, relative prices and wages, substitutes for forest produce, social forestry technology, irrigation and road development, and changes in scale and efficiency of agency operations.

Benefits and costs can be tabulated against those who will absorb them, specifically government, the village, and significant village groups. The result is a table which shows the level and distribution of plantation and project benefits and costs among the various participants. The costs and effects of necessary re-distributive arrangements would then be estimated.

23. Benefit-cost ratios can be derived from the table for each level of analysis and adjusted for re-distributive arrangements that appear necessary. The ratios for village groups would simply relate earnings gained against earnings foregone. The discount rate would be high, based on what is required to secure satisfaction of wants for a year. The ratios of groups most and least benefitted can be compared to obtain an indicator of distribution.

A ratio for the village as a whole would relate total gains in income to costs of foregone uses of land, and would be adjusted for the effects of re-distributive arrangements among village groups. The discount rate might be derived from a time horizon of ten years, or whatever the rotation length of the plantation is expected to be.

An agency ratio would relate savings in forest yields to budgetary costs, and use a discount rate equivalent to rates of return in the forestry sector.

The overall project ratio would relate gains in income and savings in forest yields to village costs of foregone land uses, agency budgetary costs, and the costs of all re-distributive arrangements and their enforcement. The discount rate would be whatever rate is set at the national level for public investments.

Implications

24. The benefits and costs of a social forestry project are obviously not limited to the area, crops and establishment costs of its plantation component. A plantation is intended to reduce village uses of forestland. By enclosing currently grazed lands, it can force grazing pressures elsewhere. New sources of income must be created to draw displaced labor into more productive activities. The development of irrigation and social forestry based processing and marketing activities may be required to do so. A project includes all of these changes and the area and population in which they occur.

25. Project analysts compare the streams of benefit and cost from land, labor and capital use with and without a social forestry plantation. It follows that project analysis is a comparison of the economies of alternative land use plans for areas now and potentially affected by village needs. Areas would include forestlands, whatever their legal status, that may be degraded in the absence of a social forestry plantation. They would also include grazing sites to which livestock pressures might shift, as well as agricultural lands that might be developed to absorb labor displaced from forest pursuits or grow fodder intensively and reduce pressures on the forestland range. As land use plans are more
concrete and understandable than analyses of benefits and costs, they probably provide a
better focus for discussion of social forestry between villagers and forestry officials. Village-
centered land management plans would be the social forestry equivalent of management
plans for forestlands.

26. For program purposes, forest departments want to array potential project sites
according to the relative returns to social forestry plantations that can be expected from
them. They need a system of site capability assessment for social forestry to suggest
priorities for investment. The analysis of benefits and costs from different sites provides
one basis for assignment of priorities. Site capability assessment requires the same
information. When benefit-cost analysis produces a different classification of site
capabilities than project experience demonstrates, the objectives, means and values used in
the analysis may not fit the problem. Key information is being ignored or weighted
wrongly. Benefit-cost analysis is supposed to predict project performance and, as it is
used to rank projects relative to one another, to predict program performance as well. If
it is not doing so, revisions in approach are required.

27. The benefit-cost framework presented in this paper suggests several ways in
which the contributions of social forestry can be increased and/or the sacrifices reduced.

(a) Improvements in the productivity and efficiency of social forestry cropping
systems can increase the difference in value between present and projected
patterns of land use. Scientific development of new technologies can increase
project returns and the number of sites in which social forestry is a viable
proposition.

(b) Improvements in the value of alternative opportunities for employment of labor
can increase the benefits of social forestry projects by increasing the opportunity
cost of forest cutting. The development of plantation trench forces for
agricultural water storage and of processing and marketing opportunities for
social forestry produce, for example, may have such an effect.

(c) Improvements in departmental manpower skills and organization for social
forestry will reduce administrative cost and/or increase returns to departmental
effort. For a given staff and budget level, the number and productivity of
projects could be increased.

(d) Monitoring projects results can sharpen site capability assessment criteria,
increasing the frequency of selecting good project sites as well as improving
staff management skills. It would reduce project costs over time.

(e) Developing arrangements that clarify property rights, facilitate agreement
between villages and government, and assure a viable distribution of benefits
and costs among villagers, will also reduce project costs by reducing conflict,
uncertainty, and consequent rates of project failure.

Social forestry benefits and costs are likely to appear less attractive as time goes on
if such improvements do not occur.
SUMMARY

The purposes and effects of a social forestry project extend beyond the bounds of its plantation. As predictions of performance, project analyses must incorporate them as well as plantations' direct costs and returns. The critical features of project performance have drawn considerable attention in recent years. This paper is an attempt to translate them into a framework that can be used in project analysis. It proposes that a social forestry project be defined to include the area and population within which a plantation causes changes in the employment of land and labor, thus in the level and distribution of income. It also proposes a three-tiered mode of analysis to account for the distributive requirements of project viability: benefit-cost estimation for the project as a whole for the project as perceived separately by participating villages and departments, and for the project as perceived separately by groups of villagers for which its outcomes are significant.

References

2. Ibid.