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The Costs of Landscape

Whatever might be said of the measurability of landscape *values*, planning, creating and maintaining desirable landscape clearly has measurable *costs*. *Visiting* a landscape—even one that merely exists and was not designed for aesthetic pleasure—has costs. *Inhabiting* a landscape also has costs.

Financial Costings

“Cost” may mean simply financial outlay. Substantial private, corporate and public monies are spent on landscaping projects ranging in scale from reshaping and revegetating enormous mineral waste heaps to planting small flower-beds in housing schemes.

Cost-consciousness is nothing new. The huge enterprise of creating such landscapes as Louis XIV’s park at Versailles (see Fig. 4.3) clearly needed financial resources beyond any but the wealthiest individuals. Going back earlier, St Luke’s Gospel relates a pertinent story:

For which of you, intending to build a tower, sitteth not down first, and counteth the cost, whether he have sufficient to finish it? Lest haply, after he hath laid the foundation, and is not able to finish it, and all that behold it begin to mock, saying, This man began to build, and was not able to finish. (Luke, 14, 28–30)

It is not recorded whether this was an aesthetic or strategic investment, but similar cash flow crises, from primary aesthetic purposes, occurred in later times. The German nobleman Fürst Pückler spent lavishly and eventually beyond his means on his estates of Branitz and Bad Muskau. His enthusiasm to emulate England's naturalistic parks eventually resulted in his selling Bad Muskau to pay his debts.

As for the builders of Seville Cathedral, mentioned in Chap. 1, awe at their vision might be tempered with concern about their self-proclaimed lack of rationality. *Should* they not have considered the cost of their megalomania?

Even sponsorship, or funding of public projects through private partnerships (Dümpelmann 2015), does not avoid financial outlay. And in all cases, there might be uncomfortable speculation, on what the money might have funded instead.

Factors of Production in a Landscape

Financial cost is of great importance, within private enterprises, and within any political economy constrained by cash (that is, *all* political economies). But finance matters because it commands the physical resources required to create landscape, or to undertake actions which have incidental aesthetic effect.

Among the factors of production traditionally recognised by economists, landscape professionals would most closely identify with “land”. It also fits closely with the ecological concept of landscape as a territory occupied by interacting organisms. Within this territory occur also the scurrying getting and spending of human economic activity.

Although “land” was the traditional term, in the twentieth century preference grew for “natural resources”, embracing not only Earth's

solid surface and all that moves thereon or exists thereunder, but also water bodies (from ponds to oceans) and all that swims or floats therein, and atmosphere and all that flies therethrough. In parallel, landscape embraces also seascape and skyscape, as many famous works of many famous landscape artists testify.

Land is the artistic medium which landscape architects change, the less tractable elements of sea and sky forming a given complement. Its physical nature determines what may be done on it and how it may be remodelled, and its location brings together those who use it for other-than-aesthetic purposes, and those who experience the aesthetic effects of that use.

Even before the days of finance, great human resources were applied to modifying land, with aesthetic as well as ceremonial purposes. Decisions to initiate such changes are the earliest manifestations of landscape economics. Before the industrial age, the main applied resource was labour—application of human effort to create desired products. Desert pyramids and ritual landscapes (Fig. 2.1), admired aesthetically today, might draw censure for their human cost. But other manifestations, such as chalk downland figures, may have been communal efforts, and today are maintained voluntarily by the original creators' descendants.

The landscaped parks decreed by Persian and Mughal emperors, those designed by Le Nôtre, Capability Brown and their contemporaries, were intended as landscapes of delight. And, less spectacularly but more pervasively, the cultural landscapes of terraced agriculture, rice paddy and prairie, of small fields, hedgerows and ridge-and-furrow cultivation, of home gardens and wood pastures, they all are an incidental—but perhaps not entirely incidental—product of efforts by millions of rural workers, over many hundreds of years. Benson (2008) sees in the utilitarian purpose of these efforts an element that deepens aesthetic value. Its engagement in shaping the land might be considered to give labour moral entitlement to its aesthetic products, as well as physical ones.

More particularly, landscape professionals might be considered—though might not wish to be—a manifestation of Adam Smith's specialisation of labour (Smith 1776).

Other constructions did not have a primary aesthetic purpose: yet mighty defensive works, aqueducts for water supply, viaducts and



Fig. 2.1 Ring of Brodgar, Orkney—a landscape for Neolithic rituals, created by applying much human labour, at a meeting of land and sea and sky

bridges for transportation, all are much-visited and greatly admired today. These works are conventionally attributed to famous sponsors and engineers: the Pharaoh Cheops (Great Pyramid of Giza), King Zheng of Qin (Great Wall of China), the Emperor Hadrian (the eponymous Wall), the bridge-builders Telford, Brunel, Stephenson, Eiffel, Roebling. But they also commemorate the tens of thousands of slaves, artisans and navvies who worked on them, and the many who died while doing so: “The human cost of the construction is unknown, but it has been estimated by some authors that hundreds of thousands, if not up to a million, workers died building the Qin wall.” (Wikipedia 2017) (Fig. 2.2).

Raw materials are all those items found in the works departments of public bodies, in sheds adjoining private estate offices, on the property of landscape contractors who work for them and for households’ amenity schemes. They range from biological elements like grass seed and organic fertiliser, through minerals like sand and chippings, to manufactures like fencing, geotextiles and support structures for revetments.



Fig. 2.2 Great Wall of China as landscape feature. *Photo credit* Ann Reisner

They make no immediate contribution to aesthetic pleasure—rather to the contrary, their stocks may be deemed unsightly, things to be kept from the view of landowner or public. Raw materials need to be moved to site and embedded in structures or planting designs before they are useful.

That introduces capital: not, as commonly understood, the wealth on which persons and organisations can call, but a collection of resources which human endeavour and ingenuity—and even the efforts of animals such as beavers—have brought together in productive form. Capital includes earth-moving machinery to model contours and dig out water features; implements to manage vegetation; buildings for productive activity, and folly towers and temples for aesthetic pleasure. Then there are vehicles that transport both the raw materials needed to execute projects, and visitors to admire the completed result ...: all these are capital of particular relevance to landscape. Since the Industrial Revolution, the efficiency and accumulation of such capital have compensated for the increasing cost of labour, in constructing, maintaining

and improving “intended” landscape. And so too they condition the “incidental” landscape of materially productive activities: agriculture and forestry, industry and commerce, residential development. All these are nudged towards a more geometrical, less organic form, by the optimal working conditions of machinery and efficient dispositions of structures (Ipsen 2012). But even the needs and capabilities of primitive ploughs conditioned the curving forms of pre-industrial agriculture (see Fig. 16.6).

Capital may also include improved human capabilities embedded by design training and real-world experience, and manifest in assimilated processes of design. As well as constituting specialised labour, it requires early investment in skills, to improve longer-term productivity.

Similarly, social capital describes the institutions formed over time: among other things, to evaluate human interventions in the landscape, to control or facilitate their implementation, and to bring public investments to fruition.

Natural capital is that part of natural resources which can provide continuing benefits without depletion. Should quantification be desired, this is best done via those (net) benefits that flow from its existence. Much time could be spent on fruitless discussion of how much of a human-modified landscape should be considered natural capital, and how much constructed capital (their interaction precludes ready separation). But it has been debated whether the two components should be treated differently in valuing sustainability: see Chap. 16.

Enterprise, “the organising factor of production”, falls in landscape designers’ province. They take control of an area of land, arrange hire of machinery, mobilisation of labour, purchase of raw materials, everything needed to realise their aesthetic vision—or to mitigate the adverse aesthetic effects of development for other purposes. Capability Brown took on this role, while Humphry Repton just produced designs. There is, however, an additional risk-bearing role which lies with the landowner, private or public. Providing finance is a necessary step in mobilising physical resources. And if finances run out, if heavier-than-anticipated demands are made on them, if, when all is spent, the aesthetic objectives have not been achieved, then private bankruptcy or public pillorying ensure. Fürst Pückler and St Luke’s unnamed antihero knew this.



Fig. 2.3 Stourhead, aesthetic pleasure achieved at the expense of productive land, cohorts of labour, and much raw material, brought into being at no small risk, under the enterprising hand of the owner, Henry Hoare II

For running such risks, entrepreneurs themselves reasonably expect some reward, in cash and titular accolades (public servants) or in kind (private landowners) (Fig. 2.3).

Added to the direct costs evidently expended for operations on site, are further inputs and expenditures in general support of enterprises and the factors of production that carry forward their purposes. On-costs are contingent on employing factors of production. For labour they include holiday pay, sick pay, allowances for times when work is suspended because of unsafe weather conditions or unavailability of machinery (broken down or undergoing maintenance), together with employers' contributions to social security accounts. Such costs arise from employing and motivating a workforce, and are often legally obligatory. The summed on-costs, as a proportion of summed direct labour payments, provide a mark-up on direct wage cost. Overheads are costs of running an enterprise or organisation which are not uniquely attributable to a single operation or project, yet must be paid if the enterprise

is to remain viable. In costing operations, they may be calculated as a proportion of direct costs, and distributed evenly over each activity, unless there are special reasons why overheads would change atypically with change in an activity.

Costing a Project

Their association with elusive landscape values does not render costs immune from ordinary economic concepts (like scale economies, competition and monopoly), nor is detailed cost analysis inappropriate. For certain easily-specified operations (moving a quantum of soil, laying hard surfaces, planting a given size of tree), standard costs can be provided (AECOM 2016). From these, expenditure for given projects can be estimated by summation. The range of site conditions, however, is such that these figures are only approximate. Costs vary with geology, topography, soil type, climate, vegetation and accessibility. Particularly, when landscape preservation means changing the design or location of an intrusive development, each alternative must be costed individually.

When landscaping benefits are constant among alternatives, economic evaluation differs in no way from customary analysis. For example, choice between undertaking a scheme by an organisation's own work force or by contractor depends on correct identification of variable cost and how fixed costs and overheads are treated. Choice between labour-intensive (spade and barrow) and capital-intensive (excavator and truck) methods is sensitive to the economy's state of development (with its influence on wages). High-initial-cost (cobbled surface) or high-maintenance-cost (grass) solutions are compared by discounted cash flow techniques, discussed further in Chaps. 3 and 16. These examples are not exhaustive, but merely illustrate how conventional is the analysis of costs associated with landscaping.

The costs, or cost savings, of doing something in a different way are less obvious than those of land-modelling, surfacing and planting, but nonetheless real: Kendle et al. (2007) review the costs of different styles of vegetation management. Erecting irregular boundary fences to forests, undergrounding electrical installations in sensitive scenery, and



Fig. 2.4 Dyfi Forest: irregular boundaries are expensive to fence

using local building materials in protected areas are all aesthetic concessions requiring financial outlay (Fig. 2.4).

Least obviously, expenditures are incurred when a more expensive development scheme is preferred on aesthetic grounds. An early case study, described in Chap. 17, evaluated a decision to adopt a more costly route for an electricity transmission line, rather than impinging upon a heavily-used road. The (unimplemented) decision in the 1970s to build the Third London Airport at Foulness rather than Cublington, at an estimated extra cost of about £[2016]3000 million, was nominally intended to preserve a rural environment, in which landscape values were significant. In such cases money is less evidently spent on landscape. But financial cost is increased, and more physical resources are engaged, for aesthetic reasons: these should be debited to landscape's account, just like purchase of trees or hire of earth-moving machinery.

Some projects may involve only a limited period of development. Then, the costs of restoring landscape, or removing redundant structures, should be included. Replacing lost landscape values with

compensating new aesthetic resources might theoretically avoid any intervening loss. The costs of decommissioning nuclear power stations however are inevitable, while their landscape will not be restored within the foreseeable future. This issue of costs of maintaining or restoring future values is revisited in Chap. 16. In addition to the normal on-costs and overheads associated with machinery, labour, supervision and office-work, a socially-oriented cost analysis might examine the overhead cost of public decision-making. If this exists regardless of whether the decision entails landscape issues, no overheads should apply to landscape. If debate is lengthened by introducing landscape issues, landscape has an extra cost. When the issues are so persuasive as to cause a new alternative to be proposed, then the cost of devising and designing the alternative, including technical and commercial factors, is a cost against landscape. The important question, however, is: how avoidable are these costs? As the decision-making process nears completion, the cost of producing and evaluating alternatives cannot be recovered, so it is inappropriate to debit the cost against any particular alternative. *Before* the process is initiated, the total design and evaluation costs could be reduced in particular cases, by declaring landscape issues unimportant. This seems, however, so to threaten the general freedom of input to the democratic process that it would be inadmissible. Within the bounds of political realism, therefore, evaluators should not set decision-making costs against landscape. It is for those who object, or propose alternatives, to decide whether the merit of their viewpoint justifies the cost of prolonging proceedings.

Opportunity Costs

For societal evaluation, the financial costs which concern accountants are of less interest than opportunity costs—potential benefits for-gone by society when factors of production are diverted into landscape work, and thereby withdrawn or withheld from alternative productive activities. Particularly, when land use is dedicated to a primary aesthetic objective, or aesthetic factors prohibit a development, material production may be seriously curtailed.

Theoretical debate has been sporadic, and not resolved, about whether the opportunity forgone should be considered the *best* alternative use, or the *probable* one. In practical situations, the *probable* alternative is appropriate. When more than one alternative may materialise in the absence of the project, probabilities should be assigned to each plausible alternative, and their mean value calculated, weighted by probabilities: Chap. 3 considers this is further.

Opportunity costs differ numerically from financial costs whenever markets fail to equate payment to each factor of production with its contribution to output. In costing labour, the difference may be substantial where unemployment is prevalent but institutional factors maintain a relatively high wage. High unemployment often coincides with extensive derelict land, a legacy of defunct extractive industries. Here society would benefit from giving landscape reclamation work to a willing labour force, which would otherwise contribute nothing to production. However, *societal* profit is only apparent if the financial wage bill is replaced by opportunity cost.

Market prices of raw materials, especially bulky ones, may not reflect their true cost if:

- their production itself draws on factors which are not priced at opportunity cost, including the long-term opportunity cost of depleting non-renewable resources (Price 1984);
- externalities of production exist—Kendle et al. (2007) consider the costs imposed by generating chemical and biological pollutants;
- spatial monopoly allows extraction of supernormal profits, or uniform or discriminating pricing policy does not reflect true transport costs.

Other aspects of social cost, for all factors of production, are touched on in Chap. 8. Capital, with a high value-to-bulk ratio, is less insulated from spatial competition, so that market prices reflect production and opportunity costs elsewhere in the world economy (unless large trade tariffs exist).

The most pervasively important, and most frequently investigated, opportunity cost is that for land. Land sometimes becomes the object of

landscaping treatment simply because it lies idle. Whatever that land's market value, its current opportunity cost is zero, since no productive activity is being pursued. Nevertheless, the market value might reflect expectations of future productivity, and the site's potential should be assessed before committing irrevocable changes in favour of aesthetics, or establishing slow-maturing features, such as woodland, which may be overtaken by change before delivering their anticipated benefit. Examples are enhanced opportunities for housing development as urban areas expand into rural ones, or mineral exploitation as geological exploration proceeds.

Constraints imposed to protect landscape might have opportunity cost in reduced profits, as discussed in a forestry context in Chap. 3. A more stringent constraint is entirely to prohibit a site's development—as if an application to build a tourist café on a mountain summit were rejected. Then, the societal cost of landscape preservation is the net output forgone by sterilising land development. The cost of sterilisation is not immutably fixed, but depends on what developments are feasible. For example, a heathland area may at different times be under pressure for afforestation, residential development, or extraction of sand and gravel, each with different opportunity cost of retaining its landscape.

A distinction should be drawn between stock resources, comprising those attributes and components of the land that can be exploited by once-and-for-all removal; and flow resources, such as sunlight, wind and rainfall, which are constantly generated. The rapidity of stock exploitation is limited only by the product's market size and the technical capacity of extraction equipment. But, when the job has been done, the resource no longer exists. The exploitation of flow resources, by contrast, is limited by the rate at which they are generated, but can continue indefinitely.

Consequent on this distinction is a difference in opportunity cost of restricting or preventing their exploitation. If a flow is left untapped—biological growth potential, for example—a possible benefit has been lost for ever: water under the bridge, sometimes literally. Preventing stock exploitation, however, leaves the resource in the ground, so that future generations, perhaps with different tastes in landscape or priorities in consumption, *could* then sacrifice aesthetic values to its exploitation. The benefits of exploitation are thus not forgone, but only delayed, the implications being explored in Chap. 3.

For either kind of resource, the cost of preserving landscape is the *net* value forgone by sterilisation. What is lost or delayed is not the total revenue from intensified land use, but the profit, or output *net of costs*. In such intensive uses as mineral extraction, prospective values of output may be enormous, a fact frequently used politically to belittle landscape preservation. But the enormous cost of achieving the output should also be considered: more often than should be the case, such costs are “overlooked” when exploitation is promoted.

At the same time, while costs of one sort or another are *avoided* by landscape preservation against development, the net benefits of material production in the *present use* (such as pasturage, or firewood production) are *retained*.

Unit Costs of Landscape

Because explicit valuation of landscape benefits is problematical, a convenient preliminary step in analysis is to consider what level benefits need to attain, to outweigh quantified costs. (Such, however, is landscape’s aura of imponderability that even this elementary comparison is often shunned.)

Sometimes no trade-off need be made, when landscape preservation entails no *net* opportunity cost. After all, the greater part of cultural landscape owes its existence not to protective enactment, but to land-owners’ seeing no profit in more intensive exploitation. Even where a private profit could be made, deduction of government subsidies for development (farm intensification, afforestation, mineral exploration, nuclear power construction) might reveal financial loss. Moreover, many government land users have objectives other than profit, and are often swayed by political considerations. No financial opportunity cost may attend preventing developments like these, either. Indeed, in the later decades of the twentieth century landscape pressure groups increasingly argued that some changes (like ploughing moorland, or converting scrub woodland to conifers) had been not only aesthetically detrimental, but financially unjustifiable (Ramblers’ Association 1971; Bowers and Cheshire 1983) (Fig. 2.5).



Fig. 2.5 “Improvement” of pasture on moorland and afforestation with exotic conifers, deemed detrimental aesthetically, were both driven by UK government subsidy in the mid twentieth century

Contrariwise, when pursuit of profit brought agricultural enclosure in England, a new landscape emerged that now is highly valued. Changes which enhance the landscape may prove profitable; for example, shooting rents may be increased by planting tree groups in agricultural land. Any such revenues should be deducted before costs are set against landscape values.

By another argument, Benson (2008) notes that long-term costs may be incurred to maintain an incidental landscape that is no longer economically viable. That, he asserts, risks superficiality: so considered, there is no aesthetic loss in surrendering to economic forces.

Often, however, conflict between landscape and profit is real, and trade-offs must be made. At the crudest, the cost of preservation or enhancement can be set against decision makers’ intuitive assessment of the landscape’s worth. Sometimes this cost is clearly either derisory or prohibitive in relation to landscape value. But the issue may not be clear-cut, with stakeholders ranged on opposing sides of the argument. Furthermore, sometimes several



Fig. 2.6 Landscape impact of electricity transmission line at Coedydd Aber Nature Reserve

courses of action are possible, at increasing cost, but with increasing landscape value. Initial outlays may be obviously justifiable, while final increments of expenditure seem extravagantly detailed. In the middle-cost range, however, it may be unclear whether extra outlay brings sufficiently increased benefit to justify it. To attempt intuitive judgement in these uncertain circumstances is to risk total bewilderment of the faculties or to allow unacceptable scope for prejudice.

Both faults can be ameliorated by dividing the net cost among the expected units of landscape experience: for example, resident-years for inhabited landscape, or visits for visited landscape. Such simple calculations can be revealing. Many years ago, a 400 kV electricity transmission line along North Wales's coast was proposed (Fig. 2.6). At one point, the line was to pass high over a scenic valley; the question arose, would it be worth laying this section underground to avoid impinging on a popular waterfall walk, at a probable cost of around £1 million?

£1 million has little meaning, when set against landscape value, but can be made more manageable in two steps. Firstly, an annual cost is

calculated as, say, the 10% interest charge then set by the Treasury on public investment:

$$10\% \text{ of } \pounds 1 \text{ million} = \pounds 100,000$$

Secondly, this sum is divided among the estimated 50,000 visits per year, giving a cost of £2 per visit. While this would not be an unreasonable amount to spend on preserving a high quality landscape experience, the impact of the pylon line is hardly so ruinous that the expense is merited here: no one in a party of 50 felt that it was worth paying so much for the line's removal; then, and within subsequent parties, several had not even noticed the line.

Attributing costs among years of service becomes more complex when annual future visits are expected to change. The usual economic procedure is to bring all future costs and benefits to a present equivalent by discounting techniques (see Box 3.1). For the analysis outlined above, this effectively requires calculation of "total discounted future visits" over which capital and discounted maintenance costs should be apportioned (Appendix A).

Inadequacies in the Unit-Cost Approach

In that transmission line example, the costs of landscape preservation were definitely greater than expected benefits. Elsewhere—perhaps if a fine vista could be retained by forgoing timber-production revenues on only a small area—the cost may be a fraction of a penny/cent per visit, and is obviously justified. These two extremes are lucky cases where unsophisticated analysis supplies valuable information to decision makers. Not always, however, are the figures so helpful. The cost per visit may be regarded by decision makers as marginally worthwhile, or perhaps not quite worthwhile.

Furthermore, landscape values of rather different kinds may be affected, or a given course of action will affect several different landscapes, each seen from many aspects, degraded with greater or lesser severity, and by different groups of people. Such was the problem for the early cost–benefit analysis described in Chap. 17, of alternative routes, over many kilometres, for an electricity transmission line.

Attempting to apportion differential costs over all the impacts would have become very complex.

The need to consider the full range of unmarketed values compounds the problem. The North Wales transmission line case is pertinent, since nature conservation would have been more disturbed by undergrounding the cables than by overhead stringing; thus landscape protection has another cost to bear. With the figures given above, the decision based on landscape/cost trade-off is the same as that based on nature conservation: no conflict arises. Had the unit cost of landscape preservation seemed acceptably small, a monetary quantification of nature conservation value would have been needed before applying the method. Since valuing nature is as problematical as valuing landscape, perhaps landscape value should be calculated, less the financial costs of undergrounding? Then an explicit decision could be taken on whether

$$[\text{threatened nature conservation value}] > [\text{landscape value}] - [\text{extra undergrounding costs}].$$

In these circumstances, further phases of evaluation become necessary. The benefits arising from experience of landscape must be identified more specifically, and values assigned to them on a scale commensurable with monetary costs and values of other kinds. This task occupies most of the remaining chapters.

Cost of Landscape as Implied Benefit

A very different way of using the cost of landscape preservation is to hypothesise that past decisions favouring landscape were rational, so that the benefit realised must at least have equalled the cost. Gregory (1955) introduced the approach, though it was then applied to habitat conservation.

During the 1970s, a fungal disease (scientifically, *Ophiostoma novo-ulmi*, but called Dutch elm disease) swept across the UK. It threatened, and ultimately almost completely eliminated, the iconic hedgerow tree, English elm (*Ulmus minor* var. *vulgaris*). Dorset County Council attempted protection by injecting vulnerable trees with fungicide, at an estimated annual

cost of £9.60 per tree (Jones 1979). Nothing is recorded of their estimates of probable success, but the calculations might have gone as follows:

Probability of survival without protection	= 0.1
Probability of survival with protection	= 0.6
Implied value of certain survival for one year	$\geq £9.60 \div (0.6 - 0.1) = £[1976]19.20$

The present discounted value of all costs through an estimated 50 remaining years of life, with the 6% discount rate then used for public investment, is given by a standard capitalisation formula (see Box 3.1) as

$$\frac{£19.20}{6\%} \times \left(1 - \frac{1}{(1 + 6\%)^{50}}\right) = £[1976]303 \approx £[2016]1900$$

On the same argument, it might be claimed that the cost of landscape restoration after exploitative use represents a judgement of the restored landscape's value.

There are, however, several objections to this approach.

- Especially for long-past decisions, it may be impossible to know how (or whether) the cost of the decision was calculated. What outcome probabilities were estimated, or vaguely held in mind?
- If the benefit of all decisions favouring landscape at least equals the cost, the estimated *net* value (benefit minus cost) of doing *anything* at least equals zero: there is no means to set priorities among the set of “anythings”.
- It is unclear that past decision makers, in estimating benefit, were representative of the beneficiary population, or even that decisions were made public-spiritedly, rather than for personal ends.
- Most fundamental, however, is the question of *how past managers could assess* that benefits exceeded costs. If they had some reliable direct means of doing so, then why may we not utilise the same means, rather than inferring what their direct valuation must have been, by *indirect* means? And if they had no such method, why should we assume that benefits at least equalled costs?

The best that can be said, is that the method provides a starting point for discussion. By offering insight into values presumptively held at the time of the decision, it may facilitate construction of an intergenerational consensus.

If the worthwhileness of spending money is to be judged reasonably, some independent estimate of benefit is needed, to which matter later chapters return. Before that, however, further aspects of opportunity cost are explored.

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