

ENVIRONMENTAL ISSUES AND THE SNA

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The concept of environmental accounting is developing as the system of national accounts (SNA) is being revised. A basic difference at present is that environmentalists regard natural resources as assets analogous to man-made capital, whereas they are treated as free gifts of nature in the national accounts. In this paper the author examines the consequences for the SNA of adopting the environmentalists approach to capital.

INTRODUCTION

Over the last ten to fifteen years public reaction to environmental issues has broadened from concerns for endangered wildlife and for preserving aesthetically pleasing landscapes to the realization that the whole process of economic development is dependent on the utilization of natural resources. In extreme cases, such as in sub-Saharan Africa, the physical and economic survival of millions of people depend critically on the management of land and water resources, both in quantity and quality.

When environmental economists wish to demonstrate their concern in quantitative terms and to illustrate the impact of alternative scenarios, they find national accounts developed using the present System of National Accounts (see United Nations 1968) to be inadequate on a number of counts. The problems are both of omission and commission. Many activities undertaken by women in less developed countries, for example finding wood for fuel and carrying water, are excluded from the present measures of gross domestic product (GDP). On the other hand, major projects to rehabilitate polluted rivers or otherwise restore environmental resources degraded in previous periods are included in GDP and if these projects are initiated without matching cutbacks in other programmes, increases in this type of activity lead to increases in GDP.

In taking issue with these treatments, the environmentalists make common cause with other economists who object to the present measures of GDP on the grounds that it is not a measure of welfare. National accountants make no claim

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to measure welfare and indeed can cite the deficiencies of GDP as such at least as cogently as the critics. Nevertheless these disclaimers are devalued in the common perception by the continued and growing emphasis given to statistics such as GDP and GDP per capita as the most readily available measures of economic activity and growth and, by implication, of welfare.

Steps to redress these perceptions are in hand. Various specialized statistical systems have been or are being developed to address questions in specific areas and the environment is no exception. Physical resource accounts are being developed to show, in volume terms, inputs and outputs of physical processes including natural resources as well as manufactured products. The United Nations "Framework for the Development of Environmental Statistics" (see United Nations 1984), for example, attempts to put environmental, economic and social statistics in context with one another to show their interaction. Various proposals have been and are being examined to develop an aggregate that includes the "desirables" that are omitted in the SNA and excludes the "undesirables" that are included in the SNA. It is intended that such alternative statistical systems will form satellite accounts to be used in conjunction with the revised SNA and to the extent that such systems are greater elaborations of specific details, the re-arrangement of existing items and inclusion of others, no conflict should arise. However, given the claim of the SNA to provide a comprehensive framework under which all such satellite accounts can be developed, it is important that the present process of reviewing the SNA ensures that appropriate interface to environmental matters is established. However, there is one issue on which environmentalists and the present SNA take very different views.

The case put by the environmentalists is that neither non-renewable resources such as mineral deposits nor resources such as land and water should be treated as free gifts of nature. While land and water seem at first sight to be free we are increasingly conscious that these resources are not automatically self-renewing and while man may have limited power to renew them he has much greater power to destroy them. Economic activity necessarily interacts with nature and allowance must be made for programmes which maintain and husband these permanent resources and for lack of such programmes which lead to their destruction. The presence or absence of such programmes is therefore an economic decision that directly affects the potential economic activity in subsequent periods, just as decisions on the rate of depletion of non-renewable resources does. In both cases therefore there is a strict parallel with the decision to create and maintain man-made capital and it is argued the SNA should record these resources as alternative forms of capital. The question therefore is how the treatment of these resources as natural capital would change the present practice of the SNA. The main purpose of this paper is to answer this question.

A further criticism that can be made of the use rather than the definitions of the SNA is the automatic use of measures of gross product where net product would often be more appropriate. Environmentalists would like to introduce a concept of sustainable income to allow also for degradation of natural capital assets. This is also addressed after the basic SNA concepts are discussed.

EXPLOITABLE RESOURCES

Much of the discussion by environmentalists in the past has concerned the treatment of non-renewable resources such as mineral deposits. In fact, similar arguments also apply to natural forests used for timber and natural fish stocks. Since both of these are renewable, even if not actually renewed on a realistic time scale, it is perhaps convenient to speak of exploitable resources to cover all three cases.

Within the production accounts of the present SNA, when an exploitable resource such as oil is extracted and sold only the direct costs associated with its extraction, including labour, are deducted from its market value and the whole of the difference is treated as gross operating surplus. Net operating surplus differs from this only to the extent that consumption of fixed man-made capital occurs. Though the process of oil extraction is treated as production, neither the value of new reserves discovered nor changes in value of reserves because of changes in world prices, is treated as production. This results in a somewhat anomalous presentation of stocks information. The value of the unexploited oil at the start of the year appears in a balance sheet for the industry and the nation as do the start of year values of man-made capital assets, but since all changes to the value of exploitable resources between the start and end of the year are explained in the reconciliation account this occurrence in the balance sheet is in effect a memorandum item. If exploitable resources were treated as natural capital, part of what is now treated as gross operating surplus in the production account would appear as consumption of natural capital and net operating surplus would be decreased by this amount. A matching entry would appear in the balance sheet of natural capital assets.

The question arises of what value is appropriate to attach to the exploitable resource prior to its exploitation. One suggestion is that in addition to the direct cost of extraction, an entrepreneurial return (calculated perhaps as a given mark-up on the direct costs) should also be deducted from the value of the oil at the well-head and the residual would represent the sub-soil value. This straightforward approach has the appeal of simplicity and economic sense. Variations in world prices would lead to matching variations in sub-soil values determining when a deposit was commercially viable and when not, this latter being when the sub-soil value fell to zero or below. In certain circumstances exploitation might continue when this value were negative, for example because the direct costs could not be averted. In such a case the entrepreneurial return would have to absorb the operating loss and the value of the reserves, for balance sheet purposes, would be set to zero.

More complicated alternative valuations for mineral extraction have been proposed. For example El Serafy (1986) suggests determining an income stream using a discounted cash-flow analysis of expected earnings from the deposit over its expected life. Such calculations are instructive, but constitute analysis of the data based on given assumptions rather than direct measurement, and thus seem better suited for ancillary analysis than for direct incorporation in the SNA.

PERMANENT RESOURCES

Another type of expenditure of concern to environmentalists is related to the preservation of land, water and clear air. This is generally described as defensive expenditure though as we shall see further categorization is instructive, and income as well as expenditure needs to be considered. For contrast with the case of exploitable resources discussed above, these resources will be described as permanent resources.

Before considering how to treat issues related to permanent resources, it would be helpful to review the SNA guidelines on the treatment of man-made capital. Two types of transactions occur on a year by year basis associated with capital. One of these is consumption of fixed capital (depreciation), an allowance to permit the replacement of the capital asset at the end of its useful life. Over the economy as a whole the value of the consumption of fixed capital in a year is the value of all man-made assets used up in that year and which have to be replaced if the level of man-made capital stock at the start of the year is to be kept intact. In addition current expenditure on repair and maintenance of capital stock also takes place. In paragraph 6.123 the SNA makes the distinction between current and capital repairs as follows: "Expenditure on current repair and maintenance make good breakages in fixed assets and keep them in proper working order while outlays on capital repair and alteration lengthen the expected normal lifetime of use of fixed assets or increase the productivity of these goods significantly." However, this distinction may be blurred in practice. Although current maintenance may not directly extend the life of an asset, the lack of maintenance may shorten it and in practice estimates of life length of assets are based on the presumption that regular maintenance takes place. Thus, there is a relationship between the level of current maintenance and of capital consumption. Indeed for a specific group of assets including roads and dams paragraph 7.20 of the SNA states: "It may be considered that expenditure on repairs and maintenance are sufficient to maintain the asset in its original condition" as justification for making no provision for consumption of these fixed assets. This provision has already been questioned in the SNA revision process and it is likely to be changed in the new SNA manual. In a number of the poorer developing countries, for example, the retrenchment of government expenditure has led to the neglect of road maintenance and in time new capital projects have been undertaken to replace roads; capital expenditure that would not have occurred if adequate current maintenance had taken place. Thus it is suggested that if maintenance is not adequate to keep roads in their original condition then estimates of capital consumption of these assets should be made. Although not yet discussed in detail, the appropriate value of the capital consumption would seem to be that of the "missing" maintenance.

How do these practicalities carry over to the proposal to treat natural resources as capital assets? Expenditure associated with permanent resources can be of two related but rather different types. The first is expenditure intended to prevent degradation of natural resources taking place and the second to redress degradation that occurred earlier. Preventive expenditure clearly parallels current maintenance and in particular the current maintenance of roads. If all industries ensure that no degradation of land, air or water takes place, these natural resources

remain in their original condition and the preventive expenditure is clearly current.

Basically such preventive expenditure may be undertaken in one of three ways, by industry itself (either voluntarily or in response to government legislation), by government funded by taxes levied on industry according to their pollution potential or by government funded by general revenue. In the first case the industry's expenditure on pollution prevention would be classified as intermediate expenditure. In the second case, since the payment to government is related to the service provided, this activity of government should be treated as a public enterprise. Payments to government should be treated not as taxes but as fees for services and thus also be classified as intermediate inputs. (Government provision of waste disposal services to industry is already treated as a public enterprise in some countries.) In the third case, when government undertakes pollution control out of general revenue this appears as final expenditure.

Some environmentalists argue that all such preventive expenditure should be excluded from GDP and therefore wish to categorize even government-funded programmes as intermediate expenditure, but this proposal is flawed. The distinction between intermediate and final expenditure is determined by whether the product is resold to another economic agent or not, not on the nature of the product. For welfare or other analyses, one may wish to exclude specific activities because of their nature. As well as environmental protection costs, defence expenditure and crime and drug "industries" have been put forward as candidates for exclusion. The derivation of an alternative measure of a restricted set of activities by deducting from (and possibly adding to) those included in GDP using normative criteria is a legitimate and arguably desirable development, but it does not make the case for suppressing GDP as a measure of all economic activity regardless of "desirability," nor for changing the accounting basis for discriminating between intermediate and final expenditure.

Even the alternative presented here, that when preventive expenditure is undertaken by industry or by government on a charge-back basis it is intermediate expenditure, is over-simplified and misleading. The preventive expenditure consists of the purchase of labour and of goods and services which in turn have labour input. It is possible to envisage these costs being absorbed by a fall in gross operating surplus. In a closed economy this would leave GDP unaltered. However in practice these costs are likely to be passed on either in whole or in part, even when they are incurred under more stringent government legislation. Therefore the initiation of a preventive expenditure programme will lead to an increase in value-added and thus in GDP, even if its first recording in the accounts is as intermediate expenditure. Indeed, the fact that increased pollution prevention would lead to increased employment opportunities is often cited by environmentalists as an argument in favour of initiating such programmes. Under the present SNA, all alternatives lead to the conclusion that the initiation of a pollution prevention campaign, however funded, leads to a rise in GDP vis-a-vis the earlier situation.¹

¹ Implicit in this presentation is the assumption that previously unused resources can be mobilised to initiate the preventative expenditure programme. If in practice resources are obtained by diverting them from their former use, GDP will not rise when compared to the earlier situation but will be higher than the present situation excluding the environmental protection programme.

The suggestion put forward here is that no such apparent rise in GDP should be shown. The consequence of treating natural resources as capital assets is that degradation of those natural assets is treated as capital consumption and should be included in GDP. This treatment would exactly parallel the present position over the treatment of roads described above. The new SNA proposal is that the GDP should include either the cost of maintaining roads in their original condition or consumption of man-made capital of the same amount. This recognizes that the present practice where maintenance is not in fact undertaken leads to GDP being understated by the amount of this missing capital consumption. In the case of the environment therefore, it is proposed that if preventive expenditure is incurred and no pollution results, GDP is correctly measured. If such programmes should be undertaken (because pollution is increasing) but are not then GDP is underestimated to the extent of the preventive programmes.

In the absence of the preventative programme, industrial costs are lower than they would otherwise be, leading to lower levels of gross output. These are matched by lower prices to consumers. That is, both producers and consumers are receiving in effect a "subsidy" whose value is represented by environmental degradation. Since this is by definition a non-market activity, it is appropriate that the adjustment should affect GDP in the same way as unrecorded consumption of man-made capital by non-market producers.

A simple numerical example of the alternatives is given in Table 1. This illustrates the case where a country presented has a value of GDP of 100 with consumption of man-made capital of 10. The effect of environmental degradation is 5 which is exactly redressed by the introduction of an environmental protection programme (EPP).

TABLE 1

	Present SNA		Proposed	
	No EPP	With EPP	No EPP	With EPP
GDP	100	105	105	105
Consumption man-made capital	10	10	10	10
Consumption natural capital	n.a.	n.a.	5	0
NDP	90	95	90	95

This highly simplified example highlights the consequences of the proposed treatment and of preserving the existing position. Net product measures are the same in both systems, showing that the introduction of the EPP leads to an increase in NDP. Under the present SNA there is an increase of equal size in GDP, whereas under the proposal here there is none. The means of achieving this is to revise the present valuation of GDP, without the EPP, upwards to allow for the consumption of natural capital.

At first sight it seems counter-intuitive that taking account of environmental degradation leads to an increase in GDP. This reflects the common lack of awareness that the "gross" in GDP means before allowance has been made for

consumption of capital. Common usage overlooks this part of the definition or assumes that the allowance for depreciation is fairly constant over time, so gross and net product measures move in line with one another and gross can be used as a proxy for net without undue distortion. This assumption has proved misleading for many poorer countries where new capital is not acquired as fast as the old is exhausted. In environmental terms, the assumption is equivalent to the assumption that the environment is not degraded, and it is the obvious refutation of this that is the origin of the present concern. An objective of the present review of the SNA must be not only to ensure that GDP and NDP are properly measured but also that the concepts are clearly explained to facilitate better-informed and more appropriate commentary and analysis.

A major use of GDP is for comparisons over time or between countries. While there may be reluctance to revise upwards past estimates of GDP to allow for the consumption of natural capital, the alternative is also disturbing. Without this revision, countries introducing environmental protection programmes will show increases in both GDP and NDP. The worse the environmental degradation that is being reversed, the greater this increase will be. Under the proposal above, only NDP will record this increase, and the gap between gross and net product will narrow, in accordance with both the economic and accounting interpretation of gross and net. The entries for this capital consumption, as well as that for man-made capital, would also be featured in the balance sheet and would show the cumulative effect on the resources available to the nation of continued neglect of environmental degradation or of its restitution.

VALUATION

Assuming the theoretical proposal above is accepted, there remains the question of how consumption of natural capital should be measured. Consumption of man-made capital, though not without its own difficulties of measurement, is capable of calculation at a disaggregated level based on different life length assumptions for different types of assets in different industries. For the consumption of natural capital such an approach is neither possible nor appropriate. Not only is industry not the only degrader of the environment, attributing the degradation to individual industries may be impossible. Consider for example the case of three factories all discharging effluent into the same river. It is possible that the river could absorb the effluent from any one, but not all three, or that it was the combination of different types of effluent that was the source of the problem. In such cases attribution of the cause of the pollution between the three factories would be difficult and not especially instructive. Degradation may also be caused by final consumers, for example by the car exhaust of households or government, and may occur not as a result of activity in one's own country but as an involuntary import from a neighbouring country.

As pointed out earlier, degrading the environment affects both production and consumption costs. Allowance within the SNA must be made for adjustments to income, production and expenditure estimates of GDP. Thus, despite the legitimate concern to identify the major industries causing pollutions, in money terms within the SNA it may be sufficient to sidestep the difficulties just described

by making only a single adjustment to gross product measures. This might be seen as being analogous to the adjustment made for imputed banking services which in the present SNA is made in total only and not attributed to individual industries.

For the national accounts for a year, it is the change in that year in the environmental endowments that is to be captured, not the deviation from an absolute state of perfection. These annual changes can be measured using physical measures such as air and water quality indexes and standard costings for the cost of effecting improvements. Some work has already been done on valuing clean air and pure water and is being steadily improved. Since the revised SNA will not be published before 1991 and not implemented until some time later, it is reasonable to assume that techniques for quantifying environmental impacts will by then be much improved and more accessible than now. Although the measurement and valuation of the consumption of natural capital may be subject to some degree of approximation and simplification, it is not clear that these inexactitudes would be any less tolerable than those already encountered in such areas as the ownership of dwellings, the valuation of subsistence output and the derivation of holding gains and losses on intangible assets.

ENVIRONMENTAL ENHANCEMENT PROGRAMMES

In the foregoing it has been assumed that there is a *prima facie* case to include adjustments for consumption of natural capital for all countries, though it may transpire that for some countries where no environmental degradation occurs the appropriate adjustment is zero. There is another factor for consideration though this may apply irregularly and to a restricted set of countries. This is the question of major programmes to reverse degradation that has occurred in previous periods. Such programmes are perhaps most likely to be funded by government, but there is no reason in principle why they should not be funded by industry or by private non-profit institutions. Whoever undertakes the expenditure, it clearly leads to the enhancement of natural resources that would provide increasing availability of such assets in succeeding time periods. This underlines the case for treating the assets as capital and the expenditure as capital expenditure.

Treating environmental enhancement programmes as capital expenditure is a logical consequence of introducing the consumption of natural capital as an adjustment between gross and net product measures since they are in effect negative capital consumption. It was argued above that the measurement of natural capital consumption should be based on annual changes in quality indexes of environmental endowments. If such an index shows an improvement over the year, the value of natural capital consumption for that resource is zero, but the value of the improvement which is by our definition the value of the enhancement programme should enter the accounts as the same broad type of expenditure, i.e. as capital rather than current. Some misattribution of capital expenditure may go undetected if the programme does not effect a positive improvement, but only mitigates the degree of degradation in the environment. If the data sources

were rich enough, adjustments for these situations could be made, and for separate adjustments to be made for different types of natural resources. However given that it is proposed to make the adjustments for consumption of and enhancements to natural resources at the national level, aggregation of the effects across projects and resource types will still ensure consistency in the flow accounts and balance sheets at national level. It may be argued that natural resources are not in themselves economically productive assets and therefore expenditure to enhance them should not be treated as capital. However not all items included in gross domestic fixed capital formation (GDFCF) in the present SNA are economically productive. Schools and universities produce better educated people, who in turn may be more productive, but only if employment opportunities exist that utilize the extra education gained. It is not unknown for such institutions simply to increase the number of educated unemployed, but no diminution in GDFCF is made on this account. Nor should it. Schools and universities are means of improving the human capital stock. The deployment of that capital is a separate issue. Some man-made capital assets are purely defensive, for example the Thames barrage—a mechanical barrier across the River Thames to hold back water under conditions of high tide and adverse winds and so prevent flooding of the City of London. Some serve obviously non-economic functions such as a new cathedral or a spy satellite. The range of assets to be included in GDFCF in the new SNA is due to be reviewed and a distinction in classification between productive and non-productive assets might be very desirable, but even on present grounds it seems a case can be made to treat major environmental enhancement programmes as capital formation.

No mention of these sorts of programmes is made in the present SNA and it is difficult to be categorical about present practice, but it would seem that the implicit recommendation in the SNA to treat such expenditure as current is generally followed. In line with the discussion above the introduction of such programmes, even if treated as current expenditure, will at present lead to increases in GDP, but will not be separately identifiable. The proposal being made here is that major environmental rehabilitation programmes should be classified as capital expenditure identified as enhancement of natural resources, regardless of who funds them. In supplementary analyses, a more limited class of capital expenditure, including only “productive” capital however defined may be used, paralleling the derivation of more restricted measures of “desirable” activities described in the discussion of preventive expenditure.

UNPLANNED ACTIVITY

The sections above deal with current and capital type expenditure in relation to the environment and also with the non-incurrence of these, but in the context of planned activities. Major impact to the environment and to subsequent economic activity is also caused by a natural disaster such as an earthquake or a man-made disaster such as a major chemical spillage. Re-examination of the proposals above in this context shows they would encompass the effect of such unplanned activities also. As a result of a disaster, consumption of natural capital

would increase and net product measures would show a fall offset in part by any major expenditure to restore the situation, which would count as enhancement of natural capital from its post-disaster state. The same is true of the effect on natural resources in one country caused by the degradation (planned or unplanned) originating in another country.

THE QUESTION OF SUSTAINABILITY

Apart from the intrinsic information to be contained in environmental accounts, there are two further benefits that this initiative has brought to national accounting. One is focusing attention on the difference between net and gross product measures, since even when the distinction relates only to man-made capital there are still numerous occasions when national income on a net basis would be a more appropriate indicator than the ubiquitous GDP. The other benefit is more diffuse, but arguably of greater importance in the longer term. The present SNA has depersonalized economics by concentrating on production processes and associated technologies. Environmentalists have brought attention back to the question of how people live and the quality of life, associated with an understanding that respect for life is intimately and inevitably bound up with respect for the environment. In statistical terms this gives a new opportunity to bridge the present separation between economic and social statistics by articulating the interaction of environmental development on human development via the economic production process. It is this integration of natural, man-made and human resources that provides the framework for defining sustainable development.

Environmental economists are still working towards an agreed definition of sustainable income, but central to it is the point recognised by Hicks that if assets are consumed without replacement one is worse off at the end of the period than at the start and consumption in the period has covered not just income, but also an element of wealth. So far, however, no precise formulation of sustainable income has been agreed.

The present SNA contains three measures of gross domestic product from the income, output and expenditure side, all of which are identical in value. It is clear that it may be possible to determine measures of sustainable income and sustainable output which are equal in aggregate, but not in their disaggregated parts. For example, if income from a mining activity is utilized to fund alternative productive activity when the mineral resources are exhausted, the output from mining is not sustainable even if total output and total income is. However, there is no necessity for the income in a later period to be at exactly the same level as in the previous period. Which level of income is to be used as the basis of sustainable income? Is it the sustainability of income or income per head that is of interest? Is sustainability an absolute or relative concept?

The answer to these questions must depend in part on the needs of analysts and may well vary from one application to another and may depend on assumptions about future technological change and other subjective predictions. Given this uncertainty, such work seems at present a candidate for satellite accounts rather than total integration with the SNA. However a substantial link could be

established by the adoption of "sustainability factors." These factors would be nothing more than the ratio of capital stock at the end of the period to capital stock at the beginning adjusted for price change when necessary. Hicks' definition of income, "what you can consume in the period and be as well off at the end as at the beginning," is equivalent to saying new capital must be at least that of capital consumption in the year so that the capital stock at the end is at least as great as at the start. In this case a sustainability factor would have a value of one or greater. A value less than one implies too much capital has been consumed and the consumption level is not sustainable indefinitely.

Despite the simplicity of the definition this concept of a sustainability factor has several advantages. It can be applied at detailed levels as well as in aggregate. Sustainability factors for man-made capital could be provided disaggregated by asset and industry. Even at the detailed micro or project level sustainability factors for environmental resources could be calculated separately for various categories of land, for water and air. Further, since the factor must be price invariant they can be based on the same sort of quantified information used to calculate consumption of natural capital proposed above. Indeed their compilation would be a logical step in deriving estimates of consumption of natural capital. Such measures could be applied in areas of human capital also by measuring, for example, the ratio of the number of trained doctors in the country at the end of a period to the number at the start. Further variations on the basic ratio are also possible; for long-term planning, periods longer than a year might be used. In other cases assets per head of population might be the basis of the ratio.

Not only would the adoption and presentation of a set of sustainability factors that can be calculated easily and without ambiguity form a bridge between the main SNA and satellite environment accounts, they would highlight directly the difference in value and interpretation of gross and net product measures. Provision of and reference to a set of such factors can only help to widen the understanding of the concepts of the national accounts and raise discussion in the popular media to a more informed plane. This would be of benefit to both national accountants and environmentalists and an important step on the road to the introduction and acceptance of more elaborate concepts of sustainable income and product.

CONCLUSIONS

The concept of sustainable income is likely to be agreed at about the time the revised SNA is to be published. If satellite accounts for the environment are to be seen as complementary to the SNA rather than as an alternative system, there must be agreement on basic accounting conventions in the two systems. In particular the distinction between final and intermediate expenditure and the extent of capital consumption that is the difference between gross and net domestic product must be agreed if the two systems are to be harmonized.

According to the arguments in this paper, the changes to present SNA conventions to reach this harmonization are as follows.

- (1) It would be necessary to introduce a balance sheet for natural resources.

(2) Part of what is presently treated as gross operating surplus for exploitable resources would be treated as consumption of natural capital and would appear as such in the production account.

(3) An adjustment for the consumption of natural capital in respect of permanent resources would be calculated and applied as a single adjustment of the economy as a whole.

(4) Both of the adjustments in (2) and (3) would be deducted from net product measures as presently defined.

(5) Projects designed to effect major enhancements to environmental resources should be classified as natural capital formation. This attribution would be appropriate whether the expenditure was undertaken by government or industry.

(6) The estimates of consumption of natural capital from (2) and (3) for enhancement to natural capital from (5) would both carry over to the balance sheet.

(7) Sustainability factors should be introduced showing the ratio of capital stock at the end of the period to that at the beginning of the period in respect of all capital—man-made, natural and human capital—as an aid to the development of more comprehensive measures of sustainable income in the longer term and to give emphasis to the practicality and desirability of using net rather than gross product measures where this is appropriate.

The reluctance of national accountants to make major changes to the theoretical structure of the SNA is well-known and well-founded. However, the case that environmental resources can no longer be regarded as free gifts of nature is one being accepted by an increasing number of economists, not just specialized environmentalists. If national accountants are to serve the needs of all economists over the next 20 to 30 years by means of accounts based on the revised SNA, the case for treating natural resources on a par with man-made capital must at the very minimum be examined on its merits and not dismissed out of hand.

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