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Presentation of the paper "Why environmental sustainability can most probably not be attained with growing production"

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1. All economic activity is aimed at the satisfaction of wants (welfare). Consequently the term 'economic growth' can mean nothing other than increase in welfare, defined as the satisfaction of wants derived from our dealings with scarce goods. Welfare is not a quantity that can be measured directly 'from outside'; it is a category of individual experience. It is for this reason that the statistician focuses in practice on charting trends in factors that *can* be measured and that can plausibly be argued to influence welfare such as production, scarce environmental functions, income distribution, labour conditions and employment.

For scarce goods it holds by definition that more of one is less of another. Nowadays environmental functions are scarce goods. When preference is given to the environment over production and a government imposes controls on production processes and consumption habits that lead to a smaller volume of goods and services produced, there will be an increase in the overall satisfaction of wants obtained by means of scarce goods. ***A decrease in production will then lead to greater welfare.***

2. Environmental sustainability is defined as the situation in which vital environmental functions are safeguarded for future generations. So the issue at stake is that the *possibilities* to use them remain available.

Environmentally sustainable national income (eSNI) is defined as the maximal attainable production level by which vital environmental functions remain available for future generations, based on the technology available at the time. In combination with the standard national income (NI), the eSNI indicates whether we are approaching environmental sustainability or drifting farther away from it.

The theory of and the necessary statistics for an eSNI has been worked on since the mid 1960's. A first rough estimate of the SNI for the world in 1991 by Tinbergen and Hueting (1991) arrives at fifty percent of the production level of the world: the world income. The Institute of Environmental Studies estimate for The Netherlands in 2001 also arrived at fifty percent of the production level or national income of The Netherlands. Estimates for the years 1990, 1995 and 2000 show that in the period 1990 - 2000 the distance between NI and eSNI increased by 13 billion euros (that is by 10%).

3. In our physical surroundings, the environment, a great number of possible uses can be distinguished, which are essential for production, consumption, breathing, et cetera, and thus for human existence. These are called environmental functions, or in short: functions. As soon as one use of a function is at the expense of another, or threatens to be so in the future, there is competition between functions. This marks a juncture at which functions start to fall short of meeting existing wants. Competing functions are by definition scarce and consequently economic goods. They are indeed the most fundamental economic goods at the disposal of humanity. In the situation of severe competition between functions, which prevails today, labour is not only reducing scarcity, and thus causing a positive effect on our satisfaction of wants (welfare); but it is also increasing scarcity, thus causing a negative effect on welfare. The same holds for consumption.

One out of many examples is: overuse of the function 'water as dumping ground for waste' goes at the expense of the function 'drinking water'. Another example is: overuse of the function 'provider of wood', by excessively cutting forests, goes at the expense of the function 'regulation of the water flow', leading to flooding and erosion.

4. Producing is, according to standard economic theory, adding value. National income (NI) equals the sum of the values added. So NI measures production. This value is added to the non human-made physical surroundings. Consequently, environmental functions remain outside the measuring of standard NI. This is logical and easy to understand, because water, air, soil, plant and animal species and the life support systems of our planet are not produced by humans. So losses of functions, caused by production and consumption, are correctly not entered as costs. However, expenditures on measures for their restoration and compensation *are* entered as value added. This is asymmetric. These expenditures should be entered as intermediate, as they are costs. By entering these expenditures as final instead of intermediate, the growth of production is overestimated, thus obscuring what is happening with both the environment and the production.

Asyms (asymmetric entries) can relate to events in the past, to events in the current financial year (e.g. oil spills) and, as prevention, to events expected in the future due to loss of function; that does not make any theoretical difference. It always boils down to undo the effects by production growth that should not contribute to the same growth. Asyms will increase considerably because of the expenditures on (1) measures to eliminate the source of the climate problem by reducing the emission of greenhouse gases and on (2) measures to compensate the effects of climate change, e.g. by building dikes and moving to higher situated regions

5. On the grounds of the data below it is extremely unlikely that environmental sustainability can be attained with growing production.

(1). It would require technologies that: (i) are sufficiently clean, (ii) do not deplete renewable natural resources, (iii) find substitutes for non-renewable resources, (iv) leave the soil intact, (v) leave sufficient space for the survival of plant and animal species and (vi) are cheaper in real terms than *current* available technologies, because if they are more expensive in real terms growth will be reduced. Meeting all these six conditions is hardly conceivable for the whole spectrum of human activities. Especially simultaneously realising both (i) through (v) *and* (vi), which is a prerequisite for combining production growth and conservation of the environment, is extremely difficult.

(2) An analysis of the basic source material of the Dutch national accounts shows that roughly one third of the activities making up standard NI (measured as labour volume) does not contribute to its growth. These activities include governing, the administration of justice and most cultural activities. One third contributes moderately to the growth of NI, while the remaining one third contributes by far the largest part to the growth of production. Unfortunately, this latter part consists of activities associated with production and consumption that cause the greatest damage to the environment in terms of loss of nature and biodiversity (by use and fragmentation of space), pollution and depletion of resources. These activities include the oil and petrochemical industries, agriculture, public utilities, road construction and mining. These results are almost certainly valid for other industrialised countries and probably valid for developing countries

(3) The burden on the environment as represented in standard NI equals the product of the number of people and the volume of the activities per person. Reducing this burden by decreasing the population lowers growth or leads to a lower production level.

(4) Applying technical measures has a negative effect on growth of production because they enhance real prices: more labour is needed for the same product. The research for the estimates of eSNI's has shown that environmental sustainability cannot be attained solely by applying technology. In addition, direct shifts, such as from car to bicycle and public transport and from meat to beans, also are necessary. From point (2) above it follows that these shifts also reduce growth or lead to a lower production level.

(5) A price rise resulting from internalising the costs of the measures which restore the environment means, like any price rise in real terms, a lowering of production growth. Depending on the situation, this decreases the production level. For a given technology, product costs will rise progressively as the yield (or effect) of environmental measures is increased. Of course, technological progress leads to higher yields. As production increases further, however, so must the yield of the measures increase in order to maintain the same state of the environment, while the fact of progressively rising costs with rising yields remains unaltered.

(6) A part of the value added in standard NI consists of asyms and should therefore not be considered as a contribution to its volume.

(7) A sustainable production level with available technology is about fifty percent lower than the current level, both for the world and for the Netherlands. From this it follows that eSNI has to grow more than twice as fast as NI in order to reduce the distance between NI and eSNI. This seems to be an almost impossible task for the environmental technology, which is the only means for increasing eSNI.

Conclusions and recommendations

The arguments given above lead to the following conclusions and recommendations.

(1) Our planet is threatened by a wrong belief in a wrongly formulated growth.

(2) Environmental sustainability cannot not be attained with a growing production and without a broad acceptance of de-growth of production, that is NI ex asyms.

(3) The NI's in all countries should be supplemented by a series of NI's ex asyms and a series of eSNI's.