WASTE PRODUCTION AND OVERDEVELOPMENT

An approach to ecological indicators

Dag Poleszynski
Chair of Conflict and Peace Research, University of Oslo
and
International Peace Research Institute, Oslo

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1. Introduction.

In this paper we shall discuss some of the possible implications of converting the affluent, exploitative and unjust part of the world into a world in social and ecological balance. We shall not go into lengths arguing for the necessity of such changes, but rather assume that radical changes in world order are needed for the survival of mankind at large, be it socially or ecologically. The focus will be more on what technically can be done to change things than on what is politically possible, and therefore may be termed naive or unrealistic. But it is our contention that shall a utopian vision ever become more than wishful thinking, somebody has to show that Utopia indeed exists. And in our Utopia people don't produce hangar ships, nuclear warheads or SST's. They concentrate their efforts on the fulfillment of our basic needs for food, health, clothing, shelter and education, and they supply humanity-at-large with these basic needs without disrupting the world's eco-systems or exhausting its resources.

2. Background and values.

In the rich, industrialized part of the world, development was for a long period of time identified with economic growth, or growth in processing and trading, put together and recorded as GNP. The assumption was that the higher the GNP per capita in a given country, the more developed that country would be. In this paper, however, such ideas of development are rejected[1]. Instead we identify development with the extent to which a country has satisfied its inhabitants' most basic needs, the extent to which there is equality and social justice, with the level of autonomy or self-reliance among all inhabitants, and the degree to which one has reached ecological balance.[2] The stress is, in other words, on the development of human beings, not on things. As such we are in agreement with the thoughts developed in the Cocoyoc Declaration, both when it comes to the definition of development and to the historical analysis of our present predicament[3]. We fully agree with the view that it is the historical consequence of nearly 500 years of colonialism which concentrated economic power in a small group of nations, giving rise to the maldistribution of world wealth today:

> "..... at least three-quarters of the world's income, investment, services and almost all of the world's research are in the hands of one-quarter of its people." [3]

In this paper we will focus our attention on the richest 20-30% of world population. These are the people that play havoc with the environment and threaten to deplete our resources, be it fossil fuels, metals or water. They also eat the bulk of world food production, thus demonstrating the invalid character of a Norwegian director's statement that "whether you are rich or poor, you can only eat until you are full." Clearly, the quality of what people eat counts more than the quantity, a point that the Cocoyoc group has fully comprehended:

> "Grain consumption in North America has grown per capita by 350 pounds since 1965 [largely in meat products] and is 1,900 pounds today. Yet this extra 350 pounds is almost equal to an Indian's total annual consumption. North Americans were hardly starving in 1965. The increase since then has contributed to super-consumption which even threatens health. Thus, in physical terms, there need be no shortage this winter. It requires only a small release from the surplus of the rich to meet the entire Asian shortfall."

It is essential to realize that dietary habits in the overdeveloped parts of the world not only threaten the health of those who are lucky enough to have the choice of eating themselves sick, but it also makes it impossible for the less fortunate to cover their basic caloric needs. Without going into further details, we would just like to mention that FAO has estimated that the 1970 flour and fodder production would be sufficient feed for 6.68 billion people on diets as "enjoyed" by the developing countries, but only enough to feed 1.4 billion people on U.S. 1967-69 standards.[4] But, unfortunately, neither food nor other resources are distributed evenly amongst us:

> "The traditional market makes resources available to those who can buy them rather than those who need them, it stimulates artificial demands and builds waste into the production process, and even underutilizes resources."3

On a world scale those who can buy the resources, are the richest nations, be it those in the capitalist or "socialist camp". Within each country, it is the affluent few who consume the lion's share, be it due to the conditions of "free" market formation or bureaucratisized "socialist" allocation. Related to the first point, we find that world energy use is divided mainly between capitalist developed countries, representing less than 20% of world population, and the East European ["socialist"] countries, accomodating about 9.5%. Within these two groups the capitalist countries consume the bulk, 62%, and the "socialist" countries another 22.5%, meaning, of course, that the remaining 15% of world energy is used by 70% of the total world population [1972][5]. Because of inequalities within each country,

the differences between the most affluent and the poorest people are even more striking on a world scale. Weaver and Jones have made such calculations for the 1964 world population and found that in terms of income, the poorest 20% only received 2.9% of world wealth, the next 20% 3.5%, the middle group 4.7%, the second richest quintile 22.5% and the richest 20% as much as 66.4%[6]. Needless to say, if we have in mind a world without exploitation or social injustice, we cannot aim for consumption levels as found amongst the affluent one-third or one-fourth - the conditions for such affluence are simply not there, be it from an ecological or social viewpoint.[7]

3. The magnitude of waste.

Most people would probably agree that there are pockets in the world where the consumption level is far beyond what anybody would consider necessary, and we could all point to many examples of human and natural resources being squandered. The underutilization of human labor (mostly in the poor world) may not seem to be as important as the overutilization of natural resources (in the rich world) in an ecological perspective, but indeed it is, since human labor is made superfluous by exactly the same mechanisms that produce pollution and depletion of natural resources: In a capitalist world, men are replaced by machines, causing unemployment, which calls for higher production levels, achieved by more machines, again reducing the need for human labor-input in the process. At the same time, industrialists and traders have to expand the markets in order to sell the increased production, and so the spiral continues, giving rise to less and less-needed products and increasing pollution and depletion. This process is, however, not only confined to the capitalist world. In order not to "lag behind" in the industrialization process, the centrally planned economies have, in most cases, long surpassed the basic needs and excell in extravagances like drinking Coca Cola, driving private cars and buying television sets. They also seem to be as eager as anybody in showing their latest GNP/capita figures, their nuclear power plants or tourist resorts.

We are not arguing that any level of industrialization is bad or that the use of "advanced" technology should be completely ruled out. Technological innovations and the consequent application in labor-saving machinery or in health care have in many cases been important in releaving us from physical toil and in securing our food supplies or good health. However, above a certain point the

inputs of "advanced" technology and energy in any society invariably yield negative returns, not only giving rise to social break-down, but also to ecological imbalance. Concluding from the above, we may say that we visualize both a minimum and a maximum level of energy use, mechanization and technological application. Below the minimum we would not be able to assure everybody the fulfillment of basic material and immaterial needs, and above the maximum, the system would start to break down. The difficulty is, naturally, to define where the "middle range" lies and then to stay within this range.

Given the dialectical relationship between overdevelopment and underdevelopment, it should be in the interest of the people in both the rich and the poor countries that the overdeveloped ones start on the scaling-down process towards the "happy medium". But first we have to gain acceptance for the contention that the industrialized part of the world long since has passed the maximum limit. To do this we can use one or both of the following approaches: We can either start sorting out the excesses and then calculate what remains to be "essentials", or we can try to estimate what part of a country's economy is used to cover our most basic material needs and let the residue represent our waste-production. In performing such an analysis, we must consider that there may be cultural differences when it comes to the conception of what constitutes "essentials" and "waste production"[8], and also that statistics on employment and production are not classified according to social utility or ecological impact.

But before persuing the difficult task of quantifying our thoughts, we will reflect on a few quotes by a man who has performed a great deal of thinking on the issue of lower and upper limits to industrialization and energy use, Ivan Illich:[9]

> "...beyond a certain level of GNP, the cost of social control must rise faster than total output and become the major institutional activity within an economy. Therapy administered by educators, psychiatrists and social workers must converge with the designs of planners, managers and salesmen, and complement the services of security agencies, the military and the police.
>
> .....I argue that beyond a certain median per capita energy level, the political system and cultural context of any society must decay.
>
> .....Both the United States and Mexico have passed the critical divide. In both countries, further energy inputs increase inequality, inefficiency and personal impotence. Although one country has a per capita income of $500 and the other of nearly $5,000, huge vested interest in an industrial infrastructure prods both of them to further escalate the use of energy."

Ivan Illich also argues that societies with ever-expanding industrialization and energy use will sooner or later be restrained by social breakdown. He also feels that social breakdown will be the mechanism preventing rich countries from choking in their own waste, recommending that the poor abandon "distant expectations and the rich...recognize their vested interest as a ghastly liability."[9]

But whatever comes first, social or ecological breakdown, we still need some quantitative estimates on which to base our future work.

3.1. Some attempts to quantify waste production.

In our first attempt at quantifying the degree of waste production in the industrialized world, we will use official U.N. energy statistics. Our method will be to take three countries that still are developing industrially, but that already seem to be able to cover their citizens' most basic needs for food, health, shelter, clothing and education. The average energy use in these countries can then be compared to the energy use of any "developed" country, the excess energy use in the latter over the former being a measure of "waste" or "luxury". Now to our figures:

Table 1: Energy use in some less industrialized countries[5]

Country:	Annual per capita energy use (1973)
Cuba	1188 kilos of coal equivalent (kce)
China	583 " " " " "
Albania	674 " " " " "
Sum	2445 kce,): 815 kce on the average*

If Ivan Illich is correct (see the discussion above)[10], the consumption of energy in Cuba is already approaching our visualized upper limit on energy use (Mexico's per capita figure is at 1318 kce) in terms of social effects, but the ecological breakdown-margin is still ample.[10] Comparing our 815 kce with some highly industrialized countries gives the following results:

* An average weighed with the population would put the "basic energy need" very close to the Chinese level of slightly below 600 kce.

Table 2: "Excessive" energy use in some industrialized countries.[5] (1973)

Country	Per capita use in kce	"Excess" use (-815 kce)	"Excess"in % of total	"Basic need" in %
U.S.A.	11897	11082	93	7
Canada	9921	9106	92	8
Denmark	5642	4827	86	14
Germany,W.	5993	6178	86	14
Netherlands	6260	5445	87	13
Norway	5028	4213	84	16
Sweden	5973	5158	86	14
Switzerland	3951	3136	79	21
Czechoslov.	6817	6002	88	12
Germany, E.	6375	5560	87	13
Poland	4596	3781	82	18
U.S.S.R.	5058	4243	84	16
Japan	3932	3117	79	21
Australia	6064	5249	87	13
Unweighted average	6250	5435	87	13

Judging from the above table and our suggested "basic energy need" of 815 kce, industrialized countries spend on the average 87% of their total energy use on less-essential production. Conversely, only 13% of their energy use would be needed to cover basic material needs. But could the industrialized countries really do with as little as 10-15% of their present energy supplies? Without going into a deep analysis of this question, we believe to be able to say that they could not. Should the commercial energy supplies fall suddenly to a level of 815 kce in the industrialized world, we probably would experience mass starvation, industry would come to a halt, and if it happened during the winter, people would have to expect sub-zero room temperatures due to the lack of "non-commercial" energy resources like firewood, cow dung or methane gas. In short, the industrialized world would collapse.

Such a pessimistic view is based on the fact that industrialized countries now rely heavily on energy inputs in all parts of society. Both their infrastructure, industry and agriculture[12] are based on massive energy subsidies, and it would be impossible to switch this dependence around in a short time. Even in the medium term, there would be insurmountable problems involved in performing such a

radical change. Not only are climatic conditions less favorable in many industrialized countries than in China, Albania or on Cuba, but cultural factors and the natural resource endowments may, in many cases, be a significant handicap.[13] In saying this, however, we do not imply that no industrialized country could ever return to a low-energy society like the Chinese or Albanian, i.e. could de-industrialize. But for the moment, we will consider the estimated 80-90% "excessive" energy use definitely to be an upper limit.

A second approach for finding out how much is wasted in rich countries' economies, is to look at some of the more recent studies on the scope for energy conservation. Especially after the "energy crisis", this kind of exercise has become quite"popular in the Western world, both within organizations like the OECD, ECE and the IEA, but also among environmental groups and independent researchers.[14] Without listing a great number of references, we feel safe to say that most studies indicate that there is a considerable scope for energy conservation even without changing existing life styles in the industrialized world. Typically, a country on our list in Table 2 might expect to be able to reduce the order of 30-40% by trimming the energy fat, but some countries seemingly have scope for more:

> ".....that without prohibiting cost of disruption, and with considerable advantages, the total level of US energy conversion could then be reduced by a factor of at least two over the ensuing two or three decades. It is unlikely that anyone who has seriously studied the scope for energy conservation and for redeployment of economic activity in the USA will quarrel with this conclusion. Similar, though perhaps less drastic, economies are undoubtedly possible throughout the industrialized world, and are often necessary on other grounds [e.g. food supply]." 11.

A reduction in energy use among richer nations would not only have a positive impact on our global ecology, it would also mean that more energy would be available to the Third World and that employment would increase in the industrialized countries.[15]

Comparing our tentative approaches, we find that the magnitude of waste in the industrialized part of the world probably lies within a range of between 30 to 40 and 80 to 90 percent. This estimate relates to energy use. However, we have reason to believe that our lowest figure on energy savings would become considerably higher, if we also take into consideration the energy used by industries and processes which pollute the environment or play havoc with our resources. What we are trying to say, is that some products may be

necessary, but can be produced with less energy-inputs, thus reducing environmental effects of energy use. Other products may not only be produced in energy-inefficient ways, they may in themselves be undesirable from an ecological point of view. In addition, some products may be socially detrimental and should therefore be weeded out (miniature war games for children, obscene literature, etc.), while others may threaten our health without necessarily having any significant impact on the environment as a whole (alcohol, narcotics, tobacco).

From the above discussion we could deduce a third approach that we could use to identify "excesses" in rich societies. This approach would not only look at energy use, but try to define sectors of the industry, processes, products and job activities that would either be considered fundamental, less essential or wasteful/luxurious to human needs coverage. It is beyond the scope of this paper to perform such an analysis in any great detail. Therefore, our discussion below will merely be indicative of some of the things one could find in performing such a study.

A prime consideration in an analysis of ecologically unsound or socially unacceptable forms of production would be to find out how many people could be affected if one started to cut down on such production. An estimate of the number of people involved would require a cross-sectional analysis on a very detailed basis for each economic unit within society. We could, for instance, try to find out how many people in a given country are involved in the production of military equipment. But to produce military equipment, one needs not only a certain number of researchers, engineers, specialized workers, etc., but also various raw material inputs like aluminum plates, iron and steel products, computer systems, components of glass, plastics, etc. Our next step would therefore be to try to estimate the total number of employees in the steel industry, the aluminum industry, etc. required for the production of the inputs to the defense industries. Next, we would look at inputs to these industries and then continue down the line all the way to mining activities, tools fabrication, construction and machinery industries, etc. What we would expect to find is that the direct employment in the arms industry only represents the tip of the iceberg, and that policies for reducing arms expenditures might cause unemployment in many sectors of the economy we had not realized. This does not imply, though, that excesses should be allowed to continue, but we should know the likely conse-

quences before we act to trim the fat off. Especially burdened with "fat" would be, for instance, the following sectors within the industrialized economies (and even in some poor countries):

1. The military-industrial complex and the armed forces. In many countries, the military-industrial complex is a significant portion of the total production capacity. Estimates reveal that as much as approximately 6% of the developed countries' total GNP is devoted to military expenditures. In 1973, the NATO-countries spent an estimated $121 billion on the military and the WTO-members some $72 billion, together accounting for nearly 80% of the world military expenditures of 244 billion dollars.[16] This figure may not mean very much unless we relate it to, for instance, how much it would cost to cover poverty stricken people's basic needs. According to New Internationalist;[17]

> "It is impossible to estimate excactly how much aid would be needed to meet the basic needs of all mankind. It is, in any case, a task that could not be achieved by money alone. But a very rough financial estimate, based on World Bank studies, indicates that it would take $125 billion; rural and urban water supply, $28 billion; urban housing, $16 billion; urban transport, $8 billion; population and health programmes, $6 billion.
> Arms spending by the developed nations is currently (1975) estimated at between $200 and $250 billion per year."

We probably do not exaggerate when we say that the military sector represents the least useful one from a basic needs perspective, although we cannot rule out the possibility that some of the products made by the military-industrial complex could be put to useful tasks, while others easily could be converted.[18] And to put the products into essential use we at least have the personnel: the military men. They can hardly do anything less useful than war exercises. From a basic needs and resource perspective, even unemployment seems an attractive option for those who would be affected by military cuts.[19]

2. The space exploration activitites. Even if the size of the major countries' space exploration programs is small compared to the military allocations,[20] they still represent areas of obvious wastes. Resource and communications satellites may deserve some merit in the future, but the need for sending rockets to Mars or Venus can hardly be justified except in the very remote future.[21]

3. The automobile industry. In the capitalist developed world, the business of making private cars is one of the major industrial endeavors. In the U.S., the world's biggest car-maker, one person in every 7 is employed in a job somehow connected with making or maintaining the private car.[22] We are beginning to be aware that the

private car is one of the major causes of pollution, depletion and bad health in most industrialized countries. Consider what Kenneth Schneider refers to in connection with his discussion of the "fabulous" Interstate system in the U.S.[23]

> "Pavement area equals 400 square miles. ...Steel requires 30 million tons of ore, 18 million tons of coal and 6.5 million tons of limestone. ...Lumber requires all trees from a 400-square -mile forest. ...Culvert and drain pipe equals the combined water and sewer main system of six cities the size of Chicago."

In some areas in the U.S., the private car dominates land use completely. In the inner city of Los Angeles, about 3/4 of the land area is paved, and in the district as a whole, 62% of all land is given over to the exclusive use of the automobile. But the car is not only a threat to our natural resources: If it is a threat to life itself:

> "The government reports that every new car has a 25% to 40% chance of causing personal injury to someone.
> The AAA (American Automobile Association) reports that automobiles killed 365 million animals in 1968, nearly four for every car on the road.
> Every year 4,000,000 people in the United Stattes are injured in automobile-related accidents. At this rate, in 50 years the entire population would be so injured."[24]

With no major wars coming up during the rest of the century, the number of people killed in car accidents may soon compete with the number of victims in wars during this century. At a traffic safety conference in Paris last fall, the American traffic expert Norbert Tieman put the estimated number of people killed in traffic since the introduction of the private car at 25 million,[25] compared to a total of about 28 million soldiers and officers killed in Europe during the period 1898-1965.[26] In addition to this, death frequencies increase in areas with high traffic densities because of the toxic emissions from cars, trucks and buses. But in spite of these obvious disadvantages, the use of the private car spreads to all corners of the world at an ever increasing rate. Recent research now seems to indicate that even the private car's advantage of convenience and high speed becomes a myth if too many cars are put on the road:

> "The typical American male devotes more than 1,600 hours a year to his car. He sits in it...parks it...searches for it. He earns the money to put down on it and to meet the monthly instalments. He works to pay for petrol, tolls, insurance, taxes and tickets. He spends four of his sixteen waking hours on the road or gathering his resources for it. And this figure does not take into account the time consumed by other activities dictated by transport: time spent in hospitals, traffic courts and garages; time spent watching automobile commercials or attending consumer education meetings...1,600 hours to get 7,500 miles: less than five miles per hour. In countries deprived of a transportation industry, people manage to do the same, walking wherever they want to go, and they allocate only three to eight

> per cent of their society's time budget to traffic instead of 28 per cent. What distinguishes the traffic in rich countries from the traffic in poor countries is not more mileage per hour of life-time for the majority, but more hours of compulsory consumption of high doses of energy, packaged and unequally distributed by the transportation industry." 27

The solution to the predicament of too many cars on the road may seem obvious: turn the city streets over to pedestrians, bicyclists and buses and expand the network of trams and trains. More acceptable cars for use in rural areas should be developed, that is, non-polluting high energy-efficiency cars that are unable to travel faster than the speed limits. In this manner, most people would become independent of private cars, but it would still be an option for the handicapped, the old, or less-mobile families.

4. Other industries. In most industries we can probably find both wasteful practices and ecologically unsound production. In addition to excessive energy use, we find excessive use of toxic materials (now in the order of several hundred thousand in industrial usage) and alienating industrial processes. But to determine what is wasteful or not is a difficult task, except perhaps in the extreme cases. Let me not be considered dogmatic when suggesting that the following areas need further scrutiny:

The food precessing industry is in a sense an extension of the old-fashioned farms, and in many cases, food processing is not only unnecessary, but tends to reduce the quality of the food. The refining of sugar and flour, polishing of natural rice (and the addition of artificial vitamins), food coloring and artificial flavoring are praetices that in no way are necessary and may even ve detrimental to good health. In the same category we would include the so-called "convenience foods" (TV-dinners and the like), the snacks industry (potato chips, pork-crisps, chocolate and sweets, soft-drinks etc.) and many sweet bakery products (cookies, cakes and the like).

The packaging industry may also deserve a closer look. In many cases, packaging is far more elaborate than required for easy handling and transportation of goods, serving both to raise prices on the final goods and to waste resources. In Sweden, calculations show that an average familiy carries home in excess of 3 tons of foodstuffs per year.[28] Included in the 4-member family's grocery bag, however, is more than mere food: Of the approximately 60 kilos of food carried home during one week's shopping, about 10 kilos represent the packaging. During one year, this represents a heap of garbage weighing more than 500 kilos, costing something in the order of 2000 Norwegian kroner. According to the industry,[29] this amount is saved due to cheaper transportation, storing and handling. However, since the costs of getting rid of the wastes are not included in the industry's

calculations, we sincerely doubt the validity of them.

Industrial design and marketing functions are, at least in the capitalist world, performed more or less for one reason: to increase the salability of goods and to create new consumption habits.[30]

The pharmaceutical industry may not be unessential, but excessive. While all evidence points to a needed total of approximately 100 different kinds of medications, some countries allow tens of thousands of types to be marketed.[31] As stress and social unreast increase in the industrialized world, drug companies are finding a captive market:

> "This year, Americans will spend an estimated 10 billion dollars on drugs of all kinds....doctors write 2.5 billion prescriptions a year, at a cost to patients of more than 5 billion dollars."[32]

But these excesses do more than attack the patients' pocketbooks: According to senator Edward Kennedy, chairman of a U.S. Senate subcommittee on adverse effects of drugs, at least 30,000 deaths are caused in U.S. hospitals each year by adverse drug reactions[31]. This is touching upon Ivan Illich's main arguments in his discussion about modern medicine, the main thesis being that it long since has passed the optimum threshold of intensity and that modern medicine now has become counterproductive.[31]

International trade is another area which ought to be scrutinized. How much is wasted in exchanging almost identical products (Japanese cars shipped to the U.S and European cars to Japan etc.) is unknown, but research may give us a few unpleasant surprises. Related to the discussion on a New International Economic Order[1,2,3,33], it should be fairly obvious that the developing countries' demand for an increase in the level of processing of their own raw materials not only will give economic spin-offs, but will also be ecologically advantageous (smaller volumes in international trade will save energy, etc.).

Cosmetics industries and fashion products industries should need no further comments as to their place in a fundamental-needs-oriented world. However, when it comes to another aspect of personal consumption, we will give some few comments. This relates to the food habits of the rich and should be seen in connection with our discussion on this topic on page 2. Not only do we deprive less fortunate groups of people composing our menues in very energy-demanding ways, (eating too much meat, poultry and eggs) and by eating too much of it in absolute volume (both in terms of protein and calories), we even allow ourselves to throw away large quantities of food on the garbage dump:

> "The food we yearly throw in the waste basket, could have fed 250 000 people! ....This relates solely to food left-overs from private households. If we include so-called institutional households, hotels, restaurants and hospitals one would get a figure of 380 000 people."[34]

The above quote relates to Norway, a country that probably is no less motivated than other rich nations in sharing with the poor.[35] With food squandering on a comparable scale in the rest of the developed world, something like 75 million people could be well fed on the affluent minority's wastes, had the structure of world economy been ideal.

The scope of this paper does not allow further explorations into our affluent life. What remains, therefore must be attacked at once. What should be done with all the expendable labor we invariably would get once our process of weeding out waste production in the overdeveloped part of the world got started?

4. Reorganizing the work force.

We shall not dwell on the feasibility of the different proposals for manpower allocations, as caused by implicitly assumed social and ecological awareness in the rich world. Rather, we will list a **continuum of possibilities requiring an increasing degree of state participation or socialization efforts. Some of the possibilities might be the following:**

1) Unemployment. People made expendable could simply be left unemployed, for instance with full pay for a certain period of time. The rationality for such a solution could be that the "market forces" would find new jobs, and other industries would be able to increase total employment because of falling wages.[36,(19)]

2) Retraining and establishment of new jobs. A less disruptive approach would be to have people retrained for new jobs needed to fulfill the requirements of an environmentally and socially conscious society. As an alternative to military exercises, one could visualize activities like tree planting, resettlement of abandoned farms, registration of natural resources, recycling efforts (collecting wastes for separation and reuse), mining of garbage dumps, the organization of recycling centers and the collection of separated wastes from households and institutions. This scheme could also include new priorities and uses of research and development-subsidies needed to convert growth economies to steady-state, low-energy societies.[37]

3) Rural resettlement and increasing labor-intensity. With less use of pesticides, fungicides, herbicides, etc., artificial fertilizers and complica-

ted machinery in agriculture, more people would be required for the production of foodstuffs.[38] Many of these could come from secondary and tertiary food production, thus saving energy and natural resources and helping to restore the natural fertility of the land. Stricter quality controls on consumer goods and longer-lasting products would likewise require more labor-inputs in the production process. Coupled with the increased rural population, an increase in artisan and craftsman labor would enable industry to be decentralized without loss of scale-advantages. Such a decentralization scheme also would reduce the demand for transportation services, thus further reducing energy demands.

4) Producing for the Third World Another use of available production capacity in the industrialized world could be to make basic material goods for development and catastrophe aid. In a transitory period, there probably would be a great need for things like basic household appliances, education materials, building components, hospital beds and medical equipment, medicines, foodstuffs, agricultural tools (spades, plows, hatchets, pitchforks) and simple transportation equipment (bicycles, barges, carts, trucks). Such production could be coupled with the gradual transfer of the production capacity of such goods to the poor countries themselves, thus little by little reducing the volume of such transfers, enabling manpower in the richer countries to be retrained and put to other uses as described above.

Of the alternatives presented above, the first one is clearly unacceptable. However, this would be a typical way in which a capitalist economy would respond to public demands for some factory to be shut down because it polluted the environment. The directors would find alternative employment, and the workers would join the dole queue. The second alternative would probably be acceptable to many capitalist socialdemocratic countries such as in Scandinavia. However, environmentally acceptable projects initiated by the governments would probably only be used as counter-cyclical measures and definitely not for the purpose of creating non-growth societies. As Per Kåreson argues,[39] we cannot wait for capitalism to disappear before more environmentally acceptable practices in the industrialized West are implemented. Let us not be co-opted by the capitalists, but neither let us reject ecologically sane

changes in the economy just because capitalism invents them. Option three goes still further than the second. Clearly, with such measures implemented, both capitalist and "socialist" industrialism and techno-romanticism could give way to another society, based on self-reliance, autonomy and social justice. The fourth alternative would only be acceptable for a short time-period, until self-reliant developing countries were able to cover their own basic material needs with their own resources and production facilities.

It is important to stress that the changes, as visualized above, will become necessary to perform for industrialized countries, because the Third World soon will demand to use their own resources for their own development. However, it is equally important to emphasize that the process of scaling down resource use, of decentralization and of implementing alternative lifestyles in the overdeveloped parts of the world also will give them a richer life. In such a process we will probably not only need strong and active governments which understand the need for changes, but an increasingly aware and active public opinion which actively seeks the alternative. The steady-state, egalitarian society that we visualize will not be a capitalist one. It will be a radically different alternative, a new type of socialism, where human values and development, complete mobilization of the masses and collective actions become dominant.

Self-reliance means adaptation to local values and traditions and a rejection of "culture" imposed from the outside. Exactly how the world would look in our vision of the future, we cannot tell at this point. But the world would be different, and in our opinion, be able to solve the problems of starvation and fear, of ignorance and indifference to the fate of our fellow humans. As mentioned above, changes should be encouraged to take place even within the framework of the capitalist economies, and all scenarios for a better world in social and ecologial balance should be considered with an open mind.[40] Small changes will be followed by more important changes, laying the foundation for an active and motivated population, and voluntary changes for the better can be led and followed by government actions along the lines suggested above.

5. Ecological indicators in perspective

In the present paper we have discussed some aspects of overdevelopment and presented some methods for quantifying the waste. We will now elaborate a little further on how we may proceed in the future to make better indicators of how resources are used in the present world.

First of all, in our example of "excessive energy use", we did not differentiate between exploitative energy use and just plain too high use relative to needs. It may be acceptable to use non-renewable energy sources in order to cover basic material needs, at least until other alternatives have become available on a large scale. However, one may argue that it is defensible to maintain a luxurious standard of energy use, as long as nobody is exploited and no pollution is being caused. To take an example, if we were heating our house with solar energy and managed to reach 25°C inside during the winter time, this would be acceptable. If we used oil or electricity generated by nuclear power to keep a house that warm, it would be objectionable. In other words, when we put limits on energy use, we primarily should be concerned with energy sources that either are running out or are polluting or both.

There may be social limits to the use of any source of energy, at least within some sectors of the economy. It seems reasonable to expect Illich's general hypothesis to be true, that is, that at some point any increase in the use of energy will cause inequality to increase in a society. But the threshold may not be the same for all sectors of the economy. Putting limits on the use of energy in the transportation sector, in other words, seems more reasonable than putting limits on how hot bath water people should have, if they can heat the water with solar energy.

A second point that should be made in the indicator discussion is that there is a difference between using a lot of a resource that nobody else needs and using a lot of something that there is little of. If a scarce resource is essential for other people's development, an extravagant use becomes especially objectionable. To take two examples: If I live in Norway and want to use a lot of rocks to build a house, a limit on the use of "grey-stone" would be nonsensical. However, considering the scarcity of food, it would

make sense to limit my opportunity to build the house on agricultural land. In other words, we have to differentiate between resources that are essential for human well-being and those that are irrelevant. An approach we could use here would be to develop a set of Basic Needs Units (BNUs) and identify the resources which would be necessary for mankind-at-large to cover them. BNUs would for instance be the caloric food value needed for 1 person per year, square meters of clothing fabric needed per person per year, or square meters of housing required, etc. We would then argue that each person was entitled to cover his basic material needs for food, health shelter, clothing, education, work, communication, and transportation and calculate how many times each country was able to cover these needs for their citizens with their own resources. The implication would then be that countries that came out with an index greater than 1 should be obliged to turn some of their extra resources over to countries with a number lower than 1. By analyzing export- and import patterns we should get an idea of which countries that simply could stop exploiting other countries and which countries really were lacking in resources. It is our hypothesis that if exploitation ceased, most countries in this world would be able to assure their citizens a sufficient number of BNUs.

A third consideration would be to differentiate between resources that may be used to cover basic needs in the short run and those that are necessary to maintain basic needs coverage in the long run. Oil, for instance, may not be necessary in order to cover poor people's need for heating in the winter time. What they need is energy, not oil, but until other forms of energy are available, oil may be the best alternative. In other words, since a large part of humanity has very little time to waste in covering their BNUs, even non-renewable and polluting energy forms may have to be used temporarily. In the case of oil we would not have to increase the total world oil production, but rather use less of it in the industrialized world and more of it in poor countries. And this, we suspect, may be the case for many resources in our present world.

6. Conclusion

The present paper has been an attempt at discussing the magnitude of waste production and its social implications in the industrialized world. We realize that the ideas are tentative, and they are weakened by the fact that most examples are taken from the capitalist developed world and are not supplemented by empirical evidence from the socialist developed countries. However, we feel that the essential fact that the world currently is divided between an affluent North and a poverty-stricken South is well enough documented that we now should proceed from détente to efforts at reducing this gap. And in doing this, the socialist as well as the capitalist rich have a profound responsibility in realizing the intentions of the Cocoyoc Declaration and the Third World's demands for a New International Economic Order, thus laying the foundation for the fulfillment of basic human needs for all of mankind. Hopefully, our work with ecological indicators will contribute toward this end.

NOTES

1. For a more detailed discussion of the concept of development, see Johan Galtung: *Towards New Indicators of Development.* Resolution, Commission A, 1st Conference of the International Development Center. Appendix. Doc. 37, CID 1/ALG/C.A.1. Algiers, 24-27 June 1975.

2. The background for the discussion of values in the paper quoted above (1) is presented at length in Johan Galtung *et al.:* "Measuring World Development"; mimeo, University of Oslo, October 1974.

3. *The Cocoyoc Declaration - A call for reform of the international economic order* derived from a symposium on environment, development abd resource use held by UNEP and UNCTAD at Cocoyoc in Mexico in October 1974. For the complete text, see *The Bulletin of the Atomic Scientists,* March 1975.
For some recent comments on the Cocoyoc Declaration, see John Tinker: "Cocoyoc revisited", *New Scientist,* 28 August 1975, and John Tinker: "Cocoyoc: the new economics", *New Scientist,* 4 September 1975.

4. The respective diets and the derived carrying capacity of the earth has been calculated for the years 1970 and (estimated for) 2000-2020 by FAO, showing that a *doubling* of world grain and fodder production by the next 30-50 years would only serve to accomodate 2.7 billion people with U.S dietary habits. However, most estimates on world population growth during the next decades point to a total world population of at least 5.5-6.5 billion by 2000, indicating that the most optimistic dietary pattern we normally can justify would be the equivalent of that of Western Europe in the early 1960s or Japan as of today.

5. See United Nations: *World Energy Supplies, 1970-73.* Statistical Papers, series J., No. 18, N.Y., 1975. The data refer only to coal (incl. lignite) and coke, petroleum and its products, natural and manufactured gas and electricity and do not include non-commercial sources of energy, such as cow dung or firewood.

6. See Gunnar Adler-Karlsson: *Harrying and Carrying Capacity.* Royal Ministry for Foreign Affairs, A Swedish Contribution to the U.N. World Population Conference, Stockholm, 1974.

7. For a more detailed discussion of the world's carrying capacity when it comes to energy use, see Dag Poleszynski: "Ecology, Energy and Resources: Some Problems of Indicator Formulation". PRIO Publication no. 21-35, August 1975.

8. Natural resource endowments and climatic differences may also serve to complicate the picture, as well as each country's demographic characteristics.

9. Ivan Illich: *Energy and Equity.* Ideas in progress. Calder & Boyars, London, 1975. See esp. pp. 18-19 and p. 21.

10. Ivan Illich presents a number of convincing arguments, but his statement that any speed above bicycle-speed is undemocratic, seems lacking in empirical evidence. We therefore shall be less dogmatic and will consider our calculations to be *examples* rather than absolute values.

11. Amory B. Lovins: *World Energy Strategies. Facts, Issues, and Options.* Friends of the Earth, Inc., N.Y. and London. Published by Ballinger Publishing Company, Cambridge, Mass., 1975.

12. According to Lovins,[11] "The direct energy cost of 1 kg of protein in English milk is estimated to be the equivalent of about 20 litres of petrol. A ton of gutted fish landed by a U.K. trawler costs a ton of oil ... modern US production of 1 kg of beef protein requires about ... 12 kg of coal." (See p. 97.)

13. For a country like Japan, the domestic resource base is extremely poor, although cultural factors may enable the Japanese to withstand a crisis better than many other capitalist countries.

14. Of course, the OECD does not favor zero-growth in energy use, but rather some measures to save energy in private homes etc., so that the industry may still expand their already profligate use of energy.

15. For a discussion of the arguments for energy moderation, both from an ecological and social viewpoint, see 7, 9, and 11 above, and The Ford Foundation: *A Time to Choose: America's Energy Future.* Energy Policy Project of the Ford Foundation. Ballinger Publishing Co., USA, 1975.

The EPP/FF study demonstrates that a lower energy growth rate in the future than historical rates would lead to increased employment in the U.S.

16. Stockholm International Peace Research Institute: *World Armaments and Disarmament. SIPRI Yearbook 1975.* The MIT Press, Cambridge, Mass. and London. Alqvist & Wicksell International, Stockholm, 1975.

17. *New Internationalist,* No. 32, October 1975, p.21. We do *not* imply here that if we give the poor a few billion more aid, all will be well.

18. Military transportation aircrafts and supply vessels could carry emergency food aid and basic materials to catastrophe areas, and hoovercrafts and helicopters could perform important tasks in countries with little or no infrastructure developed. More specialized equipment like guns, tanks or fighter-planes represent valuable stocks of high-quality metals that can be remelted and used for the production of more basic material goods.

19. As we know, unemployment has been the fate of many US soldiers returning from Vietnam. Even if the US capitalist economy seems incapable in securing a high rate of employment among its population, this particular case forcefully underlines our point concerning the attractiveness of unemployment as an alternative to socially and ecologically undesirable employment.

20. NASA's annual budget is around $3.6 billion, while the new European Space Agency (ESA) currently operates on "only" $360 million. *U.S. News & World Report,* Oct. 13, 1975.

21. When and if the world has managed to stabilize its population and cope with the social and environmental problems we face today, a peaceful exploration of outer space by a World Space Agency will probably be justifiable.

22. See Kenneth R. Schneider: *Autokind vs. Mankind. An Analysis of Tyranny - A Proposal for rebellion - A Plan for Reconstruction.* Schocken Books, New York, N.Y., 1972.

24. Schneider, back cover.

25. *Arbeiderbladet,* 3 October 1975.

26. B. Urlanis: *Wars and Population.* Progress Publishers, Moscow, 1971. P. 223.

27. Ivan Illich: *Energy and Equity,* pp. 30-31.

28. *Aftenposten,* afternoon edition, 2 October 1975.

29. It is only natural for the industry to try to justify its existence. In Norway, 12,000 people are employed in the packaging industry, representing a total output of nearly 2 billion kroner in 1973, or close to 2% of total GNP. *Aftenposten,* 11 September1975.

30. See Vance Packard's *The Waste Makers,* 1960, and *The Hidden Persuaders,* 1957, both from David McKay, New York, N.Y.

31 See Ivan Illich: *Medical Nemesis - The expropriation of health,* Calder & Boyars, London, 1975, for a well-documented criticism of modern medicine.

32. See *U.S. News & World Report,* 16 June 1975.
Also note that "Despite a storm of criticism, Mr. Kennedy later revised his estimate to a range from 60,000 to 140,000 ...".

33. Centre for Economic and Social Information: *Problems of Raw Materials and Development. Declaration and Programme of Action.* Adopted by the sixth special session of the General Assembly of the United Nations on May 1, 1974. CESJ.E21. United Nations.

34. Translated from *Arbeiderbladet,* 10 October 1975. Also see *Arbeiderbladet,* October 8 and 13, 1975.

35. In fact, a recent poll performed for the environmental group "The Future in Our Hands" (see editorial in *New Internationalist,* October, 1975, on this group) revealed that as many as 76% of the respondents thought that the standard of living in Norway was too high. The respondents assured their willingness to accept a lower standard of living for the benefit of poorer nations, and only 1% felt that Norwegian living standard should be increased. *Arbeiderbladet,* 14 October 1975.

36. This process has already started taking place in some private industries. Recent cutbacks in Britain's defense budget (see *U.S. News & World Report,* 13 January 1975) have forced "a radical rethinking of the shrinking aerospace" (*New Scientist,* 3 July 1975: "Dole queue or useful projects?"). In the Lucas Aerospace Combine Shop Stewards Committee, plans are drawn up for a transition to alternative technologies in order to produce socially useful projects. However, as the market for such products necessarily is rather limited in the developed part of the world, this is probably not a long-term solution for more than a marginal number of such firms.

37. For a discussion of current uses of energy research and development subsidies in the Western world, see Dag Poleszynski: "Predicting World Energy Development - A Theoretical/Empirical Analysis". PRIO Publication no. 21-34, March 1975. This paper also discusses how priorities should be turned around to fulfill the future demands for a less alienating and

38. For a continuous debate over the problems of modern agriculture, see magazines like *Environment, The Ecologist, Resurgence, Miljö och Framtid, Ambio,* etc.

39. Per Kågeson: *Sløseriets politiske økonomi.* Pax Forlag A/S, Oslo, 1974.

40. For a "non-ideological" framework of suggested future changes, see Mihaijlo Mesarovic and Eduard Pestel: *Mankind at the Turning Point. The Second Report to the Club of Rome.* E.P. Dutton & Co., Inc./Reader's Digest Press, New York, 1974.