



NATUROPA

1974 N° 21

**BULLETIN OF THE EUROPEAN
INFORMATION CENTRE
FOR NATURE CONSERVATION
COUNCIL OF EUROPE**

European
information
centre
for
nature
conservation



The symbol for the Council of Europe's nature conservation activities.

"Naturopa" is published in English, in French, in German and in Italian by the European Information Centre for Nature Conservation of the Council of Europe, 67006 Strasbourg Cedex, France.

Editor responsible: Jean-Pierre Ribaut

Editor: Gillian Holdup

Printed by: Pillet SA, Martigny, Switzerland

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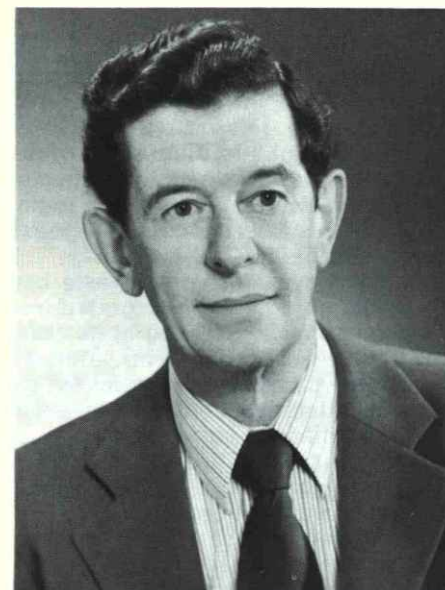
"Naturopa" is the new title of the bulletin formerly entitled "Naturopé" (French version) and "Nature in Focus" (English version).

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EDITORIAL

It is a law of nature that waste cannot be really eliminated or destroyed, but only changed into other solid, liquid or gaseous substances. This forces us to rethink the problem of waste elimination completely. It is now known that there is no way of eliminating or treating waste which is entirely innocuous for the environment. However, thanks to recovery and reuse, a certain amount of our waste products need place no additional burden on our natural environment.

Today, it is necessary to aim at optimisation, that is to say at establishing a well-balanced correlation between the treatment or transformation of waste, the cost to the environment and the expenditure in money and labour. In order to succeed the problem must be considered as an administrative task and not merely as one of elimination. The three functions of waste administration are discharge, the industrial cycle of raw materials and the natural cycle. We shall not go into detail about discharge, except to point out that it will never be possible to do without it, since any system of elimination, treatment or recycling of waste leaves residues which need to be discharged.

THE INDUSTRIAL CYCLE OF RAW MATERIALS

The world population increases by approximately 2 to 2.5% a year, while industrial production increases by over 6%. The chemical industry, for example, produces approximately one-third of the products required by the market, and two-thirds of undesirable products in the form of solid, liquid or gaseous waste. In other branches of industry, the disproportion may well be greater. The need for planning in respect of

waste products from industrial undertakings and craft industries is thus clearly evident.

Raw material sources are not inexhaustible and it is necessary to face up to facts: we can no longer allow ourselves to waste natural resources as we have been doing since our entry into the era of prosperity. In order to see that they last longer, we have to reintroduce into one of the industrial cycles the raw materials contained in waste. Recovery, reutilisation and transformation of waste is now the order of the day.

Recycling is necessary, not merely in order to economise on raw materials, but also because of the growing encumbrance of the environment by waste. Surfaces and areas available for discharge are increasingly difficult to find and their capacity is limited.

The more waste we can reintroduce into an industrial or a natural cycle, the lighter the burden imposed upon the environment.

Long before the word recycling became fashionable, waste was being recirculated, reutilised and processed. In Switzerland, for example, used papers are partially reintroduced into the production cycle. At present about 40% of paper and cardboard waste is recycled. The same applies to the glass industry where the proportion of used glass utilised in the manufacture of new glass is around 25%.

Scrap iron, picked out of garbage, is sent to the iron and steel industry, and, more important, the shredders — machines for the dismantling and crushing of disused vehicles — also allow other metals used in car building to be recovered.

As has long been known, used oils

can be transformed into new lubricants by a re-refining process; this is also done in Switzerland, though on a reduced scale. It is quite unintelligible that better use is not made of this possibility, instead of burning and discharging or pouring into the waters immense quantities of used oil.

These are but a few examples of recycling possibilities which should be far better developed and made use of than hitherto. This would, however, require systematic organisation and regional planning or even, for certain categories of waste, supra-regional and longterm planning.

In addition to these possibilities, new procedures are being studied which will allow us to produce new products from waste which are entirely different from the initial waste-product. For instance, there are processes which make use of fresh compost to produce composition board and other panels used in the building industry, slag from waste incineration for the manufacture of building materials or again, disused tyres for road surfaces or for the production of substitutes for mineral oils.

However attractive and interesting all these possibilities appear, certain reservations must be made. If they require too much labour or if all they do is shift the problems arising from the burden on the environment from one point to another, it is no doubt better to do without. It is up to technology, up to the science of management of industrial undertakings and also up to ecology to study these possibilities and procedures and to decide whether they constitute real progress from the point of view of the environment, of public economy and of a saving in raw materials.



THE NATURAL CYCLE OF RAW MATERIALS

Since man has produced waste, that is to say since the beginnings of humanity, waste returns, to a greater or lesser extent into the natural cycle. Formerly it was above all a question of organic waste, namely natural materials, which could be directly reintroduced into the natural cycle.

Today, however, municipal waste can no longer be entirely reintegrated into the natural cycle, because of its composition. We must, however, attempt, as far as possible, to return to the earth the materials contained in waste by using them to produce humus or fertiliser (sludge from purification plants, compost, organic and biodegradable waste from certain industries, waste from industrial farming). Similar reservations to those formulated in connection with the industrial cycle must be made as regards the natural cycle. Because of the growing production of energy and of chemosynthetic materials, refractory hydrocarbons may conceivably get into the sludge from purification stations and into solid waste. As yet little is known about their ecological effects. This is also true of the metallic salts. It is necessary to prevent, at all costs, the deterioration of the environment from attaining uncontrollable proportions.

CONCLUSION

It is thus absolutely necessary to intensify basic interdisciplinary research in order to counter the harmful effects of poisonous substances and those resistant to biodegradation. The planning of land and of water is today recognised as indispensable. That of the atmosphere is in process of realisation. As to waste, unless we succeed in subjecting it to an administrative plan, in reintegrating it into an industrial or a natural cycle and in ensuring that the principle of recycling is accepted as fundamental in both research and practice, it is likely, one day, to render our environment unfit to live in.



ENVIRONMENTAL PROTECTION IN GERMANY:

RECYCLING GOING STRONG

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When in 1964 Adlai Stevenson announced before the UN Economic and Social Council "We are travelling together as passengers in a small space ship that is dependent on its fragile resources of air and land" (retranslated from German text) he could be sure that everybody would agree with him. It was clear that, if constantly utilised, limited resources would be used up and that it is therefore necessary for them to be reprocessed. The image of the space ship earth was quickly taken up by politicians in their Sunday speeches and gave rise to a whole wave of literature. The public was startled by a perfectly stylised method of deliberate exaggerations and of painting the picture in apocalyptic dark colours. "Silent Spring" by Rachel Carson, "The Limits to Growth" by Dennis Meadows, the books by A. and P. Ehrlich on the overpopulation of the earth, and finally the classics by Vance Packard at least produced a consciousness of the environment — and we should be grateful to them for this. Meanwhile an increasing number of writers like John Maddox with his book "The Doomsday Syndrome" are drawing attention to themselves because — as a counter-reaction, so to speak — they attempt a more detailed analysis and above all attempt to balance the dynamics of science and economics. The symbol of the "space ship earth" is logically rejected because it arouses false associations. It cannot reveal what accidents can be expected to happen.

Attention is admittedly drawn to resources but no account is taken of the fact that natural catastrophes such as changes in climate (when will the next ice age occur) or shifts in the earth's magnetic field, changes in solar activity, or warfare are also possible and will confront mankind with far greater problems than a resource whose supply is nearing exhaustion. Such optimistic writers represent the thesis that every material can be replaced by another or by a combination

of several materials. Accordingly, there are no materials with a key function without which civilisation would collapse, because gases and metals are always consumed for a specific purpose which can be achieved with other resources as well — even though perhaps at greater expense. Such notions ranging from the revelation of sombre catastrophes to a "laissez faire" attitude are difficult for the politician to digest. He must concern himself with the conceptions of the groups he represents and act accordingly. For political reasons he cannot afford just to refer to the dynamic forces inherent in our societies; moreover the results are unsure. This is why it is only natural that environmental protection dominates the national and international scene today. And there have been many different possibilities and necessary reasons to point out genuine abuses that should be eliminated. Beginning with each individual the object has been to gain understanding for more expensive products and services because their production is being burdened by an increasing number of environmental regulations.

However, the aim has also been to educate people with a view to ensure that natural and cultural landscapes do not fall in value for those seeking recreation through e.g. littering. So we have to give up certain personal degrees of freedom for the benefit of all. The slogans "Keep Britain Tidy", "Keep America Beautiful", "Don't be a Litter Bug" are an expression of these efforts.

Environmental measures

In the Federal Republic of Germany the Federal Government's Programme for the Environment (Umweltprogramm der Bundesregierung) was elaborated in 1971; it provides a survey of the present level of the waste water burden, of impurities in the atmosphere, and the strain on land through solid waste and waste gases caused by

industry, traffic and private households. The general survey compiled in this way resulted in the obvious idea of minimising as far as possible the strain on the environment caused by waste products by attempting to prevent them from arising at all. Wastes are officially described as being "raw materials, in the wrong place". This implies the demand for increased recycling — a demand that gained in strength when at the end of 1973 and beginning of 1974 the supply of petrochemical products to the chemicals industry and of heating oil and petrol to private citizens slackened as a result of the boycott imposed by a number of oil-producing countries.

The "Abfallwirtschaftsprogramm" (Economic Waste Programme)

As early as 5 October 1973, the Federal Minister of the Interior, who is responsible for environmental affairs, announced a wideranging Economic Waste Programme. After appropriate preliminary work, and spurred on by the oil crisis, work was begun at the end of March 1974. As was the case when the 1971 Programme for the Environment was drawn up, experts from industry, science, and public authorities worked together in ten Working Circles and the results of their work was co-ordinated in three cross-section groups. These cross-section groups co-ordinate their work among themselves and co-operate with the Ministries involved in the so-called Steering Committee (cf. Diagram 1).

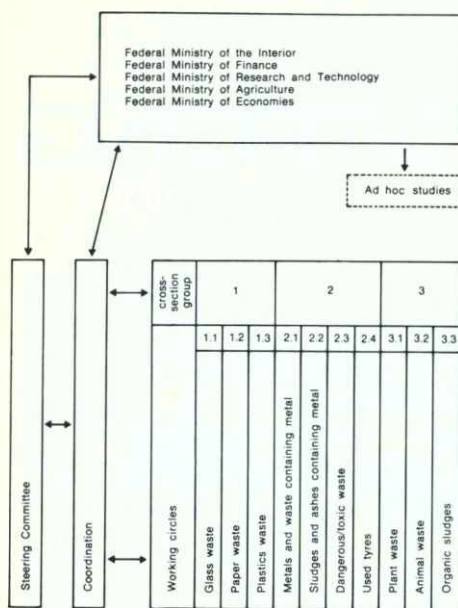
The official objective of the Economic Waste Programme is to:

- reduce the amount of waste;
- exploit the possibilities of reutilising and further utilising waste;
- remove unavoidable waste in an orderly fashion;
- share the costs of disposal more equitably.

The reports of the individual Working Circles, reflecting in the main the actual present position with respect to

Diagram 1

Organisational Plan of the Economic Waste Programme



packaging and contained in Section 14 of the Federal Act on Waste Removal, which thus came into force in 1972 directly after the Federal Government's Programme for the Environment was announced.

This regulation states that the Federal Government can decree a legal order according to which packaging materials and containers that are difficult to dispose of, in comparison with types of packaging that can be utilised for the same purpose, can be banned, or allowed to only a limited degree. An obligation to label materials is also a possibility.

It is no secret that the legislator had in mind packaging materials made of plastics and in particular those made of polyvinylchloride when this latter "possible regulation" was drawn up. When the Waste Removal Act was passed the Federal Upper House requested the Federal Government to report on the possibilities that exist of taking recourse through equalisation levies to the manufacturers of consumer goods that later incur high disposal costs so that they share the social costs of environmental protection. This is a question that seems to have its origin directly in the Waste Oil Act.

In its report of 3 April 1974 on this question the Federal Government dealt, inter alia, with plastic packaging materials in detail. In this context equalisation levies are not expected at present to make a major contribution towards easing the problem of waste disposal. When, however, shortly beforehand the Federal Minister for the Interior emphasised in connection with the announcement of the elaboration of a recycling programme that the success of these measures will decide for which materials the authorisation under Section 14 of the Waste Disposal Act will be invoked, then the political pressure on the packaging industry and the groups of materials affected by the regulation becomes clear.

Initiative of the plastics industry

The plastics industry in the Federal Republic of Germany recognised these signs early. In 1972 already the plastics producers together with their Association Verband Kunststoffherstellende Industrie e. V. (VKE) began the elaboration of a research project entitled "Reutilisation of plastic waste materials". The basic idea was to collect together all the questions that are still openly related to the reutilisation of waste in firms producing plastics, in plastics processing plants, as well as that caused by the innumerable users of plastics, and the

waste plastics existing at the domestic level. The research project, costing approximately DM 6 million, was submitted to the Federal Government in November 1973. If the public authorities confirm the urgency of the project by participating in it financially then the industry is prepared to bear the remaining financial cost. Negotiations have now just begun between the project agents and the Ministries supporting the project. This delay is explained by the fact that the project is intended to be integrated into the Federal Government's Economic Waste Programme.

Recycling for plastics wastes

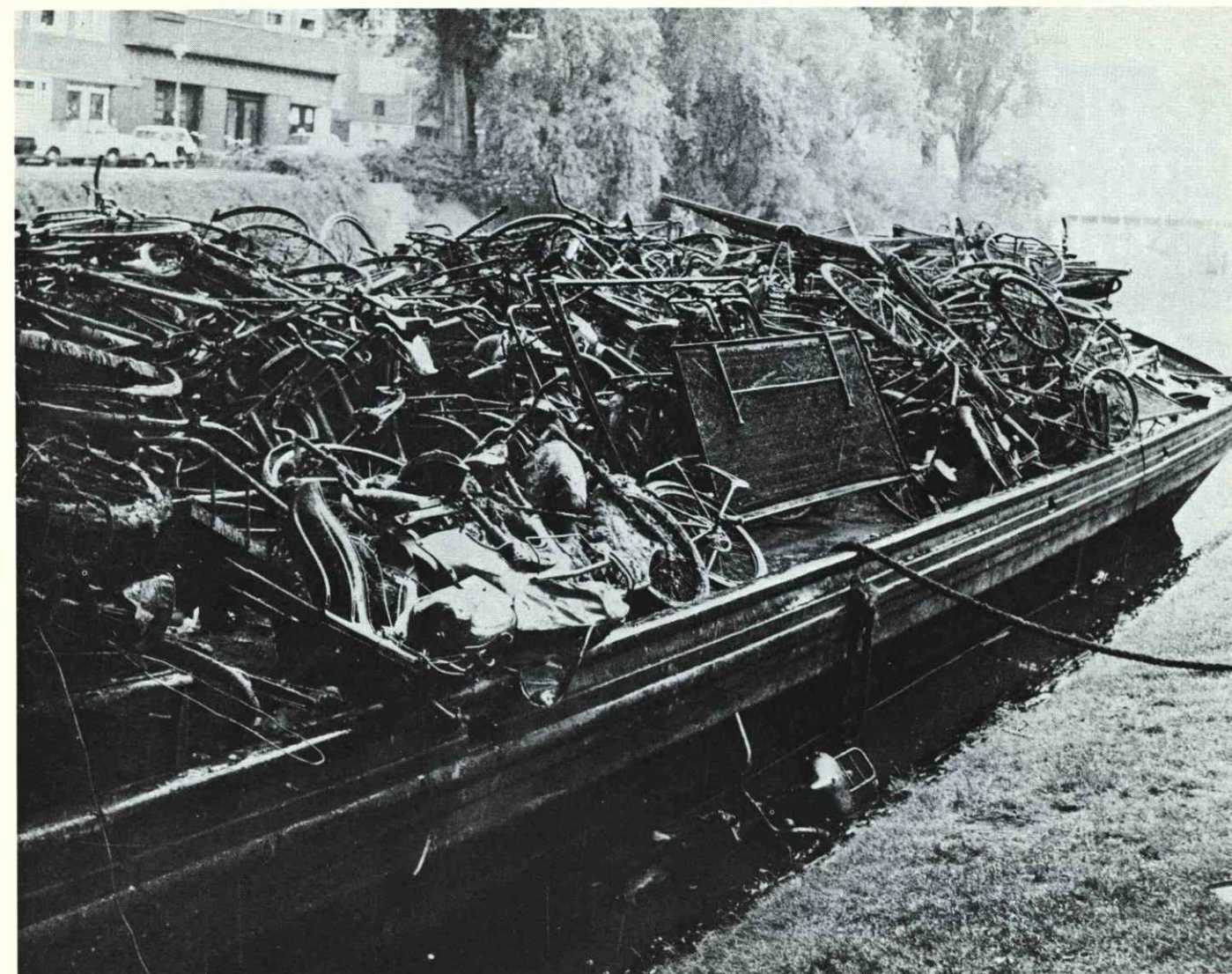
The research programme of the plastics industry consists of seven sub-projects that will be briefly described below. At the same time this will make it possible to take a look at the recycling situation in the plastics field.

Collecting plastics wastes

It is of singular importance to establish precisely at which stages which type of plastic occur, and in what form and quantities (sub-project 1). At present only rough estimates are available. They reveal that approximately 400,000 tons of production waste occurred in 3,000 plastics processing plants in the Federal Republic of Germany in 1973, of which 250,000 tons was reutilised within the plants, via the scrap trade or via regeneration plants. This means that 150,000 tons were disposed of. However, it is precisely this waste that can be of interest for recycling purposes because it is material with relatively few impurities and could perhaps be effectively recovered on a regional basis without invincible obstacles. Taking into consideration the cost of new products, this waste represents a value of DM 300 million.

Almost nothing is known about the amount of plastics waste that occurs in the production, application and utilisation fields. Here, too, interesting attempts could be made at drawing together small streams of waste to form a river that would make the cost of reprocessing worthwhile.

There is no doubt that the most difficult problem is to utilise the plastic products that are thrown into private dustbins after having served their purpose. This waste comprises only 3-4% of the weight of the total. It would therefore hardly be worthwhile to recover these plastics. Certain prospects in this direction would exist only if all the usable parts of domestic waste could be sorted in one process. Even if this were to succeed, plastics cause greater difficulties than other



Bicycles and bedsteads taken from the canals in Amsterdam.

materials when it comes to reutilisation, because many kinds of plastic (approximately 50 are of economic significance), with numerous separate types in each case, and produced in different shapes (foil, solid parts), exist. Whilst cardboard and paper, for instance, can be traced back to fibre materials, there is no common denominator in the case of plastics. Even the collection of plastic products already separated in households from other waste, as is being done in Japan on a trial basis, does not get round this problem.

The following possibilities exist for the further treatment of mixed plastic products:

- Processing in the direction of separating the different kinds of plastic and the attempt to regenerate the separate groups that have been recovered in such a way that at least a few quality parameters are attained. These studies will be

treated in sub-project 2 of the research project of the trade association of the plastics manufacturing industry.

- As a second possibility, the attempt can be made to process the relevant mixture of plastic products directly into new products. Adding filling materials, paints and certain chemicals make it possible to produce palettes, for example, and at a later stage tiles that are laid out of sight, or profiles. In Japan the experience was made with fence posts and flower bowls; but a thorough examination of their suitability also with respect to market factors is in any event of decisive importance. The processing techniques that can be used are extrusion and pressing. These possibilities of reutilising mixed plastic waste via melt solidifying are to be studied in sub-project 6, while sub-project 7 deals with the exami-

nation of the products manufactured in this way from the applications engineering point of view.

- The third variation of treating mixed, concentrated plastic waste is pyrolysis (sub-project 4) or hydrolysis (sub-project 5), whereby in the first case petrochemical raw products such as ethylene and styrene and in the second case e.g. with respect to polyurethane, the basic products for its manufacture, namely polyisocyanate and toluene, are produced. Within the framework of the research project is intended to test half-scale continuous plants and examine them with a view to introducing them in the future.

- Finally, in sub-project 3 the utilisation of waste containing plastic materials through biological decomposition is to be studied. So-called decomposable plastics are now on

recycling as well as proposed measures for improving the situation, are expected to appear by the beginning of 1975.

The Waste Oil Act

The Economic Waste Programme is not the first official activity undertaken in the Federal Republic of Germany in the field of waste reutilisation. Against the initial resistance of industry a Waste Oil Act came into force as of 1 January 1969 providing for a levy of DM 7.50 per 100 kg of lubricating oil and lubricant payable by the manufacturer and coupled to the tax on mineral oil.

This serves to finance the collection and orderly disposal or regeneration of waste oil with less than 10% impurities free of charge by firms whose function is made publicly known. Waste oil containing more than 10% impurities is also collected, but in this case a charge is made.

However, it is not yet possible to quantify the amount of oil that no longer penetrates the water supply system as a consequence of these measures or to determine the percentage that is regenerated.

But because this arrangement is meanwhile considered to be extremely successful new proposals are repeatedly being discussed to regulate the disposal or regeneration of other materials in a similar way.

The Law on Waste Disposal

Initial considerations in this direction led to a regulation pertaining to



the market which are so constructed that normal chemical/physical ageing properties are accelerated. Such plastics do not simply dissolve into thin air. Hence the question arises as to the relevance for the environment of the decomposition products and the possibilities of utilising them. An initial thorough approach to the assessment of plastics with artificial decomposition features was undertaken by Battelle, Frankfurt, on behalf of the Federal Ministry of Research and Technology. According to this study, decomposable plastics used for packaging purposes would result in a total gain of DM 10 million per annum (less room required in waste dumps, less litter) but would involve costs of DM 200 million per annum (plastic packaging materials would become more expensive; the pollution of groundwater through the decomposition products would be considerable).

This means that plastics which do not decompose are clearly to be preferred owing to the lower burden they place on the environment. The studies that are planned nevertheless seem to be interesting from a scientific point of view because the possible effects on the environment of the "decomposable plastics" on the market should be known.

Recycling at any price ?

At present the reutilisation of plastics waste takes place only insofar as clean waste is concerned and is generally done via melt solidifying. However, new forms of organisation with respect to waste collection and new knowledge about pyrolysis and hydrolysis may be able to considerably increase the present percentage that is recycled. The necessary know-how is expected to result from realisation of the VKE-Programm. Lastly, government measures can produce the same effect if return offers for used products, like

drums or something similar, are made statutory.

It is very difficult to assess whether this is sensible in each case from an overall economic point of view. Recycling regulations that increase the costs for producers in the market more than is saved by the elimination of disposal costs will automatically lead to higher product prices. This would be justifiable only if as a result a noticeable reduction in effects on the environment were achieved. However, it has not yet been possible to quantify this in every individual case because there are no objective prices attached to burdens on, or a disburdening of the environment.

All models relating to the environment developed hitherto suffer from this quantification problem. In practice, calculations are therefore currently limited to quantities that can be established at the individual plant level. Above all the utilisation of fewer resources is aimed at and this leads as a rule to improved company returns,

as well as a reduction in waste. That this must not be tantamount to a greater burden on the environment is proved by the examples of "open-end" spinning and the continuous production of "non-woven" textiles. In the metal industry, continuous casting has replaced block casting, and it has been possible to replace thread cutting with thread rolling with the formation of metal filings. Increased precision in production and the avoidance of interruptions in production also contribute to reducing waste. Even though the possibilities discussed here do not directly belong to the question of recycling, they do nevertheless have the same effect, namely a reduction in the amount of resources utilised. This saving in materials is often large enough to justify the additional costs of a more expensive machine. An analysis of the causes and costs of 21 interruptions in the operation of a printing machine showed that most of the trouble could have been avoided by redesign and special training measures through an expenditure amounting to a fraction of the additional costs normally involved as a result of the interruptions.

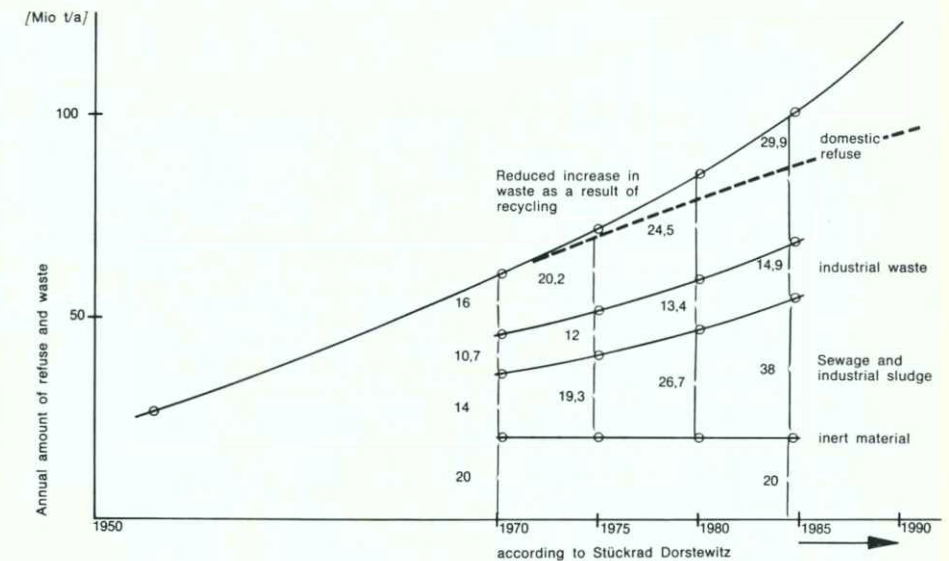
The purity of wastes is essential for classic recycling materials

To come back to recycling: Owing to the lack of homogeneity alone of the different streams of waste, the regeneration of all waste products is hardly possible. However, special efforts should always be made where specific materials can be collected at low cost.

It is estimated that at least in this way the rate of increase in waste can be reduced. The following diagram 2 gives the effects that can be expected in this respect. At present waste materials such as paper, scrap iron, scrap precious metals, clean plastics waste, glass and textiles are being partially recovered. The importance of homogeneity in waste materials to be reprocessed is well illustrated in the case of paper: in Sweden 100% of the waste paper in the paper-processing industry and large printing works is recovered, but only 50% of the waste occurring at the higher levels of processing and in the trade, and 15% of paper waste at the consumer level is recovered. In the Federal Republic of Germany the recycling of waste paper amounts to 45.5% of domestic production and represents 31% of paper consumption. This means that it is in third position when compared internationally (Verwertung von Altpapier, Battelle, Müll und Abfall, Beiheft 6), (see diagram 3).

Diagram 2

Annual Amount of Refuse and Waste in the Federal Republic of Germany (excluding agriculture)



Only 2% of reutilised waste paper in the Federal Republic of Germany originates from private households. The different kinds of paper that exist in household refuse can only be utilised as unsorted waste paper and produce the lowest returns for the highest costs of collection.

It is technically possible to increase the proportion of reutilised paper of different kinds by 1/3 (i.e. 800,000 tons). Nevertheless, some kind of state aid would be necessary, all the more so since the price of paper has increased greatly. As a result of the high level of economic activity in the steel industry there is a strong demand for scrap metal at present. Stocks of scrap metal have been run down for some time as a result, and the processing of wrecked cars has again become interesting. Scrap from cars furnishes less than 10% of the total scrap input of the steel industry. According to a Battelle study 1.3 million cars are scrapped each year in the Federal Republic of Germany. Besides the processing of steel parts, only copper (mainly from radiators) and lead (batteries) are collected separately. The remaining materials, namely road dirt, upholstery material, paint, cable sheathings, broken glass, and rubber and plastic components pose a problem. These materials that result mainly in shredder plants have to be dumped at present, whereupon special measures are sometimes required for

Diagram 3
Percentage of recovery and utilization of waste paper in major countries

Country	Waste paper %	Recovery sequence	Waste paper %	Utilization sequence
Holland	39,6	1	36,1	5
Japan	37,7	2	38,1	3
Federal Rep. of Germany	31,5	3	45,5	1
Switzerland	30,9	4	28,7	9
Belg./Luxemb.	30,2	5	22,8	11
Austria	29,8	6	25,6	10
France	29,3	7	34,5	6
Great Britain	28,9	8	40,3	2
Spain	27,6	9	33,8	7
Finland	22,2	10	4,7	15
Sweden	22,2	11	6,4	14
Italy	20,5	12	29,3	8
USA	18,8	13	19,8	12
Denmark	17,8	14	37,6	4
Norway	17,2	15	6,8	13
Canada	12,6	16	3,3	16

upholstery materials made of synthetic foam materials owing to their elasticity.

In the steel industry uncleaned scrap causes emission problems when it is melted down and the products manufactured from it are naturally less valuable. Enrichment of zinc is a particular problem since when it circulates in blast furnaces it condenses easily on cooler surfaces.

For this reason scrap metal from cars is usually only accepted without reservation when it no longer contains such impurities. This is most frequently the case with respect to scrap from shredder plants. It should be remarked in passing that the EC Commission for Steel and the Federal Ministry for Research and Technology, for instance, are supporting projects designed to separate out such impurities. Their ultimate aim is to widen the circle of residues suitable for recycling.

If, therefore, every branch of industry works on saving resources and if recycling becomes a major objective, it should not be forgotten that if the costs involving the reutilization of waste or its reduction to a minimum are too high, then these measures are not always possible. If they are not kept within the framework of an economy based on competition then the economic and ecological effects can easily be negative.

However, there should be enough openings available by which the situation may be improved without moving into the dangerous area bordering on a state controlled economy. But it is up to the state institutions and local authorities to establish an orderly policy framework and to provide the corresponding incentives. In this context factors such as public relations work for the notion of recycling should not be underestimated.



RECYCLING

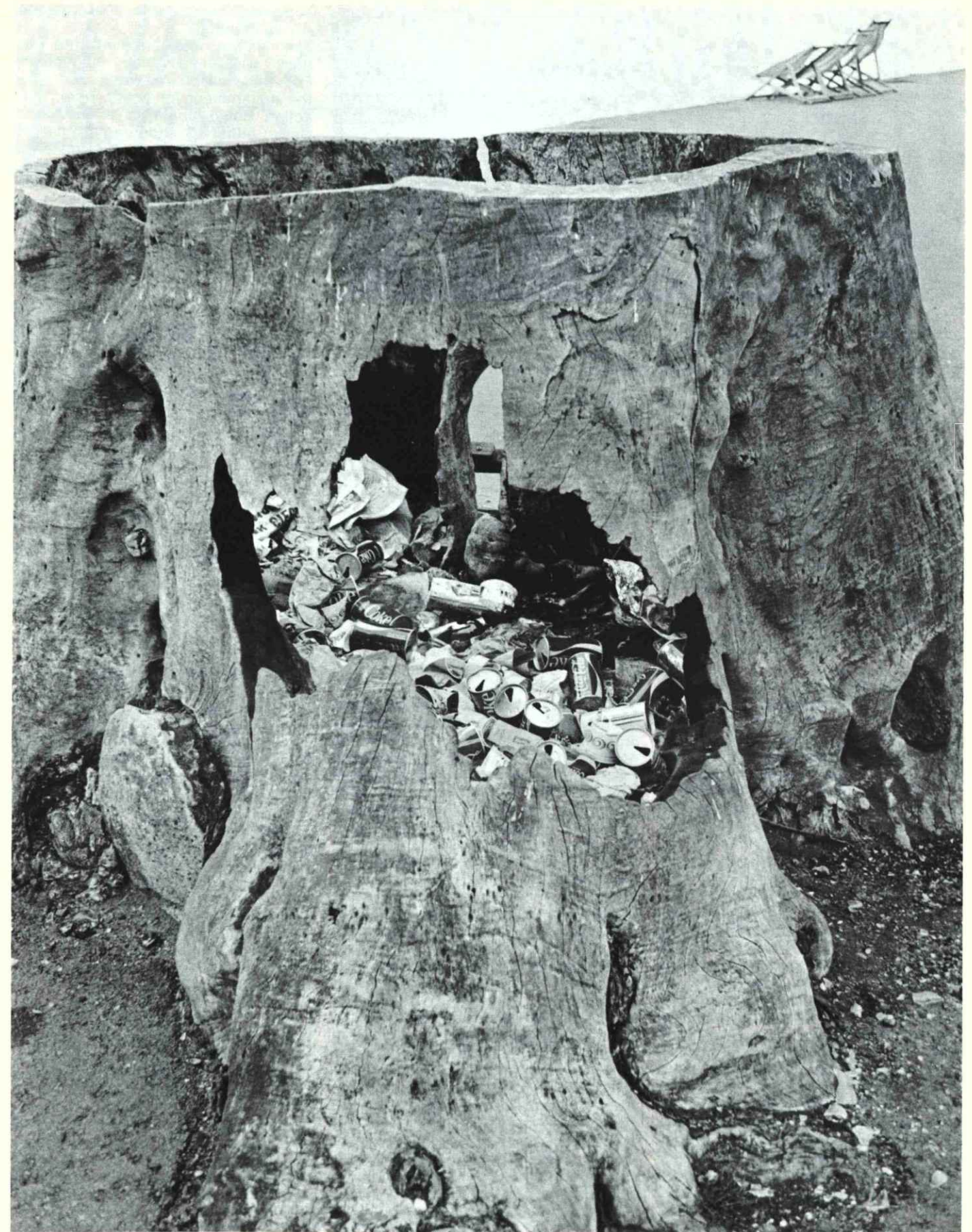
Christine THOMAS
Friends of the Earth Ltd.
9, Poland St.
London W 1

Friends of the Earth (FOE) in Britain have had a longstanding interest in recycling. This is hardly surprising for recycling is one of those issues that soon spring to mind in an environmental debate, since it seems to make ecological sense. Recycling is an attempt to imitate nature's own cycles which have themselves achieved a steady-state, requiring no material inputs and creating no wastes, although, of course, depending on continual inputs of energy from the sun. Natural cycles are perfect examples of 100% recycling. It thus seems obvious that, being concerned about the environment, we should be concerned to maximise recycling.

But things are not generally so straightforward. Is recycling all pluses and no minuses? FOE thought this highly improbable and accordingly took a closer look at the benefits and disbenefits of recycling. The benefits are obvious: reduced resource consumption, diminishing solid wastes, reduced pollution associated with the extraction and use of raw materials and reduced energy consumption. But disbenefits must also be expected. Paper salvage was the first area of recycling investigated by Friends of the Earth. Many FOE local groups were already involved in operating their own voluntary collection schemes. In early 1974 we published an FOE manual, "The Great Paper Chase". In it we looked at what turned out to be a very clearcut issue; on the one hand, the precarious position of Britain's paper industry and its need to absorb larger amounts of waste paper to survive, and on the other hand the waste paper at present unutilised. The main area of potential expansion for improved supply is from domestic waste. The operation of separate collection systems for waste paper has proved, in many cases, to be financially beneficial to local authorities; partly due to the reasonable prices offered, the high proportion of paper in domestic refuse (33% by weight and 60% by volume) and the relative ease of separate collection. It was in this direction that our campaign was successfully aimed. Following this we have spent some considerable time examining the broader

issues associated with the desirability of increasing the recycling of all materials found in domestic waste, and how this can be realised practically. The results of this research will appear in the near future in a report which should serve both as a useful survey of the recycling question and set out our own interpretation of the scene. The number of materials involved grows when the scope is widened to include all domestic wastes; the complexity of the problems associated with their reclamation and recycling multiplies even more so. There are so many facets to this question that it is difficult to cover them adequately in one article. I shall first try to outline why we feel that recycling is important and thus should be encouraged, and then to suggest in what direction we must move to achieve this aim.

Unfortunately, it is assumed by some advocates of recycling that it is a "free" technology; a non-polluting and non-consuming technology. This is not entirely so, but we have found that in virtually all the cases examined recycling has considerable less environmental impact than production and manufacture using raw materials. In all the cases the need for virgin resources is reduced, sometimes to nil though often some raw material inputs are needed in the manufacturing processes. In many cases processes utilising reclaimed materials are less polluting and less energy-intensive than those using raw material inputs. One of the strongest arguments in favour of greater recycling of materials is that it can drastically reduce the energy costs associated with a given level of material consumption. The energy requirements for many materials produced from secondary materials as opposed to from their ores are invariably, often dramatically, smaller. For example, the energy cost incurred in producing copper from scrap is about one-tenth of that of producing it from USA ores, and the cost for aluminium about one-thirtieth of that of producing it from bauxite. However, when looking at the complexities of industrial production and distribution it soon becomes apparent that there are limitations on the level





"The operation of separate collection systems for waste paper has proved, in many cases, to be financially beneficial to local authorities; partly due to the reasonable prices offered, the high proportion of paper in domestic refuse (33% by weight and 60% by volume) and the relative ease of separate collection."

of recycling which can practically be achieved. Limitations such as those imposed by certain uses to which goods are put (for example, the paper used in cigarettes and the lead in petrol) and by the way in which the design of many goods often involves combinations of small proportions of different materials which can seriously inhibit reclamation and generally make it unnecessarily expensive and energy-intensive.

Another limitation that cannot be ignored is that of continued growth in the production of consumer goods. This leads to a situation where last year's waste cannot match this year's demand; detailed analysis of the waste supply situation shows that recycling can do nothing to sustain growth in this way. Policies that attack this trend at its source are needed. Source reduction of wastes could be achieved in a number of ways, such as: by eliminating planned obsolescence; by laying greater emphasis on repairs and spare parts rather than on replacement; by giving greater attention to possible further uses for products (reuse or multiple use); by cutting down the production of unnecessary goods. However, if reduction of wastes at source were to be considered in conjunction with recycling, then clearly we would begin to tackle the problem of solid waste management, resource depletion and over-consumption of energy. From the amount of recent talk on the subject, one would suspect that much were being done already about recycling. However, anyone holding this view would soon be disappointed. One only has to look more closely at the present efficiency of recycling, particularly when a distinction can be made between total waste and "old" or post-consumer waste being recycled, to realise the

true extent of the situation. The figures quoted as "recycling percentages" usually refer to the total waste used, lumping together that arising from the manufacturing processes and that which has become waste after serving a useful purpose. Hence the misleading picture that the figures paint. A clear example of this is glass-making, where 21% of the materials used is cullet (waste glass) but of this only 3% ever left the factory. Manufacturers' waste is relatively homogeneous, available in large quantities and easily accessible, so it is not surprising that it is put to good use. But "old" or used wastes are generally very heterogeneous and widely distributed, thus proving relatively difficult to recover. It is here that there is most scope, and need, for improvement. It is a symptom of our economic system that recycling "old" scrap is unprofitable to individuals and companies, whereas it clearly represents important savings to society as a whole. In a free market economy industry will externalise many of its costs: the social and environmental costs associated with raw material extraction and use, as well as solid waste disposal. These must be borne by the community, whilst on the other hand the reclaimers of wastes do not generally receive any of the benefits associated with relieving these costs. Thus the economic balance is at once tipped in favour of raw material use. There are other factors that further strengthen this inequality, arising from the emphasis placed in the past on the importance of developing our extractive industries. Financial assistance has been made available to encourage mining operations, for example. As a consequence of this prevailing attitude considerable research and investment has led to the development of

superior techniques for the extraction of raw materials.

This historic imbalance will not right itself without external intervention. For this reason we look keenly to the government for action here. Such action could come in a number of ways; either by encouraging markets for products using recycled materials (by the use of government purchasing orders) and thus stimulating the demand for reclaimed materials, or by applying fiscal incentives to alter the economic picture itself (as has been done to encourage the extraction of our raw materials). Government assistance is also of vital importance in the development of municipal reclamation schemes. Following a requirement laid down in the recent Control of Pollution Act, all local authorities responsible for disposal of wastes will in the near future be drawing up solid wastes management plans. However, for these plans to represent anything further than a restatement of the current situation it is probable that the local authorities will require prior assurance of central government finance to establish the necessary infrastructure.

In this area we can perhaps learn from current activity in the United States. A recent report by the US Environmental Protection Agency lists some six municipal reclamation schemes already underway. These all appear to have been initiated by their 1970 Resource Recovery Act, recently amended by the Energy Recovery and Resource Conservation Act, which set out to encourage greater reclamation and recycling in three main ways. Firstly, money was made available for research into reclamation and recycling technology; secondly, funds were also provided for the implementation of resource recovery systems; and thirdly, the Act set out to examine and set specifications for government procurement practices so that recycled materials would be included where possible.



THREATS TO EUROPE'S SEABIRDS

Stanley CRAMP F.R.S.
Chief Editor of
"The Birds of the Western Palearctic"

Seabirds as indicators

Man has long since regarded the seas as an ideal dumping ground, vast enough to absorb safely all the filth he deposits in their cleansing waters. This comforting belief is now being questioned. As human numbers explode and agriculture and industry develop, so does pollution — from human sewage, oil (whether from ships, refineries, offshore drilling or draining from the land), persistent pesticides, industrial wastes (including organochlorines as well as heavy metals), radio-active materials and even poisonous gases. The web of life in the sea is complex and still too little known, so the effects of all these pollutants on a vital source of food is often obscure. Seabirds may serve as one valuable indicator of what is happening.

Survey of breeding colonies

Europe's seabirds are found in the greatest number and variety in the north-west, from Iceland, the Faeroes, and Britain and Ireland to Norway and the Arctic seas. Many of the breeding colonies are vast and remote and we know little of numbers there, or how they have changed. Recently, however, an important survey has been made of all the coastal breeding seabirds in Britain and Ireland. The report of this enquiry (The Seabirds of Britain and Ireland, by Stanley Cramp, WRP Bourne and David Saunders, 1974. Collins, London, £ 3.50) makes it clear that the problems of counting seabirds on forbidding cliffs or remote stacks are considerable and still unsolved for some species. Nevertheless, for 17 of the 24 species studied, fairly precise estimates were obtained and it can be said that the total numbers breeding on the coast were of the order of some three million pairs. This is far less than had been surmised in the past, and certainly only a fraction of the numbers of land birds to be found in these two countries.

One of the main aims of the survey was to provide a more accurate baseline, based on total populations as well as the numbers and extent of colonies, to assess future changes. It is possible, however, to say something on recent changes in 17 of the 24 species. Briefly 12 (Gannet, Fulmar, Great Skua, Shag, Cormorant, Sandwich Tern and all six gulls) have certainly or perhaps increased in recent years, while only five (Little Tern, Roseate Tern and three auks) have apparently decreased, so the picture is not one of unrelieved gloom, and it is worth looking at some of the possible factors involved, bearing in mind any available information on these species from elsewhere in Europe.

Changes in population

Experts often differ as to the precise reasons for changes in bird populations, not least because studies in sufficient detail have rarely been made. The explanations for increasing species fall into two main groups. Firstly, the reduction in human persecution (in Britain, following protective legislation from 1869), often accompanied more recently by active conservation measures, and, secondly, changes in natural factors, such as food supply or habits. For two species, the Gannet and Fulmar, detailed counts are available for many years. The Gannet declined markedly in the last century, then began a slow recovery from about 1885, and has since shown a dramatic increase in Britain and Ireland, from 48,000 pairs in the early years of this century to 138,000 pairs in 1969-70. It spread to France in 1939 and Norway in 1946, while four new colonies have been established in Iceland. The initial recovery undoubtedly owed something to reduced persecution, but the continuing increase suggests that other, unknown factors may now be involved. The Fulmar began to spread and increase, earlier the large-billed form breeding

in the warmer waters of the eastern North Atlantic increased in Iceland over 200 years ago, spread to the Faeroes about 1839 and to the mainland of Britain (it had long maintained an outpost on St Kilda) in 1878.

It soon reached Ireland and has colonised Norway and northern France this century. It was first argued that the basic cause was the new rich food supply from offal, first from whaling and later from fish trawling. Others have postulated that a new genotype arose in Iceland, enabling the species to spread into lower latitudes and accept smaller, more straggling colonies, or that changes in temperature and other oceanographic factors have helped.

The gulls appear to be a highly successful group. The Kittiwake, now the most numerous gull in Britain and Ireland has been increasing at some 3% per annum for many years, a population explosion comparable with that of the Fulmar. It has also increased in southern Norway, Denmark, Sweden, Heligoland, Brittany and even on Bear Island in the far north. Much as with the Gannet, reduced persecution has been suggested as a main cause, but again it has been argued that increased food, especially from fishing operations has also played a part. The other five gulls have similarly gained from reduced persecution, but most have also learned to fill a new role as scavengers in the modern urban environment, taking fish refuse from ports and frequenting rubbish dumps and railway sidings in cities, while some are feeding more on agricultural land, and all have learned to use reservoirs as safe roosting sites.

Increases have been noted elsewhere in north-west Europe, as well as in North America, leading to attempts to control their numbers, often with limited success. It is unfortunate that so little is known about changes in the Mediterranean, which has both heavy



Apart from their aesthetic aspects, the avifauna represent one of the main indicators of environmental health. Will the birds of the high seas – which go mostly unseen by the greater part of the European population – teach us, through their gradual disappearance, that the world's oceans are changing for the worse?



pollution and a relative paucity of seabirds. The Herring Gull is still often numerous there and may be a danger to its much rarer relative, Audouin's Gull, which is confined to the Mediterranean.

The Mediterranean is important also for its colonies of tubenoses (Storm Petrel, Manx Shearwater, Cory's Shearwater), but little is known of the present status of their colonies and, as elsewhere, still less of any changes in numbers.

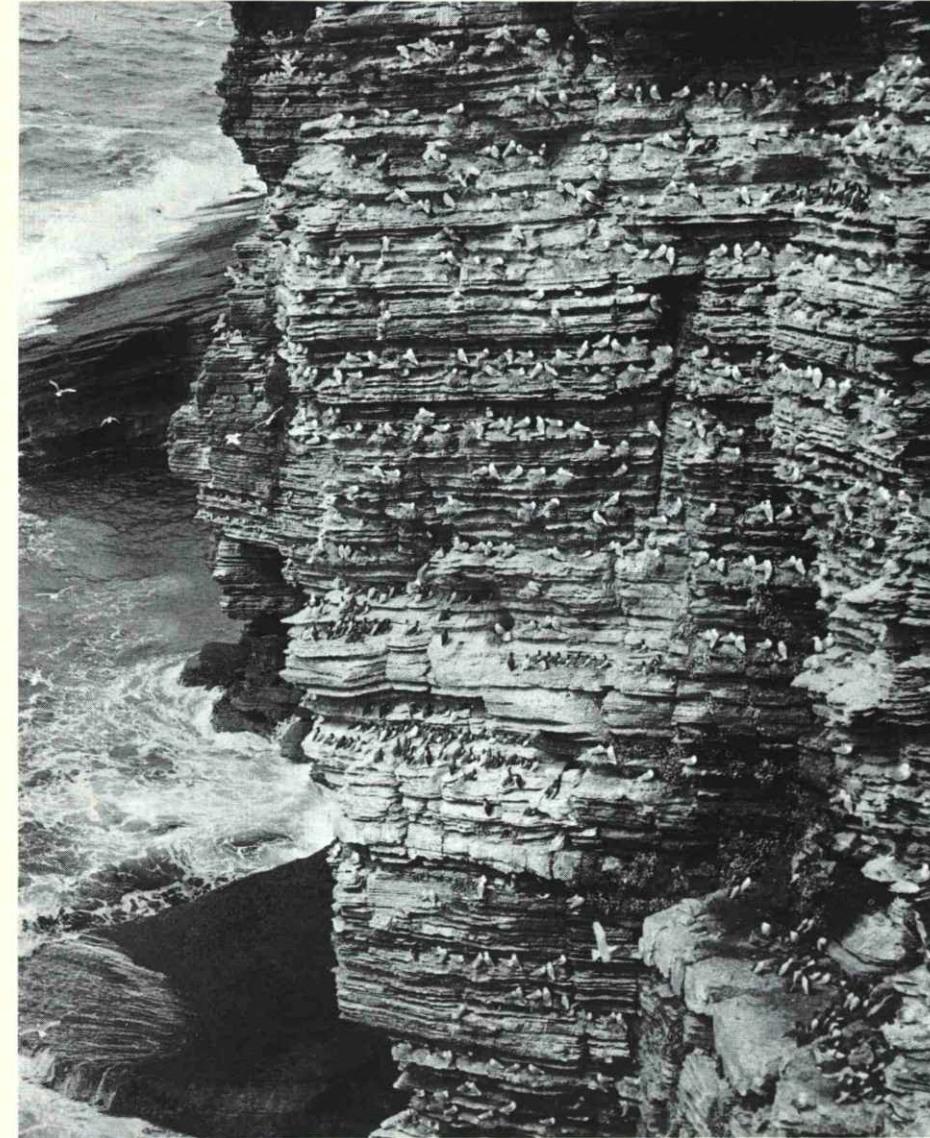
The terns nest on the ground, often in large colonies, and are particularly vulnerable to human disturbance. In Britain and Ireland, the Sandwich Tern has probably increased, the Common and Arctic may have held their own or declined slightly, while the Roseate Tern, which recovered well after facing extinction there in the last century,

may have declined recently, and the Little Tern has decreased markedly. Without the provision of reserves, all terns would have been at serious risk.

Locally, there are other dangers, as shown by the dramatic decrease in Sandwich Terns in the Netherlands (from up to 40,000 pairs in 1940-57 to 65 pairs in 1965), caused by organochlorine residues in their main fish prey. The Cormorant and Shag have increased locally, perhaps due to lessened persecution by fishermen, though this remains a decisive factor for the Cormorant at its inland colonies elsewhere in Europe.

We are still unable to assess auk numbers accurately, but there seems little doubt that the three most numerous species in Britain and Ireland (Guillemot, Razorbill and Puffin) have all

declined in the south-east. More recently, there have been reports of Puffin decreases in their large northern colonies, especially St Kilda. Oil pollution has come under major suspicion here, for the behaviour of auks makes them particularly susceptible and the first declines occurred in areas of the heavy tanker traffic. Oiling is a serious hazard to seabirds and sea-ducks elsewhere in Europe, particularly off Denmark, France, and in the Baltic and probably, though few surveys have been made, in the Mediterranean. Others have argued that climatic changes caused a northward shift in food supplies. The disaster in the Irish Sea in autumn 1969, when over 15,000 birds, mostly Guillemots, were found dead on the beaches, suggested other possibilities, for although the true cause was never

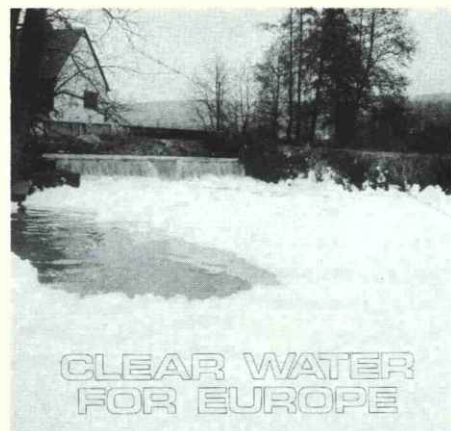


discovered, it was thought that most suffered from starvation, perhaps aggravated by the toxic effects of heavy metals and organochlorines found in many of the bodies.

Conclusions

So although this first complete survey suggests that in one part of north-west Europe at least, most species of seabirds are thriving, there are some disquieting changes which may indicate that pollution, whether gross or insidious, could be adversely affecting other species, and hence also perhaps, other forms of marine life. Further detailed studies, especially in the Mediterranean, are clearly desirable.





FRESH WATER CAMPAIGN: News from the National Agencies

The Council of Europe's Information Centre for Nature Conservation has realised a publicity campaign focussing attention on the problems of conserving and protecting Europe's precious freshwater resources (see « Naturopa » No. 20, of which the greater part is also devoted to these problems). However, the Centre is aware that much of the success of its work is due to the assistance of its National Agencies and Correspondents in both the member and non-member countries. Thus these two pages give a random sample of the activities of a few members of this most important network. It would also seem opportune at this point to announce that the Centre's campaign for 1976 will centre on the conservation of wetlands, one of Europe's most threatened biotopes.

Greece

The problem of conservation of fresh water in Greece is equally, if not more acute, than for other European countries. Greece is a country which receives an irregular distribution of rainfall, with a wide range of annual rain fluctuations from area to area. To this should be added the disproportionate extension of sea coasts in relation to the country's whole surface, as well as the limestone structure of the land and its general relief. These features explain the great quantity of both surface and underground waters running out and lost into the sea.

The above reasons, plus the disturbances caused by man through his excessive exploitation of the forested areas, the irrationally extended clearing of land, the illogical use of agricultural and grazing ground, all through the millennia of the nation's history, caused a general increase in surface flow to the detriment of its useful filtering and storage below surface. Thus man's interference, in its turn, renders the solution of the problem of securing the fresh water supply in sufficient quantities more difficult, especially in view of the continuously rising demands for good quality water. In this country serious efforts are being made towards turning to best account its water resources through the execution of many-sided projects. At the same time the Ministry of Social Services takes care of securing the good quality of water, with the co-operation of other agencies in the country. Of course all measures taken do not completely cover the sector of fresh water conservation, and there is still much to be done. Serious efforts are also being made for acquiring the international experience in this field, given moreover that the dramatic development of industries has caused new problems, to face which there is a need for new techniques and methods, which have not yet been introduced in the country. The endeavours of the government services are, wherever possible, assisted by university laboratories, thanks to their research, as well as by private organisations.

The Hellenic Society for the Protection of Nature, within the scope of the campaign for the conservation of fresh water, led by the European Information Centre for Nature Conservation of the Council of Europe, has scheduled a series of manifestations, e.g. lectures by specialists etc, in order to face the problems caused by the use, the pollution and the general management of the water

resources of Greece. The manifestations will begin as early as possible after the formation of a responsible parliamentary government, which, it is hoped, will be in a position to undertake an effective policy.

Byron ANTIPAS,
Hon. Secretary of the Hellenic Society
for the Protection of Nature, Athens.

Sweden

The initiative taken by the European Information Centre for Nature Conservation in launching a new European freshwater campaign is very welcome in Sweden, which boasts a considerable number of lakes and watercourses used for recreation and sport as well as for consumption.

These fresh waters, moreover, have become increasingly polluted by industry and the communities so that in 1964 a research programme on the physical-chemical and biological conditions in the four biggest water-systems was started by the National Environment Protection Board. Much has been done since then but there is still much remaining to be achieved.

In order to inform the public in the vicinity of the lakes about what has happened during these 10 years outdoor exhibitions were arranged last summer, illustrating practical moments in the research work, how to take test samples of oxygen, phytoplankton etc, the present condition of four big lakes, and the interplay between different ecological variables. The four lakes, Mälaren, Hjälmaren, Vättern and Vänern, together compose an area which is one fourth of the total water area in Sweden.

It is expected that the exhibitions will interest people in the work being done and underline the importance of further actions in order to improve the conditions of the lakes. It is also hoped that the documentation which has been distributed as part of the Centre's campaign, together with the poster, will enhance this interest in the need for the conservation of freshwater.

Sven LUNDSTRÖM
Head of the Information Section
the National Swedish Environment
Protection Board, Stockholm.

Liechtenstein

The Council of Europe's current campaign on "clear water for Europe" represents, as far as our country is concerned, an important and highly topical phase in the drive for water conservation.

Water conservation in Liechtenstein

The public first became aware of the need for water conservation when the Water Conservation Act of 4 June 1957 became law. The country's first biological/mechanical purifying plant began operating in 1967. When referenda were held on the need for water conservation (i.e. on the ear-marking of substantial public funds for this purpose), 89% of the electorate in the Liechtenstein Unterland (14-16 May 1971) and 93% of the electorate in the municipality of Balzer (19 May 1972) agreed that considerable resources should be used in this way. As a result of these referenda, Liechtenstein will have, by the end of 1975, 100% purification capability for all waste water, i.e. all waste water discharged into sewers will be treated in purification plants. All industrial waste water is already so treated.

Questionnaire on environmental issues

Largely thanks to their active participation in European Conservation Year 1970, the people of Liechtenstein are already alive to environmental issues. In a recent, representative questionnaire, the question: "What do you consider the most pressing environmental problem in Liechtenstein?" was answered as follows: 28% of the population thought water conservation, 24% regional planning, 19% nature and landscape conservation, 18% anti-air-pollution measures, 7% waste disposal, and 4% noise abatement the most urgent environmental need. Thus water conservation was given the highest priority.

The "Clear Water for Europe" campaign

Water conservation laws: a governmental draft version of projected water legislation is currently under study. In accordance with the spirit of the European Water Charter, the Liechtenstein Society for Protection of the Environment wants added protection measures and an inventory of existing water reserves.

Press: the material supplied by the European Information Centre for Nature Conservation has been sent to the national papers, and some of it has already been printed.

Schools and education: the folder on the Water Charter prepared by the British Correspondent was passed on to the Liechtenstein grammar school for use during English lessons.

Internal circulation: on the basis of our mailing list, we have circulated the copious material supplied by the European Information Centre for Nature Conservation to interested institutions, authorities and individuals (teachers, experts etc).

Competition for young people: as part of this freshwater campaign, themes relating to water conservation and research have for the first time been included in the regularly-appearing competition, "Young Liechtenstein on the Look-out".

Lectures: when a purification plant was opened in Balzer, the European Water Charter was translated into German for the mayor, who was able to cover other aspects of the freshwater campaign in his address. Following publication of the relevant information material by the Council of Europe, we began to publicise the freshwater campaign relatively late, towards the end of the summer. We were very grateful for the data supplied by the Council, particularly for the German translations of the texts, and put it to good use. The campaign is continuing and any opportunity to publicise the European Water Charter will be exploited.

Mario F. BROGGI,
Technical Director of
the Liechtenstein Society
for Protection of the Environment.

Italy

The problem of water conservation, like all other problems of ecological importance, comprises two aspects: firstly, there is the straightforward question of conservation, which comes under the general heading of ecological theory; secondly, there is the largely practical question of meeting the increasing need for fresh water supplies.

In Italy especially, the demand for water has assumed proportions which suggest that all the country's resources will have been exploited in the near (or even immediate) future. Connected with this, there is the still more delicate problem of water quality, which, from a practical standpoint, can be solved only with reference to the amounts of water that must be supplied to meet the demands of all users. And because those amounts together add up to a volume representing very nearly the total of Italy's water resources, it is clear that the two problems must be considered as one.

Not surprisingly, public interest has been aroused chiefly by the practical aspect of the problem, because of its direct relevance to immediate needs. The general public is now aware of the extent to which pollution has become commonplace in Italy, the highest levels being recorded in areas of heavy industry (industrial waste), in densely populated areas (domestic waste) and in regions where intensive farming is practised (pesticides, fertilisers, etc.).

The campaign for fresh water conservation organised this year by the European Information Centre for Nature Conservation of the Council of Europe is extremely well timed and the general public will certainly respond favourably to it.

There is now no doubt that in Italy, the problem cannot be dealt with piecemeal, but only in the framework of nationwide planning and policy options.

Water conservation is in fact a matter for regional planning specialists, for we have now reached a stage where every decision has repercussions not only on the behaviour of watercourses (a problem in its own right) but also on the total amount of water available for drinking, irrigation, etc.

For that reason, water quality has itself become the subject of a plan and a matter of concern to decisionmakers at all levels, from the individual to communities and associations of every sort and kind.

From the above considerations, it is already clear which organisations and persons are likely to respond favourably to a campaign for water conservation. In Italy, every ministry has an interest in water for one reason or another. One could single out the Ministry of Public Health, the Ministry of Agriculture and Forestry, the Ministry of Tourism and the Ministry for the Budget and Economic Planning. Then there are the regions, with their assessorati competent in the same fields, the provinces and the municipalities. Other organisations include the Chambers of Commerce (one in each province), the land improvement consortia, the mountain communities, the Water Research Institute of the National Research Council, and the Magistrature.

On the political front, the campaign is already being waged energetically: as early as 1971, the Senate began a wide-ranging survey of these problems with the co-operation of some of the most reputed ecologists. Progress is likely to be even more rapid and vigorous at local (municipal) level, where moves are already under way to install water purifiers and to slow down urban development. Standards for the protection of water against pollution are laid down chiefly in the consolidated legislation on health (1934), the laws on water and electrical plants (1933), the 1931 angling act, and other indirectly related acts.

Although it leaves much to be desired, this body of law has enabled the courts to take some effective action in recent years. The most important, and most difficult, task for our politicians is therefore to bring the country's legislation on water conservation up to date, so that action in that field can be still more effective in the future.

Dr. E. MAMMONE,
International Relations Office,
Ministry of Agriculture, Rome.

Austria

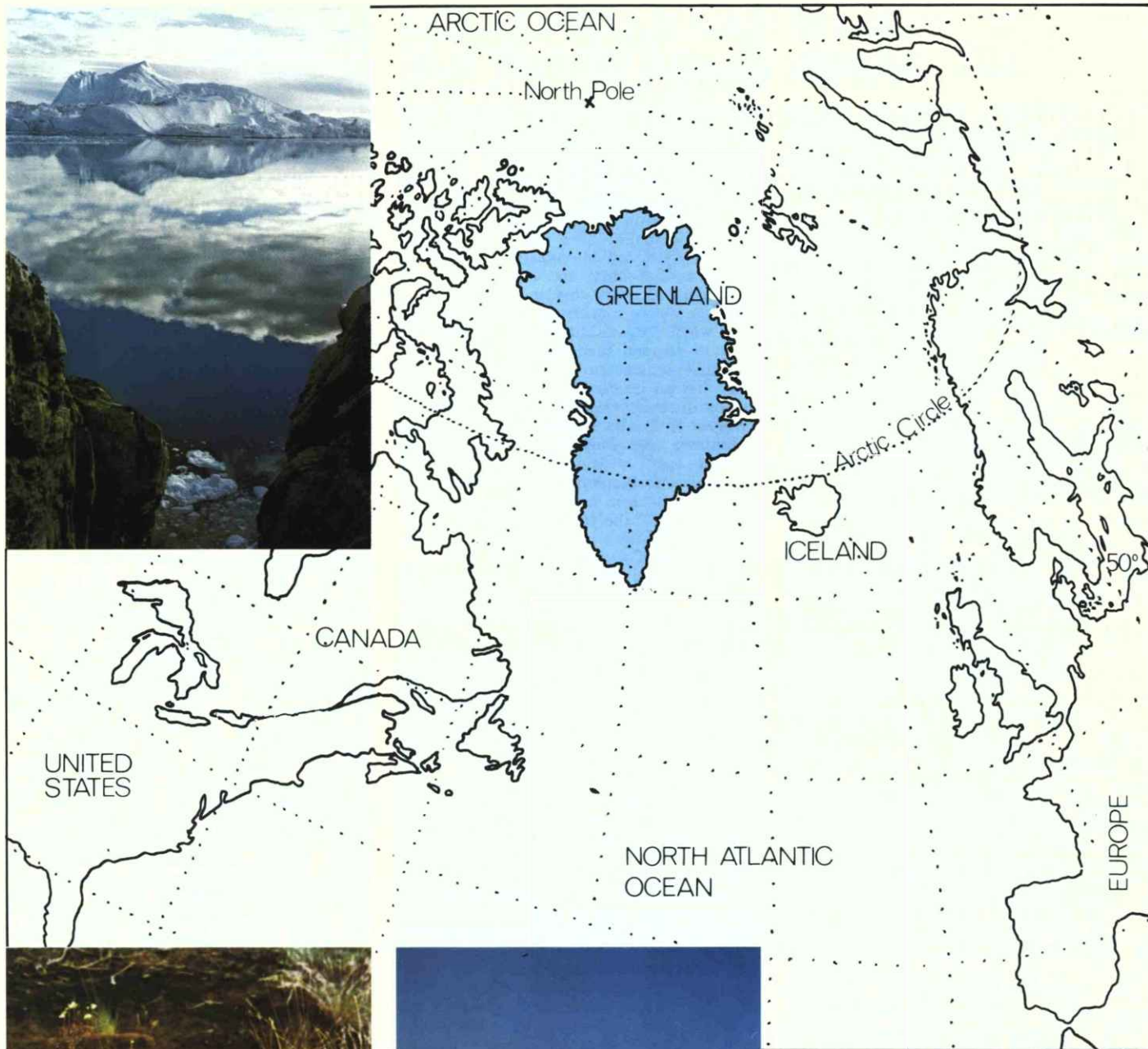
The Council of Europe's 1974 campaign on freshwater conservation has met with great interest in Austria, who is not without her own problems in this domain. Already in 1973, the Federal Ministry of Agriculture and Forestry officially expressed the urgent necessity of improving the water quality of the river Mur and proposed certain measures to this end. The Mur is the most important river in Styria, particularly from the industrial point of view and thus its banks are also very heavily populated; it is therefore not surprising that over long stretches the quality of its water is very low. This

is mainly due to industrial effluents, especially those from the paper mills and cellulose factories, together with domestic and industrial waste which flows untreated into the river at Graz, the capital of Styria. The Ministry is striving to achieve a quantitative improvement in the water quality of the Mur by the end of 1978. Among others, it is demanding that human and domestic wastes be biologically cleansed before entering the river; that sufficiently large purification plants for both towns and industries be constructed; and finally that closed water circuits be created so that industry may use and reuse the water it needs. Many seminars and colloquys have been devoted to the conservation and protection of freshwaters, particularly problems concerning the increasing pollution of the lakes which are being visited by more and more tourists. Various länder have in their own territory issued a rule prohibiting the use of motor vessels on the larger lakes; despite initial angry protests from many of the motorboat owners, this measure has proved highly efficient and has received much support from the majority of all those seeking recreation at the lakes. It is envisaged that this law will eventually be extended to include the prohibition of motor vessels on rivers and on the smaller lakes.

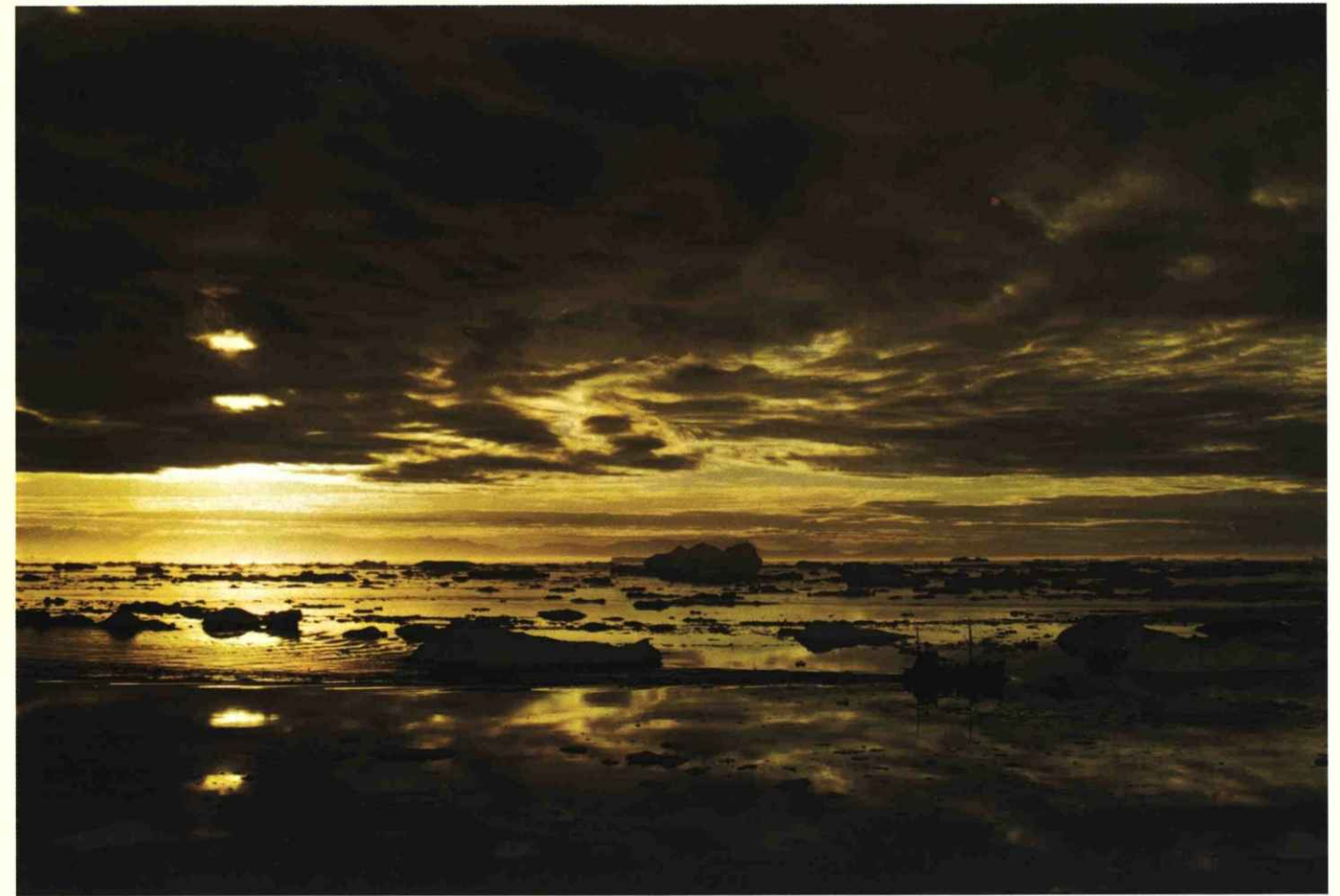
Last May, during the meeting of the International Water Conservation Commission, Austrian specialists reported on water conservation measures taken in the region of Lake Constance, while the problems of cleansing water polluted by industry were the theme of the meeting held in September at the University of Mines at Leoben. Widespread discussion of these problems have also been organised at schools and colleges of further education and special educational material, including films such as "The life of a river" and "But the best thing is water" has been used within this framework. Other special material has been sent to various newspapers in order to give the widest possible scope to water conservation problems; the articles provided by the Council of Europe as part of its campaign have been sent to all members of the Association of Journalists concerned with the Environment. In October an Environmental Fair — Project 2000 — was held in Graz where the land of Styria showed its initiatives in the field of water conservation and displayed its specially constructed laboratory van. Various firms, particularly from the United States of America, demonstrated various technical possibilities for water purification. In summary, it may be said that this campaign has reached a wide audience and has clearly shown the urgent need to protect and conserve freshwaters. It is hoped that, as a result of these efforts, sufficient understanding and awareness will have been created for the necessary political measures to be taken.

Dr. H. ORTNER,
Austrian League
for Nature Protection.





High in the North Atlantic and crossed by the Arctic Circle lies the vast and enigmatic island of Greenland. Of its total surface area of 840,000 sq miles only 1,6% is not permanently covered with ice. Its sparse population of about 45,000 is concentrated in relatively few towns and settlements along the southern coast. Greenland is the Island Territory of Denmark but its geographical position is closer to the American continent, of which it possesses many characteristics particularly in terms of flora and fauna. For example, the Musk Ox originally migrated from the American continent to Greenland where it is now found in the northern and eastern coastal regions. Glaciers prevented any further movement into the southern part. In general problems of environmental conservation may at first glance appear to be few, but the growing international interest in deposits of oil and



mineral resources together with increasing tourism are causing grave concern. However, a new legislation currently in preparation will enable large areas of Greenland to be permanently protected as vast arctic national parks. This legislation will also make it possible to take further necessary precautions to ensure the protection of arctic wildlife, vegetation and the environment as a whole. Greenland was given its name by colonising Norsemen who settled in the sheltered inland valleys of the southern region, the only area in Greenland where trees can be found. Despite the rough climatic conditions and although characterised for the most part by small plants, the Greenlandic vegetation is in general very varied and spectacular and is composed of a wide spectrum of beautiful and delicate hues. But this vegetation is of course highly sensitive to all human activities such as pollution from vehicles. Furthermore, the small forests of southern Greenland have been considerably reduced due to fuel requirements and other areas have suffered considerable devastation from sheep grazing. However, it is hoped that through an increased awareness of these problems, intensive research and careful planning, it will still be possible to safeguard the characteristic and valuable assets of Greenlandic nature.



The question of whether the general public should be allowed access to a national park or nature reserve is a subject of great controversy which has given rise to a range of often directly opposing points of view. In Nature in Focus No 18 Dr. Roderkerk cited one example in particular where both admitting the public to a national park and continuing conservation of the natural environment are possible (Kennemerduinen National Park). This is of course a special (and highly successful) case and the measures taken in this national park will not necessarily work in all other national parks and reserves — for reasons such as management policy, the composition of the park in terms of fauna, flora and landscape etc. In the following two articles, the authors discuss the pros and cons of admitting the public to national parks and nature reserves.

NATIONAL PARKS NATURE RESERVES AND THE PUBLIC I

J. J. ZWEERES
Representative of
the Netherlands National Agency
of the European Information Centre
for Nature Conservation
(Council of Europe)

Why admit visitors at all ?

Perhaps the greatest challenge to those who are entrusted with the management of nature reserves is how to cope with the growing interest in conservation and with the resulting influx of visitors to these reserves. There are also those who claim that visitors destroy the very work being carried out in nature reserves and ask whether in fact visitors should be admitted at all. Of course some reserves are so vulnerable that there is no question of visitors being admitted. However, the majority of the larger reserves up to the national parks, which encompass whole villages and sometimes even towns and where the human inhabitants are actually an indispensable part of the ecosystem, can be visited without too much harm being caused if appropriate precautions are taken. Furthermore I think that it would be unfair to prevent those who contribute financially to the creation of nature reserves (be it through annual subscriptions to private societies or just through the inspiration of their governments to use part of the tax-payers' money for this purpose) from seeing for themselves the results of their efforts and how conservation works. Even in the case of a reserve where no visitors can be admitted at all, I think it is necessary to inform people of what is happening there, such as by using the mass media, by widely published reports, films, etc.

European Diploma

It is worth mentioning here that for a number of years the Council of Europe has been awarding the European Diploma to "Certain protected landscapes, reserves and natural features" in order to "encourage the effective protection and management". Since it is a well-known fact that people seldom fully appreciate certain aspects of nature, beauty sites, or natural surroundings in their immediate vicinity and with which they come into contact regularly, the award of the European Diploma to such a site may act as an eyeopener and lead people to realise that what may have seemed commonplace and ordinary is, in reality, worth their interest and attention; that such a site is special in its own particular way and that its value from the point of view of nature conservation may be almost priceless. If the Diploma is indeed to be effective in this way, its bestowal should be widely publicised in the country of origin as well as abroad. Thus not only will attention be attracted to the site in question, but people will want to come and see for themselves why the Diploma has been awarded and what special qualities the area possesses. This of course is precisely one of the intentions of awarding the Diploma. However, since the Diploma is also awarded to encourage protection, certain measures must be taken to deal with the hundreds or thousands of visitors flocking to the area in question, in order not to destroy the very reason for its preservation, etc.

Measures to be taken :

1. Environmental education

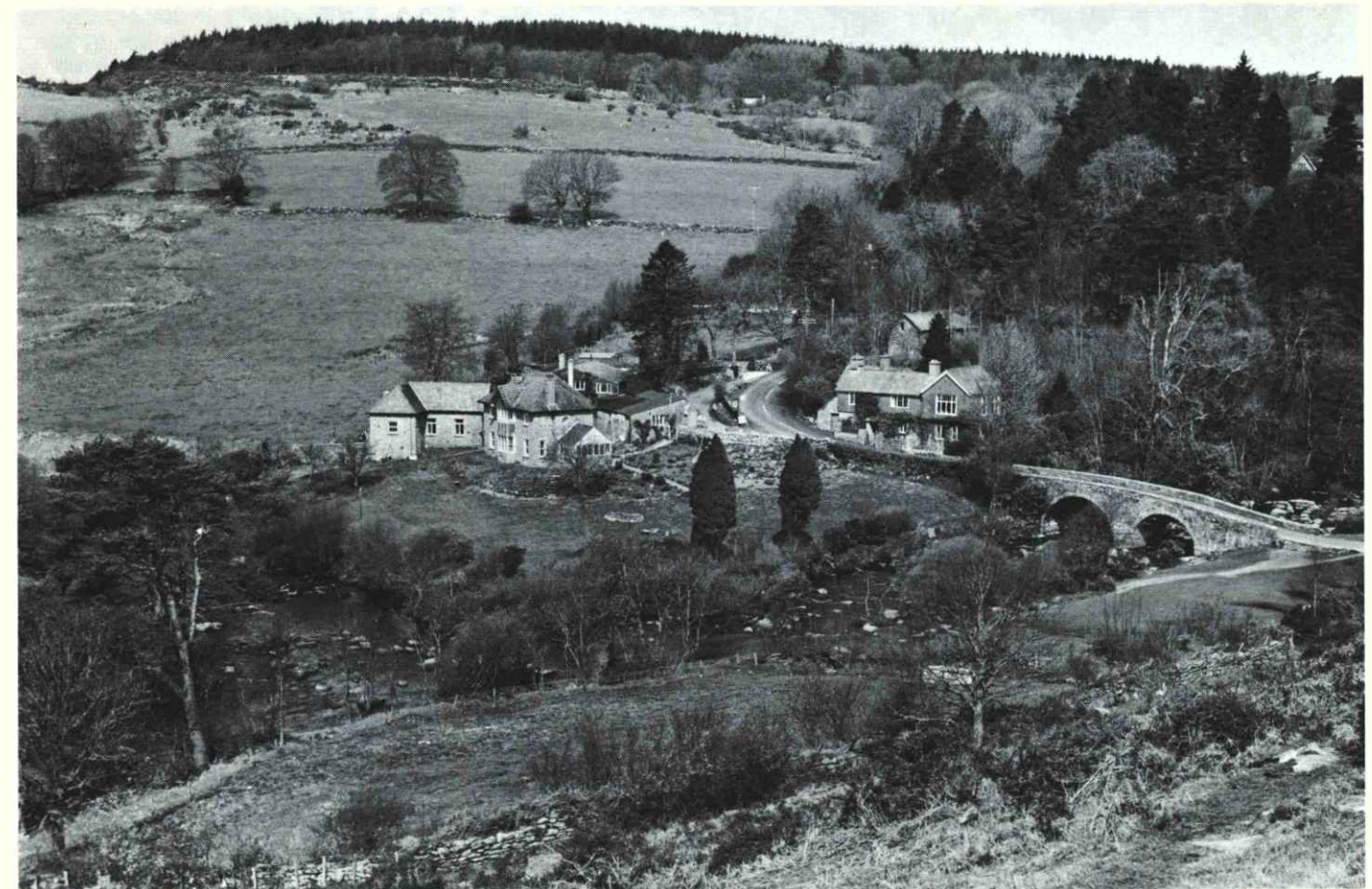
As a worker in the field of environmental education, I naturally put great trust in its possibilities as a means of "taking measures". These possibilities range from a visitors' centre, aimed at showing people how they should behave when they visit a nature reserve (such a centre would have to be situated near the entrance to the reserve), to nature trails, observation huts (very fine examples of these are to be found at the R. S. P. B. bird reserve Minsmere in East Anglia, England), camping sites (preferably combined with a visitors' centre and also the starting point for one or more nature trails) and personally conducted tours.

It may be argued that all such provisions just tend to attract even more visitors. This is of course an inevitable result of all endeavours to promote a public interest in the cause of conservation.

The only solution is to find appropriate and efficient ways of keeping ahead of and dealing with the ever-increasing stream of visitors.

2. Creation of zones

In the case of fairly large reserves, a very interesting and successful system of protection lies in the creation of zones, viz., an outer zone where visitors are more or less left to their own devices; an inner zone where they are expected to abide by certain rules and regulations; and the innermost zone



"The majority of the larger reserves up to the national parks, which encompass whole villages and sometimes towns and where the human inhabitants are actually an indispensable part of the ecosystem, can be visited without too much harm being caused if appropriate precautions are taken."

or heart of the reserve, which can be closed to all visitors from the general public.

By prohibiting the use of mechanical transport and constructing trails which become increasingly impassable towards the centre of the reserve, most visitors can be discouraged from reaching the inner sanctuary, even without the erection of numerous notices. In the fine national park near Zakopane in Poland I have witnessed the extremely successful operation of this system. In the outer zone there is even special transport available in the form of horse-drawn carriages, carrying visitors to the border to the second zone, where they are obliged to walk along a prepared trail. At the edge of the inner zone there is an attractive restaurant, where visitors can rest and refresh themselves before starting out on the way back. Few people seemed to be enticed to enter the third zone, which is in fact a strict reserve.

3. Diverting interests

I believe that in general it is very important to strive for guidance in a way that is not obvious. If rare birds of

prey are nesting in a certain sector of a wood, one possibility is to put up notices announcing this fact and asking people not to leave the trail, at the same time explaining why they should not do this. Most visitors will automatically oblige, but even the one or two exceptions who do not may irreparably disturb the birds. Thus the safest way of protecting the birds would be not to mention the breeding site at all, but to put up alternative notices attracting visitors away from the nesting site for other reasons. A notice saying "Half a mile from here Bluebells are in full flower", will cause everybody to hurry along to have a look at them.

When a nesting site is in use year after year it is sometimes a good idea to encourage the growth of prickly shrubs along this part of the trail, to physically (but subconsciously) restrain people from leaving it and straying into the wood. The surface of a trail may also discourage people from following it in an unwanted direction. In mountainous country it might even be possible to divert the course of a brook, provided this does not turn the trail into a cul de sac. It should me-

rely continue in the direction required to be taken by the visitors, away from the site where the precious birds are nesting. When the Ospreys returned to Scotland and attracted much public interest, the R. S. P. B. wisely put up an observation hide at a safe distance, from which visitors obtained a wonderful view of the birds on the nest through powerful binoculars. (Many of them showed their gratitude by contributing to the collecting box and so helped to pay for the extra measures to protect the nesting site !)

4. Guided tours

The very best way to prevent damage is to have conducted tours only. But this is possible only when enough guides are available. In Britain and in the Netherlands the collaboration of volunteer guides has been very successful. Although most of those are available only at the weekends, this is still the period during which the greatest numbers of people wish to visit. Retired people have more leisure time and for them the work of a voluntary guide might even give them a new purpose in life.

NATIONAL PARKS NATURE RESERVES AND THE PUBLIC II

Dr. Arthur BOURNE

The question of whether the general public should be allowed access to a national park or nature reserve is a tricky one and cannot be answered with a blanket yes or no. The decision to set aside an area of land or a stretch of coastline as a national park or nature reserve requires the careful analysis of a number of considerations. "Why" and "where" are, of course, questions of paramount importance for they should be the *raison d'être* for declaring an area a reserve, but "for whom" should also be very much in the minds of those responsible for the decision. Unfortunately it is in deciding whether or not access to the public should be granted that the conflict is felt. On the one hand it seems ludicrous to deny the public access because it raises the question of who the reserve is for; yet, on the other hand allowing the public into a reserve may defeat the original objective. The conflict is heightened by the overwhelming fact that the public generally pay, through their taxes, for the upkeep of the park or reserve and feel that they have a right to enjoy what has been set up in their names and with their money. Given, then, this conflict between interests, what guide-lines are there to enable us to reach a fair decision? Luckily these can be found in the reasons for proposing the area in the first place.

The usual reasons for setting up a national park or nature reserve are that it is an area of outstanding natural beauty or scientific interest, it is ecologically unique e.g. the habitat of some rare and vanishing species of plant or animal, it is of geological, historical or archaeological value; or any combination of these. There is also the over-riding fact that the reason that this particular area should be protected is that previous to setting up the park or reserve it has suffered from human interference. It is implicit therefore that human interference should be prevented for otherwise the objective would be defeated, but if people are not allowed to enjoy the

area or thing to be conserved, what is the point of the operation? Conservationists will reply that it is the artifact, plant or animal that counts, but then they have to rely on the public, a great many of whom may either be disinterested in or unaware of the objectives of the conservationists.

This brings us right back to the beginning — the question of whether or not to single out a piece of territory for preservation or conservation should be given the fullest airing in public, so the people may know the "whys" and "wherefores". Given the reasons in a way they can readily understand, an informed public will, generally speaking, accept decisions regarding access to the park or reserve. Here we should differentiate between these two terms, because they can mean different things in different countries. Both, by and large, have the same objectives, but usually national parks are much larger than nature reserves, the latter frequently being included within the boundaries of the former. Parks are usually declared because of their outstanding beauty and the reason for setting them aside is to protect them from despoilation by development and urbanisation, and other man-made intrusions.

Very often in small countries, such as the United Kingdom, there are villages, farms or even small industrial sites within a park. The question of access therefore has to be refined, because we have to understand its meaning, especially when a part of the public is already living in the protected area. The major problem in a large national park is the influx of tourists who come to see and enjoy "their" park; unfortunately the result of these seasonal migrations can be catastrophic. In the United States, for example, where there are over thirty national parks preserved "for the profit, the satisfaction and the inspiration of the American people", steps have had to be taken to protect them from despoilation by their visitors, particularly the impact of the souvenir hunters. The problem is not whether there should be access

but how much. If the objective is to preserve the beauty of the area, then we have an obligation to those who have not as yet had the opportunity of visiting a park and to those who are yet to follow us. So the question is not merely one of whether or not people should be allowed into a park but also one of how many and when. The answer will depend on the nature of the park, the number of visitors and the effect or effects they are having on it. The question of numbers is one of the most difficult to answer, for once a park is open to the public, how does one control the number permitted to enter; it is much easier and fairer to disallow all than to allow some and not others. Inequality and unfairness engenders more illwill than a frank "No Entry".

Generally speaking, apart from wardening the park and educating the public on the dangers to it from their own, innocent or otherwise, activities, the only way to cut down the number of visitors and thereby reduce the damage, is to control accommodation facilities, hotels, lodging houses, camping sites, club huts, and motor vehicle access. It is senseless for instance, to construct a highway into a national park and expect it to survive! The answer must be to limit access, and in certain regions, where the damage is severe, prevent access altogether. Many national parks are large enough for such measures to be carried out without depriving the public too much.

The case of nature reserves, whether they form part of a national park or not, is very different. These have usually been set up with a more precise objective in view than that which led to the creation of a national park, and more often than not they do not have within their boundaries permanent human habitation. The question of access to nature reserves, then, is one of priorities. If the reserve has been set up, and therefore the taxpayers' money spent, to preserve the habitat of a rare or vanishing species, especially if it is known that the habitat may be damaged by human interference, or the animal — say a breeding bird — is sensitive to human presence and may desert its eggs or offspring, then the argument for forbidding access is sound; otherwise we are defeating the object of the exercise and wasting public money. It is not quite so precise in the case of a geological, archaeological or historical reserve, where it may be possible to allow visitors to view the site providing there are sufficient safeguards to ensure its security. However, even in such sites it is not sufficient to



In the Brecon Beacons National Park specially provided lay-bys with various amenities such as picnic tables and conveniences, are extensively used by caravans as overnight halts.

prevent only the plunderer or the occasional souvenir hunter, the site has additionally to be safeguarded from the simple trampling of all its visitors. For example, many prehistoric sites, mounds, earthworks and the like are used as vantage points, especially when they are sited along the coastline or at the highest point in the surrounding countryside, and in such places the effect of trampling is to destroy the covering vegetation where the paths wander over it. This leads to accelerated erosion and gully formation ruining, not only the look of the site, but also its archaeological value. There are two solutions to this problem: either public access is prevented altogether or the site itself is fenced off, thus creating an offensive intrusion into the reserve.

If the decision to disallow public use of the reserve area is made, then the authorities have it upon themselves to honour the agreement with the public, and by this I mean that any access by whomever and for whatever purpose should only be made if it is in the public interest. Having persuaded the public that their money is being well spent in protecting a particular plant or animal, or preserving a particular archaeological site, then the authorities responsible must see to it that there should be as little interference as possible with the site. There is nothing more irritating and more liable to incense the public against conservation than the thought that nature reserves are there for the amusement and interest of a privileged few. The public will accept that bona fide personnel, wardens, specialists, naturalists etc.,

will have to have access to a reserve, but they will, quite rightly, question the rights and the value of visits by parties of what appears to them as privileged persons. If scientists or students are to be allowed in, then questions will be asked. In most cases, except that of sensitive animals or small areas of delicate ecological niches, well-conducted but limited parties would probably do little harm, though more consideration should be taken of their long term effects; long intervals between visits, however, should provide sufficient safeguards. In a situation where there are sensitive animals then there is a strong case for making it an absolute reserve with no access allowed to anyone, including scientists and naturalists, unless it is imperative for the animal's preservation that it should be observed.

Changes of policy also lead to trouble, the more so when the avowed reason for setting up the reserve is abused. Fairly recently a decision was made to allow the killing of seals on a traditional island sanctuary on the pretext that it was not only in the interest of the salmon fishermen, who alleged that the seals were taking inordinately large numbers of their fish, but also because it was good for the seals that their population should be controlled. What the decision actually achieved was to destroy the meaning of sanctuary. This opened up the whole question of ethics of taking people's money, for this particular sanctuary was set up by public subscription solely for the purpose of preserving wildlife. What faith could the public possibly have in the face of such a turnabout

In the oldest nature reserve of my country, the Naardermeer, visitors are admitted only in restricted numbers and are taken round by punter. They have to pay the wardens who take them round and this generally works quite well. In other situations it might be possible to have special coach parties only. If these coach tours can be interrupted by short walks along carefully chosen trails, the whole of the visit might become very attractive and instructive.

5. Informative leaflets

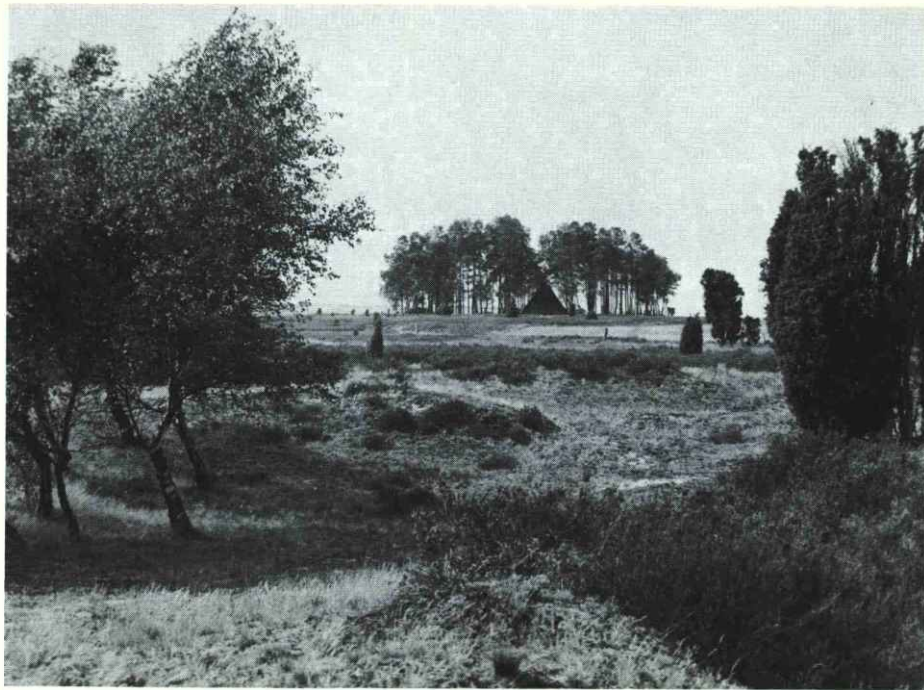
Reserves of international fame inevitably attract visitors from abroad. Generally speaking these will be people with a special interest in conservation. Nevertheless it is often worthwhile preparing a leaflet for them in their own language, indicating in simple terms the special values of the reserve and the measures that have been taken for its protection and preservation. Those responsible for the booklet should not be afraid to state that they are proud to show what has been achieved and I am sure the visitors, on reading this, will be more willing to co-operate. (It might be a good idea to make those leaflets available to the national agencies, so that people will arrive well-prepared for what is expected of them.)

I think it might even be worthwhile to consider the possibilities of composing a simple conservationist's "Travel Guide", which gives information on carefully selected reserves in a number of countries, with full details on possibilities for visits, where to apply for permits etc. This will attract people to those reserves which are considered able to receive a certain amount of visitors and, which is far more important, may keep them away from those reserves which are more vulnerable.

I would like to say in conclusion that I do not think we should prevent the public from being admitted to certain if not all nature reserves and national parks.

However, I am aware of the dangers which can arise from an ever-increasing number of such visitors unless the appropriate precautions are taken. I believe that a widely executed system of measures (many more can surely be added to those I have mentioned) will enable not only the general public to visit, enjoy and appreciate our natural heritage but also the continuation of our efforts to protect and conserve it.





The Luneberg Heath National Park — this part of the landscape has been specially reserved for recreational purposes. This national park was awarded the European Diploma by the Council of Europe in 1968.

in policy by those responsible for the sanctuary?

Understandably, though they do stand to gain most, in the long run, from the idea of nature reserves, the public very easily lose interest when they see this sort of behaviour. Other cases could be cited where pressure groups with strong commercial interests have influenced a change of policy towards a nature reserve or a national park. In the United Kingdom, the search for minerals has been allowed in at least one national park.

If we are to continue to have national parks and nature reserves, then there will be times and places, depending on the reasons for establishing them, when clearly in the interests of conservation or research, the public at large will have to be kept out. Although it may appear to be some form of scientific chauvinism to keep people out of an area of outstanding scientific interest, it is in the interest of the site to do so. To persuade the taxpayers to pay for a site on these grounds and then allow them to destroy the site is not only a waste of their money, but plain silly. If the public agree that part of their taxes is to be spent on research and conservation, then they not only have a right to see that this is done in the best possible way, but also they have an obligation to co-operate with the scientists in seeing that this policy is carried out. The scientist, naturalist, or warden in charge of a nature reserve and the personnel in

charge of the running of a national park should remember at all times the reasons for which the reserves or parks were set up and the objectives set for their maintenance. If it is their specialist opinion that the public should not be allowed into the whole or part of a national park or nature reserve, then it is their responsibility to act on that opinion. They should also remember at all times that the public are not only paying for the park or reserve through taxes but also for their salaries; it is much more satisfying to explain to the public why such action is being taken than to ignore them and earn their suspicion and antagonism.

The concept of the national park and the nature reserve is one of the more enlightened in an age when material progress is regarded as the pinnacle of Man's achievements, and it provides a little sanity in what at times appears an insane world. Although at times we may have to be kept out of our parks and reserves, we should welcome them as little oases.



In the first issue of 1974 (No 18), a series of articles on production, consumption and the environment was begun. The recent surging developments in energy production was taken as the initial theme, to which the contributors were the Royal Dutch Shell Group and the Arbeitsgemeinschaft der Verbraucher (Bonn). In No 19, transport systems were considered by VOLVO (Sweden) and the Unione Nazionale Consumatori (Rome) and in No 20, the Federation of Migros Co-operatives (Switzerland) and the Institut National de la Consommation (Paris) commented on the food industry. In the present issue, this series is resumed by the following two general articles in which Jacqueline Poelmans-Kirschchen of the Free University of Brussels, discusses consumption and the environment, followed by a contribution from Philips (Netherlands) on industry and the environment.

CONSUMPTION AND THE ENVIRONMENT*

Jacqueline POELMANS-KIRSCHEN
Professor at the Free University
of Brussels

Men are customarily considered to have two sides, producer and consumer, whose interests may be contradictory. But man is also a citizen with ideas regarding human development which do not always coincide with his immediate material interests. In his article "Energy and the Environment" ("Nature in Focus" No. 18, 1974), Dr. Tilman Höhfeld stressed the particularly serious conflicts of interests over energy utilisation. In varying degrees, his analysis is valid for all forms of consumption.

It is only relatively recently, in the space of less than a decade, that whole populations, and particularly those of the developed nations of the so-called Western world, have been made aware of the deterioration of the environment. The action undertaken by the Council of Europe in this connection, and notably the organisation of European Conservation Year, has been highly influential.

Why has this growing awareness taken place around the Seventies and not earlier? What forms has it taken?

Damage to the environment — the principal forms being pollution (of the air, seas and rivers, and of the individual's environment by noise), the irrational and uncontrolled spread of urban areas, the shrinking of open spaces and scorn for aesthetic considerations — is nothing new. The proof lies in the fact that some countries (notably Great Britain) already had policies for protecting the quality of life a century ago.

(* The fundamental ideas taken up in this article were the subject of a conference, bearing the same title, held at the College of Europe during Bruges Week in May 1974.

If concern for the protection of the environment has now become commonplace, it is because a threshold has been reached beyond which the harmful effects become disproportionate and often irreversible: animal species are disappearing, unspoilt countryside and open spaces are shrinking at bewildering speed, scenery is irreparably spoiled and townspeople are fleeing towards what remains of the country.

The sudden awareness we are witnessing is also due to several other factors, some of which are interdependent:

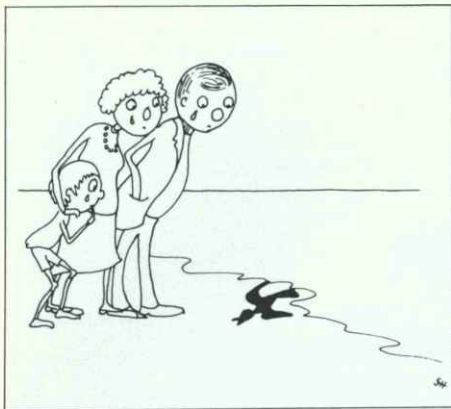
- the accelerated growth of the production potential during the last 25 years;
- the accelerated pace of scientific and technological discovery;
- the exponential increase of the population;
- a standard of living high enough in some countries for the campaign for a better environment to be included among the priorities;
- progress in various sciences affording what specialists call a "macro-view" of phenomena;
- and finally, the questioning of the goals of the "consumer society" which assumed bitter, spectacular proportions in 1968.

If the citizen-consumer of 1974 knows that the environment is being spoiled, if he sheds a tear for the gull whose wings are smeared with tar, if he gives up swimming in the North Sea to avoid conjunctivitis (especially if it is too cold), if he is suspicious of mercury-tainted fish and hormone-nourished veal, if he complains about the traffic on the motorway which keeps him from sleeping, if he swears about traffic jams, if he fears the building project that will block his view, it must be said that in most cases his attitude is

egotistical and does not go beyond superficial sentimentality. Now, since consumption is the final goal of all economic activity, whether agricultural or industrial, it is an easy step to regard consumers as solely responsible for the deterioration of the environment. Is it not they who, clamouring for more and more mountain resorts, chase the eagles from their nests? Is it not they who are — rightly — choked by the fumes of motor cars that pollute, congest and make noise? Is it not they who, to be rid of tedious chores, consume more and more water and energy (in their dishwashers for example)? Is it not they who use detergents, man-made fibres and plastics which cannot be recycled and are difficult to destroy?

Their responsibility is however not the only one involved: further up the line the inventors of new techniques, the producers who perfect low-cost mass-production, and the distributors with their persuasive sales talk, must also stand accused. So we are faced with a network of complex relationships, one of whose effects is negative — environmental deterioration — while the others are positive — higher standards of living, increased comfort and so on.

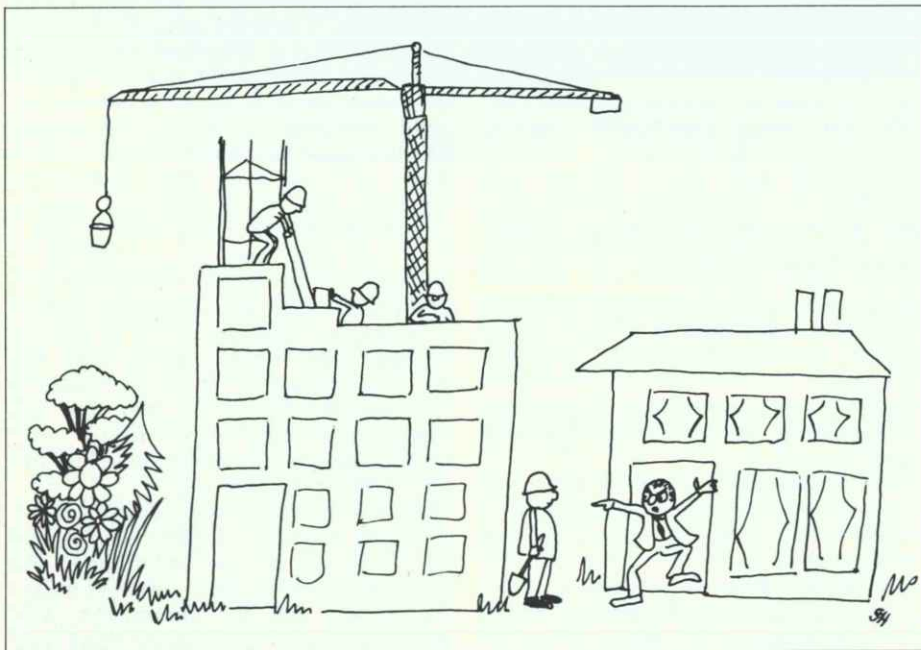
It goes without saying that the ideal solution from the consumer's point of view would be to improve the environment without having to forgo any of the advantages of his present lifestyle: having one's cake and eating it too, in other words. The Club of Rome, which made one of the first attempts to quantify the dangers facing our civilisation, raised storms of protest two years ago. While this article does not seek to criticise that courageous study, it is pointed out that zero growth, one of the solutions proposed by its authors and taken up by certain



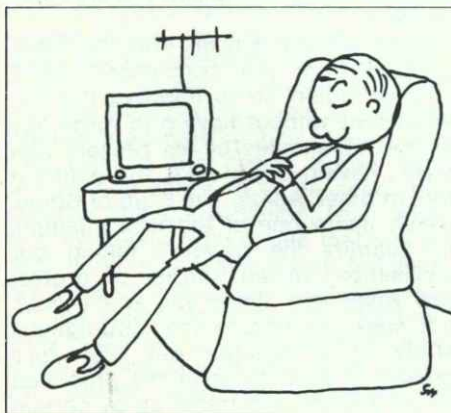
"... If the citizen-consumer of 1975 knows that the environment is being spoiled, if he sheds a tear for the gull whose wings are smeared with tar..."



... if he is suspicious of mercury-tainted fish and hormone-nourished veal..."



... if he fears the building project that will block his view..."



... it must be said that in most cases his attitude is egotistical and does not go beyond superficial sentimentality."

economists and even some politicians, is doubtless inapplicable in the present socio-political context, even if desirable and defensible. The reason is that the distribution of existing revenues, whether between developed and underdeveloped countries (the best proof being the more-than-alarming reactions aroused by the possible effects of the oil crisis on the GNP of most countries) or between rich and poor within a country, cannot conceivably be held in fixed patterns.

To be realistic, then, we must work for environmental improvement while at the same time assuming economic growth. The many studies already devoted to this subject give an indication of the main approaches it would be profitable to pursue, thus :

- to prevent the exhaustion of raw materials ;
- avoid waste by perfecting economical production processes and re-using waste products ;
- encourage production based on plentiful and readily available raw materials ;
- to combat pollution :
- adopt different production methods ;
- perfect purification processes ;
- organise effective destruction of refuse and reduce its quantity ;
- to ensure wise land management :
- draw up sound land use plans ;
- to beautify the environment :
- issue the necessary regulations ;
- educate the public.

The combined efforts of governments, businesses and consumers are needed to attain these various objectives.

What role can consumers play in such a scheme, and what can be expected of them ?

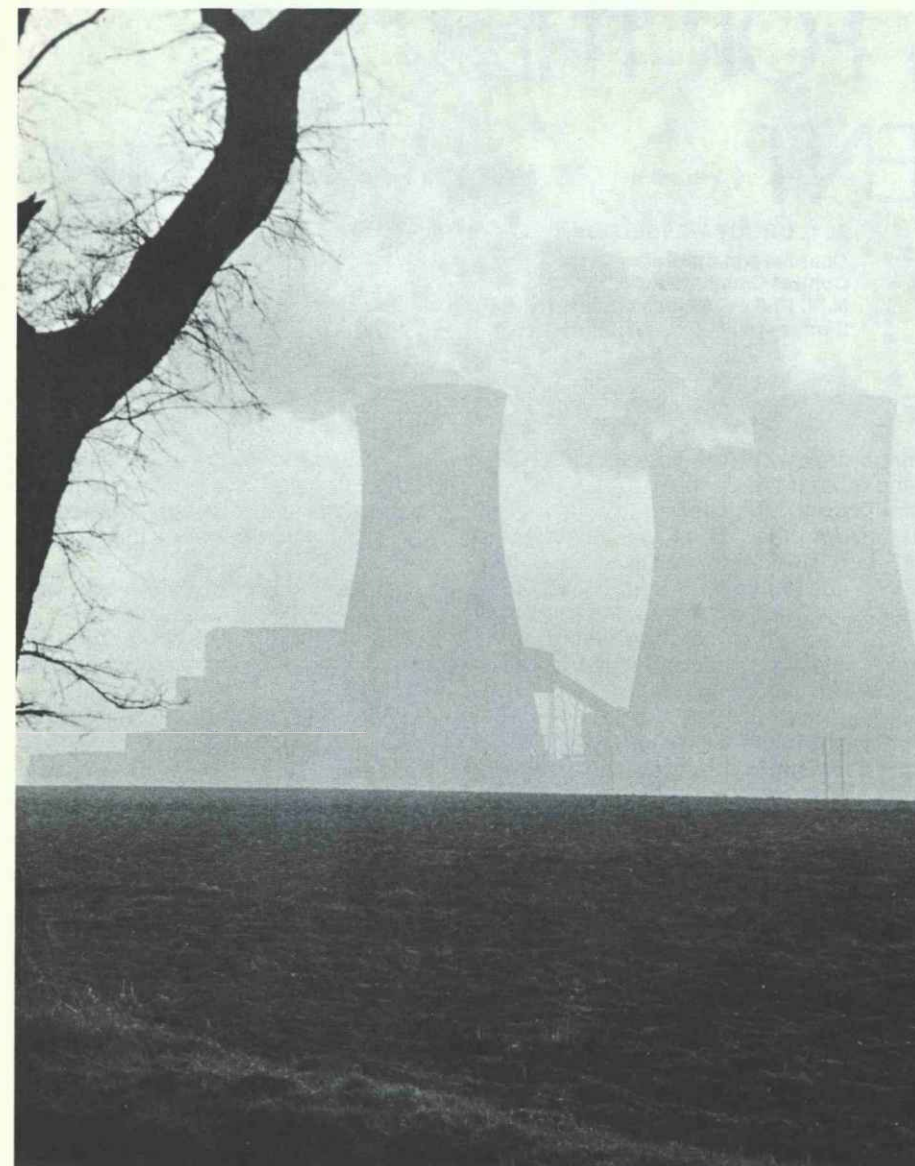
The fight for a better environment will have a series of consequences for consumers which it is not certain they are ready to accept.

1st consequence :

An increase in the price of certain goods. The principle that "the polluter must pay" will mean higher prices for goods produced by polluting industries (unless other less-polluting manufacturing processes are developed).

2nd consequence :

An increase in taxes, since the fight against certain forms of pollution can be carried on only by public authorities. OECD has recently calculated that the cost would amount to about 1 % of GNP.



"We must work for environmental improvement while at the same time assuming economic growth."

3rd consequence :

The acceptance of more regulations (noise limits, use of pesticides, regional planning).

4th consequence :

The need for self-discipline. For example, not polluting nature, not discharging untreated sewage, sorting refuse, limiting the use of cars, not using non-biodegradable products, giving preference to durable products and those which consume little energy, avoiding over-frequent changes in fashion, and resisting purchases of no real use. Most consumers are certainly not enthusiastic about such action, especially since the resulting environmental improvement is often not immediately apparent to them. Let us not forget

that at this level economic laws militate against the environment : repairing a car may cost more than buying a new one, a journey by car is often cheaper than by train, and so forth. Who likes to pay more for the same goods, pay higher taxes, or give up the "advantages" of our civilisation ? Some rare idealists will walk to the shop for their newspaper, save waste paper for possible collection, refuse unnecessary plastic packing material, or resist the desire to buy the latest model of refrigerator. These isolated actions can only have marginal effects. The individual consumer is not an angel, and we must not depend on him for our salvation. Nevertheless, more and more consumer associations are taking up the

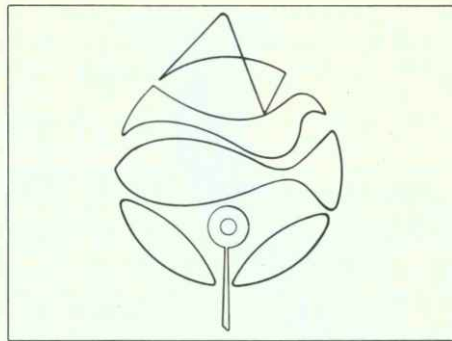


cause. Likewise, in the developed countries at least, associations for the protection of the environment are mushrooming. Both types can catalyse energies and bring pressure to bear on industry and public authorities. The results they achieve prove to sceptics (who are legion) that the citizen-consumer can make his presence felt. It is through them that a new conscience may be born and that the effective protection of the environment may at last take its rightful place in governmental programmes.

MOBILISING FOR THE ENVIRONMENT

AT PHILIPS

A. T. GROOT WESSELDIJK
Chairman of the Pollution
Control Committee
N. V. Philips' Gloeilampenfabrieken
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Industry and its responsibility towards the environment

Industry has always proved capable of adapting to new social situations. Thus its sense of responsibility towards the maintenance of a clean and healthy environment and the conservation of all its natural resources has increased as the severe state of the situation in which we are today has emerged.

Naturally each branch of industry has its own particular environmental problems such as air pollution or water pollution, so that the policies adopted and the measures taken tend to be specific to the industry concerned. This article intends to give an impression of how Philips, a world wide organisation*, are endeavouring to pursue an active anti-pollution policy and deal with these problems.

Anti-pollution policy

Philips attempts to uphold its responsibilities towards the environment in two ways: First, within the organisation itself, all new production processes are designed to include anti-pollution measures so that any detrimental effects on the environment may be eliminated to the greatest extent possible. Existing processes are under continual modification to this end and systematic monitoring and control and extensive research into the nature and content of any resulting pollution has led to the redesign of certain production techniques and equipment.

* Founded in 1892, the Philips Concern currently have organisations in more than 60 countries. At the end of 1973 the total personnel amounted to 402 000 of which 305 000 were employed outside the Netherlands. 72 % of their turnover comes from Europe, 17 % from the Western hemisphere and 11 % from the rest of the world.

Philips are of course very fortunate in being able to use the products they manufacture themselves to protect the environment. Thus the measuring and recording instruments which they supply can be used for this purpose outside as well as inside the organisation. Furthermore, considerable emphasis is placed on consultations with public authorities at all levels — industries, institutions etc. concerned with environmental hygiene, which has proved indispensable for the establishment of certain standards and specifications. At present a system of international co-operation is being set up to facilitate these procedures.

Organisation of pollution control at Philips

In the late sixties, attention was increasingly focused on "environmentally undesirable" situations within the organisation, which underlined the need for a centrally and systematically operated pollution control system. This concern was ultimately expressed by the President at that time, in a letter to all the divisions of Philips in the Netherlands, in which he stressed that the organisation should fulfil the requirements imposed by industry, by the government and to no less a degree, those imposed by the organisation itself. It was thus in 1971 that a special Pollution Control Committee was established, comprising representations of the Building Design and Plant Engineering Division, the Medical Services, the Nature Protection Department and the Secretariat.

Later that year, the Pollution Control Office was created as the executive organ of the Committee. Its functions now include:

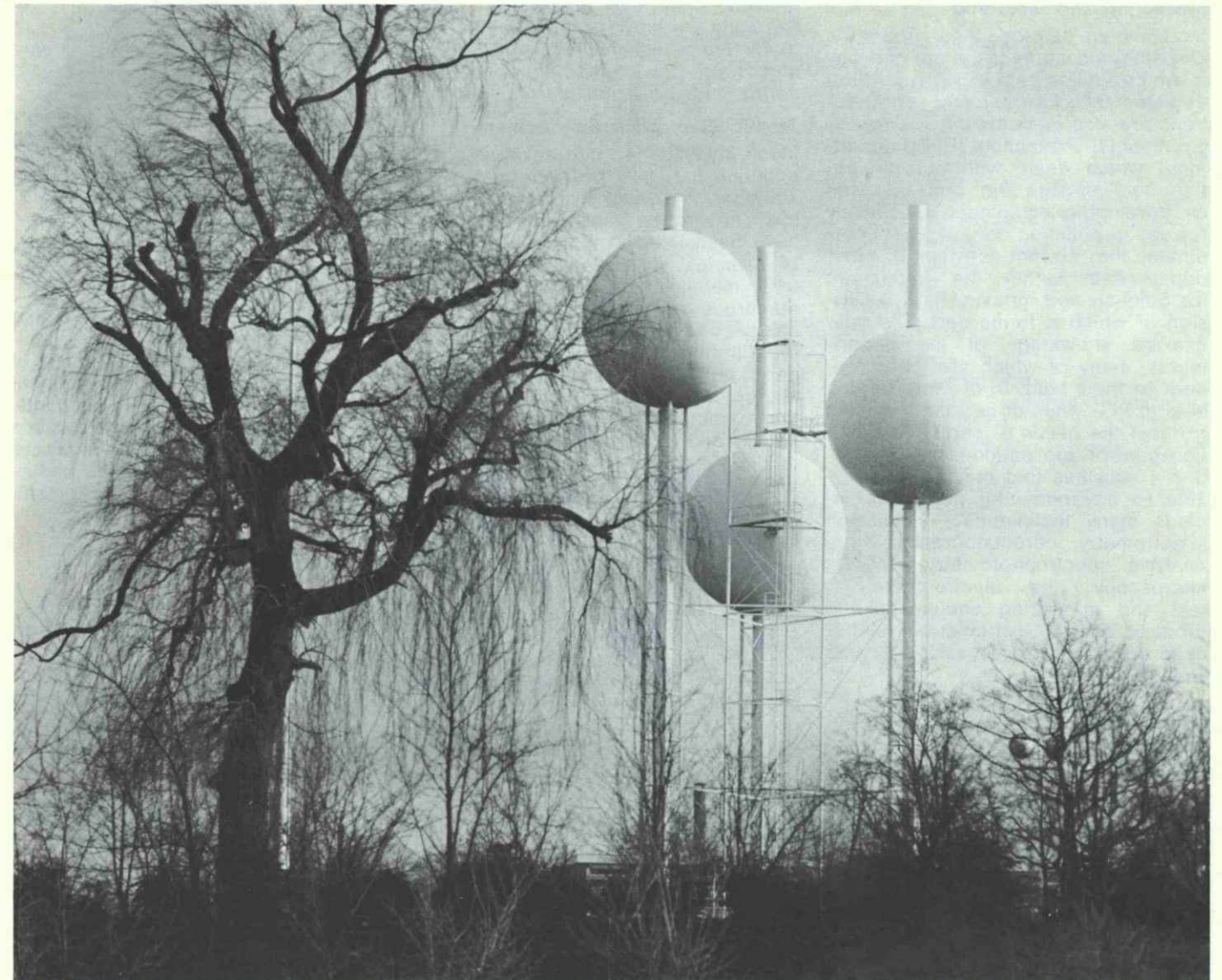
- research into purification techniques;
- collection and analysis of data on processes causing pollution; promotion of anti-pollution measures and the discontinuation, prevention or redesign of techniques causing pollution;

- co-ordination of these activities on the national and international levels within the organisation, particularly in the production plants and factories;
- establishment of contacts with pollution control departments of other industrial concerns and various research associations in the Netherlands;
- supply and exchange of information.

Production processes and the environment

At Philips the approach to pollution control of its production processes has changed considerably over the past few years. This initially involved the incorporation of purification systems into already existing processes to ensure that the end products and more especially the waste products discharged into the environment were of a relatively harmless nature. It then came to be realised that a more efficient method of combatting pollution would be to concentrate first and foremost on reducing the waste products of any process to an absolute minimum.

One achievement in this respect concerns the discharge of phosphate. Waste water containing phosphate is discharged in the preparation of fluorescent powders for fluorescent lamps. The phosphate used to be removed in a purification process in which lime was involved. This prevented the eutrophication of the water by the phosphates, but it meant that the phosphates had to be removed in solid state. In the meantime a much better solution has been found. The process now comprises a post-reaction phase in which 90 % of the phosphates are converted into fluorescent powder, with the result that the phosphate discharge has been decreased by the same amount. At the same time the efficiency of the process has gone up by 10 %.



Water tower of the City of Eindhoven. Built in 1971: capacity 1500 m³.

Thus existing processes are being constantly adapted everywhere. This qualification concerning waste products is now included in the design of all new production processes and techniques where anti-pollution measures constitute a prime consideration.

Thus the quality of the production process is beginning to play a more and more important role, alongside the quality of the product.

Solvent regeneration

A certain amount of waste products is always inevitable, particularly in the case of solvents used in the processing and/or cleaning of materials and components. Within the context of active pollution control, this problem

is solved through the recycling or regeneration of the used solvents. This is not only an anti-pollution measure but is also an effort towards the preservation of natural resources in raw material as well as the economising of production costs.

Such efforts to promote efficiency are of course by no means new, but hitherto little was known of the possibilities existing for regenerating or recycling wastes. It was far simpler to discharge or dump liquids or remove solids for destruction.

Since 1971 the increasing shortages of raw materials, the resultant steep increase in prices, and anxiety about the environment have been additional reasons for changing over to regeneration of solvents on a larger scale.

Regeneration has the effect of reducing costs. Re-use means that far smaller quantities of solvents need to be obtained, while the costs of transport and destruction of wastes by incineration also disappear. The cost of regeneration is almost always lower than the sum of the additional purchases and transport and incineration costs but the actual relation will depend on the market situation. Users are now being urged to limit the use of mixtures of solvents to the absolute minimum. Experts think this is possible in far more cases than many people seem to realise. The same applies more or less to the number of varieties in use. Limitation of the type of solvent used could increase the effectiveness of regeneration still further.

Measuring and recording

Modification of production processes and other measures taken are one way in which Philips help to safeguard the environment. Far-reaching contributions are also made by the Philips Environmental Protection (PEP) department which deals with activities in this field outside the firm. As well as developing equipment specifically for use in pollution control, PEP coordinates the relevant activities of other departments within the Equipment for Science and Industry (S & I) Division of which it forms part. The specialised knowledge of the departments, many of which are world leaders in their field, is of considerable help to PEP when organising a system to meet the needs of particular pollution control applications.

S & I activities that are often applicable to environmental protection include many techniques — emission spectrometry, chromatography, X-ray analysis, spectrophotometry, electron microscopy and electro-chemistry, test and measuring equipment and process control instrumentation, backed up by a data-processing system service.

Computerised air pollution monitoring networks

Discussions about air pollution are usually bedevilled by a lack of comparable data. Accurate measurements of the various most troublesome pollutants are simply not available for extended periods even in Western Europe and North America. Present-day Philips computerised air pollution networks are supplying the missing facts. Monitoring networks are able to supply information in four ways:

- by establishing the composition and quantity of various types of pollution;
- by collecting data for use in long-term analyses of the problem;
- by investigating just what effect counter measures have on pollution;
- by giving warning of short-term variations which might, for example, be a health hazard.

Sulphur dioxide has long been recognised as a reliable tracer or warning signal for monitoring purposes. Philips has produced a special detector device in this respect. This device, in fact a self-regenerating automatic sampler, has been industrialised and is now the heart of the Air Pollution Control Network that was opened in the Rotterdam area of the Netherlands in 1969. A measuring system of 250 of these sulphur dioxide monitors is being installed all over the Netherlands. It is envisaged extending the Dutch

network over part of Belgium and Germany. A similar network has already been installed in Milan (Italy) and Basel (Switzerland) has also ordered such an installation.

Atomic Absorption Spectrometry

Much investigation into environmental pollution can only be performed with standard analytical instruments. Atomic absorption spectrophotometers have been used to measure all types of samples suspected of containing toxic metals or metalloids. There are numerous reports of air-borne dust being collected on filters (sometimes the filters of air-conditioning machinery) and then analysed by atomic absorption. Examples include: lead in the particulate matter from car exhausts and lead and other toxic metals in the smoke discharged by heavy industry.

The use of atomic absorption is becoming widespread throughout the food industry. Contamination from pollutants in the soil and water and even from the containers in which the food is transported or sold can be detected quickly and accurately. Products such as beer, wine and fruit juice are particularly prone to contamination from containers due to comparatively high acidity of these products. Atomic absorption tests are made on containers to determine their suitability, using solvents of similar acidity.

Water Consumption

Almost every industrial process uses water to a greater or lesser extent and yet it is now becoming apparent that water is by no means a limitless resource. Already the scarcity of good quality groundwater and the increasingly high costs involved, especially where wastage is concerned, has meant the need to economise. The Water Economy Committee at the Philips headquarters at Eindhoven is very much aware of these problems and has been systematically studying ways and means by which unnecessary wastage may be reduced.

It found that four main factory sites in Eindhoven, with a total annual water consumption of 12-13 million m³, use 60-70% of it for cooling purposes. Needless to say, the committee first directed its attention to the main consumers such as the boiler houses, engine rooms etc. In the meantime, compressors, vacuum pumps etc. have been fitted on a large scale with thermostatic control valves to regulate the intake of water automatically, the maximum permissible cooling-water temperature being set in advance. As a rule, the cooling-water temperature may rise to 40° C without causing machinery any harm. It was a common

practice in the past to drain off cooling-water when its temperature had risen only 2° C. The new arrangement has already led to a saving of 400,000 m³ per year. The Water Economy committee would like to convert as many people as possible to their conviction that water saving can be achieved in most situations by employing relatively cheap control valves.

Only when high quantities are involved or the installations are complicated are cooling towers or water-cooled refrigerators necessary.

"Mobilising for the Environment within Philips" is a reality since the organisation is in the fortunate position of being able to protect the environment with its own techniques and products. The above article attempts to explain how Pollution Control activities are implemented and how Philips contribute to protection of the environment.



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