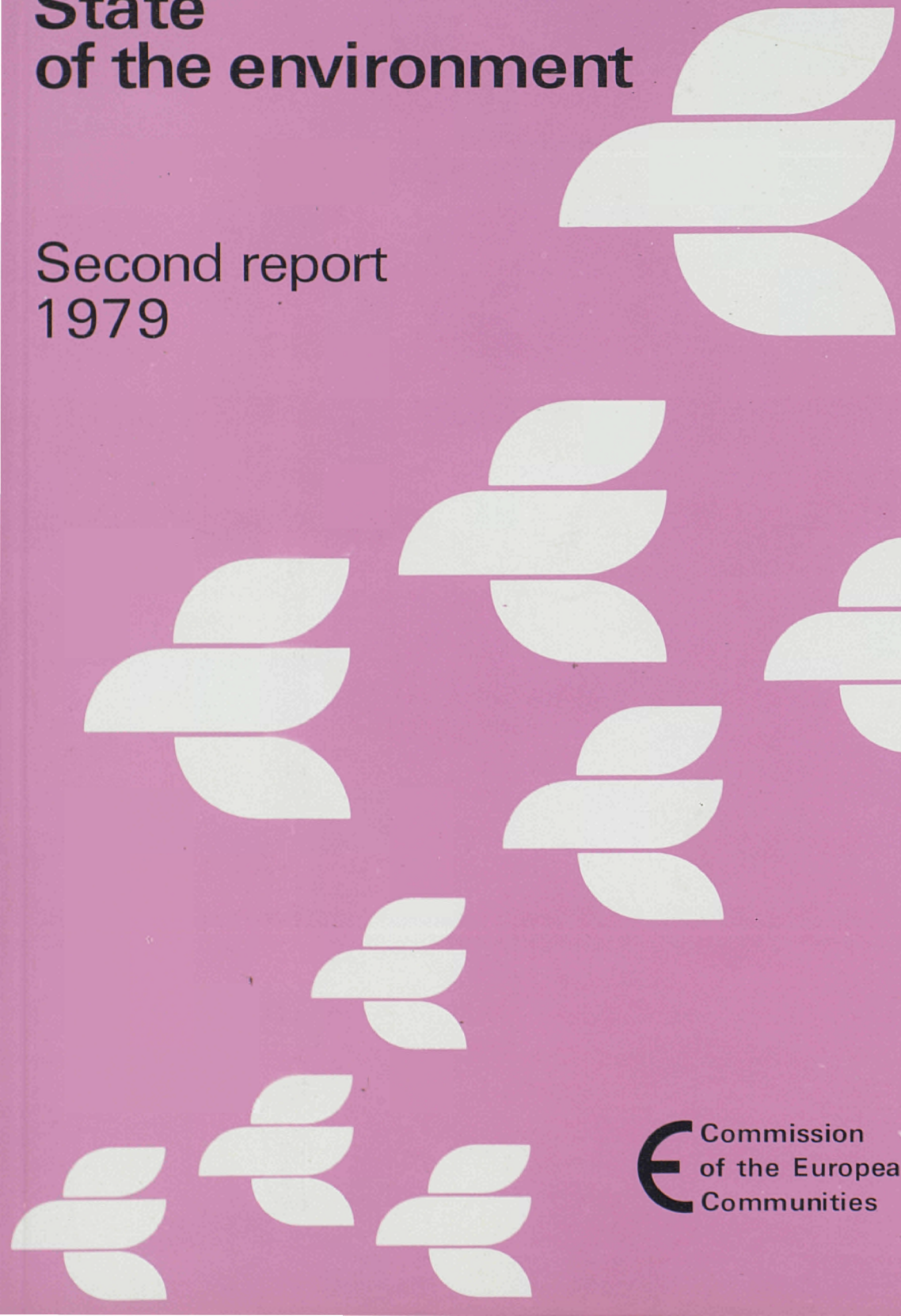
State of the environment

Second report 1979



Commission of the European Communities

COMMISSION OF THE EUROPEAN COMMUNITIES

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This publication is also available in

DA ISBN 92-825-0934-6
DE ISBN 92-825-0935-4
FR ISBN 92-825-0937-0
IT ISBN 92-825-0938-9
NL ISBN 92-825-0939-7

Cataloguing data can be found at the end of this volume

Printed in the FR of Germany

ISBN 92-825-0936-2 Catalogue number: CB-24-78-152-EN-C

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Introduction

I.1. Introduction

While the general public attaches tremendous importance to the improvement of environmental quality, the information available to it in this field is often of a highly technical nature, forcing discussion to be left to experts.

One of the aims behind the publication of 'Reports on the State of the Environment' is to make environmental problems understandable to the non-expert, and thus generate greater public understanding of Community policy in this area, as desired by the European Parliament.

The first Report summarized the whole range of activity at Community level, as expressed in proposals made to and decisions made by the Council. The second Report does not attempt to be comprehensive. For example, it does not touch on questions raised by the production of nuclear energy, on which the Commission held a series of public hearings in December 1977 and January 1978, reports on which will be the subject of a separate publication. This report merely selects a number of individual topics, felt to be of particular interest, and presents them in a non-technical manner. It does not necessarily give the complete statement of Community policy in the fields covered, but is intended rather to illustrate various aspects of environmental policy and their progressive development.

The European Parliament also asked for a set of easily comprehensible statistics on environmental quality in the Community to be prepared. Unfortunately, it will take considerable time for this report to be fulfilled in its entirety. So, while this second Report does contain a section on the quality of the environment, this is restricted to a résumé of the progress made with Community agreements on the exchange of data and to three contributions by Member States, showing the successes achieved by particular environmental policy measures.

The first two Reports are very different in character, as explained above and the appearance of future editions will be greatly influenced by the reactions of our readers to this one.

I.2. The changing direction of environmental policy

More than four years have passed since the adoption on the first 'Programme of Action of the European Communities on the Environment' in November 1973, much has been achieved (see Annex 1), although much also remains to be accomplished. It is now possible to step back a little from the many individual projects contained in the first Programme and in its successor, approved by the Council of Ministers on 17 May 1977, and take a broader look at the way environmental policy is developing and how it ought to change in the years to come.

What we are witnessing is indeed a significant change. Environmental policy, after the great efforts of the last decade to cope with a range of immediately pressing problems, is coming of age. A second generation of longer-term policies, aimed at promoting a qualitatively superior form of economic growth as a foundation for the future, is taking over from the first generation of, often, *ad hoc* legislation. Its motto is 'prevention is better than cure' and the next ten years are likely to see the introduction of a whole range of new policy instruments designed not simply to clean up pollution but more generally to plan for an overall improvement in environmental quality. This will mean not only searching for the most economical means to prevent pollution from arising, but also the rational management of natural resources and of space in the interests of a long-term increase in the quality of life.

This change of emphasis does not mean that the problems of the past have all been solved nor that the basic framework of environmental legislation designed to deal with them has been fully completed. But it does mean that additional efforts in the future will take a new direction.

Work is still in progress to complete the basic structure of legislation foreseen in the first Action Programme of the Communities but already the continuation of this Programme, approved by the Council on 17 May 1977 (and popularly known as the 'Second Action Programme') shows a change of orientation. It can be thought of as having four parts.

Firstly, the reduction of pollution is still a major source of concern. Environmental quality objectives and standards are being developed, setting out the concentrations of air and water pollutants which should not be exceeded in the long-term in different areas of the Community used for differing human activities. Most progress has been made

here in fixing objectives for water and Community-wide quality objectives have already been agreed for bathing water and for rivers and lakes used to provide drinking-water (see Chapter II.2.).

Standards are also being worked out for two types of products. Some products pollute the environment while they are being used; for example, various categories of fuel contribute to air pollution when burned (see Chapter II.4.) and most noise is produced by products, such as aeroplanes, motorcars, construction equipment. Other products pollute in the form of waste when their useful life is over and the development of a rational waste management policy is an important part of the Programme (see Chapter III.2. for an example). In all these cases Community action is based not only on the desire to reduce pollution at source but also on the necessity to harmonize national product standards, which, if they differed one from another, would create new barriers to inter-Community trade in these products, thus undermining one of the fundamental elements of the Community.

A further area in which standards are being developed is that of the polluting discharges of industrial installations. Of particular interest here are the emission standards for discharge into water of dangerous pollutants such as mercury and cadmium (see Chapters II.2., II.7.).

It would be fair to say that more progress has been achieved on Community level in reducing water pollution than in reducing air pollution. To a large extent this reflects the priority accorded to the former in view of its specific characteristics: water is a very homogenous medium in respect of the effects of pollutants discharged into it, it is an essential input for almost all human activites — drinking, bathing, agriculture, fishing, industry — and it all flows in one direction, namely towards the seas, a resource shared by all of us.

Secondly, the Community is actively engaged in cooperating with non-Member States and international organizations on those environmental problems whose dimensions exceed the frontiers of the Community. This is a time-consuming but essential task if progress comparable to that achieved within the Community is also to be made on a world-wide scale.

The third area of work set out in the Second Programme concerns the rational management of natural resources, including non-renewable resources, water, flora and fauna (see Chapter II.8.) and land itself. This area has provided the impetus for the development of the 'second generation' of policies referred to already. It is increasingly apparent that it is insufficient for environmental policy simply to react to the problems posed by the growth of industrial society, which so often in the past has been seen as a goal in itself, irrespective of the economic and social problems and the damage to natural resources which have followed in its wake. On the contrary it has become clear that it should be actively concerned to reorientate that growth, to restructure it towards

activities which enhance the quality of life without endangering future generations by destroying their environment. What is needed are preventive policy instruments designed to incorporate respect for and conservation of natural resources and of the quality of life into economic development.

Such an integration of an environmental dimension into economic growth is bound to be difficult because we are dealing with a very complex system. All industrial processes are based on the transformation of natural resources, including energy, into useful products. This means that the pollution produced as a by-product can often be reduced or eliminated only at the cost of consuming further resources. On the other hand, the stream of waste in which all products eventually end, can be seen not only as a problem but also as itself a source of scarce resources (see Chapter III.2.) including energy. The interlinkages within this system, the many different chemical and physical changes which raw materials passing through it undergo, are so complex that our understanding of them will never be complete. The aim must therefore be to develop a set of mechanisms which will automatically push this system in the right directions, without the need to decide exactly how each and every technical process within it should be modified. Just as for Adam Smith the price mechanism was an 'invisible hand' guiding the economy along an optimum path, so we need preventive instruments (see Chapter III.1.) to encourage a type of development in which environmental problems are foreseen and reduced to a minimum from the outset. The screening of new chemicals before they are launched on the market, the development of stringent safety procedures for potentially dangerous production processes, the systematic evaluation of the likely environmental impact of all major new activities, and the development of a basic classification of the characteristics of all Community territory are examples of the type of 'preventive instrument' being developed.

The fourth field of Community policy is made up of a complex of individual topics, all designed to back-up and reinforce an active environmental policy. It embraces environmental education, research into environmental protection technology, the improvement of public awareness of environmental problems and environmental education, and measures to improve the working environment.

It also includes economic aspects of the environmental policy, a topic for which the idea of the price mechanism as an invisible, guiding hand is of even more relevance, in the sense of attempting to ensure that environmental costs are taken fully into account in the development of the economy. The polluter pays principle ('PPP'), one of the fundamentals of Community environmental policy, sets out to ensure just this. The idea is that by putting a price on scarce environmental resources we can encourage the economic system to adjust and use less of them just as a rise in the price of a particular raw material is reflected in the long run in lower consumption of it.

One of the main objects of the Commission's Environmental and Consumer Protection Service's work in the economic field is the search for methods of implementation of the

'PPP'. A proposal for the introduction throughout the Community of charges related to the amount of pollution discharged into water is in an advanced stage of preparation, the use of charges on particular products (such as cars or packaging) to be used to finance their final disposal as waste, is under consideration, and a first study has been completed on the possibility of taxing the consumption of scarce resources with a view to conserving more of them for future generations.

Finally, a word should be said on the relationship between environmental policy and unemployment. For a long time it was assumed that a strong environmental policy would adversely affect the costs of industry, lead to the closing-down of factories and thus to unemployment, and represent a brake on economic expansion. There have certainly been examples of these effects, but they have not been widespread. And it is becoming increasingly clear that not only the 'pollution control industry' (a term used to describe the building and running of waste water treatment plants and municipal garbage incinerators, selling thousands of newly-developed pollution monitoring devices, producing scrubbers to cut down sulphur dioxide discharge from chimneys, and so on), but also the new emphasis on environmental improvements in the form of the rehabilitation of old buildings, the recultivation of derelict land, reafforestation, the creation of recreational facilities of many types in the countryside, are becoming a major source of economic stimulus, contributing to the creation of new employment opportunities on a broad basis throughout all the regions of the Community. It even seems possible (see Chapter I.4.) that a major new programme of environmental works could be launched specifically to combat the high unemployment existing in the Community today.

The conclusion must be that there is no need for major conflicts between economic growth and a clean environment, particularly when growth is seen as the raising of the quality of life in our time, taking due account of the social and cultural values which are an inextricable component of it, and without jeopardizing the resource base on which the life of future generations will depend.

The new challenge for environmental policy-making over the next few years is to develop the tools to ensure that this goal of environmentally compatible growth is fully achieved.

I.3. Environmental policy and employment

One of the arguments sometimes advanced against the inplementation of an environmental policy is that by adding to the costs of industry it endangers jobs. Environmental measures are seen as using up resources which could have been invested profitably in industry, creating new jobs. For this reason, the economic recession of

recent years has often given rise to the demand to go slow on environmental policy in order not to increase unemployment. This idea is of such political importance — for unemployment is rightly regarded as one of the greatest social evils — that it is important to discuss the problem in a more differential way. It is extremely difficult to assess accurately the impact of environmental policy on employment, taking into account direct and indirect effects, short-term and long-term periods, etc.

Further research covering all these aspects in a comprehensive way is necessary. With this reservation in mind it is of interest that most of the studies tend to show a net positive effect on employment for most environmental measures taken.

A number of current often-cited arguments about the negative influence of the environmental policy on employment, are:

(1) Environmental considerations may lead governments to ban certain industrial processes and products, leading to a loss of jobs in the firms concerned;

(2) Industrial development may be banned or severely restricted in certain regions; firms may be unwilling to invest elsewhere because costs are higher;

(3) Firms may be obliged, in order to comply with environmental regulation, to change their means of operation: e.g. to cease using certain raw materials or to install pollution control equipment. These enforced changes add to the firms' costs, which causes, in the longer run, a loss of jobs either because sales will be lost to competing firms (possibly operating in countries with a less strict environmental policy) or because, as profits become lower, firms will be less inclined to invest in this industrial sector;

(4) Businessmen may be deterred from investing in new equipment by the threat of new government regulations designed to protect the environment;

(5) Environmental measures are seen as using up resources which could have been invested in productive industry, creating new jobs;

(6) Environmental regulations limit the opportunities of firms to invest and hence lead to loss investment.

The following considerations have to be made against these arguments:

(a) Environmental measures have, except for certain sectors in common with safety and health regulations (among other factors), a relatively marginal effect on total costs and are hardly ever a reason in themselves, to change a decision on investment or choice on processing or product. In almost all cases they play a minor part in the total decision making which is more dependent on labour costs, location, sales, etc.

(See arguments 1, 2, 3 and 6.) Taking an example, in argument No 3 it would be very difficult to attribute such a decision to environmental reasons only.

Most problems occur for firms which make no or only marginal profits, and which can therefore neither finance the necessary investments in pollution control systems nor carry the costs of operating them afterwards. Such firms could thus be forced to close down and to dismiss their employees. It should be said at once that there is no evidence that this type of closure has occurred in the Community on any significant scale in the recent past, despite the widespread introduction of effective pollution control equipment in many branches of industry. (See first part of argument No 3.)

(b) Employment is a complex problem, which has a very high priority. However one should consider, from both the economic and the social point of view, that the favourable effects on employment could create negative impacts in other areas, such as the health effects on the population, environmental damage, etc., resulting in a net-negative overall effect for the society. A ban on certain industrial processes or products is normally the result of a long and serious legal procedure, which clearly demonstrates the harmfulness to the population or to the environment of the processes and products concerned. In that case the employment aspect would lose its priority in favour of the environmental or health considerations, despite the fact that jobs are lost or investments will not take place. (See argument No 1.) Also in this respect a parallel could be drawn with the health and safety regulations.

(c) Differences in environmental policy can result in distortion of competition between Member States, although there is no evidence of significant relocation for environmental reasons inside the Community (see second part of argument 3). To avoid the possibility of distorting competition, it is necessary to establish as soon as possible an homogeneous environmental policy in the Community. Such a policy would also establish a better and more secure climate for investment. (See argument No 4.)

(d) At the present time the sluggishness of productive investment is a result more of the investment climate in general and of inadequate demand for industrial products and thus lack of attractive investment opportunities, than of a lack of investment funds. It is therefore clear that the relatively modest total investment in pollution control involved is not responsible for the 'investment anaemia' which is one of the characteristics of the current economic situation. (See argument No 5.)

(e) It is pointed out that pollution investments are unproductive in the sense that they do not produce a marketable product. It must be admitted that this is true, but only in the same way that it is true of expenditure on schools, hospitals and other social services. On the other hand, advances in technical progress are taking place all the time, so that a given reduction in pollution control can often be attained now at a lower cost than in the past, and indeed there are many examples of pollution control

systems which are self-financing as a result of the revenues from the sale of the materials recovered by them. (See argument 2, 3.)

(f) It seems almost certain that a weak environmental policy would induce less employment and make investment less attractive in sectors linked to the environment such as tourism, fishery, recreation, etc. On the contrary it could be argued that positive effects in such sectors for jobs and investments would result in the case of an increasingly active environment policy.

Set against the criticisms of environmental policy there is the undoubted importance of the jobs created in what has come to be known as the 'pollution control industry'. The construction of sewage works, the production of air-pollution filters, the design and installation of treatment plants for toxic wastes, and many more such activities, all create job opportunities. The design, production, installation, operation and maintenance of pollution control plant and equipment is now an important industry in its own right. An estimate for the FRG for the period 1975-1979 suggested that on average this industry (and related industries) would provide at least 370 000 jobs on a cumulative basis, against an estimated direct loss of employment for less than 7 000 persons. Another study for Germany which considered only the employment effects of investment in pollution control equipment indicated that 140 000 jobs were created in 1975.

A study for the USA (Bureau of Labor Statistics) has come to broadly similar conclusions, with the positive job-creating effect far outweighing the negative effect induced by environmental measures.

This positive effect on employment offsets, and may even outweigh, the potentially negative effects described above. It is clear that any relaxation in the rhythm of implementation of environmental policy would put many of the jobs in the 'pollution control industry' at risk.

At the macro-economic level considerable research work in the Community and in other countries of the OCED such as Japan and USA has been devoted to models, which attempt to stimulate the overall effect of environmental policy on the economy.

The results, though inconclusive, suggest that the net effect on economic growth, and hence on employment, is minimal. The positive and negative effects roughly balance out. What these studies have not done, however, is to ask whether this conclusion should be modified for different types of environmental measures and they also neglect the fact that unemployment is not just a macro-economic factor but represents unemployed men and women of differing skills and qualifications, who may or may not be suitable for employment in 'pollution control industry'.

With this in mind, the Commission has had a study carried out to examine the structure

of unemployment within the Community with a view to seeing whether a carefully-designed package of environmental improvement projects could not be used to provide jobs in the right place and with the right qualifications, as a contribution to the Community's campaign against unemployment. The conclusion is that this is indeed possible and the study presents a detailed description of the type of project which could be included in such a schema.

Of course, the necessary money for such a programme would have to be paid by someone, in all probability to a large extent by government, but it seems that finance is not necessary an unsurmountable problem.

This study points out that in periods of high unemployment, substantial sums of money are spent by government on unemployment benefits. Calculations are made showing that the net effect on the public finances of subsidizing (even up to 100%) the wages of unemployed who are given jobs may often be positive; the increased income of the State through taxes and other deductions from gross wages is sufficient to outweigh the difference between the wage paid and the unemployment benefit. The extent of this effect varies from one Member State to the other.

The study proposes a programme of twelve types of environmental projects, ranging from sewage works to the recultivation of slag heaps, the restoration of historic buildings, and the systematic collection of environmental data. The weight given to each of these projects has been chosen to reflect the type of labour required for them, matching this with the qualifications of the unemployed workforce. For example, the weight given to the collection of environmental data reflects the high proportion of office staff among the unemployed, whereas other projects are particularly suitable for employing young people or construction industry workers. Similarly, the proposed programme is also broken down by urban, rural and problem areas (caused by obsolete economic structures), reflecting differences in the type and intensity of enemployment in them, as well as the different types of environmental problems they face. In this way the programme can be designed to provide jobs of the right type and in the right place to meet the needs of the unemployed.

Whatever the action that the Commission decides to take as a result of this study (not known at the date of going to press) the study does demonstrate that there is not necessarily a conflict between a better environment and more jobs.

On the contrary, the question that should be posed is whether the expanding 'environmental industry' cannot make a contribution to the restructuring of our economies away from those traditional industries which have become unprofitable as a result of competition from low-wage countries, towards the modern, often high-technology sectors which we need to master the problems of the future. Just as a clean environment is a pre-condition of secure and balanced growth in the future, so the

environmental industry can increasingly become an important source of satisfying job opportunities.

These conclusions are similar to those of a study on public sector job-creation schemes undertaken by the Directorate-General for Employment and Social Affairs. This study, which was based on an investigation of the job creation schemes in operation in four Member States (Denmark, Germany, the Netherlands and the United Kingdom) indicates that a wide range of activities are suitable for the employment of the unemployed: for example: additional personal social services and simple construction projects that meet local community needs, as well as projects of an environmental nature. The whole issue of the creation of employment through the development of collective services is being considered by the Community as part of its work programme following the last Tripartite Conference.

I.4. Some trends in environmental legislation

The first remark to be made about environmental legislation in that, like most of the rest of environmental policy, it has only recently been invented. Naturally it existed before, but in general the textbooks and university courses specifically on 'environmental law' date from the early 1970s. Its content varies vastly from one country to another, some having an impressive legislative arsenal, others a very uneven development with e.g. extensive water legislation and virtually nothing on noise, and still others with a kind of legal rag-bag in which special decrees and parts of general laws are supposed to control the myriad activities affecting the environment. In fact even the search for environmental legislation can be difficult; some of it is found under Public Health, much under Planning and Zoning, some under Agriculture, Local Government, Nature Conservancy, etc. However, this apparently young branch of law is already well-established and some of its antecedents are quite ancient, e.g. the original French law on polluting industries (établissements classés) dates from 1815. The mere fact that the category of law has been given a new name does not mean that it was suddenly created *circa* 1969; on the contrary some countries had highly-developed systems, admittedly scattered under different headings such as those referred to above, which they have now gathered together, and entitled 'Environmental law'. Other countries have not yet undergone this process, but their laws are not necessarily less effective for that reason.

What is common to all our Member States is that environmental legislation has reached the 'take-off' point in all of them since the United Nations Conference on the Human Environment which took place in Stockholm in 1972. There has been legislative activity in all of them, and in some cases there has been so much that it is difficult to keep abreast of it, e.g. France and the Federal Republic of Germany. The amount of

legislation must not, of course, be confused with the level of effort in solving environmental problems. Some countries produce little legislation, but also have fewer problems, e.g. Ireland. Others produce legislation intermittently, e.g. UK and Netherlands, but when it appears, it is of great importance, e.g. the Control of Pollution Act or the Dutch draft law on Noise Nuisance. A short chapter on trends cannot hope to be exhaustive and this one will limit itself mainly to some of the interesting and important features of the legislation of our nine Member States. However, some reference will be made to international developments and the law of other countries, where their experience can serve as a guide for us. One common trend that can be noted as a preliminary remark is the sheer quantity of laws, regulatory and administrative measures in existence, ranging from vast framework laws to ministerial circulars and codes of practice. How can an industrialist or a private person, or a government agency, discover exactly what is the law concerning e.g. the discharge of a specific pollutant into a certain river in one of the Member States; are there in fact, as it is alleged, legal 'pollution havens' in the Third World; what international conventions apply to exploitation of the continental shelf in the North Sea, etc.? These kind of questions are frequently posed to the Commission, as they are to other international organizations, and to national ministries, and it is far from easy to reply in many cases. The United Nations Environment Programme is already working to collect national and international legislation on the environment, with the aim of putting this knowledge at the disposal of States seeking to develop their legal system.

The International Union for the Conservation of Nature has been working for almost a decade putting eighteen countries' legislation into a computer and the task is not yet completed, and of course it will always need updating. The sheer amplitude of the task would take most non-lawyers, and indeed many lawyers by surprise. A small idea of how much is being produced can be gathered from the fact that under the Information Agreement of 1973 (an agreement whereby the Member States forward to the Commission for its information and in some cases for action, their proposed measures in the field of environment) over 200 notifications of all types, framework laws, sectorial laws, specific decrees etc. have been received in a period of four years. And this is the tip of the iceberg. The Commission has also been studying the possibility of putting at least all major measures for the Nine into an automatic information system, which would then ultimately be open to users in the style of 'Euronet', the idea being to reduce the bulk to manageable proportions and to provide a service which would be useful to both a specialized and a general public.

It has already been said that the volume of environmental legislation does not necessarily reflect environmental concern, but on the international level it certainly does. The last ten years have witnessed a proliferation of international conferences and conventions, e.g. IMCO Conventions, the Law of the Sea Conference, the Convention of Paris for the Prevention of Pollution from Land-Based Sources, the framework Convention for the Protection of the Mediterranean Sea against Pollution, the Convention against Chemical Pollution of the Rhine, to name but a few directly

concerning the Nine. The reason for this international and worldwide concern is clear; since the Stockholm Conference there has been increased awareness that we have 'only one earth', which has been translated by the international conventions into legal obligations to use this earth well and fairly. This is particularly so in relation to marine pollution; obviously the problems of the high seas can only be regulated in an international forum, and therefore the United Nations has been very active in this field, e.g. the UNEP action in convoking the Barcelona Conference, which led to the Convention for the Protection of the Mediterranean. As was said in both Action Programmes, one of the principles is that it is necessary to establish the level of action (local, regional, national, Community, international) which befits each category of pollution. Thus alongside international legal action, there are corresponding or different legal initiatives on the other levels mentioned. In this context, reference should also be made to the contribution to international action, on a more geographically limited basis, of such organizations as the OECD and the Council of Europe throught their recommendations and draft Conventions.

On the Community level there has been, as stated in the First Report on the State of the Environment, considerable activity. Since the adoption of the First Action Programme a large number of legal instruments, regulations, directives, decisions, recommendations have been adopted relating to all sectors, water, air, waste, noise, dangerous chemical substances, nature conservancy, etc.

It must be borne in mind that Community directives must usually be transformed into national law. Thus the Nine are currently legislating concerning the sulphur content of certain liquid fuels, the quality required of surface water intended for the abstraction of drinking-water, on waste in general, and on the disposal of waste oils, in order to comply with the corresponding Community directives.

While much has been achieved at Community level (or is in the pipeline) which will necessarily be reflected on the national level, it will be of more interest here to outline national trends about which perhaps less is known, especially since an exhaustive discussion of Community legislation was contained in the First Report.

It is very difficult to generalize about the national legislation of the Nine. The countries are at different stages and have different attitudes to environmental legislation. In the UK and Denmark there has been an attempt to consolidate legislation and to use a unified agency for its elaboration and enforcement, i.e. the UK Control of Pollution Act 1974, administered by the Department of the Environment, and the Environmental Protection Act 1973, administered by the Environment Ministry in Denmark.

At first sight there is a connection between the kind of legislation and the administrative agency. It is very difficult to envisage framework legislation, like that of Denmark, which aims to regulate virtually all pollution problems when fully implemented, being effective if there is not a central agency which controls the situation. On the other hand

a central service may be set up, but a division of powers may still exist, as is the case in the Federal Republic of Germany where the competence for environment is divided between the Federal Government *(Bund)* and the States *(Länder)*. This has not prevented the *Bund* from making massive framework laws (in fields in which it has power) e.g. the Bundesimmissionsschutzgesetz (BImSchG) concerning air pollution and noise nuisance. The attempt to consolidate the administration of environmental legislation in the hands of a specific body can also be seen in the USA in the National Environmental Policy Act of 1969, which set up the Environmental Protection Agency and that interesting procedure known as Environmental Impact Assessment, which will be discussed in more detail later (see Chapter III.1.b).

In almost all of our countries an administrative reorganization has been made in order to set up Ministries, or at least secretariats which have overall responsibility for environment. However, just as the legal texts remain scattered under Public Health, Planning, etc. so often do the administrative powers, at least partially, despite the creation of new ministries. It would therefore seem to be no accident that the two general framework laws coincide with two powerful control bodies.

However, it would not be correct to conclude that framework laws and central bodies are the hallmark of the most advanced environmental planning and legislation. Some countries have excellent sectoral legislation, e.g. the Netherlands, which they are intent upon developing at present.

Similarly in France, steady legislative progress is being made on all sectoral fronts, although it has been declared that the ultimate intention is to draw up a code of the environment. In Germany and Italy the situation is different because of their constitutional organization. It has already been stated that the German *Länder* also have competence (in some cases exclusive) for the environment. In Italy the Regions also have very far-reaching powers. In these countries very considerable legislative activity has taken place within the *Länder* and the Regions. In Italy it has become clear that legislation can be passed far more rapidly at regional level than at national, and some regions are forging ahead with their programmes. In these circumstances, it seems logical to question the drawing-up of an overall framework law to cover all environmental questions, even if it were constitutionally possible.

It can be seen that we have already strayed under the pretext of discussing the tendency to framework laws and centralization, from the national level to the regional level. As mentioned above, the regional level must also always be borne in mind as one which may be the appropriate solution. In Germany and Italy the discussion cannot be carried out simply on the basis of appropriateness — it is a question of constitutionality. However, at least two highly-centralized states consider that the regional level is the correct one for water legislation. France has divided her territory into six river basin areas, each administered by a single authority ('agence de bassin') and specific legislation and administrative measures are passed for these regional units, which cut

across other traditional boundaries. The UK, in the Water Act 1973, constituted similar Water Authorities, authorized to deal with water pollution problems, which also do not coincide with the other regional boundaries.

This kind of regional measure is in marked contrast to the legislation passed by the *Länder* and the Italian Regions. The Rhine and the Po cross several *Länder* and several regions. The question immediately rises as to what happens if two *Länder* or two Regions make water pollution laws for the same river which are incompatible. The logical answer would be a return to the national authority for coordination, and in fact last year in Italy the law 'Merli' against water pollution was passed, upon which all regions must model their own laws. As a result several regions are now contemplating modifying their laws.

In fact the regional level, or the local level, may well be the most appropriate level for ensuring the protection of the environment. Certainly the enforcement of many Community Directives will ultimately be carried out by regional or local authorities e.g. the quality standards for water by the water authorities and waste elimination by local authorities. Whether local legislation is appropriate will depend on the nature of the pollution e.g. local ordinances or orders are frequently made in relation to noise. However, if we are not to have a legal patchwork of different local regulations in addition to the legal rag-bag on the national level mentioned earlier, the lead and coordination must usually come from the national level if not higher.

Returning to the two national framework laws which already exist, a distinction should be made between the British legislation and the Danish. They both seek to regulate the whole spectrum of polluting activities, but apart from that they are very different. The reason lies in the differing environmental histories of the two countries. The UK, suffering from early industrialization with its accompanying pollution, had to legislate very early, e.g. the Alkali Act dates from 1878, and continued legislating mainly by sector (water, air, noise, waste, etc.) steadily thereafter. As a result by 1970, there were literally hundreds of texts concerned with pollution control. The draft framework act was drawn up to rationalize this situation for all four major sectors, repealing some legislation, but leaving other major sectoral legislation such as the Clean Air Act virtually untouched. Denmark, in a much less complicated environmental and legislative situation, wished to organize a comprehensive system, and in some cases to create the legislative basis. Thus the wide-ranging and well-considered Environment Protection Act was drawn up, much of which, however, had to be implemented by subsequent regulations.

What trends can be discerned for the other seven who have not yet reached or do not wish to reach the stage of the large framework act? The main trend is obviously the development of sectorial legislation. Most countries already have relatively well-developed water legislation, and several of them are working on its improvement, e.g. the French with their series of quality objectives which are being implemented and the

system of separate agreements with individual branches of industry, the Germans with the fourth version of their Water Management Law and the Law on Water Pollution Taxes, the new Irish Law, the Belgians with twenty-five Royal Decrees concerning specific discharges, etc.

Most countries have basic legislation concerning air pollution, but not as much as for water. However, with the exception of Germany (the 'BImSchG' already referred to, with its complement the 'Technische Anleitung Luft', which set up a wide-ranging programme for improvement of air quality by reducing polluting emissions from fixed and mobile sources) one cannot discern the flurry of legislative activity which might be expected. Framework laws against air pollution exist in Belgium, France, Italy, Luxembourg and the Netherlands all of which have to be implemented by specific decrees except in the Netherlands. These decrees are being made, but not very rapidly. Most of the implementing legislation is concerned with the nature of fuel, or the nature of fuel to be burnt within certain localities. Under the stimulus of Community legislation, and the OECD's report concerning certain countries as exporters of sulphur dioxide, one might predict a speeding up of the legislative process at least on less polluting fuels in the near future.

A sector where legislation is rapidly developing and indeed is bound to do so because of Community directives, is in relation to waste. In most Member States until 1973 there was virtually no general legislation on waste as such. The administrative organization was left up to local authorities, and heterogenous provisions on waste were included in Planning Acts, Water Acts, Public Health Acts etc. Since 1973, there has been the Control of Pollution Act in the UK, which in Section 2 sets out a general scheme and obligations, the Environmental Protection Act in Denmark, the Elimination of Waste Act 1976 in France, and a draft law in Belgium, the Netherlands, and Italy. Several specific Acts, namely the Belgian and Dutch laws on toxic or chemical wastes of 1975, and 1976, have also been passed to deal with particularly dangerous waste. Waste oils have also been the subject of legislation in Denmark and Germany. Within the period of the last four years, the legislative arsenal has been provided to put an end to unlicensed dumping and the scandal of the appearance of highly poisonous waste of unknown origin.

Concerning this category of toxic and dangerous waste, it should be noted that a directive was adopted by the Council of Ministers on 20 March 1978. This directive sets out a general framework for the elimination, transport, storage, etc. of such waste, in such a way that it should always be carefully followed from 'the cradle to the grave', and to ensure that its ultimate location will always be known with certainty. (See Chapter II.8.)

The highly laudable aims of this directive were accepted in principle quite rapidly by the Council of Ministers, but the provisions concerning the procedure known as the adaptation to technical progress caused considerable controversy. It was argued that,

although the directive contained an annex with a list of substances which are to be considered as constituting toxic wastes, nevertheless the nature of the directive was not sufficiently technical to admit such a procedure. A compromise was agreed upon, concerning those aspects of the directive which were to be subject to the procedure of adaptation to technical progress, and so the directive could be approved in its entirety.

The above-mentioned procedure allows for a system of majority voting, and has been used successfully, within well defined spheres of action, on many occasions within the Community, e.g. the adaptation to technical progress Committee concerning motor vehicle directives. It is a very convenient procedure designed to ensure that the Council does not become overwhelmed by the sheer number of technical adaptations to earlier directives which could be dealt with adequately at a different level. It is foreseen that it will be used for Community environmental directives in other sectors, e.g. the Committee instituted in the quality of bathing water directive of December 8, 1975.

Another area where there was virtually no legislation five years ago is that of noise nuisance. In the UK the Noise Abatement Act already existed, but the mechanism has been rethought and widened to deal with potential nuisance in the Control of Pollution Act. In Germany the 'BImSchG' is steadily being implemented with decrees on noise, e.g. on cranes and pneumatic hammers. In Belgium and Luxembourg framework laws were passed in 1973 and 1975, but have not yet been complemented by the necessary decrees. In Denmark the situation in principle is covered by the Environmental Protection Act. The most interesting development is in the Netherlands where a massive framework law, which aims to regulate all acoustical emissions except the human voice, has been under discussion for some time. The draft provides for a comprehensive approach, including zoning, charges, etc.

If nature conservancy can also be regarded as a sector, mention should be made of the recently passed laws in Ireland and France and the drafts under discussion in Italy and Germany.

This concludes a birds-eye view of sectoral legislation. Another interesting trend is what one might call specific legislation, which is not so wide in scope as sectoral legislation, but cuts across several sectors. The most noteable example is that concerning highly-polluting enterprises. The originators of this system of attempting the regulation in a logical across-the-board fashion of all nuisance likely to be engendered by a particular establishment are the French.

The first of their laws dates from 1815, but the most important date from 1917 and 1976. The Law of 1917 known as 'établissements classés', set up a system of authorization for certain polluting trades etc., which was expanded to commercial and public premises by the law of 1976. Any activity likely to endanger the environment now falls within the purview of the new Act. Thus many categories of premises will now have to conform to the comprehensive controls specified in the Act, before they can

obtain their authorization. It is interesting to note that the Danes also adopted a special system for highly-polluting enterprises under their 1973 Act, which is now being implemented by a series of decrees. When reading the categories under the Danish Act, and the nomenclature under the French system, one wonders whether any industrial establishment would fall outside their purview.

In both cases the chemical industry is certainly subject to such provisions and it is now increasingly subject to regulations concerning the pre-testing of its products. One of the most interesting recent pieces of legislation is the Toxic Substances Control Act 1977 from the USA. In France a law has also been passed concerning chemical products (July 1977). In the UK a scheme has been proposed for the notification of the toxic properties of substances. The common idea behind these two laws and the scheme is that many environmental disasters have been caused by the premature launching of products on to the market without adequate attention as to their possible environmental consequences, polychlorobiphenols being one case that springs to mind.

In order to prevent this, an environmental dossier should be filed either before, or at the latest at the time of marketing, by the producer of any new chemical product, so that the national authorities can examine it and decide whether to authorize the product or not. A prosposal on this subject is at present under discussion within the Council, so hopefully one can eventually expect to see legislation on this subject by the Community (see Chapter III.1.d)).

One of the most interesting developments of recent years is the Environmental Impact Assessment procedure. This was first introduced by the National Environmental Policy Act in the United States. There, government agencies proposing or responsible for proposing legislation or for administering federally funded projects, must file an environmental impact statement which explains what consequences there will be for the environment in general and in detail, and the impact statement must be approved, and/or modified, before the legislation or project can proceed. This innovative and useful procedure has been copied in several other countries, e.g. Australia, Columbia and New Zealand. In Europe two similar systems have been created. In the German Federal Republic under a decision of 1975 there must be screening of public projects (at federal level) for environmental relevance and environmental compatibility. If a project is not compatible then another alternative must be sought. There is however, no provision for public participation in hearings as there is in the United States. In France the 1976 law for the Protection of Nature requires in principle that there should be environmental impact assessment for all projects requiring governmental approval. This would cover a vast field but a decree from the *Conseil D'Etat* stipulates how this provision will be applied. The United Kingdom and the Netherlands have both been studying the possibility of implementing such a system. It should be noted that in planning procedures, which are well developed in all the Member States, a certain element of environmental impact analysis has always been included even if this is now judged in some cases to be insufficient (see also Chapter III.1.b)).

This concludes a very brief survey of some trends in environmental legislation within the Nine. Framework laws, sectoral laws, specific laws, international conventions, community legislation, national legislation, regional legislation, everywhere a flurry of activity. What possible disadvantage could there be in this? Obviously there may be a lack of coordination, both inside a nation and between nations, concerning the same natural resource, e.g. a common river such as the Rhine. At Community level via our legislation, and our coordination within international fora, we try to ensure that this is not the case.

Coordination alone cannot, however, be enough. The Community of nations must have a clear idea of where it wants to go in relation to environmental law. As was said at the beginning, this has only recently become a separate category of law, but its origins reach back many years and it has been built up piecemeal. Thus it is very difficult at the international or national level to make out any coherent philosophy of environmental law. The two countries closest to it in the Nine are the UK and Denmark, and even their position is not altogether clear. On the international level, principles of law, to correspond to political principles of the Stockholm Declaration, must be evolved; the UNEP has already begun the necessary discussions, to which some of our Member States are actively contributing, and to which the Community is also giving its help. The OECD in its work in the Transfrontier Pollution Group is also trying to establish for a more limited group of nations legal principles upon which those nations should act, e.g. its Recommendation concerning Equal Access which aims to allow foreigners to sue across frontiers when they have suffered damage through transfrontier pollution. There are however several interesting developments in relation to environmental law, which in their own way try to enforce the right to enjoy a decent environment. One is the much greater part played in the enforcement of obligations by environmental protection associations (see Chapter III.3.). Another connected phenomenon is that of trying to impose strict liability (liability without fault) upon the polluter, the most notable example of which is to be found in the Belgian Law on Toxic Waste.

A similar attempt to reapportion the burden of pollution can be found in funds set up under legislation. Under the Dutch Air Pollution Law, polluting enterprises pay into a central fund which is used to indemnify victims of air pollution living in the Netherlands, who are paid if they can show damage (they do not have to prove who caused it or whether he was at fault). Under French Law, the users (i.e. the airline companies) of Orly airport have to pay into a fund which is used to acoustically insulate the houses of those living nearby. These last developments are just some examples of the attempts to find new solutions to new problems in a new branch of Law.

In conclusion, it can be said that it is not enough to work out the technical solutions to pollution problems, many of which can be found enshrined in sectoral legislation and on a higher level in Community Legislation. We must also work out the new legal principles which will adequately ensure the protection of the environment of our 'only one earth'. In this task the Community is also preparing itself, and cooperating with international bodies, in order to ensure that the right foundations are laid for the future.

I.5. Opinions of the European Parliament and the Economic and Social Committee

The European Parliament and the Economic and Social Committee appreciate the efforts made by the Commission to carry out the practical measures in the action Programme. They regret, however, that the implementation of Community environment policy — like that of other common policies — has been delayed by the slowness of the Council's decision-making procedure.

During the period covered by this report, the European Parliament and the Economic and Social Committee approved the proposals which the Commission sent to the Council.

Of the opinions delivered by Parliament and the Committee in this connection those concerning bird conservation and toxic and dangerous wastes deserve special attention.

Parliament has long attached particular importance to the protection of migratory species. At its request the action Programme of 22 November 1973 proposed measures to avoid the large-scale destruction of birds, in particular song birds and migratory species, and, more generally, to ensure the survival of certain animal species which are endangered or face extinction. But Parliament did not rest content with this fairly general declaration of intent. In various resolutions it has asked the Commission to present it without delay with concrete proposals on the active protection of birds, relating in particular to the creation of bird sanctuaries, extension of the list of protected species, etc.

For its part, the Committee has stressed how bird conservation is a major assignment for the Community and has also drawn attention to the conflict which may arise between economic developments such as urbanization, industrialization, tourism and recreation, agricultural advances and development on the one hand, on the other, the protection of birds.

As regards toxic waste, Parliament has asked the Commission to grant Community funds to encourage research to develop new processes for converting waste into raw materials and energy in some important sectors.

Parliament has also deemed it essential to lay down standardized methods of labelling toxic and dangerous waste so that it can be identified even after a long period of storage. It is also of the opinion that the Member States should be obliged to specify locations for storing toxic and dangerous waste.

The Economic and Social Committee considers that the proper application of the Directive depends on the creation of suitable sites for waste processing and storage and

that the disposal process should be selected not only on the criterion of its cost or its profitability for the firm but with all the social costs in mind.

More generally, Parliament expressed its opinion on the various aspects of Community environmental policy in two reports. These were Doc. 12/77 on the outcome of the 4th International Parliamentary Conference on the Environment, held at Kingston from 12 to 14 April 1976 (rapporteur: Mr Jahn) and Doc. 468/77 on the first Report on the State of the Environment of the Commission of the European Communities.

In these documents Parliament dealt with various problems, including shared natural resources, cross-frontier pollution, enforcement of environmental regulations, the establishment of an international marine environment authority and new chemicals.

In particular, Parliament proposed that the code of conduct recommended at Kingston in respect of shared natural resources should be sanctioned by means of a Directive. The Commission did not consider it necessary to take up Parliament's suggestion as the principles laid down at Kingston already form part of the first action Programme and the practical measures proposed are embodied in Community law or included in the action Programme.

As regards cross-frontier pollution, Parliament has asked the Commission to present suitable proposals to the Council as soon as possible and has also considered it indispensable to draw up a regulation on compensation for cross-frontier damage based on a draft convention drawn up at the request of the Parliamentary Conference.

The Commission stated in this connection that the directives already adopted by the Council applied to cross-frontier areas and that, in some cases, there are special provisions in them for increased control of pollution in these areas. Furthermore, international conventions to which the Community is party also protect such areas.

The Commission has taken the view that, in these circumstances, it is not necessary to present special proposals to the Council as the implementation of the action programme should suffice to protect cross-frontier areas. The Commission considers it premature to put forward a general proposal on compensation for damage. The Commission notes that the draft Convention referred to by the European Parliament has not yet gained general agreement internationally and that the current tendency is to guarantee pollution victims sectoral compensation (e.g. victims of marine pollution arising from the carriage of oil).

Parliament has also stressed the need to take effective measures to enforce environmental regulations and to adopt strict regulations to curb violations in order to ensure that the law is applied.

Like Parliament, the Commission attaches extreme importance to the enforcement of provisions on environmental protection. The Treaty also lays down procedures applicable to Member States which do not comply with the Community's legal acts.

The Commission will apply these procedures in the environmental sector. As the first Community provisions were adopted from June 1975 onwards and the time usually allowed to the Member States to apply Community directive is two years, the Commission has not been able in this report to make a consistent and detailed critical study of the implementation of the Community measures because the procedures provided for in the Treaty had not been completed when this report was prepared. However, the Commission intends to present this critical study in its third report on the State of the environment in the Community.

Parliament requests the Commission to take the initiative in drafting an international convention for establishing an international marine environment authority which could make an important contribution to the protection of this environment.

The Commission stresses the extent to which matters relating to the law of the sea are in a state of flux and are still being discussed at length at world level. The Commission therefore considers Parliament's suggestion to be premature.

The impact of new chemicals on health and the environment will certainly form a very important part of the Community's environmental measures. Like Parliament, the Commission attaches considerable importance to the rapid adoption by the Council of the proposal for the sixth amendment of the Council Directive of 1967, concerning dangerous substances (see Chapter III.1.d)). Since October 1967, discussions have taken place between the Commission, the Member States and the appropriate American agency with a view to finding harmonized solutions to problems raised by new chemicals.

On 30 May 1978 the Council authorized the Commission to open negotiations with the United States to seek ways of reaching an agreement on how the Toxic Substances Control Act is applied to Community products and adopted the necessary negotiating directives.

Part II

Past and present work

II.1. Introduction

The most casual reader of the Community's 1977–1981 Action Programme cannot fail to get the impression that an enormous series of topics is included, on which the Commission is to work with a view to presenting proposals to the Council. Some of this work is scheduled to come to fruition in 1978, much will continue in the years which follow.

This part of the Report does not attempt to cover all of these subjects. It merely takes up some of the topics on which the Commission has made proposals or on which the Council has taken decisions in the recent past, which are likely to be of particular interest. A complete list of Council decisions taken and Commission proposals made is contained in the Annex to this Report.

II.2. The pollution of water by dangerous substances

The increasing use of chemical compounds in industry, agriculture and in products for household use brings in its train increasingly serious hazards to the quality of the environment and to human health (see Chapter III.1.d)). The area most seriously threatened is the aquatic ecosystem, the balance of which is already precariously poised, as many Community industries using harmful products discharge their wastes into watercourses or coastal waters.

The examples of the 'Minimata' and 'Itai-Itai' diseases in Japan have served as horrifying warnings of what can happen if these dangers are neglected: At Minimata mercury discharges from a factory on the shore accumulated in the fish which were the

staple diet of the local people, resulting in catastrophic damage to the nervous system. The disease, called after the town, is particularly painful and incurable. Over 1 400 victims of it were identified by the Japanese government. 'Itai-Itai' disease, also particularly painful, was identified in 1959 to be a result of cadmium discharges into water. Its main effect was decalcification of the bones, rendering them extremely brittle. 123 victims were officially identified, of whom 32 died.

The alerting of public opinion to these problems has led various international authorities to work out a number of agreements regulating discharges of toxic substances into water, most notably the Paris Convention for the prevention of marine pollution from land-based sources, the Convention for the protection of the Rhine against chemical pollution and the draft Protocol for the protection of the Mediterranean sea against pollution from land-based sources.

In this context, a Directive on pollution caused by certain dangerous substances discharged into the Community's aquatic environment was prepared by the Commission of the European Communities and adopted by the Council of Ministers on 4 May 1976 (Directive 76/464/EEC) (see First Report on the State of the Environment, p. 38). The intended aim is to halt the deterioration process of the aquatic environment by banning or restricting present and future discharges of harmful substances.

The Directive encompasses the Community's entire aquatic environment, that is to say, inland waters, coastal waters, territorial waters and ground water. It covers a range of substances whose discharge must be monitored, the measures to be taken for this purpose, the time limits to be complied with, the manner in which this is to be carried out and the obligations incumbent upon Member States.

A distinction, expressed by two lists, has been established, based on the degree of harmfulness of substances discharged into water. The first list, termed the 'black list', groups together particularly toxic, persistent and bioaccumulable substances. There are many toxic substances, which, when discharged in water, are diluted and broken down by chemical and biological processes until their toxicity disappears. But others are persistent, that is to say they retain their chemical form, and hence their toxicity, for a long time (which may be measured in many years), either in the environment or in man himself. This property is particularly dangerous in the case of those organisms, (algae, shellfish, fish, etc.) whose natural mechanisms for eliminating pollutants are too slow and in which they thus accumulate, leading to a concentration of pollutants in the food chain. It was the end result of such a process of bioaccumulation in man which caused 'Minimata' disease. It is therefore clear why concentration of such pollutants in the environment should be reduced as well as being closely monitored.

Apart from mercury and cadmium, other products on the black list are pollutants having carcinogenic effects and, also, various products used mainly in agriculture, including certain persistent pesticides (the best known of which is DDT).

The studies on the ecotoxicological consequences of the presence of these five substances in an aquatic environment have clarified effects of differing concentrations of these pollutants and ascertained the effects of acute toxicity and chronic toxicity on aquatic organisms and micro-organisms.

The technological studies have focused on the quantities discharged into the environment and the possibilities of reducing the amount of dangerous substances contained in the effluents of the various branches of industrial activity.

The third type of study concerns the economic effects on the industries concerned of the pollution control measures envisaged with a view to assessing industry's ability to absorb the resulting costs.

The second list of pollutants, termed the 'grey list', groups together various dangerous metals and metalloids, such as arsenic, lead, copper, silver, cobalt, and the non-persistent hydrocarbons, etc. The 'grey list' relates mainly to those substances whose harmful effects are restricted to a certain area and depend on the characteristics of the water receiving the substances and its location. The hazards posed by the discharges of such substances are, in short, geographically more localized and, hence, more limited.

It is clear, however, that it will be possible to add to these lists new substances which will be put on the market in the future and these lists will, moreover, also be capable of alteration in step with scientific and technical advances. They can be revised and supplemented, where appropriate, by transferring certain substances from the second list to the first list, in particular where these are suspected or proved to be carcinogenic.

On the basis of these two lists of substances the Directive provides for a series of concrete measures. Its basic feature is a system of licencing before any discharge of harmful substances can take place. Whether substances of the first list or of the second list are involved, an authorization issued by the competent authority of the Member State concerned is required. The authorization will set the specific standards applicable to the substance in question which are to be respected in the polluting factory. An authorization may be granted only for a limited period and when it is renewed it must take account of any alterations in the maximum values set at Community level.

With regard to substances on the black list, provision was made, in the first place, for setting permissible concentration and quantity limits on the effluents discharged from any factory using the substances in question. The concern to expose human beings as well as fauna and flora to the least possible danger is to be the overriding concept in the establishment of these uniform standards. This undoubtedly, represents a rather stringent procedure but it has the advantage of protecting man and his environment in a simple and effective manner by tackling the problem of pollution at its source.

These standards for black list substances are to be established at Community level. The Commission must accordingly propose in respect of each discharged substance maximum values not to be exceeded, taking account both of its toxicity, its persistence and its bioaccumulative properties, and of the best technical means available to eliminate this substance. If it proves necessary, the limits set for industrial effluents will vary according to the sectors of activity and the types of product concerned.

Although black list substances are thus to be subject to uniform Community standards, if the authorities in a Member State consider that, in view of the particular conditions of the environment which is to receive the discharge and of the use to which the water is put, stricter standards must be imposed, they will be able to do so.

The problem of substances on the black list can also be dealt with, however, by an alternative mechanism to the approach based on uniform emission standards.

In this case the standards specified in a factory's authorization have to be based on the desired quality on the water into which the substances are discharged, taking account of their characteristics, such as the capacity of the water to absorb and dilute to an acceptable degree the polluting substances. The sensitivity of the environment receiving the discharge and the tolerance of the aquatic organisms and micro-organisms represent a determining factor here. The necessary objectives for the quality of water, laid down at Community level, will take into consideration the concentration and power of accumulation of the substances referred to in living organisms and in sediment as indicated by the latest scientific data and taking into account the differences in characteristics between fresh water and salt water.

Close monitoring will clearly be necessary in order to meet or to maintain consistently the quality standards required throughout the geographical region affected by the discharges and a monitoring procedure is to be proposed by the Commission.

For this purpose, one of the aims of the studies on mercury, cadmium and the three pesticides, aldrin, dieldrin and endrin was to establish which are the most sensitive indicators from the ecological point of view for enabling a swift, effective and comparable evaluation to be made of the quality of fresh and salt water.

In some cases it can be simpler to carry out analyses on sediments or on fish than to monitor the entire aquatic environment directly.

The analysis of a fish can be carried out without great technical difficulty, whereas the analysis of water is costly and requires very sophisticated instruments. Since concentrations of pollutants in fish and molluscs reflect the pollution of the water they live in, they can serve as indicators of marked deterioration in the quality of water. The species chosen for this purpose as a result of the studies are the guppy and the zebra fish.

It will now be clear how complex and time-consuming the process is of drawing up proposals for Community standards in this field. Work has now started on a second group of substances for which proposals will be made after mercury, cadmium and the three 'drins'. But in view of the large number of substances concerned, the implementation of this directive is clearly a long-term programme.

In the case of substances on the grey list the procedure will be different. The standards imposed will also take account of national objectives with regard to the quality of water. The Member States are required to put in hand programmes for reducing pollution, setting goals to be attained in the light of the latest technical advances which are economically feasible.

Where Community Directives setting objectives for certain types of water (such as bathing water, water to be processed for drinking purposes) already exist, the States are obliged to pursue these objectives in their anti-pollution programmes. The specific standards included in authorizations of discharges liable to contain one of the substances on the second list will be assessed on the basis of the above-mentioned objectives.

The Commission will in its turn compare these programmes in order to ensure rapid and continued progress towards achieving a policy for drastically reducing the chemical pollution of water.

The machinery has thus been put into place and set into motion to ensure that the horrors of Minimata never have a counterpart in the European Community.

II.3. Making Community waters safe for bathing

Epidemics associated with water pollution in holiday areas, well-publicized data on the highly polluted condition of many European beaches, and the often all-too-visible evidence of inadequate sewage treatment have made the headlines frequently over recent years. The necessity for vigorous action to make Community waters safe for bathing has become ever more apparent and the Community has responded to it.

On 5 December 1975 the Council adopted a Directive concerning the quality of bathing water. The aim of this Directive is to set a certain standard for the quality of fresh, running, stagnant and sea water in areas where bathing is either authorized or tolerated.

This is the second such Directive adopted by the Council, following on the Directive concerning the quality required of surface water intended for the abstraction of drinking water, adopted on 16 June 1975 (see First Report on the State of the Environment,

p. 21). Other proposals awaiting Council decisions concern the quality of water required for fish life, for the culture of shellfish, and for drinking water itself.

The Directive contain a list of parameters, the majority of which are pollutants, indicating the values to be adhered to, the frequency of the inspections to be carried out and the methods of analysis to be used.

The pollutants and other substances listed are all of the kind which when present in water, whether dissolved or in suspension, contribute in one way or another to a disturbance of the ecological balance of the aquatic environment and might present risks to the health of bathers. Above all else, the major concern has been with the role played by bathing water polluted by sewage effluent in the transmission of infectious diseases such as typhoid, cholera, and hepatitis. For this reason, the Directive provides for the monitoring of bacteria which are carriers of contamination, such as coliform, streptococcic and salmonella bacteria.

Over and above its bacteriological purity, it is also desirable that bathing water should be clear, devoid of toxic substances and visible traces of oils or sedimentary solids and that its taste, smell and colour should be acceptable. It should also contain a sufficient quantity of dissolved oxygen, the presence of which in water plays a crucial role in the self-purification process whereby pollutants are broken down.

Among the substances to be monitored are those imparting an unpleasant taste to water such as phenols, whose major source is the chemical industry, and hydrocarbon oils, which enter water not only as a result of such obvious disasters as the wreck of the Amoco Cadiz oil tanker or the blow-out at the North Sea oil-rig Bravo, but also from a multitude of sources on land (Community action to prohibit the discharge of waste oils into watercourses is embodied in the Council Directive of 16 June 1975 — see First Report on the State of the Environment, p. 129).

Detergents also have a disagreeable taste and they can cause the appearance of foams at certain points in watercourses. Apart from the unpleasant appearance of such foams, they can be a health hazard as viruses can become concentrated in them and disseminated over considerable distances when the foam is blown away by winds.

The Directive also mentions other pollutants the presence of which must be monitored in bathing water, e.g. pesticides and certain metals such as lead, arsenic, mercury and cadmium which are poisons with cumulative effects in man, the rate at which they disappear in water being very slow.

Of course, monitoring of all these substances cannot by itself bring about improvements in water quality. The Directive also lays down for 13 of the parameters listed either a mandatory value which must not be exceeded or a reference or guide value with which Member States must endeavour to comply. Member States may not set values in

their national regulations less stringent than the mandatory values. In all cases, they may, however, set more stringent standards than those indicated if they consider this to be expedient. In the case of the remaining six parameters, for which no value is indicated, Member States may refrain from imposing one but are still required to monitor their presence in water.

The Directive allows Member States a time limit of 10 years to comply with the values indicated in respect of all bathing waters under their jurisdiction (although it does not apply to swimming pools). However, the values apply immediately to any new bathing areas explicitly authorized by the authorities in Member States in the future. But it is important to note that in the long-term the Directive does not apply only to such designated bathing areas but also to any water in which bathing is not prohibited and is traditionally practised by a large number of bathers.

A safeguard clause is included in the Directive to allow the waiving of the 10-year rule in exceptional cases. For example technical or economic difficulties with the installation of pollution control equipment could, in particular cases, make the attainment of the required water quality unlikely. However, in such cases the Member State is required to draw up a water management plan for the zone concerned and the Commission has powers to enquire into the grounds for the exemptions granted, to examine the management plan and, where appropriate, to make proposals to the Council.

Another type of exception resembles the clause common in insurance contracts concerning 'Acts of God'. Exemptions are allowed in exceptional meteorological or geographic circumstances such as floods caused by heavy storms, leading to damaged dykes and subsequent changes in water flows. Another example is the effect of seismic waves which can lead to the sudden natural occurrence of harmful substances at a level in excess of the mandatory values.

If quality standards are applied to bathing water, samples must, of course, be taken regularly in order to ensure that the water complies with the standards set. Sampling must be carried out at points at which the number of bathers is highest, and the frequency of sampling must be geared to the intensity of bathing, for example to take account of peak use at weekends or during holiday periods. As soon as a deterioration in the quality of the water is observed, inspections must be much more frequent in order to determine its source.

The values of the parameters listed and the analysis methods indicated may need to be amended in the light of new scientific knowledge. With this in mind, a Committee for Adaptation to Technical Progress has been set up, consisting of representatives of the Member States with a representative of the Commission as Chairman, within which close cooperation between the Member States will be assured.

One particular problem concerns international watercourses or trans-frontier coastal waters. It is clear that complying with the standards set by the Directive in such areas requires constant coordination between the riparian States and harmonization of the measures they take to reach the quality objectives. The Commission can participate in these consultations.

In view of the increasing preoccupation of public opinion with environmental questions, it has also been decided to keep the public informed of the characteristics of the waters in which bathing takes place. For this purpose, the Member States are required to submit comprehensive reports to the Commission, setting out the characteristics of their bathing waters, and with their agreement, the Commission will publish a summary report on the subject. The first of these reports is expected to be available in 1980.

II.4. The Community's work on air pollution caused by sulphur dioxide and particles in suspension

Almost all industrial and household activities involve the burning of fossil fuels. In addition to the usual products of combustion, namely water and carbon dioxide, such burning also causes emission to the atmosphere of:

— very fine, partially burnt particles of carbon and hydrocarbons, and

— sulphur dioxide (SO_2) due to the presence of traces of sulphur in the form of impurities in fuels.

Several of the Community's most heavily industrialized areas are located in frontier regions. The industrial areas of the Ruhr, the Escaut (Antwerp), and the Rhine delta (Rotterdam) are very close, as are those located on the old coalfield in the North of France and South-West Belgium, to cite but two examples. Because SO_2 is diffused over long distances in the atmosphere, these regions export their pollution one to the other, depending on the direction in which the wind is blowing.

The existence of frequent cases of trans-frontier pollution is one reason why a Community policy to reduce SO_2 emissions is so necessary, but there are others of equal importance.

The similarity of the problem posed in all Member States and of the solutions suggested to it, for example desulphurization of certain fossil fuels before they are burned or the use of low-sulphur content alternatives, indicates the appropriateness of a common policy. Also, different national regulations on the sulphur content of or restricted use of fuels can affect the functioning of the Common Market by creating barriers to free trade

within it or falsifying the conditions of competition between industries in different Member States. In such cases the harmonization of the differing legislations is provided for in the Treaty of Rome. Pollution by SO_2 and suspended particles is the first and best example of how the Community has set about developing a strategy for dealing with air pollution. This strategy is based on the premise that the primary aim is to safeguard the health of Community citizens and to protect the ecosystem. In order to develop adequate and rational legislation with this end in view, it is necessary as a first step to assess all the scientific data available.

In Community procedure, the first stage is to establish criteria, in other words quantitative relationships between exposure to a pollutant and its harmful and/or undesirable effects.

Epidemiological investigations have led to the establishment of such relationships between air pollution by sulphur dioxide and suspended particles and the effect on health. Two critical groups have been identified: persons suffering from respiratory ailments and children.

The epidemiological investigations have shown that a relationship exists between short-term exposure to certain concentrations of sulphur dioxide and suspended particles and increased mortality and hospital admissions of elderly persons suffering from respiratory ailments. Long-term exposure at much lower concentrations produces increasing infections of the lower respiratory tract in children.

On the basis of these criteria and taking into account the concepts of the 'no effect level' and the 'basic protection level', the Commission, early in 1976, presented to the Council a proposal for a resolution concerning the determination of criteria for sulphur dioxide and suspended particles in an urban atmosphere. The resolution states the levels of sulphur dioxide and suspended particles which must not be exceeded if human health is to be protected.

The results of this work were the basis for the proposal forwarded by the Commission to the Council early in 1976 for a Directive 'concerning health protection standards for sulphur dioxide and suspended particulare matter in urban atmospheres'.

Fixing quality standards for the air we breathe is, of course, by itself not an action which reduces pollution. The standards can only be attained and maintained in practice by direct action on the sources of emission. In parallel to the definition of quality standards, work has therefore also been undertaken on proposals to reduce SO_2 emissions by lowering the sulphur content of fuels, particularly in those areas of relatively dense human activity, in which the concentration of the pollutant most needs to be reduced.

The Council has already adopted a Directive limiting the sulphur content of light oils, (essentially domestic fuel oils and diesel oil), especially where used in urban agglomerations. A similar proposal for a Directive on the sulphur content and use of heavy oils used as fuel in industry and in electricity generation has been made by the Commission. This proposal is based on four main elements.

Firstly, 'Special Protection Zones' are to be defined as those areas in which the quality standards defined for the Community are exceeded. Secondly, it should be obligatory to use only low-sulphur content fuel-oils in these Special Protection Zones and this sulphur content is to be diminished in two stages. Thirdly, while exceptions to the use of low-sulphur content fuel may be allowed in the case of installations for which a broad dispersion of the emissions is guaranteed, this exception is to be temporarily suspended in any period of particularly high pollution caused by unfavourable meteorological conditions. Finally, all large installations should be subject to the obligation to use low-sulphur fuel temporarily under critical conditions, irrespective of their location.

The Commission is now studying the problems of SO_2 emissions from the burning of coal, with a view to making appropriate proposals. Such proposals would complete the part of the SO_2-strategy based on actions affecting particular fuels, since the use of other fuels such as wood or charcoal is hardly sufficiently widespread within the Community to warrant taking any action on them.

To return to the setting of standards for the concentration of SO_2 and suspended particles in the air around us, it is clear that such standards will need to be enforced, which means that regular monitoring of concentrations will be necessary. An exchange scheme for information derived from such monitoring is already in operation within the Community (see Chapter IV.1.b.)). But the measuring methods used in collecting the data vary from one Member State to another and the result is that the figures obtained are only partially comparable. To remedy this situation, a strenuous effort is now being made to standardize the methods.

This short description of Community activities connected with SO_2 pollution will hopefully have given an idea of the type of problems involved in developing effective and rational measures for the reduction of air pollution. Other air pollutants, such as nitrogenoxides, carbon monoxide or hydrocarbons, will follow, and for some of these considerably less basic information on health effects, and pollution control possibilities is available than has been the case for sulphur dioxide and the task will be correspondingly more difficult. But in developing a strategy for dealing with SO_2, the Community will not only have proved that the global approach works (and can be repeated), it will also have dealt with that air pollutant which is by far the most widespread source of damage to man and to the environment within the Community.

II.5. The problem of asbestos pollution

In all the Member States the attention of the public and of the medical and economic authorities has been drawn to the problem of asbestos. Interest in this problem has taken various forms, particularly campaigns carried out in the Member States, a debate on the health hazards of asbestos by the European Parliament and the passing of a resolution, and a report on asbestos drawn up by a working party of the Economic and Social Committee.

The threats which asbestos poses for human health are not always precisely known. However, a connection has been established between the following diseases and exposure to asbestos:

Asbestosis

This is a progressive lung fibrosis which generally appears only after lengthy and intensive occupational exposure to asbestos. However, exposure of only a few years may cause asbestosis.

Bronchial cancer

A considerable increase in the number of bronchial cancers linked to occupational exposure to asbestos has been proved. Such cancers generally afflict persons already suffering from asbestosis; cigarette smoke is another notable contributory factor. Such exposure is not, in general, lengthy, but it is generally extremely intensive. There is not sufficient proof so far to exclude fears that the general public is exposed to the risk of catching bronchial cancer from its surroundings which nevertheless gives rise to very weak exposure.

Mesothelioma

Most cases of pleural mesothelioma are linked to occupational or para-occupational exposure to asbestos. It is generally accepted that risk of pleural mesothelioma is linked to the type of asbestos fibres. The risk is greatest with crocidolite fibres and decreases in the following order: amosite, chrysolite and anthophyllite. The extent of the difference between, for example, crocidolite and chrysolite has not yet been clearly defined. Peritoneal mesothelioma is probably linked only to a fairly intensive occupational exposure.

Cancer of the larynx

Some of these tumours may be linked to a high degree of exposure to asbestos, but this has not been proved.

Cancer of the stomach and intestines

Some studies have claimed an increased incidence of cancer of the stomach, the colon, the rectum and the oesophagus among workers exposed to asbestos.

At present there is no proof that the presence of asbestos fibres in water, beverages, foodstuffs or liquids used to administer medicines increases the risk of cancer. Although it is difficult to provide such proof, since the risk of cancer of the stomach and the intestines varies in both time and space, studies are under way in an effort to elucidate this point.

In view of these facts, the Commission intends to submit to the Council an action programme covering a three-year period and including the following actions:

1. Harmonization of the prescribed maximum periods of exposure to asbestos in occupations involving processing of this material. Establishment of methodologies for sampling and measuring asbestos at workplaces and in installations where materials containing asbestos are handled.

2. Harmonization and establishment of procedures concerning:
   (a) precautions to be taken in respect of work involving asbestos and materials containing asbestos, including handling and demolition,
   (b) the provision, cleaning and maintenance of protective clothing and safety devices,
   (c) the information to be given to workers on potential health risks related to asbestos,
   (d) the requirements for regular medical checkups and the maintenance of adequate medical records on workers exposed to asbestos.

3. Appropriate proposals will be made on:
   (a) the labelling of asbestos and materials containing asbestos,
   (b) limiting the marketing and use of certain types of asbestos and materials containing asbestos,
   (c) replacing asbestos with less harmful substitutes when these are available.

4. Developing a monitoring system to assess the pollution of the environment by asbestos.

5. Making appropriate proposals on:
   (a) reducing the emissions and the release of asbestos fibres into the environment in general,
   (b) conditioning asbestos waste and waste from materials containing asbestos.

6. Providing appropriate information on asbestos for the general public.

7. Coordination and promotion of a research and development programme on:
   (a) improving techniques of extraction and analysis of asbestos,
   (b) early detection of diseases linked with asbestos,
   (c) drawing up of a register of diseases linked to asbestos,
   (d) experimental studies on animals,
   (e) epidemiological studies,
   (f) assessment of the potential health risks of substitute materials.

II.6. Measuring the costs of environmental measures

What does environmental policy cost? How much does industry spend on pollution control? These are simple questions, but they do not have simple answers. The initial temptation is to think that all water or air purification plants have similar costs, that members of a particular branch of industry are all faced by the same cost burden, and that the information on these costs is readily available to the public authorities. None of these is true.

The costs incurred by a particular industrial plant in conforming to the emission standards applicable to it are influenced by a considerable number of different factors. The nature of the industry is certainly the primary factor, since some industries produce far more pollution than others and will thus normally be faced with higher pollution control bills. But two plants producing the same product may do so using two different technical processes, with which differing patterns of pollution, differing pollution control requirements, and hence differing costs, may be associated. A case in point is the paper-pulp industry, a major source of pollution by organic matter in watercourses, in which two different processes, the 'sulphate' and the 'sulphite', are used, leading to two quite different pollution control problems.

Another factor influencing costs is the scale of the production process. In the field of pollution control there are many clear-cut examples of what economists call 'economies of scale' — the larger the total size of the plant the lower is the average cost of removing the same amount of pollution. This means, that if the same emission standards, in terms of permissible levels of pollutant discharge per unit of production, were to be imposed on all firms, the cost burden would fall more heavily on small firms than on large ones. This is often seen as a reason for imposing less stringent standards on small firms.

The influence of the industry, the production process, and size of the pollution control costs of a plant can all be expected to be the same irrespective of where the plant is located. But peculiarities of different sites can, in fact, influence very considerably the costs of pollution control. For example, old factories located in industrial towns may have no more land available to them on which to construct pollution control plants, and this may lead to them having to pay for alternative, very much more costly types of pollution control, which do not need as much space.

Lastly, costs are influenced by 'random' factors. The reliability of the equipment delivered by the pollution control plant manufacturer, the efficiency of the operating personnel, the availability of technical adivice, a host of local factors can have a significant impact on the cost of an installation.

No general statements can be made about site-specific or random variations in cost. But many studies have been conducted to estimate the pollution control costs incurred by particular branches of industry and identify the impact of size and process technology on them. Such studies are not only useful in giving us information on the efforts being made by industry, but also as an important input to legislative proposals for particular industries. If a decision is to be taken on the desirability of a particular pollution control technology being introduced throughout a certain branch of industry, it is desirable that data should be available on the costs of those plants in which it is already used. From this the overall cost of a generalized introduction can be estimated.

In order that this function can be fulfilled at Community level it is essential that the results of pollution control cost studies undertaken in the different Member States be comparable. In the past a whole range of differing methodologies have, however, been in use, so that this comparability has not existed. With a view to improving this situation the Commission transmitted to the Council on 16 December 1977 a draft Recommendation 'regarding methods of evaluating the cost of pollution control to industry', which sets out a series of principles, definitions and methods to be used in such studies.

A few examples will suffice to indicate the character of this draft Recommendation. Firstly, it specifies that the various components of investment costs and running costs of pollution control should be evaluated separately. This allows direct comparisons to be made between different studies, even when they make different assumptions about the

fiscal provisions on amortization or the conditions available on the capital market for investment finance in arriving at a figure for 'total costs' in annualized terms.

Secondly, it is often necessary in such studies to impute only a certain share of an investment to pollution control. This is the case if instead of simply adding on a pollution control plant to the production process, it is more reasonable to change the production process itself, to make it less polluting. This often happens in industry when an old plant is being renewed. In this case, part of the total investment can be said to represent merely replacement expenditure, and only the rest is due to pollution control requirements, the proportions often being a matter of judgment. The Commission's intention is simply that this proportion be always made explicit, so that results of two studies can be compared simply by adjusting the figure used.

One final example — all polluting discharges represent materials lost, which may have a certain value. Many pollution control plants can recover pollutants in such a form that they can be sold, and a part (or in some cases even all) of the pollution control costs recouped. Clearly, the value of such sales should be noted in the studies, to avoid false conclusions about the net cost to industry.

One of the biggest problems in these studies is that even if agreement is obtained on exactly how they should be done and on the data to be obtained, and even if industry is willing to cooperate fully in them, the internal accounting systems of firms may simply not be able to throw up the required information. Just as industry has no separate records of how much it costs to conform to regulations governing the health and safety of work-places, so it may also not have explicit data on the costs of pollution control. An element of subjective estimation is therefore always likely to be contained in the results.

This situation is not surprising and indeed it is very much in accordance with the spirit of the polluter pays principle, one of the cornerstones of the Community's environmental policy. The basic idea behind this principle is that environmental costs, which formerly expressed themselves in the degradation of the environment and in damage to human health, should become 'internalized' in the cost accounting procedures of the polluters themselves. Just as the costs of respecting the legal requirements on publication of results or on types of advertising are accepted as normal operating costs and are not calculated separately, one could hope that some day the same would apply to pollution control costs.

In the meantime the cost of environmental policy is a subject of some political importance and as long as it remains so it is as well to have data available at Community level which are generally accepted as comparable. The Commission's proposition is designed to achieve this.

II.7. The elimination of 'red mud' from our seas

A Dutchman, standing at the top of a ladder and carefully painting the white wooden boards marking the roof-line of his house, may well be conscious of contributing positively to the visual environment of his neighbours. But he is unlikely to realize that he is also an unwitting contributor to one of Europe's sources of pollution — red mud in the sea.

The best existing white pigment is titanium dioxide (TiO_2) and, because of its opacity and covering power, it is widely used throughout the Community and has many applications apart from household paints. But its production is a highly polluting process, since the 840 000 tonnes produced annually in the Community have to be extracted from minerals in which pure TiO_2 may make up between 30% and 50% at least of the total weight, the rest necessarily being left over as waste.

If our Dutchman had taken a package holiday in Italy some years ago he would have flown over the Ligurian Sea past the northern tip of Corsica and he might well have noticed areas of water stained red. At the time the Italian producer of TiO_2 discharged the solid waste from its operations at sea and the green sludge was quickly turned by chemical action into the infamous 'red mud'.

The change in colour reflects the change from the ferrous form of iron, produced in the form of ferrous sulphate, known as 'copperas', to ferric iron. This transformation uses up the oxygen in the water. The 140 tonnes of copperas discharged per day by this one factory used up as much oxygen as the untreated sewage of a medium-sized town of around 350 000 inhabitants.

At present, although copperas is no longer discharged into the Mediterranean, 320 000 tonnes per year are discharged into estuaries and on the high seas in the Community, mostly into the English Channel and the North Sea. Added to this are 780 000 tonnes of sulphuric acid which requires around 18 million m^3 of sea water per day before it is neutralized. A by no means negligible quantity of heavy metals, such as chromium, vanadium, cadmium etc. also occurs in the waste products.

These waste products are a result only of the sulphate process of extracting TiO_2. used to obtain it from lower grade ores. An alternative process using chlorine which produces negligible waste, can only be used on ores rich in TiO_2.

The biological effects of the discharges are two-fold. A short-term effect is acute toxicity leading to the destruction of living organisms, such as plankton. An indirect long-term effect is the accumulation of certain elements in food chains. This phenomenon does not necessarily lead to major effects on marine life itself but problems may arise for the human consumption of fish or molluscs which have accumulated high contents of undesirable elements in the geographical area of the discharge.

After long discussions at Community level, the Council adopted a Directive on 20 February 1978 which should lead to the progressive elimination of these problems.

The Directive contains three main elements:

— it obliges Member States to set up a system of prior authorization for the various methods of dealing with TiO_2 wastes (discharge at sea, stockage on land, subterranean stockage);

— it provides for monitoring of all waste treatment operations and of the effects on the receiving environment;

— it obliges Member States to draw up by 1 July 1980 national programmes designed to progressively reduce and eventually eliminate by 1987 all pollution caused by waste discharges of existing TiO_2 production plants. The Commission can then make proposals to ensure that these programmes are suitably coordinated. A Member State may judge that it has no such pollution problem, in which case it need establish no programme if the Commission agrees with its assessment.

The pollution control methods required for these programmes are already used by some of the Community's producers of TiO_2. For example, the acid effluents can be neutralized or recuperated for re-use in the process. The copperas can be treated by roasting, to render it harmless, and it need not be produced at all if enriched ores are used as raw material for the production process.

As far as newly established plants are concerned the Directive stipulates that they should use the raw materials, processes, and techniques which cause least damage to the environment. It appears at present that this aim would be best fulfilled by the use of the chlorine process to extract TiO_2 from high-grade or enriched ores.

At the conclusion of the programme period in 1987 it will then be possible for our Dutch householder to repaint his house without having a guilty conscience.

II.8. Dealing with toxic waste

'One day we received 25 barrels labelled 'cyanides' in letters 10 cm high, of which, as it turned out, three contained highly concentrated acid. If we had not checked the contents of this load on arrival and had simply relied on the clients's labelling, we would have mixed 22 barrels of cyanide and 3 barrels of acid together in the same tank, producing a hundred kilos of hydrogen cyanide, a toxic gas, several grams of which are sufficient to kill a man. This incident was recorded by the director of a waste disposal

centre. It illustrates the dangers which industrial wastes can present and the care which must be taken in disposing of them.

But it is not only industrial wastes whose toxicity can be a threat to the environment and to human health. All of us in our daily lives, on different occasions and to varying degrees, use products and articles which we throw away without being conscious of the dangers they may represent.

The toxicity of mercury, for example, is known to be extremely high; acute poisoning can result from breathing in mercury vapours or ingesting mercury compounds, particularly in organic form. Fatal cases have been recorded in which the amount of mercury vapour inhaled was as little as 2.5 grams, corresponding to a globule of mercury only 0.2 cm^3 in volume.

But all forms of mercury, whether in the form of metal, metal vapour, inorganic or organic compounds, represent a burden on the environment, all being converted into highly toxic methyl mercury by certain soil bacteria and fungi and thereby entering into the biological food chain. This is why mercury is such a dangerous substance in water (see Chapter II.2).

Despite this toxicity mercury is used in many household products — thermometers, barometers, many types of battery, watches, photographic equipment — which therefore represent a potential danger when disposed of in household waste.

Nevertheless, it is toxic wastes in large quantities which are particularly dangerous, and for which the necessity for adequate precautions in their collection, disposal and reutilization is most apparent.

The directive on toxic wastes adopted by the Council on 20 March 1978 lists 27 substances for which such precautions are necessary. It includes mercury and cadmium, certain solvents and pharmaceutical products, ethers, tar and asbestos (see also Chapter II.5).

The directive contains a number of important provisions.

Firstly, it establishes the principle that toxic wastes should be disposed of without danger to human health or to the environment. Member States are to take the necessary measures to prohibit the unauthorized importation, transport or discharge of such wastes.

The story quoted above illustrates the necessity of the further obligation imposed of correctly labelling all toxic wastes as to their nature, composition and quantity.

Furthermore, not all waste treatment centres have the capacity to treat all types of toxic wastes and the directive provides that each such centre should be given a specific authorization covering the type and quantity of wastes which may be accepted for treatment, treatment methods, safety precautions, and final disposal. Because of this provision the centres are also obliged to maintain a register of wastes treated, covering these same points as well as the origin, date of reception and date of final disposal of each consignment.

The directive also provides for increased efforts to avoid wastage of resources. The Member States are to give priority to measures intended to promote recycling of raw materials and of energy. Metals of secondary origin are very important for European industry as the Community is heavily dependent on the outside world for its supply of non-ferrous metals. The level of dependence is 100% for nickel, cobalt, chrome and phosphates, about 96% for copper and about 99% for manganese. The contribution by secondary production to Community supplies of primary materials has risen to about 30% for aluminium, 40% for copper, 50% for ead, 39% for tin and 30% for zinc.

Similarly, compared with primary production of non-ferrous metals, there in an important energy saving which reaches 90% for aluminium, 60% for copper, 50% for lead and 40% for zinc. About a million tonnes of non-ferrous metals remain available for a more intensive recovery. Of these, around 500 000 tonnes in the form of packaging and containers end up in municipal waste, and the balance arises mainly from consumption waste, such as used cars and refrigerators.

Finally, the directive lays down that Member States should regularly up-date their programmes for the elimination of toxic and dangerous wastes, and should present a summary report to the Commission on progress made in each period of three years.

This is a vast and complex domain, for the variety of wastes increases with the technical complexity of our industrial world, and the situation is subject to rapid change. The Commission's task in future will be to see that this is reflected in the adaptation of the list of toxic and dangerous substances coverd by the directive, and to improve our knowledge of the substances and their properties. It will also be working on a code of practice for the treatment of these wastes, to ensure that the latest available know-how becomes standard practice as soon as possible.

II.9. Protecting Europe's birds

In recent years demographers in Europe have encountered increasing difficulties in their population forecasting, because birth rates have been falling rapidly. Many European children will know why this is so — it is well known to them that new babies are

delivered by air-mail, brought by a stork, so fewer babies must be the result of fewer storks. The argument may not be strong, but the conclusion is correct, for the white stork is among those birds threatened with extinction in the Community. It is estimated that as many as 221 of Europe's just over 400 bird species are declining in number.

In some Member States of the Community the decline of species has in fact led to their extinction. According to one scientific source, 32 species have died out in Italy, 17 in Germany, and 6 in Belgium and it is thought that no less than 50 species are in danger of extinction in Europe as a whole. The first Action Programme of the European Communities on the environment had this to say on the subject.

'Hundreds of millions of migratory birds and songbirds are captured and killed in Europe every year provoking worldwide protests against the countries which allow the trapping of birds. This massive destruction provokes a serious threat to the ecological balance in Europe . . .'

and concludes that,

'Policy for the protection of the environment should therefore include measures to prevent the large-scale destruction of birds'.

Action at a Community level to protect birds in made particularly imperative by the fact that more than three-quarters of the wild bird species regularly observed on our territory are migratory — their breeding grounds are to be found in the northern half of Europe but they fly south in the autumn to winter in southern Europe or in Africa. This means that no conservation measures taken by single Member States can be assured of more than limited success. Effective conservation requires not only that conservation policy as such be pursued at a Community level but also that national regulations on the hunting of birds be harmonized, in order to avoid lax measures in one country counteracting the conservation efforts of another.

Before making a proposal for action, the Commission had two studies undertaken of the problems involved, one carried out by the Zoologische Gesellschaft of Frankfurt under the responsibility of Professor Bernhard Grzimek, one of Germany's best known experts on the animal world, the other by Stanley Cramp, director of the scientific encyclopedia 'The Birds of the Western Palearctic'. The studies concentrated on endangered species, a term which covers not only those birds which have become very rare, but also those suffering significant declines in population as well as those dependent on certain restricted types of habitat — the best examples of which are so-called 'wetlands', such as tidal salt marshes on the coast, whose number and extent have been declining steadily.

The 'wetlands' are an example of one of the three principal threats to bird populations which have been identified — the steady decline of suitable habitats. The draining of

marshes, encroachment of leisure activities on coastal breeding areas, the widespread clearance of hedges and coppices, which has accompanied agricultural modernization, all contribute to the diminution of specialized bird habitats.

The second threat is the effects of pollution on bird health. Cases of presticides accumulating in the food chain to the point at which birds of prey are no longer able to breed successfully are one well documented example. The Community's anti-pollution policy in general, aimed primarily at safeguarding human health, will clearly contribute as a welcome side-effect to reducing this threat to birdlife.

Lastly, birds are at the mercy of one predator in particular — Man. Excessive shooting and trapping of birds can upset the natural population balance of a species and put it on the road to extinction. It is particularly this aspect of the problem which has interested public opinion within the Community. During preparation of its proposals, the Commission has received letters and petitions with over 50 000 signatures in all demanding Community measures, particularly to ban certain offensive methods of hunting birds, such as the use of nets or of snares to catch large numbers of small birds, or the use of blinded birds as lures to entice birds into waiting nets.

Public opinion has also played a role through European Parliamentarians, who have put considerable pressure on the Commission to present its proposals as well as supporting them strongly in the ensuing discussions. A directive was finally proposed to the Council on 22 December 1976 and approved in principle on 13 December 1977, leaving details concerning trade in certain species to be agreed upon at a later date.

The main tasks of the directive were to find ways of dealing with the twin threats to birdlife from excessive hunting and from the destruction of habitats. It establishes the general principle that the bird species living in the wild state on Community territory are to be protected by forbidding their killing or capture and by the maintenance of a sufficient number and size of suitable habitats. Measures of reinforced protection of habitats is provided for a certain number of birds in particular danger, such as the kingfisher, the peregrine, or the white stork itself.

Exceptions to this general rule are provided for in the case of a number of species which can still be hunted (of which there were around 120 before and will now be 71). But all methods of hunting likely to considerably affect population levels are banned. This includes non-selective or massive devices such as netting and the use of snares and of lime. Also trade in birds is to be strictly confined to a certain number of species which can be hunted.

Strictly controlled exceptions to the rule of general protection can also be approved for a certain number of other reasons — for example, where gulls menace the safety of airline passengers by flying into aeroplane engines, where flocks of starlings represent a threat to crops, where birds are carriers of diseases harmful to man, and so on.

Finally, the directive provides for a programme of study and research on bird population levels, on the number of birds captured and on migration patterns, in order that it can be implemented satisfactorily in the future.

The obtaining of an agreement on the subject of bird protection is certainly both a considerable achievement and an important basis for the future. Attitudes to birds vary considerably throughout the Community, so that the hunting and the caging of small song-birds or the shooting of water-fowl may be viewed as scandalous in one Member State and as a perfectly respectable and valued part of an accepted way of life in another. One of the side-effects of the long process of obtaining agreement in the face of this diversity was that the organizations representing nature conservationists and hunters in the Member States have now got together to create umbrella organizations at European level, a step towards the formulation of common positions and attitudes.

The importance of this directive lies not so much in its detailed lists of menaced species or of species which can be hunted, much though these will improve the situation in practice. It lies in the establishment of the general principle that birds are to be protected by conserving their habitats in all our Member States and that this policy should be based on sound scientific evidence. This is a firm basis on which to build for the future. And if the decline of the white stork can be arrested, many children will be grateful in years to come.

Part III

The future

III.1. Prevention is better than cure — preventive instruments of environmental policy

(a) Introduction

Almost all human activities make some impact on the natural environment, and almost all industrial processes which transform natural resources into products for man's use give rise to some of pollution. Acceptance of the reality of this situation is now general, although there are still some who call for a removal of all pollution, not realizing that this would signal the end of human activity, as well as of industrial civilization as we know it.

But this realization is a recent phenomenon. For a long time the implicit assumption underlying the growth of Western industrial society was that it could be allowed to take place without regard to its possible consequences for our environment. This era has left us a legacy of noisy, polluting steelworks located next to residential areas, of heavy, commercial vehicles rumbling past buildings of immense historical value, of factory sites so small that there is no space for the installation of pollution control equipment, of massive decline in the numbers of our magnificent birds of prey due to the effects of the pesticide DDT, now banned from use. In short, too much economic activity has taken place in the wrong place, using environmentally unsuitable technologies. The consequence has often been a choice between accepting pollution as a necessary evil or paying very large sums of money for its elimination.

If such a development had been foreseen, many of the problems could have been avoided from the start and the cost of pollution control could have been greatly reduced. Several studies show that the cost of preventing pollution and nuisances is less than the cost of repairing the damage caused and introducing anti-pollution measures.

Considerable savings would result for manufacturers who have to bear the cost of combating pollution and for society which has to bear the costs, not directly connected with production.

The old maxim 'prevention is better than cure' is true also of environmental affairs. 'The best environmental policy' says the Action Programme, 'consists in preventing the creation of pollution or nuisances at source, rather than subsequently trying to counteract their effects'.

If we are to ensure that decisions taken today on the siting and specification of industrial and infrastructural investment do not give rise to a new crop of comparable problems in ten or twenty years time, we must attempt to project courselves into the future and identify the areas in which today's decisions will impinge crucially on tomorrow's environment, modifying those decisions accordingly. A range of preventive instruments of environmental policy must be developed, so that this idea can be systematically applied. Some of these instruments are already available and are the subject of work at Community level, others will need to be developed in the future.

(b) Environmental impact assessment

The 1973 Action Programme of the Community on the Environment states that: 'Effects on the environment should be taken into account at the earliest possible stage in all the technical planning and decision-making process'. The study of suitable environmental impact procedures, with which to implement these principles, and the drafting of appropriate proposals, is one of the most important tasks of the Commission included in the 1977 Action Programme.

It is a question quite simply of assessing the environmental impact of public and private activities likely to have considerable adverse effects on the environment; this covers industrial facilities, infrastructures, regional development plans, production technologies and the products themselves. In all these cases, the aim is to assess the impact before these facilities and activities take shape in order to prevent possible environmental damage or at least to limit it to a strict minimum.

It is no secret that most economic activities in the Member States and, in all the other industrialized nations are subject to a series of public authority controls to ensure that they comply with laws on safety, public health, hygiene, etc. An industrial establishment must normally be authorized by administrative procedures approving its construction and operation. In some States, regional development plans or economic programmes may impose various requirements as regards the siting or development of economic activities (manufacturing, residential, commercial, infrastructure, etc.). Apart from the suitability of the location of new activities, we must also consider their intrinisic characteristics. Some products present particularly acute environmental hazards,

pesticides being a good example, and some industrial processes are particularly dangerous or open to accidents. The idea of public control of production technologies is emerging in some countries and Member States and is taking shape in the establishment of public bodies.

For the reasons expounded below, it would appear desirable to incorporate into all public procedures regulating economic activities provisions for prior assessment of the possible impact of these activities on the environment.

The environmental data will then be included among the other economic, legal, social and other data concerning the project in question and the public authorities will be able to reach a decision in full possession of the facts.

Impact assessment is thus a technical instrument providing information of use in decision-making.

It has been introduced in varying forms and degrees and to various extents in several countries. For example, impact studies are required for individual large undertakings in the United States, Canada, Australia and New Zealand. Among the Member States, France, requires an 'impact study' to be drawn up before any decision on development plans or undertakings under the 1976 law on nature conservation which took effect on 1 January 1978.

In Ireland, an obligation of this type was incorporated in the Local Authorities (Planning and Development) Act of 1976 although it has not yet been applied. In the Federal Republic of Germany, a Federal Cabinet decision of 1975 set up procedures to check whether certain measures by the Federal authorities did not harm the environment. Studies are under way in other Member States (Belgium, Netherlands, United Kingdom).

Other 'preventive instruments' have been suggested. In the United States the Office of Technology Assessment carries out comprehensive studies on the environmental and social implications of specific technologies. A similar system has been put forward in France.

The principle of environmental impact assessment is easy to state but its practical implementation raises a whole series of problems: the development of environmental impact assessment methods, the training of administrative staff with the knowledge needed for supervising these assessments, determination of the most effective methods of ensuring public participation in the preparation of impact studies. Any prospect of a rational, consistent and comprehensive use of this instrument will thus require a period of very intensive preparatory work. The following paragraphs list some of the efforts which have already been undertaken.

Other problems arise when considering the task of drawing up common *principles* for impact assessment in all the Member States. The first problem is the wide range of existing administrative procedures and the varying degree of development, in particular as regards the procedures for drawing up development plans. Of course, 'common principles' of impact assessment must be in line with the administrative practices of each Member State in order not to upset traditional procedures.

Secondly, the principles of impact assessment and the obligation to draw up impact studies must be introduced *gradually* to avoid overburdening the administrations and therefore perhaps impairing the system's efficiency in the long term. Priorities should thus be selected from the potential fields of application — individual undertakings, regional development plans, economic programmes, new technologies and products. Thirdly, the assessment procedures appear particularly appropriate from the Community point of view in that they also permit consideration of the assessment made by the authorities or the public in any other Member States potentially concerned.

What are the features of the environmental impact assessment procedures and what are the consequences? Firstly, it means establishing the *obligation* 'to evaluate the effects on the quality of life and on the natural environment of any measure that is adopted or contemplated at national or Community level', as stated in the 1973 Action Programme.

Secondly, it means the drawing up of reports on environmental impact and their *integration* in the administrative procedures for approval of physical planning documents, regional development and other plans, industrial and infrastructural investment projects and, perhaps, draft legislation.

The function of such reports would not be simply to check the conformity of the proposed development with existing environmental requirements but to evaluate the *total effect* on ecological systems and the quality of life of the affected population. For example, a new industrial installation may bring with it not only the attendant direct problems of air, water, or solid waste pollution, but also the removal of land from other possible uses. Indirectly it may have an impact in placing an additional load on the transport infrastructures of the surrounding area due to deliveries of raw materials and finished products, as well as forming an incentive to provide additional housing facilities for the newly-employed work force, and so on. The aim of an environmental impact reports is thus to provide an *overall picture* of all the short- or long-term, direct or indirect effects of building such a plant, particularly when significantly affect the environment.

Because of its all-embracing nature, the assessment process means that the impact studies or reports are prepared in close collaboration with all parties concerned which are able to contribute to the assessment: firstly, the various administrative authorities responsible for the different sectors of the environment (protection of the air, water, soil,

etc.) which should state the requirements which the proposed undertaking should meet in the field within their jurisdiction and secondly the inhabitants concerned who could express their opinion on the impact of the undertakings on their living conditions; this impact is often difficult to quantify because of its subjective nature (what 'value' should be assigned to the effects of noise, the increase in urban congestion, the division of a community, etc.?) and information on the inhabitants' views is indispensable in this respect.

The consultation of these various parties must therefore be an integrating factor in the assessment procedures. Apart from the contribution of information, the fact that the various authorities responsible for individual aspects of the environment are associated with the assessment procedures may in the long term stimulate *coordination* of the environmental authorization procedures which are often too widely scattered among too many authorities (authorization of discharges into water, the air, the soil, etc.). This coordination could contribute much to reducing the time needed for authorizing a specific undertaking.

Furthermore, the obligation for public authorities and private industry to produce these studies would provide a stimulus for the development of new tools for collecting environmental information and forecasting environmental impacts.

These are the main aspects of impact assessment. The Commission has studied them from the administrative, legal and technical points of view. It is also cooperating with the Member States on feasibility studies to test the principle of environmental impact assessment in very specific cases.

The findings of these studies has already led the Commission to the conclusion that the adoption by the Member States of certain common principles in their national procedures is highly desirable both from the point of view of rational management of environmental resources and living conditions, and of the smooth functioning of the common market. It is preparing measures along these lines.

(c) The ecological mapping of the Community

An American company wishes to expand its European operations and enters into negotiations with the local authorities in one of our Member States. The region has a high rate of unemployment and the company is welcomed with open arms. A site is found, close to a motorway and on flat, riverside land, near a town with a good potential labour force. At the last moment, someone remembers to check the provisions for conforming to the local air and water pollution standards. Everything is in order, the green light is given, construction starts.

Afterwards it turns out that the new factory's effluents are just sufficient to unsettle the ecological balance of the river, because the absorptive capacity of its water is already heavily strained by a paper pulp factory a mile upstream, also the prevailing wind is just such as to afflict a nearby village with the harmless, but unpleasant odours given off by the process used, and it turns out that the factory site represented one of the last areas of high-grade, agricultural land in the region.

If an ecological mapping giving an overall view on this environmental situation had existed, the final decision on the location of the project could have taken into account in good time on the existing situation.

From the start it should be made clear that ecological mapping is not a panacea to avoid all environmentally unsuitable decisions. But its aim is to provide the authorities with global and clear summarized information that enables them to judge from an environmental point of view to what extent particular zones are suited for different land related purposes, taking account both of their natural potential and of the pollution load to which they are subjected.

Of course, it would be absurd to suggest that much of the necessary information on the environment does not exist already. But it is fragmentary, contained in thousands of separate field studies, maps, aerial surveys, special reports, and dispersed among many different institutions, university institutes and private laboratories, as well as public authorities on several different levels. What is required is to bring this information together, to fill in the gaps, and to present it in an immediately utilizable form.

Since the Council of Ministers originally requested the Commission in 1974 to begin work on this project a pilot methodology has been drawn up, and is now being tested in selected areas throughout the Community. The basis of this methodology is that quantified information on the most relevant environmental characteristics should be gathered for each unit of a 1 × 1 km grid system throughout the Community. All this data could be computer-stored and maps showing the natural potentials and pressures for any given area, or indeed any of the individual data items could be easily obtained, although this would clearly represent the end of a long process of development, with considerably more modest intermediate stages.

This unity of concept represents one half of the project method. The other half is the principle of flexibility. The Community stretches from the semi-arid zones of southern Italy to the storm-washed Scottish Islands, and from the Atlantic beaches of France to the high Alps. Any system, hoping to map realistically the environmental characteristics of such diverse areas, must allow for well-defined adjustments depending on the particular area.

In addition the project method is designed in such a way, that it can be adapted as research in the different fields of environment that it makes progress.

When the current case-studies have been completed, and the results of special studies on the data-processing requirements of the mapping and on the contribution which remote-sensing by aeroplane or satellite can make to it are available, a final synthesis report will provide the basis on which the Commission will propose a methodological project to the Council.

If the Council agrees, the next stage will then be the progressive mapping by the Member States of their territory.

An instrument will then be available to allow the systematic integration of environmental priorities into all decisions affecting the spatial distribution of human activity, especially as far as decisions at Community level are concerned (for example to guide decisions on those regions benefiting from Community aid funds).

(d) An identity card for new chemicals

Before they can be put on the market all new chemical substances should be given an identity card showing what potential dangers they may present for human health and the environment. This is the basic idea behind the Commission's proposal for a sixth modification of the Directive of 27 June 1967 on dangerous substances, transmitted to the Council on 21 September 1976.

We are all conscious of the role played by the chemical industry in the economic development of the last fifty years, but few of us realize the enormous number of new synthetic chemicals which have been produced. Hundreds of thousands of new chemicals are 'synthesized' each year, of which around a thousand are newly marketed, adding to the more than 30 000 compounds already in daily use.

The dangers for human beings and for the environment of exposure to these new substances have not always been recognized in time. Furthermore, the sheer number of new chemicals poses tremendous problems for the task of screening them to ensure that dangerous products are not allowed to be brought into use. Administrative procedures do exist to carry out this screening for certain categories of chemicals such as drugs or food additives, but a general system of control does not exist.

The necessity of having some means of preventive control over new chemicals should be emphasized, for their polluting effects can often be almost irreversible by reason of their lack of susceptibility to biological breakdown, and they can be particularly dangerous when they accumulate in certain animal species. (Examples of these effects are the PCBs and certain compounds of mercury.) In adopting the First Community Action Programme on the environment in 1973, the Council emphasized the importance of reinforcing the control mechanism for new chemicals. Since that date Sweden, Japan, Canada, the United States and one Community member, France (on

12 July 1977) have adopted legislation of the type described. The Commission's proposal, after having been favourably received by the Parliament and the Economic and Social Committee, is now the subject of discussions among the experts of the Council.

What does this proposal contain? First of all, it obliges all maufacturers or importers of new chemical compounds to carry out a study examining the possible risks for man and the environment presented by each of them, before the product is introduced. In this way the principle is introduced that the launching of new industrial products on the market should always be preceded not only by an examination of its likely technical and economic value, as in the past, but also by an assessment of its likely environmental impact.

On the basis of this study, the producer or importer can then present the authorities, at the moment of introduction of the product, with a notification containing:

— a technical dossier detailing the physico-chemical, toxicological and ecotoxicological characteristics of the product, the quantities to be placed on the market, the use to be made of it, and any necessary safety precautions;

— a declaration of the potential risks of the product for human health and the environment;

— proposals for any measures relating to the conditions of use of the product, intended to limit any unfavourable effects;

— the classification of the new product into the different categories of danger defined, (which affects the way the product should be labelled).

In this way each product will have its own, detailed 'identity card', giving the information which has so often been lacking in the past, when accidents have taken place with chemicals without anyone having the technical knowledge to know how best to react. It will, of course, be the task of the public authorities to verify the data supplied, and if necessary to demand that they be completed with supplementary information, where a full evaluatation of environmental impact is not possible. The 'identity cards', will also provide the basis for decisions on whether any particular measures should be prescribed by the authorities to eliminate potential risks.

Since the great majority of chemicals synthesized by industry are sold on international markets, it is clear that national screening procedures can be only a first step. The Commission proposal provides for a second examination at Community level, by which a Committee of national representatives, presided over by the Commission, will suggest whether Community measures should be proposed by the Commission. The Commission will also maintain a central record of all the notifications made throughout the Community, to which all Member States will have access.

(e) After Seveso — the prevention of accidental pollution

Anyone who has followed the story of the cloud of poisonous gas which erupted over a chemical factory at Seveso near Milan on 10 July 1976 and seen photo reports of the disease it induced in so many people will have become aware of the dangers of pollution from an industrial accident. The explosion of a chemical works at Flixborough in the United Kingdom in 1974 furnished another dramatic example of the risks which some types of industrial installation may present.

Industrial activities are accompanied by two types of risk for the environment:

— systematic risks, as a result of polluting emissions which always occur under normal operating conditions (e.g. certain levels of emission of air pollutants, certain concentrations of a pollutant in the working environment, certain effluent discharges);

— possible risks, which do not occur under normal circumstances, but may do so as the result of an accident, e.g. explosions, fires, leaks of toxic chemicals, etc.

The systematic risks are the subject of a large part of environmental policy. Here, a clearly defined state of affairs is dealt with by clearly defined technical means. The possible risks, however, represent a different situation. The probability that an accident occurs may be low, but often it is not known at all. The aim must be to reduce this probability to a minimum by increasing the reliability of those parts of the installation whose failure could lead to the accident visualized.

Such studies of reliability are subject to considerable difficulties in the case of chemical works, in which the presence of many different substances may theoretically give rise to a multitude of different chemical reactions in the case of accident. But much progress has been made in this field thanks to the new science of system security, in which all possible combinations of events which could produce an accident are analysed and their probabilities estimated separately, in order to identify the crucial points at which security must be improved. These techniques have been developed to a large extent in the past in the field of nuclear reactor safety.

Thoughts along these lines, stimulated by the dramatic accidents mentioned have led the Commission to develop a proposal for a Directive on the subject, which it hopes to forward to the Council in the near future. This is likely to contain obligations both for the firm itself and for the public authorities.

The industrialist planning a factory for which a certain risk exists should be obliged to:

— make a prior study of the conception, construction, and operation of the installation with a view to assessing the probability of accidents occurring;

— choose the most appropriate technology, in the sense of that presenting the least risk, where this is technologically feasible;

— provide for security equipment, alarm systems, and contingency plans for the case in which a leak, an explosion, a fire, or another form of accidental pollution contaminates the environment either within or outside the factory;

— inform his personnel of the dangers presented by the substances concerned in the production process;

— take the necessary steps to ensure that all employees know exactly how to react in the case of accident and organize practice exercises;

— inform the authorities immediately in the case of an accident and furnish them with all the informtion they need to deal with its consequences.

In the case of industrial installations using very toxic and persistent chemicals the producer should be obliged to complete a formal notification to the authorities including all the information necessary to check that all these obligations have been fulfilled, down to the name of the person in charge of accident prevention.

The role of the authorities should be:

— to check the content of the notification and ensure that it is complete;

— to carry out their own evaluation of the risks for Man and the environment;

— to inform the public in appropriate fashion of the type of risks involved and the measures taken to reduce them to a minimum;

— to demand that appropriate measures be taken to reduce the risks to a minimum, if necessary under the threat of suspending or prohibiting production;

— to carry out inspections at the factory itself, to verify that all obligations have been fulfilled.

The provisions of the proposed Directive will be concerned primarily with new installations but it is hoped to extend them after a suitable period to cover existing industial plants as well. It also provides for an important role for the Commission in receiving and classifying general and statistical information on the notifications made in Member States, this 'data bank' being a method of pooling the experiences gained and putting them at the service of any authority responsible for the examination of such an activity.

Risks cannot be eliminated from life, but they can be foreseen and reduced. The implementation of the Commission's proposal can ensure that, if humanly possible, the accident that occurred at Seveso will remain without parallel within the Community.

III.2. Re-utilization of waste paper

Paper and board are one of the most important outputs of industrial production, being used in an enormous range of human activity and making an essential contribution to the daily way of life of every consumer. Our present-day structures for the dissemination of information and distribution of merchandise would be impossible without it. But, the fact that it is utilized predominantly in the field of short-lived consumer goods means that after use paper is generated as waste which has to be disposed of in order to protect the environment.

A steady increase in paper consumption is to be expected over the next few years. This predictable growth in consumption, on the other hand, has to be seen in the light of future supply. But it is difficult to evaluate *a priori* the degree of probability of possible long term shortage, foreseen by some people, as some of the shortages previously forecast have not occurred.

The primary materials used in the manufacture of paper in the Community are indigenous wood, imported pulp and waste paper. Wood used in the paper industry is mainly small trees from essential thinnings of waste from sawmills or other wood processing plants.

The use of this wood makes an important contribution to the economy of the forest industries, is essential to forest structure and eliminates wood wastes from the environment.

At present, the EEC is already dependent on imports for more than 50% of its paper and papermaking materials. The Community deficit in wood fibre amounts to 8 000 million EUA being the second in value to oil. Unless there is an increase in the usage of indigenous raw materials, especially waste paper, during the next few years this dependence will rise, while at the same time valuable secondary raw materials, which are disposed of in household refuse as 'useless' at considerable expense, are being squandered.

Waste paper is now the most important source of raw material for papermaking in the Community, supplying over 43% of the raw material used. The development of waste-paper recycling has in the 1970s shown a certain growth despite severe fluctuations in economic conditions.

Year	1950	1955	1960	1965	1970	1975	1976	1977
Waste paper used in paper manufacture % of raw material	28.1	30.8	31.7	34.1	37	42.6	42.7	43.3

This relative growth for the Community covers a wide range of situations in the Member States and there seems to be a large potential for further development.

An increase in waste paper recycling would offer a number of important advantages with regard to both the environment and waste management:

(a) the volume of paper recycled is reflected in a drop in the quantity of waste and hence in waste disposal costs;

(b) every tonne of waste paper that is recycled replaces the equivalent of 2-3 m^3 of wood, or approximately 15 to 20 small sized trees;

(c) important energy savings are achieved by using waste paper as a raw material in place of 'virgin' raw materials;

(d) an increase in a recycling of paper would lead to an increase of employment in both the collection and in the papermaking industries.

In 1976 consumption of paper and board products in the European Economic Community amounted to around 30 million tonnes. Bearing in mind that approximately 15% ends up in long-lived products or is irrecoverable (5 million tonnes), the quantity of waste paper which is theoretically recoverable within the EEC amounts to around 25 million tonnes. Of this, only about 10 million tonnes are recovered at present. Approximately 15 million tonnes are still being disposed of as waste, mainly along with household refuse.

The European economy is therefore losing the raw material value of these 15 million tonnes. Assuming disposal costs of around £17.25 per tonne of household refuse, their disposal is costing the economy between £250.375 million per year in waste disposal costs. There are technical reasons which make a certain proportion of the paper and board waste arising in household refuse unsuitable for the purposes of refuse. However, even if this proportion is estimated at 50%, this still leaves one half of the total, i.e. 7.5 million tonnes of waste paper, representing indigenous secondary raw materials for the European paper industry which are being lost. If this paper could be recovered, the total recycling ratio for the Community would rise from its present value of 30% to approximately 55%. What is standing in the way of this desirable development?

The 10 million tonnes of waste paper which are recycled at present are mainly the relatively clean and sorted batches of waste paper. These come mainly from paper processing companies, where the waste paper recovery ratio is almost 100%, the waste paper trade, the rest of the industrial sector and from office premises, where between 30% and 80% of waste paper is recovered. Only about 3.6% of waste paper from households is recovered at present. There are a great many factors which make it difficult to achieve a higher recycling ratio some of them related to technical and economic problems but others also to human attitudes.

Some of the technical problems are as follows:

The first technical problem is the enormous variety of paper which exists. This is due to the wide production range of the paper industry, which manufactures more than 3 000 grades of paper and board. Even if only the principal grades are considered, a distinction still has to be made between 80-100 paper and board grades of widely differing composition, in terms of their virgin fibre content, and the amount of reprocessed fibres, fillers and auxiliary materials, glues and coatings which they contain. Waste paper is generated largely in the form of a mixture of the most varied grades.

In mixed batches of this kind, which constitute almost half of the total volume of waste paper, an enormously wide range of different fibre qualities is represented. Their recycling necessitates complex technical processing which is often very costly.

The second problem is the inadequate degree of purity of much waste paper. It often contains a great many foreign substances such as fillers and auxiliary materials, glues, plastics or metal coatings, printing inks, etc., which are used in the production and processing of paper, or impurities such as tar which occur during the use of paper. These foreign substances and impurities have to be removed completely, by means of special and complex separation techniques. It is also necessary to separate off the wide variety of different inkings in expensive 'de-inking' processes before recycling, in order to avoid staining of the entire fibre mixture. Thus, the recycling of waste paper as a raw material presents extensive technical problems which, although they can be resolved, entail a disproportionately high cost outlay.

Recovery techniques need to be improved in order to achieve a corresponding improvement in waste paper qualities, so that it also becomes possible to use lower grades of waste paper in, for example, the manufacture of lower-grade paper and board products for which higher waste paper grades are still used at present.

A final technical problem is that the quality of the fibres deteriorates with repeated use. An admixture of virgin material can be used to extend their lifespan and 'slow down' their deterioration in quality. At all events, the paper and board production process needs to have a continuous minimum inflow of virgin material in order to avoid what is known as a 'recycling collapse'.

Taking all these factors into account it is unlikely that it will be practicable to use more than 60% recycled fibre in paper production. On present production levels this would represent an additional recycling of 3.7 million tonnes on top of the existing 9.7 million tonnes.

Expansion of the use of recycled fibre faster than the growth of consumption after taking into account increased quantities of pulpwood which could become available would result in import replacement. This could only be achieved if the costs of raw material and production were competitive with those of our trading partners especially with those with whom the Community has free trade agreements.

If we assume 70% of the present paper and board consumption of 29.5 million tonnes is recoverable then existing recovery of waste paper could be doubled.

But, although the technical problems of the recycling of paper from household refuse need to be solved, progress in this direction is not alone sufficient to achieve the desired target. Certain necessary conditions have to be created on the human level also. Paper consumers must be informed and persuaded to modify their demands, and households will have to cooperate willingly in the separate collection of waste paper.

At present, consumers still prefer what are mostly unnecessarily high paper qualities in, for example, bright white letter paper, note-paper and carbon paper, although lower qualities would be perfectly adequate. Administrations, departments and industries in the public sector apply standards which, because of their excessively stringent quality requirements, restrict or entirely preclude waste paper usage in the case of certain paper and board grades. On this point, everybody will have to demonstrate their willingness to make a personal contribution to environmental protection by modifying their behaviour as consumers.

Households will also have to start demonstrating awareness of the environment at an earlier stage than hitherto, namely when rubbish is first thrown away. Instead of all refuse being thoughtlessly thrown together into the dustbin, waste paper will have to be collected separately.

At present, waste paper is collected mainly from sources where it is generated in large quantities (paper processing companies, supermarkets, office premises, etc.) and in urban centres. As yet only 3-6% comes from households. In the interests of rational raw materials management, however, it should also be collected on a comprehensive and regular basis from smaller sources.

Campaigns for house-to-house collections of waste paper carried out by charitable organizations and associations, etc., have provided a start. These are most laudable as instances of individual initiative, but will have to be replaced to an increasing extent by regular collection under the responsibility of the local authority. In cities where the

system is already in operation (e.g. Brussels), experience shows that its success depends simply and solely on the willingness of the public to assume this responsibility.

The Committee on Waste Management set up by the Commission of the European Communities, which is advising on the formulation and implementation of an EEC waste management programme, has given waste paper recycling top priority in the definition of Community waste management policy. A Working Party on Waste Paper has been formed from government and industrial experts to give advice on Community measures for encouraging increased waste paper collection and recycling. The measures being contemplated at present include among others, the more extensive use of paper and board products made from waste paper in the official bodies in the Community and encouragement of their use in private enterprise, especially in the printing industry, and also formulation of measures to encourage separate collection of waste paper, especially from households.

In the meantime, with a view to dealing with the technical problems that already exist the Commission has submitted and the Council of Ministers adopted the programme for a Community research and development programme on paper and board recycling for the period 1978 to 1980. Four major research topics have been proposed which cover the most important requirements for research and development in this field.

The first topic is concerned with the analysis of recycled fibres, their upgrading by means of a wide range of different processes, and the effects of repeated recycling on fibres for paper manufacture.

The second topic is the elimination of the detrimental effects of harmful substances in waste paper, including dispersion of thermo softening contaminants.

The third area is that of de-inking, including the relationship between different types of colorant and de-inking, and the treatment of liquid effluent from waste paper recycling plants.

Lastly, the programme should examine the use of municipal fibres from mechanized waste sorting systems, including technological analysis of solid municipal refuse and health problems caused by the use of recycled fibres.

The Community research and development programme on paper and board recycling represents an important and urgent supplementation of the legal, administrative, economic and ecological measures which are planned at Community level with the aid of the Committee on Waste Management and its Working Party on Waste Paper as a comprehensive waste paper management policy within the scope of the general Community waste management policy. However, active cooperation on the part of the populations of all Member States will also be essential if, in the future, the target is indeed to be achieved whereby every other kilo of paper waste is recovered and re-used.

III.3. 'Citizen suits' and their importance for environmental protection

The term 'citizen suits' comes from American law and means the right to sue granted to associations seeking to protect the environment. The USA unquestionably has far more experience in this field than the Europeans so it is convenient to use the term in their sense. 'Citizen suits' can be concerned with two different areas, that of civil law and that of administrative procedures. The first is the less complicated and can be explained by an example from the field of water pollution.

The classic situation is that someone feels that he has suffered injury from pollution, e.g. a property owner downstream has had his stretch of river poisoned by a discharge from industry upstream. Suppose he raises fish, and they have died, or that he waters his stock from the river, and they have become ill? If he can show damage, and that the damage was caused by the polluting discharge, he will usually have established civil liability, in English law tortious liability, and would be well-advised to sue the polluter in the civil courts. This is the simplest case; the adjoining property owner is said to have 'a legal interest' (i.e. a legally enforceable interest) in the use of his property which has been infringed upon. This legal interest is recognized in the nine Member States of the Community and in the US and in this case environmental damage will give rise to compensation, i.e. money damages, at the very least.

Suppose instead that the person bringing suit (the plaintiff) was not an adjoining property owner, but the secretary of an angling association, which paid a subscription for the fishing rights in that stretch of the river, would they still be able to sue successfully? The answer in general would be yes, because the angling association is treated as a property owner. It has bought a certain right, even if it is limited in time, which has a commercial value, and is regarded as being a legal interest. Therefore the Secretary representing the rest of the Members of the Association can sue in their name, and recover damages, if they can prove their damage as above.

Suppose instead that it is the secretary of an environmental protection association formed on a national or regional level, whose declared interest is in preserving the purity of water as a general environmental issue. In such a case, the answer to the question whether he may sue successfully varies very much from one country to the other. The general situation is that one *cannot* sue for a general interest in the protection of the environment. Instead a specific legal interest must be shown such as those above. This statement is however not true in some cases in the US, or in the case of certain organizations in France, in the Netherlands and in Denmark. One may well ask what the difference in social importance is between an angling association and a worldwide environmental protection association such as the 'Friends of the Earth'? Why should the former normally be able to sue successfully and the latter not? The crucial point is the question of legal interest. A legal interest usually represents something of

commercial value, which can be bought and sold, and for which the owner has given good value. Thus he is entitled to compensation if his property is injured in any way.

However the 'right to' or 'interest in' a decent environment, pure water, clean air, beautiful scenery etc. is not considered as a legally enforceable right. It is also for this reason that recently there has been discussion in Europe concerning the creation of a constitutional right to a decent environment. Legal doctrine however generally considers natural resources if unclaimed as being a *res nullius*, i.e. something which belongs to no-one and whose use is therefore not subject to restraint. This is not in fact such an old or widely-recognized legal concept. The foreshore in Anglo-Saxon law has usually been regarded as a *res communis* — i.e. something which belongs to everybody, to the Community at large, and from which everyone should benefit. This concept is being brought back into fashion; it is sometimes called the 'public trust doctrine', meaning that nature in all its beauty is given to the people as a sacred trust, and should be used as such. The corollary is that the public should be allowed to act to defend against infringements of this trust. The draft Italian law on protection of wild life expounds the principle of *res communis*. Several French laws, although not making explicit reference to the doctrine, are seen to be based upon it, in that they accord rights to well-established and serious environmental protection associations to sue in the civil courts in certain cases (see the Law on Waste Disposal 1975, Article 26, the Law on the Protection of Nature 1976, Article 40, the Law on Urbanism 1977 Article 44). Of Community countries France has certainly gone furthest in its legislation to give rights to bring civil suit to such associations. However in some other countries, such as the Netherlands, a parallel development can be seen in the 'case-law' or 'judge-made law'.

The foregoing discussion refers to someone or a group of people who have *suffered* environmental damage. The next question would be — even if I can show an interest which the courts would protect, is it much use to me to recover money damages *ex post facto?* Wouldn't I be much happier if the authorities did not give the permission in the first place for that noisy factory to be installed near my house, or for the nuclear power station not to be built on the river close by, or for the oil refinery not to be constructed near my favourite bay? The answer is obviously 'yes'. Prevention is always better than cure, and being paid for the loss of value of my house will not make me stand the noise from the factory any better.

Therefore what possibilities are there for a citizen or a group of citizens to bring suit to prevent an action which they consider potentially environmentally harmful taking place? The answer here is even more difficult to generalize than in the first case (the civil suit). Again an individual citizen with a property right (e.g. the house next to the proposed factory site) will usually, under the planning laws of the Nine, have at least a right to protest. Whether any attention will be paid to his protest will depend on a host of factors. However, the local or national environmental protection association, particularly if it does not include property owners directly involved, may be in a much less favourable position. It may not have the right to be heard at all, let alone manage to

hold up or stop a project. Again there has been a recent evolution in the legislation of certain countrie, e.g. in Denmark under a law of 10 June 1970, associations may participate in administrative procedures to defend the collective interests of the Members — e.g. for the protection of a site of natural beauty. In France under the law mentioned above for the Protection of Nature, Article 40, the recognized associations may plead, for example, before the planning authorities. In the US it has been frequent practice since the National Environmental Policy Act 1969, to add at the end of legislation affecting the environment a provision for citizen suits, i.e. in European terms giving the right to participate in preliminary administrative proceedings.

One may ask what is the advantage of giving such groups the right to meddle in planning procedures if they have no direct interest? The advantages can be said to be two — firstly the concept of *res communis* applies before nature is spoilt as well as afterwards, and secondly a judge will bring in impartial, and hopefully unclouded, vision to the consideration of issues upon which the local, regional, or national authorities may already have had to take a position, for many different reasons, social, economic, etc., but in which ecological concerns may not have been prevalent. The judge, by hearing all the parties, e.g. the industry wishing to establish itself, the administrative authorities, the environmental protection associations, can weigh all the considerations and come to a decision, which obviously cannot please everybody, but in which hopefully 'justice will be seen to have been done'. The judge very often will not judge the basic question; he will often decide that the issue has not been sufficiently investigated, and that more time should be allotted to consider the environmental consequences. Such a breathing space can be most useful for all concerned and frequently the potential polluter will of his own accord produce during this period a modified plan which will meet the objections of the environmental associations. The granting of an injunction, which imposes a kind of moratorium, can be a most useful tool in the legal arsenal for the protection of the environment, as in many other cases.

To illustrate, an example would be the case of Concorde in the United States. As is known the Concorde was initially given permission by the Federal Authorities to land at Washington, and also at New York. But the New York Airport Authority, supported by numerous environmental groups, fought the case through the courts and managed to carry out a delaying action of almost a year, making a second appeal, when its first appeal was not granted. Whatever one's views on the merits of the case, the second appeal made sure that the facts of the case itself, i.e. how much noise Concorde produces, and what difference it will make to the already very considerable noise round Kennedy Airport, were fully discussed and laid out before the American public. And this surely is the crux of the matter. It the public is informed and can weigh the advantages and disadvantages of a project, it may sometimes decide that environmental considerations are less important. The nuclear controversy, currently being fought through the courts in Germany and the UK, has perhaps aroused the strongest feelings, at least partially because the public is afraid that it has not been told the truth, or the truth is in a form it cannot understand.

A case with a specifically 'Community' connection is the Stichting Reinwater v Mines de Potasse d'Alsace where a procedural issue was decided upon by the Court of Justice of the European Communities in Luxembourg in November 1976. The case was brought by a Dutch horticulturist and the Foundation for Pure Water against a French firm, the Mine de Potasse, claiming damages because they alleged that the discharge of salt by the mines into the Rhine had poisoned it to such an extent that the horticulturist's plants died when watered with Rhine water. The case at first turned on whether the Dutch court could hear the case (had jurisdiction) or whether the Dutch plaintiffs should have sued in France. On appeal, the case was sent to the Court in Luxembourg which gave a ruling which is very advantageous to plaintiffs in civil liability suits. It considered that if the place where the damage occurred was different from the place where the act causing the damage occurred, the plaintiff could choose where to bring suit, in either of the two places. This means that the plaintiff can sue at home, and does not have to go to the expense and difficulty of sueing in a court of another Member State in a different language, etc.

To conclude, associations are becoming more and more active in attempting to ensure the protection of the environment also via the courts. The most successful associations are likely to be those which have checked their legal position, incorporated into their membership local citizens and preferably property owners, and who try and act in administrative proceedings to prevent or amend environmentally undesirable projects, who equip themselves with expert witnesses who can explain their objections to the judge, and provide environmentally sound alternatives if need be, and if the damage has already been done, who use to the full the possibilities given by the Stichting Reinwater v Mines de Potasse case.

III.4. The implications of the standstill principle

'Quite independently of our efforts to improve the quality of the environment in areas which are heavily polluted, we should at least maintain the purity of relatively clean areas'. This idea, to which most people respond with intuitive enthusiasm, has come to be known as the 'Standstill' Principle. It reflects our determination to safeguard environmental resources in the future, however much we may have neglected them in the past.

But what would such a principle involve in practice? Let us suppose it were applied to an area of European coastline, little known up to now but rich in potential as a tourist region. The government decides to increase the country's tourist facilities and to encourage economic development in that area by building a model seaside resort and it designs the new village in accordance with the latest developments in environmental engineering. Whatever happens, the air pollution and noise levels in the air due to road

and rail traffic will rise, the discharges from even the most efficient of sewage works are likely to lower the quality of the coastal waters, and the number and variety of wild animals and plants in the area will be drastically lowered. Does this sort of development represent a violation of the Standstill Principle and if so, do we really want to prohibit it?

Acting on an initiative of the Dutch Government, the Council of Ministers accepted the Principle in broad terms on 19 July 1973, in declaring:

'The Council noted the determination of the Member States to ensure that the present quality of the environmental areas, taking into account the Community regions as a whole, will not be lowered, in view of the often irreversible nature of some pollution' (see R/2310/73 [ENV. 93] dated 28 September 1973).

It is clear from the wording of this declaration that the Council never intended the Principle to be strictly applied in a small area such as the one in the imaginary example. There can be no question of the Standstill Principle being implemented in such a way as to prevent all economic development, which is always associated with some pollution, in those many areas of the Community which are both economically under-developed and environmentally relatively healthy. In what form should it then be implemented? A study to answer this question and to explore the implications and consequences of the Principle has been carried out for the Commission by a Dutch institute.

The arguments in favour of the Principle are set out in the study:

— it would help to maintain the ecological balance of our more rural areas and give ecosystems more time to adjust to their changing environments;

— it would aid in the conservation of the habitats of rare animals and plants;

— it would reduce the damage to materials and to agricultural production caused by even low levels of pollution;

— it would be an insurance policy against unexpected long-term health effects of pollution at levels which now seem acceptable;

— it would prevent irreversible changes taking place in our environment.

But the study has also made in clear that the operational definition of the Principle must be a compromise between two extreme variations. The first one would state that the overall environmental quality, taking account of increases and decreases in the amount of all pollutants should not deteriorate on average over a very large area such as a region or even a whole Member State. Since Community policy is in any case directed to achieving an overall improvement in environmental quality in our Member States,

such a formulation of the Principle would achieve nothing. On the other hand, a second definition stipulating that no environmental deterioration of any sort should be allowed in any individual small area (such as the smallest administrative unit in a country) would effectively block all economic development in large areas of the Community.

The conclusion of the study is that an acceptable formulation of the Principle would have to take a middle course in particular in determining how a Member State should be divided into zones within each of which standstill would apply, in deciding how much an improvement in one component of environmental quality would be allowed to compensate for a deterioration in another, and in the methods used to measure changes in environmental quality which occur.

The importance of the method of dividing a country into standstill zones is linked to the idea that compensation between environmental quality components should be possible. In this way the pollution caused by a new factory in one part of a zone can be accepted if pollution from another source has been sufficiently reduced elsewhere inside the zone. The extent to which this is possible will depend on the way a zone is defined. If it included both heavily polluted and relatively clean areas then the reduction in pollution in the heavily polluted areas (such as the large industrial conurbations) which will be relatively easy to achieve, can compensate for allowing the state of the environment in the adjacent clean areas to deteriorate. In some areas this would, however, undoubtedly be an unacceptable policy, as it would provide *carte blanche* for the destruction of treasured areas of natural beauty such as the islands and peninsulas of the Dutch province of Zeeland, or the valleys of the Belgian Ardennes, if these were included in a zone with, respectively, Rotterdam and Liège. On the other hand, if the predominantly urban areas were excluded from the zones within which compensation is allowed, it could be very difficult to find opportunities to reduce pollution within them in order to allow for further economic development.

Much care would therefore be needed in defining standstill zones in such a way that undesirable effects of both types are avoided.

The question of how far a fall in pollution in one place can be allowed to compensate for a rise elsewhere is further complicated by the existence of many types of pollution. There is no scientific method of comparing a rise in noise levels with an increase in the amount of sewage discharges into a lake or with a rise in the concentration of dust in the air. Any compensation allowed between such differing types of pollution would therefore necessarily be based on arbitrary judgments as to their relative seriousness.

Finally, the implementation of a standstill policy would require that the state of the environment was known in quantitive terms for the whole Community. Basic data on the state of the environment do exist (see Chapter III.1.c)), but the more detailed the fashion in which the Principle was to be administered, the greater would be the problem of measuring the present concentrations of pollutants and the more costly their continuous monitoring in the future.

The study has shown that these are only a few of the complications which would have to be taken into account in putting the Standstill Principle into practice in a comprehensive manner. It would also be possible to implement the principle in a partial way or to achieve some of its aims by other means. For example:

— It could be applied to certain particularly unpolluted areas alone;

— it could be applied to all forms of transfrontier pollution;

— a general rule could apply that the strictest environmental standards currently practicable should be kept to in all areas, thus helping to maintain the quality of the cleanest ones;

— a general rule could be applied in all environmental impact assessment procedures (see Chapter III.1.b)) that any new economic development should cause the least possible environmental damage. This would also help to keep clean areas clean.

The arguments in favour of the Principle remain valid, but the difficulties associated with its implementation are very considerable. It will undoubtedly be some time before the Commission is in a position to make a well-reasoned proposal to the Council for action in this direction.

Part IV

The development of environmental quality

IV.1. Measuring environmental quality

(a) Introduction

After all the efforts which have been devoted to the improvement of environmental quality throughout the European Community in the last decades, and in particular in the 1970s, it would be of considerable interest to policy-makers and the general public alike to know what results have been achieved and to be able to identify areas in which environmental quality has changed for the better.

Examples of successes in reducing pollution or otherwise improving the quality of life will be familiar to most of us from our daily lives — washing can be hung out to dry without being covered in soot in industrial areas where this was not possible a generation ago, a once-polluted river has become once again a habitat for fish, the creation of a pedestrian area has reduced the level of noise in a city centre, the black slag-heaps of a coal-mining area have become grassy parks. The problem is not that we do not know of environmental improvements but that we have little systematic information on which to base an overall judgement on the development of environmental quality in our Member States. The Commission's intention is that future edition of this Report should devote more and more space to filling this gap, to describing in clear, unequivocal terms what is happening to our European environment.

There are two problems inherent in attaining this objective. Firstly, there is the undoubted fact that it is not easy to define what we mean by environmental quality nor to measure it when we have done so. Secondly, there is the problem of coordination involved in obtaining comparable data from nine Member States, all of whom may have developed their own methods of measuring any specific component of environmental quality.

Perhaps the best example of these problems is noise. Noise can be defined in many ways, for example, simply as 'undesirable sound'. But undesirable to whom? The noise of a motor-cycle may well be a valuable contribution to the quality of life of its rider, at least in his own personal estimation. The context in which noise is heard is also important; a level of traffic noise which is accepted as normal in a busy shopping area (and which may in many people's minds even be associated with the vitality of an area) may become a gross nuisance in a rural recreational area. The degree of nuisance engendered by noise also depends markedly on its characteristics, not merely on its volume; the same volume of noise from children at play, from a take-off at a nearby airport, from the squeal of a car's brakes, or from a radio concert, may well elicit completely different reactions from the same person. The development of indicators of noise, i.e. quantitative data illustrating the degree of noise nuisance, is thus a very complex task, and many different methods are in use. Furthermore, the resources are simply not available to finance the continuous monitoring of noise throughout the Community. Our information on trends in noise levels is therefore fragmentary, and generalizations about them are correspondingly fraught with uncertainty.

In other areas progress has been quicker. As far as air pollution is concerned, continuous measurements (known as 'monitoring') of the 'classical' air pollutants sulphur dioxide and dust, which are produced by most combustion processes — have been carried out for many years, particularly in industrial centres, and such measurements are the subject of the first agreement on the exchange of monitoring information between Member States reached by the Council of Ministers in its decision of 24 June 1975. (See the first Report on the State of Environment, p. 68.) It had been hoped that the first results of this data exchange system would be available for this report. Unfortunately this has proved impossible and Chapter IV.1.b) restricts itself to a short description of the system. The next Report will, of course, include a summary of its results.

The Council took a similar decision in the water pollution field on 12 December 1977, in agreeing formally on a procedure for exchanging the data collected by a series of water pollution monitoring stations throughout the Community. (See Chapter IV.1.c).) It is also hoped to include the first results of this scheme in the next edition of this report.

In the absence of the information necessary for making a more complete global assessment of trends in environmental quality in the Community, the Commission asked three Member States to contribute to this Report by each taking an environmental policy area and illustrating how a particular success in it has been achieved (see Chapter IV.2)). The stories of the successful fight against air pollution in the German State which contains the Ruhr industrial area, of the gradual improvement of water quality in London's river Thames, and of the creation of national parks to protect Italy's wildlife heritage are all witness that environmental policy efforts have been crowned with not inconsiderable success in the past.

(b) The information exchange on dust and sulphur dioxide data

On 24 June 1975 the Council of Ministers adopted a Decision establishing a common procedure for the exchange of information between the networks set up in the Member States to monitor the occurrence in air of sulphur dioxide (see also Chapter II.4.) and dust (more correctly described in scientific language as 'suspended particulate matter').

The aims of this Decision were to:

— monitor long-term trends in air quality;

— trace improvements in pollution levels as a consequence of Community or national legislative efforts;

— create a data base for the study of the phenomenon of pollution transfer across regional, national, and Community frontiers;

— provide some of the information necessary for epidemiological studies on the harmful effects of atmospheric pollution on human health;

— contribute on behalf of the Community to the worldwide 'Global Environmental Monitoring System' run by the United Nations.

A considerable cooperative effort has been required from all the parties contributing to this scheme in order to arrange for the systematic collection, transmission and storage of daily data from some 300 monitoring stations throughout the Community.

The stations have been carefully chosen to provide representative data on:

— how pollution levels vary between cities of different sizes, by categorizing cities into five groups based on population size;

— how pollution levels vary within a city between industrial areas and commercial or residential areas, by classifying stations according to the type of area in which they are situated;

— what the 'background' level of pollution is in non-industrial areas, by including some stations situated in remote, rural areas.

This system is now in operation (Annex 3 contains a list of the urban stations included) and the first full Annual Report on its results will be transmitted to the Member States this year. It represents the first element in what will hopefully be a comprehensive Community system for monitoring environmental quality — bringing to light environmental policy successes, and sounding the alarm where further action is needed.

(c) Exchanging information on the quality of water in the Community

Several of the Community's Member States publish at periodic intervals maps or other data showing levels of pollution in their lakes and rivers. Usually, a general classification into about four classes is used, showing unpolluted, slightly polluted, polluted and grossly polluted waters.

This type of information, while being of considerable interest, is not particularly suitable for monitoring the results of water policies which address themselves to particular pollutants in water and in the longer term much more detailed data will be necessary on water quality in order to be able to further develop and monitor a rational water management policy. Such detailed data — on 18 different parameters, covering the physical, chemical and microbiological characteristics of the water — is now being collected in more than a hundred monitoring stations throughout the Community and is the subject of a decision taken by the Council of Ministers on 12 December 1977 to set up an exchange of information on the quality of surface fresh water.

The Decision is particularly concerned with the surveillance of the major rivers and their main tributaries. Thus, for example, the rivers listed for Germany include the Rhine and the Moselle, for France the Rhône and the Seine, and for Italy the Po and the Arno. With regard to the choice of stations, a certain number of criteria listed in Article 5 of the Decision were taken into account. According to these criteria, the sampling and monitoring stations must:

(i) be situated at points representative of the surrounding aquatic environment and not be subject to the direct and immediate effect of a pollution source;

(ii) if possible, be less than 100 km apart, be upstream from confluences and not be subject to tidal action;

(iii) be capable of periodically measuring a certain number of physical, chemical, microbiological, including temperature and flow, chlorides, nitrates, cadmium and mercury, and coliformes.

The observance of these criteria is indispensable for the effective monitoring of pollution levels in watercourses. For example, the reason for insisting that monitoring stations are located upstream of confluences is that a station located below one would be incapable of discovering how much pollution was being carried by each of the two arms of the river in question, and its measurements would be of correspondingly limited value.

The list of stations contained in the Council Decision is still incomplete, in that it cannot provide a comprehensive picture of the state of all Community surface water. There will, however, be a second phase in which the list of rivers can be supplemented in the light of experience gained and by the establishment of new sampling and monitoring stations. Any change requested by a Member State will be examined by the Commission and given consideration if it accords with the objectives of the Decision.

The Commission will undertake the central collection of the data sent in by the nine countries of the Community and will prepare an annual consolidated report. The central agency of each Member State will verify the part of the report concerning it and, if it deems necessary, will present comments which will be included in the final report. The first exchange of information, which will take place during 1978 and will be the subject of a report at the end of the year, will be restricted to the data already being collected in the Member States at the time of the Council Decision.

It is clear that the effectiveness of such a procedure depends on some harmonization of the measurement techniques used, since the comparison of widely differing data may give rise to a large number of errors and considerable delay in the exchange and interpretation of the information. Agreement has already been reached on the mode of expression and on the degree of accuracy with which the data should be presented. The national reports sent to the Commission will also contain descriptions of the sampling, sample preservation and measurement methods used in order that valid comparisons can be made between data from different Member States. The Decision further instructs the Commission to present within a maximum time limit of three years proposals designed to harmonize the measurement techniques themselves.

In the same way, provision has been made for the adaptation to technical progress of the parameters, the mode of expression and the accuracy of the figures. For this purpose, a Committee for Adaptation to Technical Progress has been set up consisting of representatives of the Member States and meeting under the Chairmanship of a representative of the Commission.

As the data from this exchange of information accumulates it will become possible to determine the level of pollution of the main watercourses in the Community and to follow pollution trends in time and space as a basis on which to evaluate the consequences and results of regulations and other measures to combat water pollution adopted at national and Community level. It will thus be possible to evaluate the results of national and Community measures — already adopted or to be adopted — to control pollution, and to protect the aquatic environment on the basis of solid, scientific information.

IV.2. Examples of successful environmental improvements

(a) The cleansing of the Thames

Introduction

The River Thames rises in the Cotswolds, a range of limestone hills in the West of England, flows eastward for 245 km to Teddington Weir, below which it forms the tidal estuary discharging to the North Sea.

Early history of pollution

The good quality of the freshwater river has always been maintained, but this has not always been the case with the tidal river, especially where it flows through London. Its pollution in the 1850s led to the establishment of the present sewerage system and the construction of sewage works discharging effluents in the Metropolitan Area (Figure 1). The close proximity of the two largest works, Beckton and Crossness, discharging between them about 1.5×10^6 m^3/day of effluent, over a length of river of only about 3 km, has always caused problems in the maintenance of river quality because of the limited dilution by fresh water from the upper river, which is, on average, 7×10^6 m^3/day and can fall to only 0.8×10^6 m^3/day in the summer.

Further deterioration in the quality of the tideway

Although by the turn of the century the installation of an acceptable sewerage system had restored the quality of the estuary, the greatly increased volumes of sewage and industrial effluents generated by the population expansion from 5 millions when the scheme was introduced to over 8 millions by 1959 had caused a significant deterioration in water quality in the London area.

The problem of synthetic detergents

The condition worsened considerably in the early 1950s as a result of the increased use of synthetic detergents which, at the time, were non-biodegradable and underwent normal sewage treatment with little decomposition. In the river, the surfactant concentrations built up to a level which restricted the surface re-aeration to 70% of the previous level, thereby reducing considerably the self-purifying capacity of the river. The level of dissolved oxygen had already fallen practically to zero as a result of increased pollution loads with the result that the river's capacity for self-purification was minimal, producing anaerobic stretches of river containing sulphide, sometimes 50 km in length. The problem caused by the non-biodegradable synthetic detergents was studied by the Standing Technical Committee on Synthetic Detergents, comprising representatives of the relevant industries, river authorities and central government. It was arranged by voluntary agreement that the non-biodegradable alkyl benzene sulphonates would be replaced by linear alkyl sulphonates, which are largely degraded by biological treatment at sewage works and, since the end of 1965, the use of non-biodegradable substances in domestic formulations has been discontinued.

Proposals for the improvement of the tideway

In the early part of the decade 1950-1960, the condition of the tideway gave cause for concern. The Port of London Authority, which was responsible *inter alia* for water

quality, had only the limited powers inherited from the Thames Conservancy when this responsibility was transferred in the late nineteenth century. The Chairman of the Port Authority in 1947 had already initiated an inquiry into causes of silting and whether the river mud was being affected by the pollutants being discharged. This led to the formation of the Thames Survey Committee, which was responsible for a programme of work to investigate those factors reponsible for causing, and those for mitigating estuarial pollution. This was probably the most thorough investigation of its kind and led to the construction of a steady state mathematical model for the estuary which is used virtually unchanged today, and to the production of a report known as Technical Paper 11 (1).

Concurrently, in 1951, a central government department (later the Department of the Environment) set up a committee under the chairmanship of Professor A.J.S. Pippard 'to consider the effect of heated and other discharges on the condition of the tidal reaches of the River Thames both as at present and as regards any proposed new developments in the area and to report'. The two committees worked together very closely and the Pippard Committee reported in 1961 (2). Its basic findings were:

1. The Port of London Authority should be given the statutory pollution control powers exercised by river authorities under the Rivers (Prevention of Pollution) Act 1951. These were granted under the Port of London Acts of 1964 and 1968.

2. That, (i) provided there was a detectable proportion of dissolved oxygen and nitrate in the river, it would be kept free from nuisance and (ii) to raise the water quality to a standard which would allow passage of salmon would probably involve a cost out of all proportion to the benefit derived. As a result of the work in Technical Paper 11, the levels of dissolved oxygen to meet these qualities were considered to be for (i) 10% as a minimum in all places and at all times, and for (ii) a minimum of 30-40% at the time of salmon smolt migration (April-May) for nine years out of ten.

3. There was a need to upgrade the two large works in close proximity (Beckton and Crossness) and some smaller works.

Thus, the central government advisers having made their recommendations, responsibility passed to the Port Authority, the remaining rôle of the former being as a referee in cases of appeal by dischargers against the requirements of the Port Authority. The latter had not waited for statutory legislation before attempting improvements. In 1951 it was estimated that 9% of the total pollution load of the Thames tideway was derived from industry. By the time the Pippard Report was completed, this had been reduced to 3% by persuasion and voluntary cooperation. The Committee considered that it might be sufficient to determine the maximum polluting load which could be accepted without causing nuisance, and then provide a margin of safety by setting a limit at 75% of this load. The Port Authority adopted a somewhat different approach. It was known that in the self-purification af the river, the oxygen of nitrate is used by the

micro-organism when the dissolved oxygen levels fall to about 5% saturation. This was therefore considered to be the minimum level consistent with the prevention of nuisance. The proposal was made to introduce a safety factor by increasing this to 10% in all places at all times, as the minimum standard for the estuary. It is now known, by hindsight, that provided there is a satisfactory level of nitrate, the estuary will not become anaerobic even if the dissolved oxygen levels fall almost to zero.

The Port of London Authority Acts enabled the Authority to issue consents to discharge effluents to the tideway; although preliminary discussions were held with the dischargers, once the consent was issued it was mandatory. The guiding principle in setting consent standards (which was implied in the Committee's recommendations) was that it is more important that the quality of the river should be satisfactory at all places and at all times rather than that a fixed standard should be imposed on all effluents. Standards were based upon effective oxygen loads, which were related to the quantity of oxygen which the effluent would consume from the river during its passage to sea.

The third largest sewage treatment works (Mogden - with an average flow of $0{,}5 \times 10^6$ m^3/day), situated about 7 km below Teddington, had been completed in 1936 and replaced 28 small and inefficient older works so that in the upper reaches, the quality of effluent discharged was very good and with the extensions made in 1962, it has continued so with BOD 10 mg/litre and ammonia N 2 mg/litre. It was necessary to give consideration to the recommendations of the Pippard Committee in respect of the two largest works (Beckton and Crossness). Apart from a biological treatment plant (which was capable of handling one-sixth of the total flow at Beckton), the sewage at both works received only the treatment which had been recommended in the 1880s. Mathematical modelling showed that the required effluent quality could be achieved by reducing the pollution load in the Beckton Works effluent from 440 to 62 tonnes/day, and in the Crossness effluent from 185 to 60 tonnes/day in terms of effective oxygen load. To this end, in 1954 Beckton Works was upgraded by the construction of new, modern primary sedimentation tanks and in 1959 by a modern diffused air activated sludge plant capable of enabling 50% of the flow to receive biological secondary treatment. Crossness was completely rebuilt in 1963 to a design based on reproducing a Royal Commission Standard of effluent (30 Suspended Solids, 20 BOD) by means of a mechanical aeration activated sludge plant. At the same time plant was installed for digestion of almost all the sludge, from which sufficient gas was generated to make both works self-supporting in respect of their energy requirements. Minor improvements were also made at smaller works, and higher qualities demanded from industrial discharges made direct to the river. The policy was adopted of persuading industrialists, wherever possible, to connect their discharges to the foul sewers for treatment at sewage works. This was, and is, considered to be the best strategy; the effluent is treated by those who are expert in the work and, generally, the charges imposed are lower than the costs which industrialists would incur by installing their own treatment to meet the consent discharge quality.

In the decade following 1960, public opinion towards the quality of rivers required for leisure activities was changing and in 1972 the Royal Commission on Environmental Pollution under the chairmanship of Lord Ashby published its third report which was, in effect, a blueprint for estuarial management. The report attempted to reconcile the views of pure environmentalists (who wished for no pollution to be discharged to an estuary), with those of industrialists (who considered that adoption of such a policy would add substantially to their costs and throw a very heavy burden on industry). Choosing a 'middle of the road' approach, the Commission recommended that whereas toxic and non-biodegradable substances such as heavy metals and persistent organic residues should be excluded from an estuary, 'the general aims of the plans should be (i) to exploit the estuary for waste disposal up to a level which does not endanger aquatic life, or transgress the standard of amenity which the public need and are prepared to pay for; and (ii) to ensure, by controlling the standards, that exploitation of the estuary does not exceed this level'.

They introduced the concept of 'pollution budgets' as the maximum quantity of polluting load which could be tolerated if the desirable estuarial quality was to be achieved, and recommended the development of mathematical models to assess the maximum permissible levels of individual loads contributing to the budget. They suggested two simple criteria for the quality of estuaries:

'(a) ability to support on the mud bottom the fauna essential for sustaining sea fisheries, and (b) ability to allow that passage of migratory fish at all states of the tide.'

Mathematical modelling

As far as the Thames tideway was concerned, to some extent the Royal Commission Report had been anticipated. The mathematical model devised from Technical Paper 11 was being used extensively incorporating more up-to-date biochemical rate-constants and the more sophisticated computer technology then available. This offered a means of establishing a pollution budget and of determining the effluent qualities required to conform to it.

To comply with the recommendation of the Royal Commission, a standard of water capable of allowing fish migration was necessary, which, according to Technical Paper 11, should be not less than 30-40% minimum saturation with dissolved oxygen. This meant that the standards for works effluents might have to be improved.

Steps had already been taken to improve the effluent from Crossness. By modifying the mechanical aeration system, it was possible to reduce the pollution load to 48 tonnes/day in 1969 and to achieve an effluent of such quality that most of the ammonia (the greatest contribution to the pollution load) had been removed. Plans were in hand to achieve considerable improvements at Beckton, but the required effluent quality was not

certain. The mathematical model showed the effects on river quality from effluents of different standards (Figure 2) from which the need to produce an effluent which was almost completely nitrified was apparent. An additional primary sedimentation plant and the latest design of diffused air activated sludge plant was proposed. There was some doubt for the above and other reasons regarding the need to upgrade the existing activated sludge plant. The models clearly showed the need to do so and this was refurbished. Improvements were similarly made to smaller works, but a comparatively large works downstream - Long Reach (20 000 m^3/day flow) - was discharging an effluent little better than settled sewage. Consideration was given to the required quality of effluent. In contrast to the situation at Beckton, it was seen from the predicted models that the achievement of an effluent better than the Royal Commission Standard would not produce an increase in river water quality commensurate with the cost and the works was designed accordingly (Figure 3). The model was run to determine what could be achieved by conventional biological treatment. Figure 4 shows that practically all reasonable improvement in river quality from this source had been achieved. In respect of the pollution load entering the tideway from sewage works effluents, it can be seen (Figure 5) that by 1980, the original 1955 load will have been reduced by approximately 90%. Perhaps it is pertinent to consider whether the 1980 load represents a suitable pollution budget. A recent report of the Thames Migratory Fish Committee (April 1977) (3) suggests that a level of dissolved oxygen of 35-50% should permit the survival of salmon smolts during the period of their migration to sea (April-May). Examination of analytical data for the tideway indicated that the quality of effluent discharges which would achieve the above would, under the worst flow conditions (0.8×10^6 m^3/day) in the third quarter of the year, correspond to a minimum average of 30% saturation with dissolved oxygen. This then becomes the standard required for compliance with recommendations of the Royal Commission, and it can be clearly shown from the mathematical model that effluent qualities do not impose a load in excess of the estuarial pollution budget.

Thermal pollution

Thermal pollution, of course, can also be a deterrent to the passage of migratory fish. It has been found that the development of directly-cooled riverside power stations since 1920 has raised the temperature of the river by about 30° C in some reaches (Figure 6) and by much higher levels in limited local areas. The mathematical model demonstrates that the temperature is now such that any further installation of directly-cooled power stations would increase river water temperature and prevent the migration of smolts or the return of adult fish. Further power stations must either be located farther seawards, or use indirect cooling systems.

Benthic faunal populations and the biological and chemical monitoring of the tideway

The Royal Commission made two other recommendations. These were that non-biodegradable toxic substances were not to be discharged and that the estuary should be

capable of supporting those benthic fauna essential for sustaining sea fisheries. These two requirements need to be considered together as the discharge of such toxic materials could affect very adversely the food chain of the fauna and indeed the fauna themselves. Systematic monitoring of water quality and biota is essential, therefore, to ensure that these requirements are met.

There has been a long history of monitoring of the quality of the tideway. Since 1893 the whole of the tidal river and estuary from the tidal limit at Teddington to the area 110 km below London, where sewage sludge is dumped in the North Sea, has been sampled on a weekly basis, sometimes more frequently in areas susceptible to the greatest pollution. A laboratory is provided on each of the sludge disposal ships so that immediate chemical analysis can be made to avoid the misleading results which can be produced by storage of samples. Any further analysis is completed in well-equipped laboratories ashore. The upper reaches of the tidal river are similarly sampled by launch, some 3 000 routine samples being examined each year. The Thames Water Authority owns two launches, one of which is a sea-going vessel equipped with trawling and bottom-sampling gear and also with a laboratory. This is used to carry out localized mud-bottom surveys and to collect fish near the sludge disposal grounds to monitor the effect of sludge dumping on the marine life in the vicinity and to check for the presence of heavy metals and other toxic substances in the fish tissue. The other launch, also equipped with a laboratory, carries out surveys on the chemical quality of the water in the upper reaches of the tideway, and is also used to carry out chemical and biological surveys of some of the tributaries.

The return of fish populations and the establishment of Thames fisheries

The objectives of the Royal Commission are now being achieved. No sulphide has been found in the 30 000-40 000 samples of water taken from the tideway since 1965; the dissolved oxygen is at a level which should allow the passage of migratory fish and indeed, the results have exceeded expectation to the extent that the establishment of a salmon fishery in the Thames has been given serious consideration, and the experimental introduction of salmon fry into freshwater tributaries has taken place.

Fish censuses

The fish population of the river is monitored by a cooperative effort between Thames Water Authority staff and the Central Electricity Generating Board power stations and one of the major motor car industries situated on the tideway. The cooling systems for these enterprises require the abstraction of huge volumes of water and, inevitably, large numbers of fish are drawn into the intakes and removed from the water by the screening mechanism. The Authority's biologists are able to count and classify the fish caught on the screens in order to increase their knowledge of seasonal variations in fish

population, and a check can be kept on the occurrence of any species new to the estuary. So far, 91 species of marine, euryhaline and freshwater fish have been identified, including a live salmon in 1974 and a sea-horse in 1976, both of which are worthy of note as being species particularly sensitive to pollution.

Trade effluent control and monitoring

The Royal Commission Report considered that pollutants such as heavy metals, pesticides and other non-biodegradable toxic organic substances should be excluded from estuarine waters. Not only are these being monitored in the estuary itself, but stricter trade effluent control is being exercised so that the levels in effluents discharging to the estuary itself are reduced. The practice of issuing consents to industrial dischargers mentioned earlier is undertaken on the basis that each discharge is considered on its merits in terms of the impact it will ultimately have on the receiving stream. Recent legislation has brought solid waste tipping within the oversight of regional water authorities so that the effect of leaching of tip wastes to watercourses can be regulated.

Catchment control programme

A novel scheme, introduced to control the quality of potable water abstracted from rivers containing a high proportion of purified sewage effluents will assist in identifying undesirable substances entering the tideway. Starting with consideration of trade effluents discharged to the sewage works supplying effluent to a particular river catchment, those premises likely to release harmful substances are visited and information sought regarding the annual discharge of such substances. By computing all such sources, it is possible to state what will be the concentration of all undesirable constituents in river water at any given point, concentrations lower than one part in 10^{10} being disregarded. There is no legislation which allows the water authority to demand such information, but in no case has any industrialist refused to give his cooperation. If it becomes apparent that any substance is present in harmful quantities, then steps will be taken for its disposal by other means.

Events during the drought of 1976

If justification were needed for the cost and effort of improving the Thames tideway, it was made apparent by the events which occurred during the severe drought of 1976. Much of London's potable water supply is drawn from the rivers Thames and Lee, in the former case from the freshwater river upstream of Teddington Weir. Statute requires that abstraction must not be such that the freshwater flow to the tideway falls below 0.8×10^6 m^3/day. Before the improvements described were carried out, the river was

black and offensive in summer if the flow fell to this level for more than two or three weeks. During the summer of 1976 it became necessary to obtain a dispensation to extract more and more water from the freshwater river and finally to use it all, allowing no flow into the tideway and pumping back leakage lost through the weir. As a result, London's reserves of abstracted water were increased by the flow of 0.8×10^6 m^3/day which normally passed to the tideway. Had there been no improvements in tideway management, the quality of the Thames in London would have been such that the Metropolis would have been a very unpleasant place in which to live and it is doubtful whether public opinion would have sanctioned the increased abstraction upstream. In the event the tideway remained in good condition, the dissolved oxygen rarely falling below 30% saturation. The absence of diluting upland flow produced the interesting result that because there was a greater intrusion of sea water, the salinity was higher and marine fish penetrated much farther upstream than before, many in reaches well upstream of the zones receiving the highest pollution loads. It thereby demonstrated that the controlling factor in regard to the return of fish is now salinity, the dissolved oxygen levels being satisfactory at all places.

The task of restoring the Thames may not yet be complete but the situation is perhaps best summed up in the words of Dr Johnson:

'In this work, when it shall be found that much is omitted, let it not be forgotten that much likewise is performed.'

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(1) Department of Scientific and Industrial Research
Effects of Polluting Discharges on the Thames Estuary Water Pollution Research — Technical Paper No 11, HMSO 1964.

(2) Ministry of Housing and Local Government
Pollution of the Tidal Thames — Report of the Departmental Committee on the Effects of Heated and other Effluents and Discharges on the Condition of the Tidal Reaches of the River Thames, HMSO 1961.

(3) Thames Water Authority — Report of the Thames Migratory Fish Committee, April 1977.

FIGURE 1

Sewage works discharging effluents in the Metropolitan area

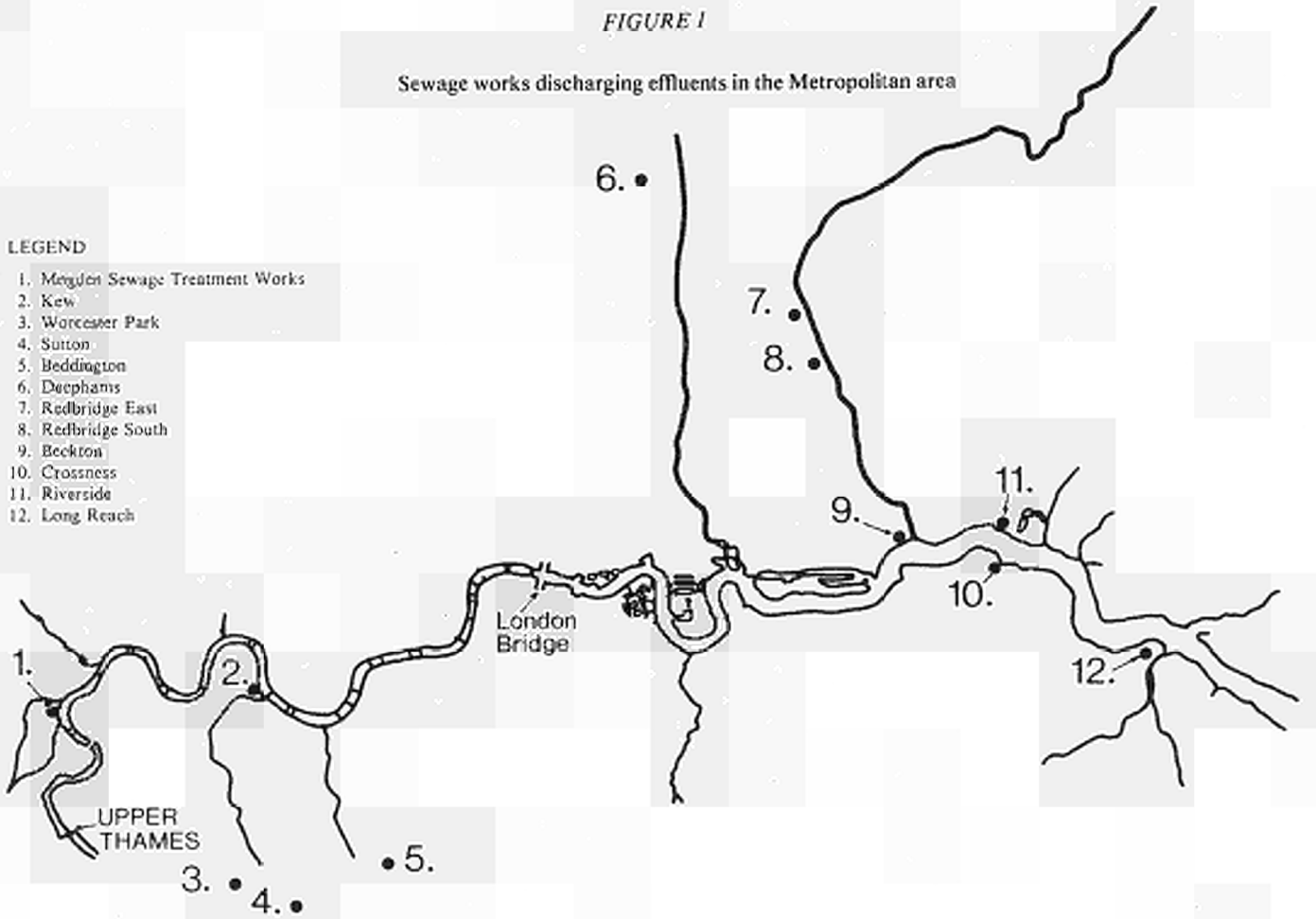


FIGURE 2

The effect of varying Beckton sewage treatment works effluent quality, maintaining Long Reach sewage treatment works at 1974 load

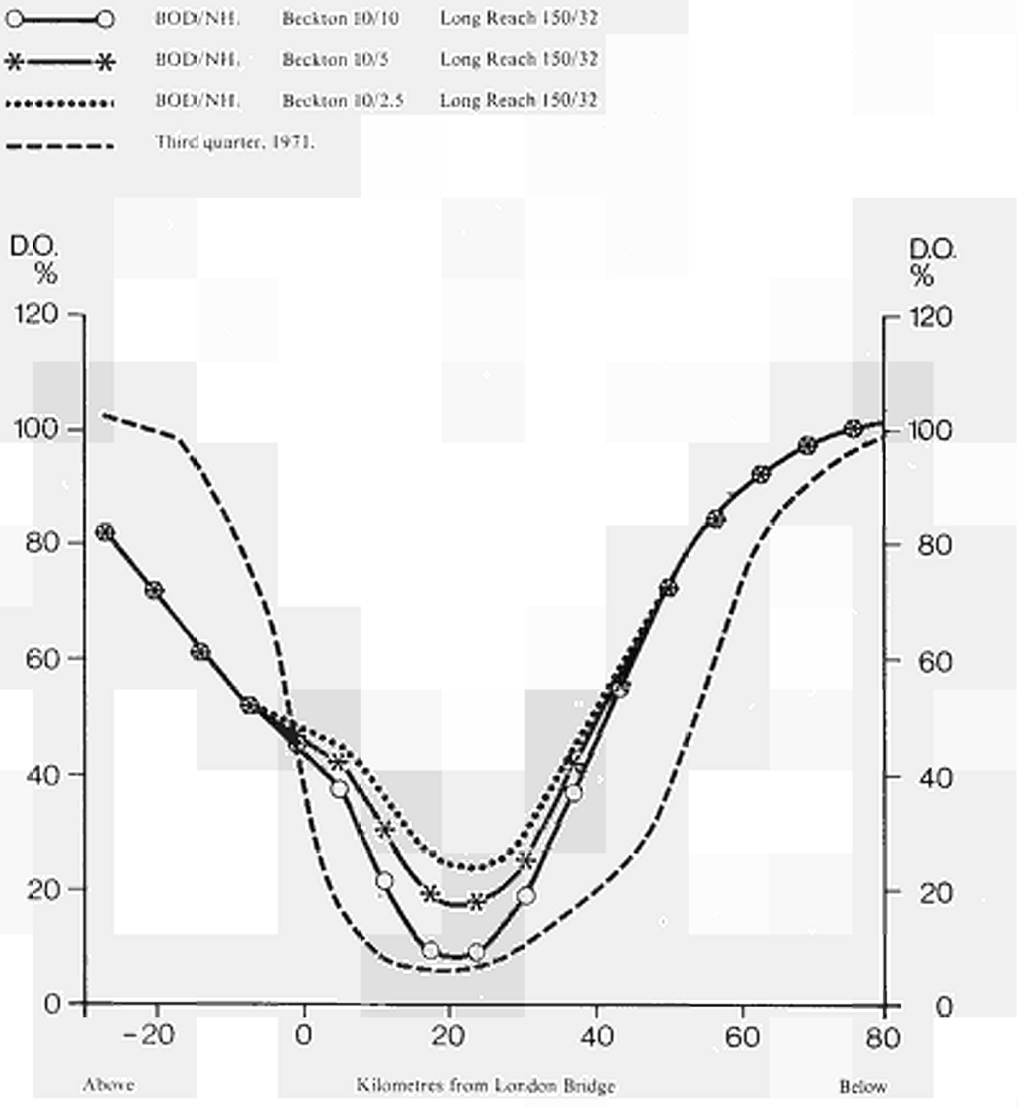


FIGURE 3

The effect of varying Long Reach sewage treatment works effluent quality, maintaining Beckton sewage treatment works at BOD/NH_4 : 10/2.5

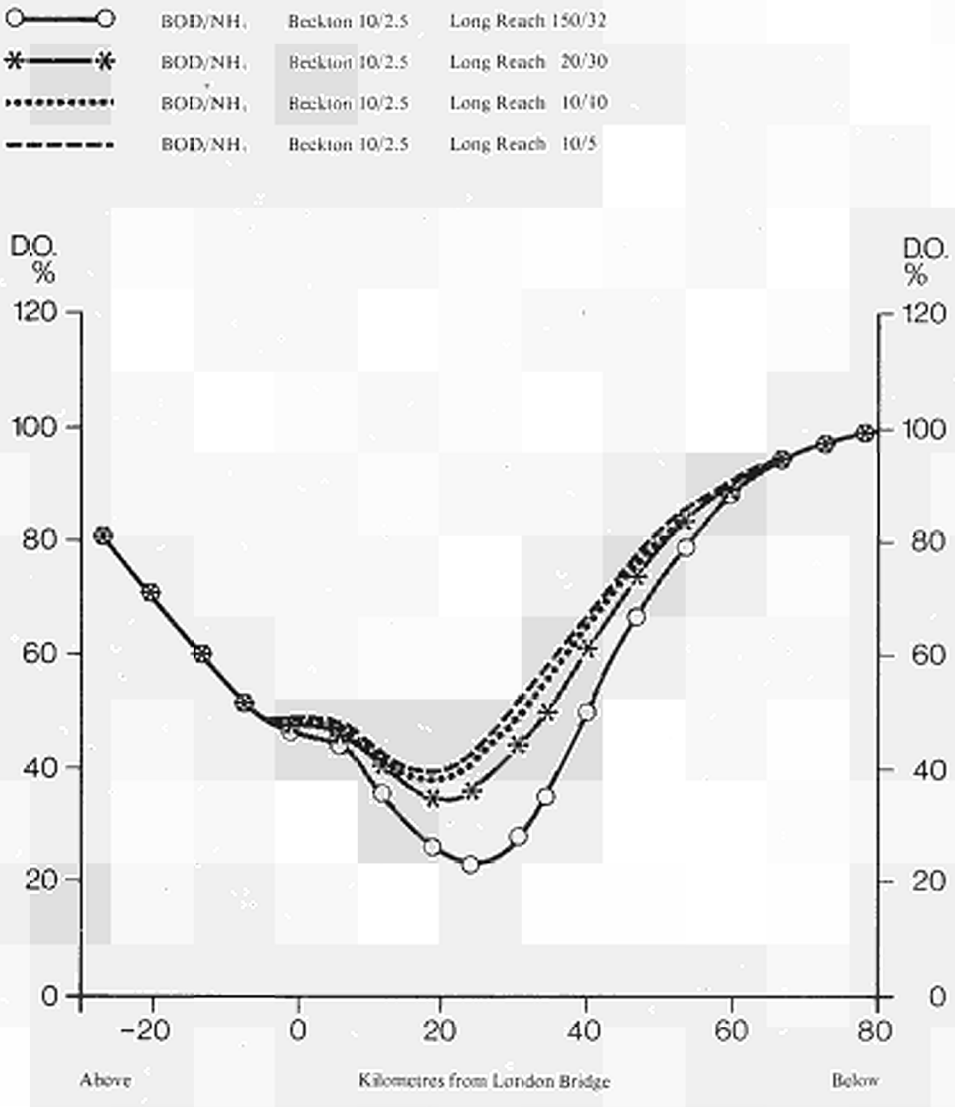


FIGURE 4

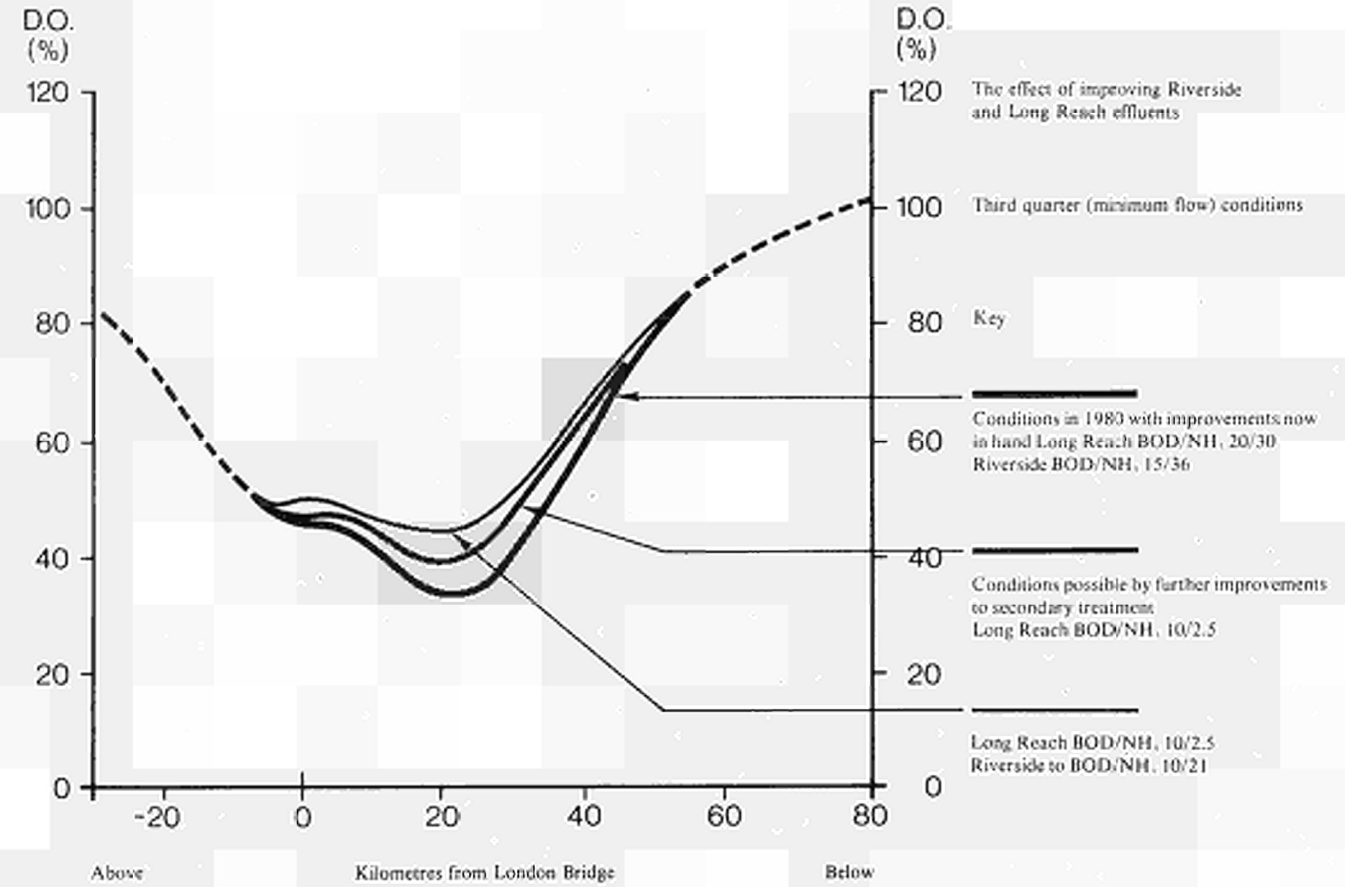

D.O. (%)
120
100
80
60
40
20
0
-20
0
20
40
60
80
Above
Kilometres from London Bridge
Below
The effect of improving Riverside and Long Reach effluents
Third quarter (minimum flow) conditions
Key
Conditions in 1980 with improvements now in hand Long Reach BOD/NH, 20/30 Riverside BOD/NH, 15/36
Conditions possible by further improvements to secondary treatment Long Reach BOD/NH, 10/2.5
Long Reach BOD/NH, 10/2.5 Riverside to BOD/NH, 10/21

FIGURE 5

Effective oxygen load (tonnes/day) from the four major sewage treatment works on the tideway

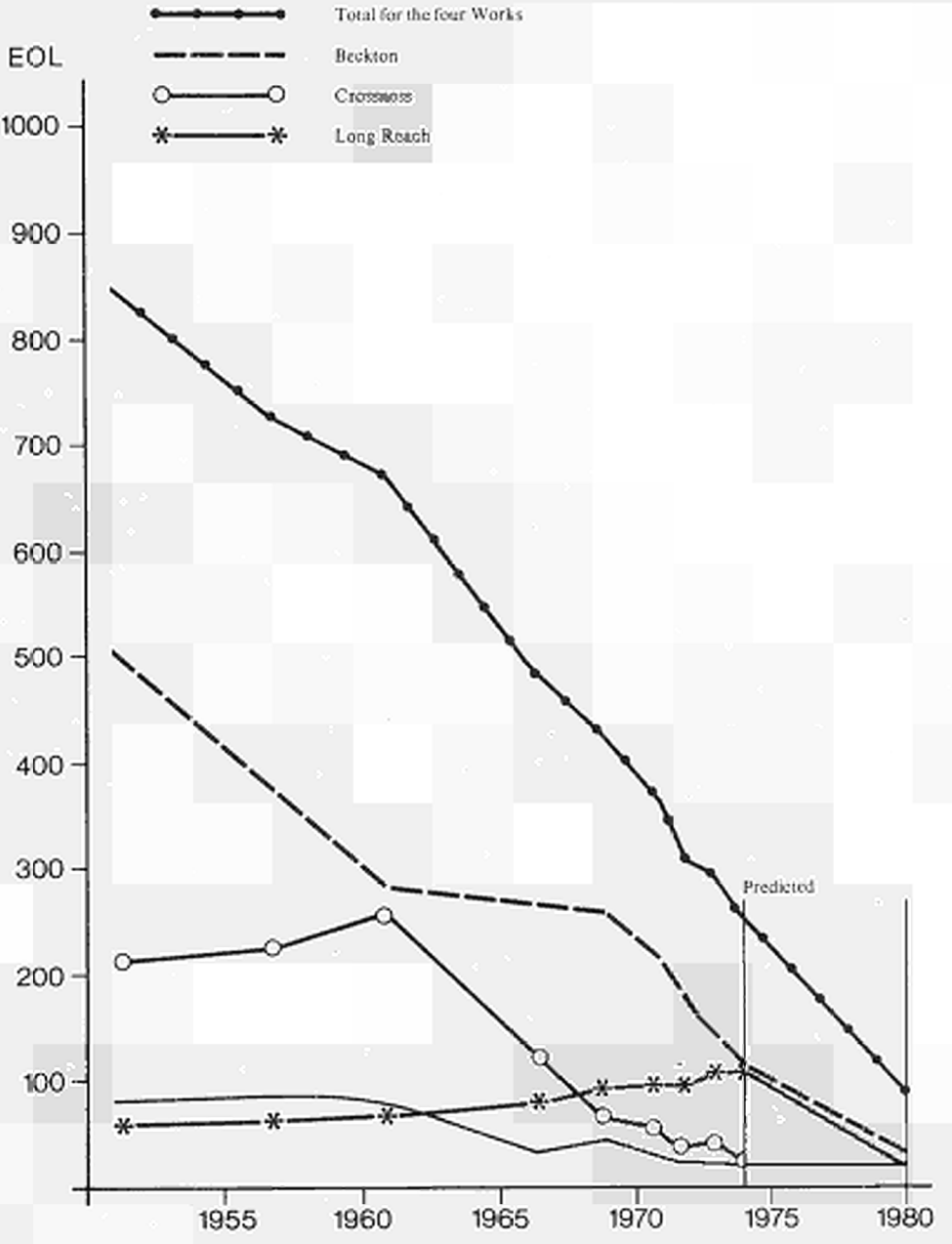
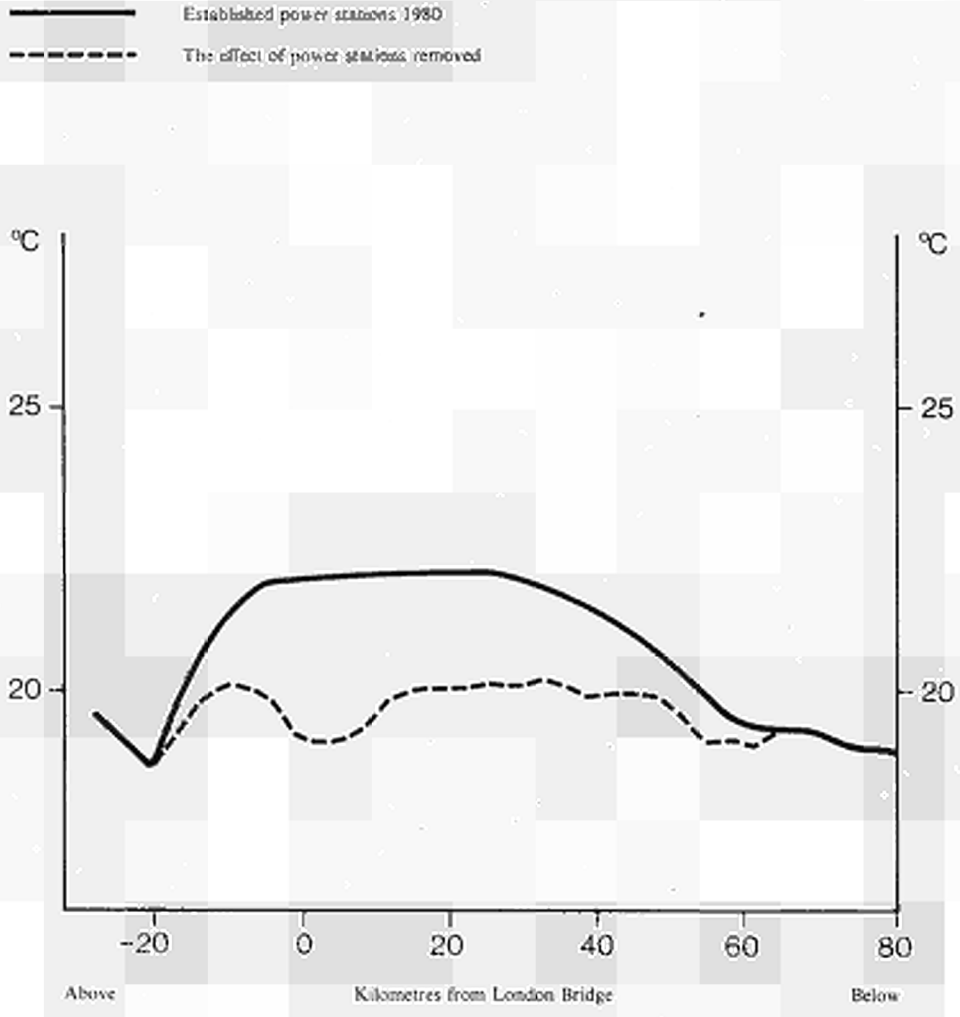


FIGURE 6

Temperature profile of Thames Estuary, showing the effect of established directly-cooled power stations under third quarter low flow conditions, 1980



(b) Reducing environmental pollution caused by dust in the Federal Republic of Germany

Introduction

Environmental pollution by dust is one of the oldest and still one of the most conspicuous concomitants of industrialization. Counter measures have to be introduced at source, in the emitting plant, since the only method of reducing the emission level — dust precipitation and airborne dust — is to take technological steps there. And, last but not least, the demand by those living in highly polluted industrial areas for a blue sky requires urgent action in those areas to reduce dust pollution. In the Federal Republic the environmental policy has provided the framework and the necessary impetus for the introduction of emission-reducing measures whose effect is noticeable in all dust-emitting industries.

As far as dust suppression is concerned, demonstrable and widespread success has been achieved in all dust-emitting sectors, no region excepted, and success has been exemplary as regards air quality in two highly polluted industrial areas.

Dust emission reduced by 65% in 10 years

Air pollution by dust has declined sharply. This can be seen from Figure 1 in which the position at 5-yearly intervals is given. The trend in primary energy consumption is given as a yardstick for economic developments. Against the background of a considerable expansion of economic activity the significant reduction in dust emissions represents a convincing success.

Dust is produced in the processes of winning, converting and consuming energy-directly in the burning process and indirectly in the various industrial processes which are all dependent on energy input. Hence the source analysis breaks down the whole area of energy into sections: power stations, industrial firing systems, domestic consumption, trades, overland traffic and processing. These include the industries concerned with winning and processing energy carriers, building materials made from non-metallic minerals, iron and steel, non-ferrous metals, ferro-alloys and chemicals.

Two types of reduction measures can be taken, namely primary measures to counteract the production of dust in the relevant process and secondary measures to scrub waste gases. For instance one important primary measure is converting to low-ash fuels and another the use of low-emission processes. Secondary measures make use of the technology of separation — scrubbing, filters. A prerequisite for the installation of separators is the collecting of waste gases containing dust, e.g. by means of suction devices.

Representative sections of the energy industry are dealt with individually below. For reasons of processing and safety, flue gases are always collected and their elimination controlled so that separators can be used in industry — which represents an immeasurable number of large units. On the other hand there is only limited application for primary measures.

As regards processing, this paper can deal only with the most important dust-emitting industries — pig iron and crude steel production in the iron and steel sector and the production of cement and bituminous road paving materials in the building materials sector.

Frequently, dust-intensive industrial processes are discontinuous, emissions occurring only over short periods and being extremely difficult to control. For the purposes of dust reduction the following aspects of any process are the most important:

— reducing the volume of waste gases and their dust content by improving the processes;

— collecting waste gases, for instance by encapsulation and suction;

— high-efficiency dust removal from waste gas flows.

Main improvements in hard coal-fired power stations

(73% in 10 years)

Figure 2 breaks down the energy consumption of fossil-fuelled power stations according to energy carriers.

As early as 1964 the Federal Government issued a general administrative regulation (Technische Anleitung zur Reinhaltung der Luft — TA Luft = technological methods of maintaining clean air) which sets out in a binding manner for the relevant authorities the requirements which — for the purposes of emission control — must be met by dust-emitting installations.

By stepping up the installation of dust collection equipment whilst at the same time improving dust collection technology and — indirectly — by increasing power station efficiency, it has proved possible to lower the specific emissions for hard coal and brown coal by factor of 3.5 to 4.

Specific heat consumption in relation to the electrical energy produced has dropped sharply during the period under review; thus, whilst fuel input between 1965 and 1973 increased by about 50%, the increase in electricity production was some 68%.

Nowadays, electrostatic filters are being used almost without exception for dedusting in coal-fired installations; new heavy oil-fired installations are also being fitted with electrostatic filters. Figure 3 provides an exemplary illustration of the trend at hard coal-fired power stations. The table below shows the trend in average specific emissions.

Overall dust emission factors for firing systems in power stations
— Figures in kg of dangerous substances/TJ of fuel input —

Fuel	1965	1970	1973	1975
Hard coal	400	200	140	110
Brown coal	270	110	80	80
Fuel oil S	34	34	34	34
Gas	0.1	0.1	0.1	0.1

The extent to which emissions have been reduced is shown in the overall diagram in Figure 4 and the breakdown by fuels in the Table below.

Trends in power station dust emissions, including combined heat and power and district heating plants
— Figures in 1 000 tonnes/yr —

	1965	1969	1970	1971	1972	1973	1974	1975
Hard coal	443	250	222	248	192	162	139	95
Brown coal	133	83	71	65	65	64	68	70
Fuel oil S	6	11	13	14	15	16	11	11
Gas	0	0	0	0	0	0	1	1
Total	582	354	306	327	272	242	219	177

Dust emissions by power stations dropped by approximately 70% between 1965 and 1975. The highest reduction rates are to be found in the 60s: over 10% per year. Coal firing is responsible for the largest proportion of the total emission. At the same time, the biggest reduction has occurred in this area. As a result of legal requirements, further reductions are likely.

Over the last few years, as dedusting technology has advanced, the proportion of fine dust in total dust emissions has steadily increased. Measurements at power stations have produced figures of around 90% for the proportion of fine dust (where electrostatic filters were used for dedusting).

Dust emissions due to industrial firing systems reduced by 20% this year

Technologically speaking there is no difference between industrial and power station firing systems; the former are, however, much less efficient. Hence in smaller installations, where maintenance leaves something to be desired and cheaper dust

reduction techniques are applied, emission values are often higher than for large power station firing systems. For this reason, the average emission factors for industrial firing systems are also higher.

The clean air maintenance regulations (TA Luft) which must be observed when new installations are commissioned, combined with the industrial innovation which, from the economic point of view became necessary as the economy expanded, has led to a 20% per annum reduction in dust emissions by industrial firing systems since 1965.

In this connection one of the main features, clearly illustrated by Figure 5, is the sharp drop in the consumption of solid fuels; the proportion of the latter fell to under 10% in 1975. The following table permits direct conclusions as to the effect of this structural change.

Dust emission factors in industrial firing systems
— Figures in kg/TJ of fuel input —

Fuel	1965	1970	1973	1975
Hard coal (including briquettes)	800	400	330	250
Coke	50	50	50	50
Brown coal	800	400	330	250
Fuel oil S	34	34	34	34
Fuel oil EL	0.7	0.7	0.7	0.7
Gas	0.1	0.1	0.1	0.1

Because of the increased use of electrostatic filters, the specific emissions for solid fuels (with the exception of coke) dropped to one-third during the period 1965 to 1975. For liquid and gaseous fuels the values are lower by at least the power of 10.

By installing electrostatic filters in new plants; improving old plants or taking them out of service, and because of the sharp drop in the number of coal-fired systems, it has been possible to reduce emissions by about one-tenth in ten years whilst energy sales have remained roughly the same. Figure 6 and the Table below illustrate this development.

Trends in dust emissions caused by industrial firing systems (under-grate systems only)
— Figures in 1 000 tonnes/yr —

Fuel	1965	1969	1970	1971	1972	1973	1974	1975
Hard coal and briquettes	339	111	67	46	32	24	23	20
Coke	1	1	0	0	0	0	0	0
Brown coal	126	40	32	23	20	18	15	12
Fuel oil S	20	24	25	26	26	26	24	21
Fuel oil EL	0	0	0	0	0	0	0	0
Gas	0	0	0	0	0	0	0	0
Total	486	176	124	95	78	68	62	53

60% improvement in ten years as a result of using fuel oil in domestic firing systems

In 1960 households and small-scale consumers accounted for approximately 23% of primary energy consumption, increasing their consumption to some 29% in 1975. A further increase is unlikely in the next few years.

Figures 7 shows the changes in end energy consumption, broken down by energy carriers.

During the same period, energy supplied in the form of district heating remained almost constant. A sharp drop can be seen in the use of solid fuels, whereas other energy carriers expanded their respective shares.

The emissions covered in Figure 8 include only those shares resulting from the direct input of gas, fuel oil and solid fuels in households and by small-scale consumers. Emissions caused by power production and district heating for households and small-scale consumers are given under power stations.

For the period under review constant average emission factors were applied. Hence trends in emissions are exclusively the result of changing patterns of energy consumption and its components.

In connection with the regular monitoring of firing systems, the substitution of liquid and gaseous fuels for solid fuels has led to a big reduction in dust emissions because of the low specific emissions involved.

Modern blast-furnaces produce 30% less dust

The comparison in Figure 9 shows that, given a more or less unchanging production of pig-iron (approximately 30 million tonnes in both 1971 and 1975), it has been possible to reduce dust emissions considerably. This development is chiefly due to the increasing monitoring of previously uncontrolled emission processes and the development of low-emission processes.

Uncontrolled emissions in pig-iron production can occur when charging at the top or when tapping the blast-furnace, in the pouring channel or in the ladle. Blast-furnaces are therefore installing more suction extractors along the pouring channel and/or at the ladle, and the waste gases collected there are scrubbed in separation filters or scrubbers which leave only very small amounts of pure gas-borne dust.

The development of back pressure gas furnaces is a good example of the decisive improvements in the field of environmental protection that advances in production technology can achieve. Developed chiefly for economic reasons, this process which

uses an excess pressure of approximately 2 bar at the top of the blast-furnace requires approximately 30% less coke. This means that while output remains the same, there is 30% less blast-furnace exhaust gas to scrub. At the same time, because of the lower flow speed, the dust content of the blast-furnace exhaust gas is approximately half that ordinarily produced by conventional blast-furnaces.

The excess gas pressure can be used as a source of energy for dedusting, e.g. by means of Venturi scrubbers, so that with less technical effort more extensive gas scrubbing can be carried out.

A further advantage of this modern process (4 of the approximately 92 blast-furnaces in the Federal Republic are currently using excess pressure) is that, because of the gas-proof seal on the blast-furnace mouth any emission at this point can only be of short duration when the pressure in the scrubber has to be reduced to atmosphere.

50% less dust in crude steel production as a result of modern production methods and stricter emission control

Figure 10 shows the trends in crude steel production and the directly related dust emissions over the last few years. The considerable reduction in emissions is due to the gradual changeover to low-emission processes.

For a long time, general purpose steel was produced by the basic Bessemer process in which air or oxygen-enriched air was blown into the molten steel bath through a tuyère bottom. Because of the large volume of gas involved, it proved possible to use separators only in a few cases to achieve a satisfactory reduction in the dust emissions caused by the basic Bessemer process. The introduction of pure oxygen has brought a considerable improvement. As a result of the considerable reduction in the volume of gas involved, it is now possible to install modern high-efficiency separators which are economically justifiable.

However, the onward march of technology did not end there but went on to produce the LD process. The following table illustrates the breakthrough of this process at the expense of traditional methods.

Developments in crude steel production and dust emissions

Process	Year	Production million tonnes/yr	Emission factor kg dust/tonnes crude steel	Dust emissions 1000 tonnes/yr
Bessemer steel	1968	7.7	7.5	57
	1976	0.7	7.5	5
LD steel	1968	15.2	1	15
	1976	32.4	0.4	13
Open-hearth steel	1968	14.5	2	30
	1976	6.7	2	14

Whilst in 1970 there were still 52 Bessemer converters in operation accounting for 18% of crude steel production, the last Bessemer converter in the Federal Republic of Germany ceased production in 1976.

Since the beginning of the 60s the LD steel production method has been introduced in more and more new steelworks. In this process the technically pure oxygen required for fining is fed into the molten steel bath through a water-cooled lance. Compared with the Bessemer converter method, considerably less waste gas is produced and what is produced can be largely dedusted. The same goes for the amount of dust produced when turning converters up or down. By means of encapsulation and suction; followed by dedusting, emissions can be limited to a minimum during these stages of the process as well.

With the advent of the now current LD process it has been possible to organize crude steel production into very much larger and hence more economic units.

Further improvements will result from the installation of electrostatic filters in open-hearth furnaces since the filtering process has been developed over the last few years to the point where it is suitable for industrial use.

Dust from the cement industry no longer disfigures the landscape

Whilst as recently as 1960 the area surrounding a cement works was enveloped in uniform grey, the nuisance to the local population caused by dust precipitation has disappeared as a result of the strict requirements which came into force in 1964.

High-powered separators, particularly electrostatic filters and filtering dedusters, have been in use for some time in the cement industry. The fact that the cement recovered in this way is saleable provides a strong incentive for lowering the emission level.

The main sources of emission are the conveyor and storage units, the rotary cement kiln, the clinker cooler and the crusher-drier units. Taken as a whole, the emission levels illustrated in Figure 11 indicate a clear trend toward reduction. This is chiefly due to:

— the drop in the volume of waste gas resulting from a clinker cooling method which does not produce waste gas, and the use of the hot rotary kiln waste gases to cool the raw materials;

— improved dedusting through the use of more efficient separators.

The trend towards larger installations is reducing dust emissions
Example: Bituminous road paving materials

In 1975, the some 90 plants in the Federal Republic of Germany mixing bituminous paving material produced 68 million tonnes. Since 1966 the number of plants has been decreasing steadily, the trend being towards larger units.

The main dust emission points in mixing plants are the drum, the conveyor system and the storage units. To some extent wet-type dust collectors are still used for dedusting, but in the majority of cases filter-type dedusters have been installed.

Figure 12 shows a distinct drop in the level of dust emissions. The determining factors in the improvements achieved so far and in any further developments are:

— the use of automatic temperature and pressure regulators;

— the extensive collection of process gases containing dust;

— the increased use of filter-type dedusters.

Atmospheric pollution has been successfully reduced

As recently as the 1960-1965 period, dust emission was still a visible concomitant of industrial activity in the highly polluted industrial regions. In the following years the measures described in this report, which necessarily derived from the Federal Government regulations on the maintenance of clean air, led to a noticeable reduction in atmospheric pollution by dust emission. Since the clean air regulations were further tightened in 1974, thus requiring the use of the most up-to-date techniques for keeping the air clean, a further reduction atmospheric pollution is likely (technical methods of maintaining clean air, 1974).

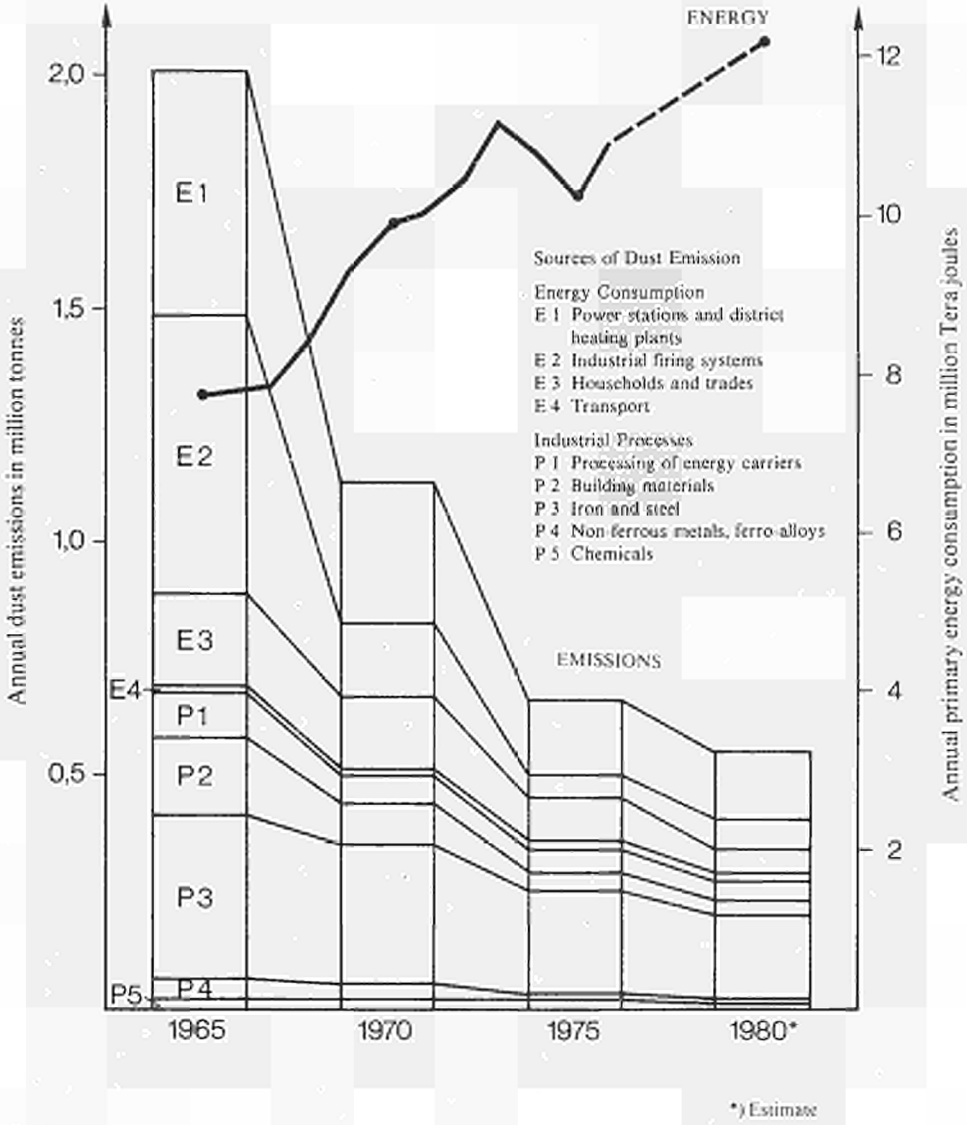
Where meteorological factors have to be taken into consideration, absolute certainty is never possible, but it is highly likely, that, even in the few areas in Federal German territory where dust emission limits are still being exceeded, strict emission limits will soon be observed.

As illustrated in Figure 13, emission levels in highly polluted industrial areas have dropped. This success is largely due to the measures taken to combat larger dust particles. And, although less pronounced than the indications given in Figure 13 for dust precipitation, the concentration of fine dust particles has, in general, also dropped in highly polluted areas.

The field is still wide open for further clean air measures to counteract the toxic content of fine dust and the large variety of inorganic gaseous air pollutants in particular, an endeavour for which the Federal emission law of 1974 already provides the legal basis.

FIGURE 1

Dust emissions in the Federal Republic of Germany, broken down by source and primary energy consumption



*) Estimate

FIGURE 2

Power station fuel consumption (including combined production and district heating works) in the Federal Republic of Germany

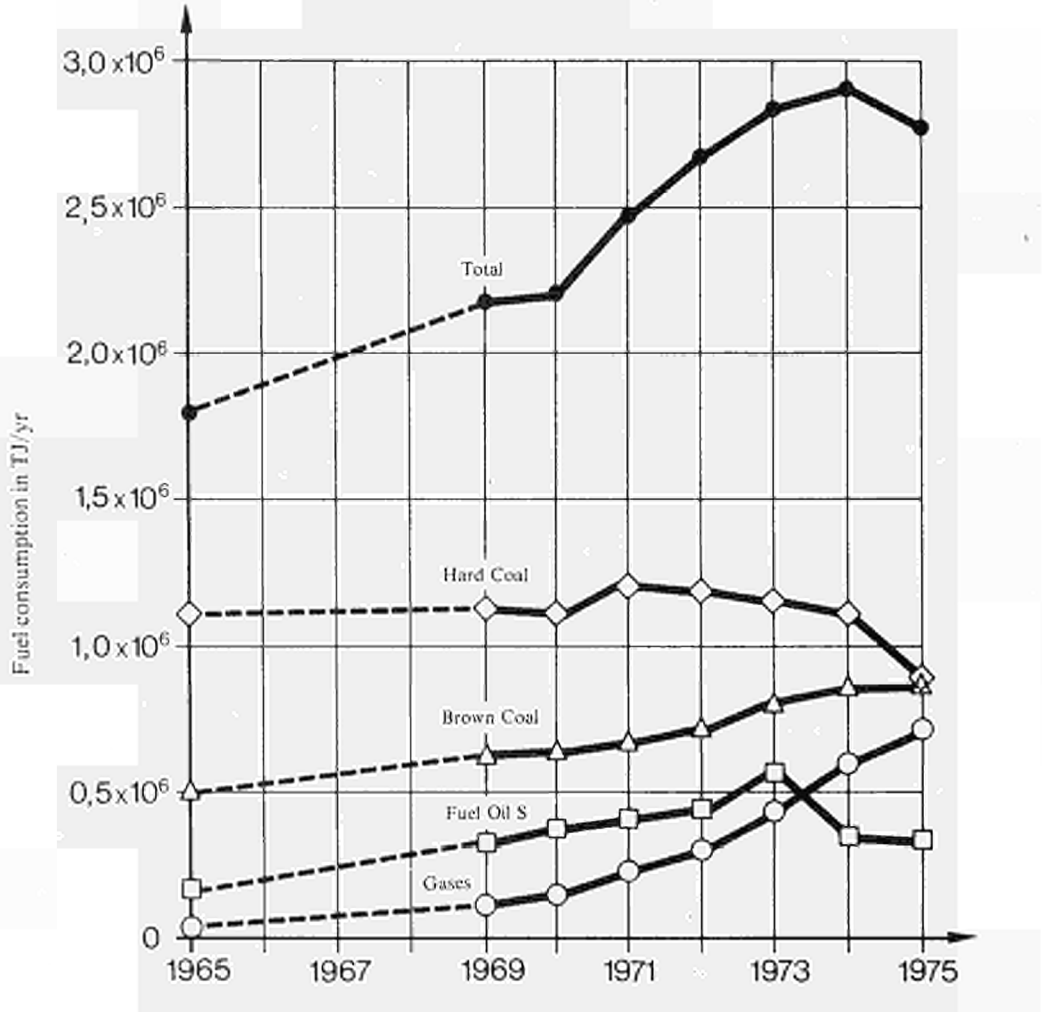


FIGURE 3

Trends in amount of dust discharged and average height of stacks in new coal-fired power stations in the Federal Republic of Germany

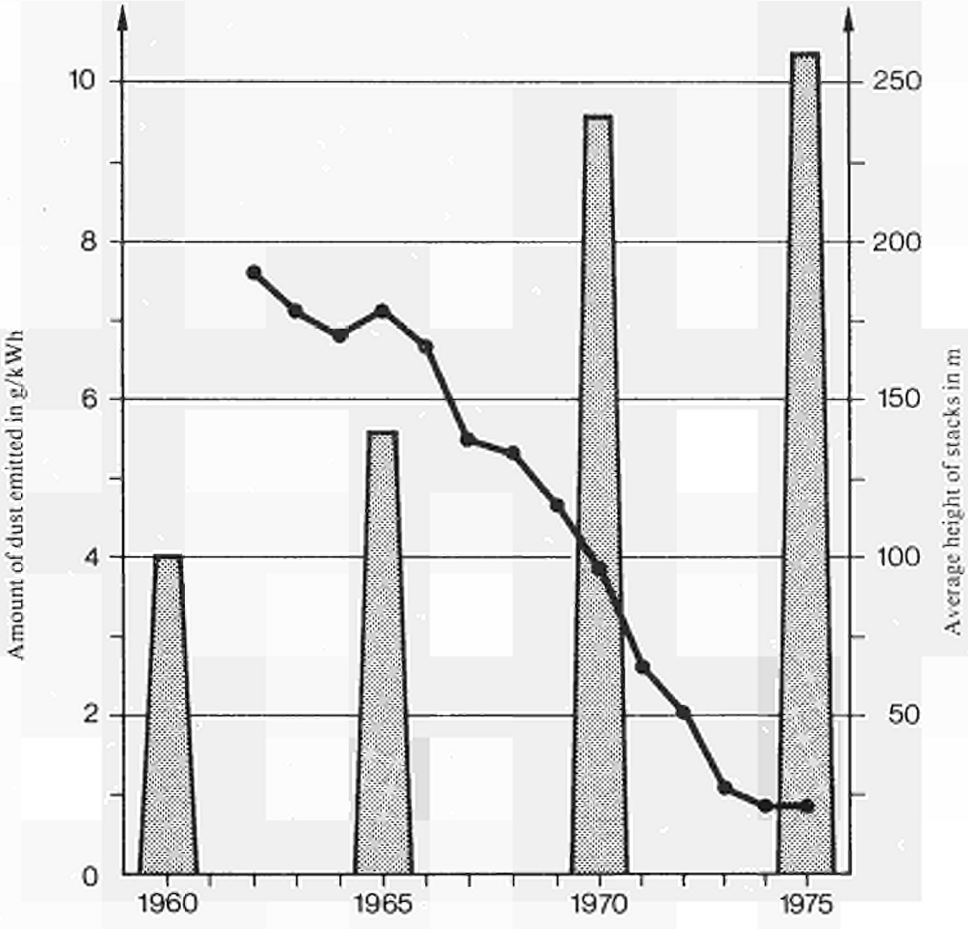


FIGURE 4

Dust emissions from power stations (including combined production and district heating works) in the Federal Republic of Germany

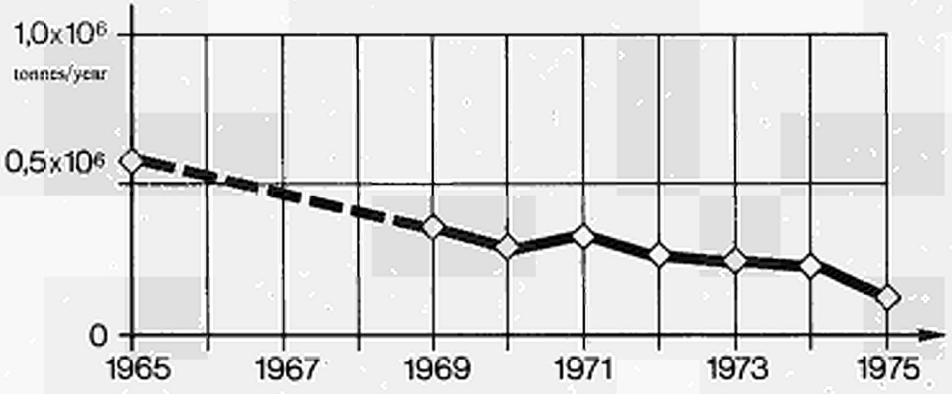


FIGURE 5

Fuel consumption in industrial firing units in the Federal Republic of Germany
(direct charge in under-grate firing)

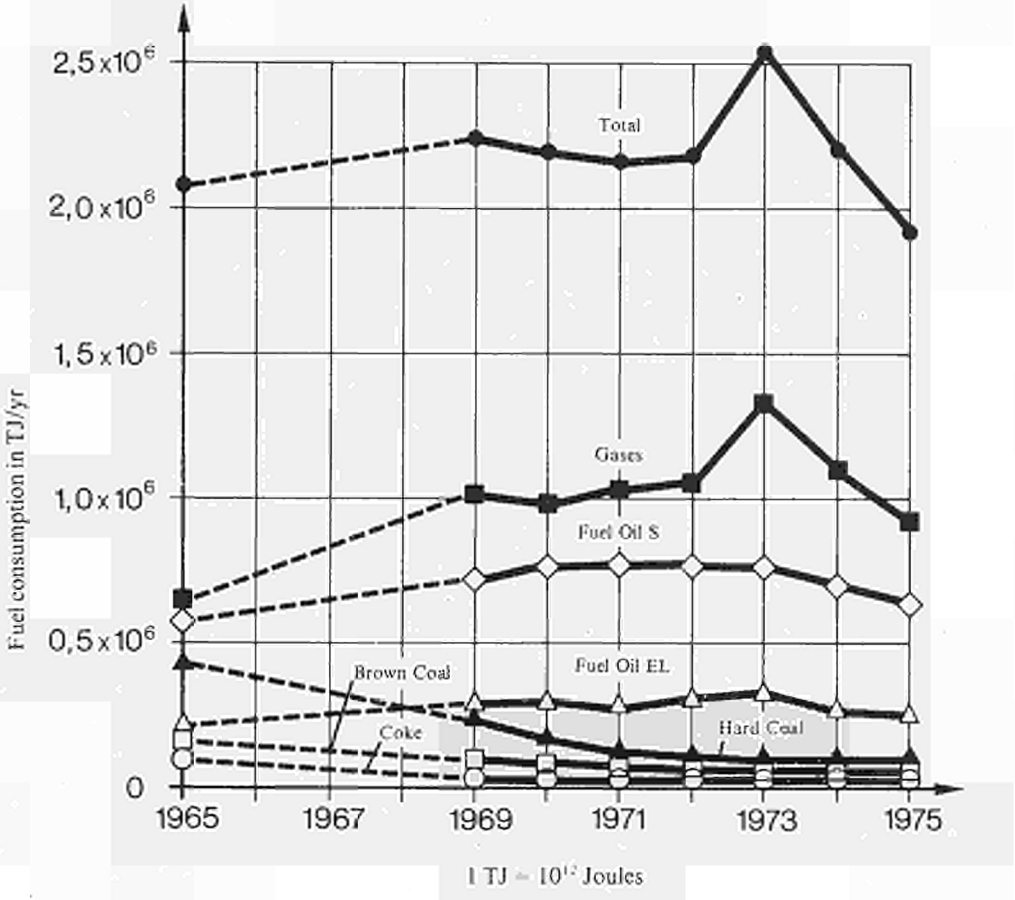


FIGURE 6

Dust emissions from industrial firing units in the Federal Republic of Germany
(direct charge in under-grate firing)

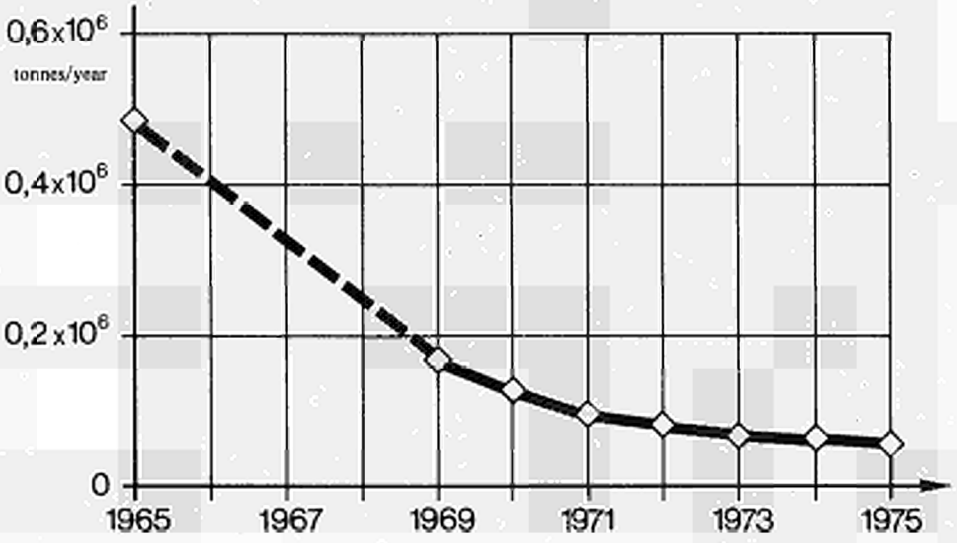
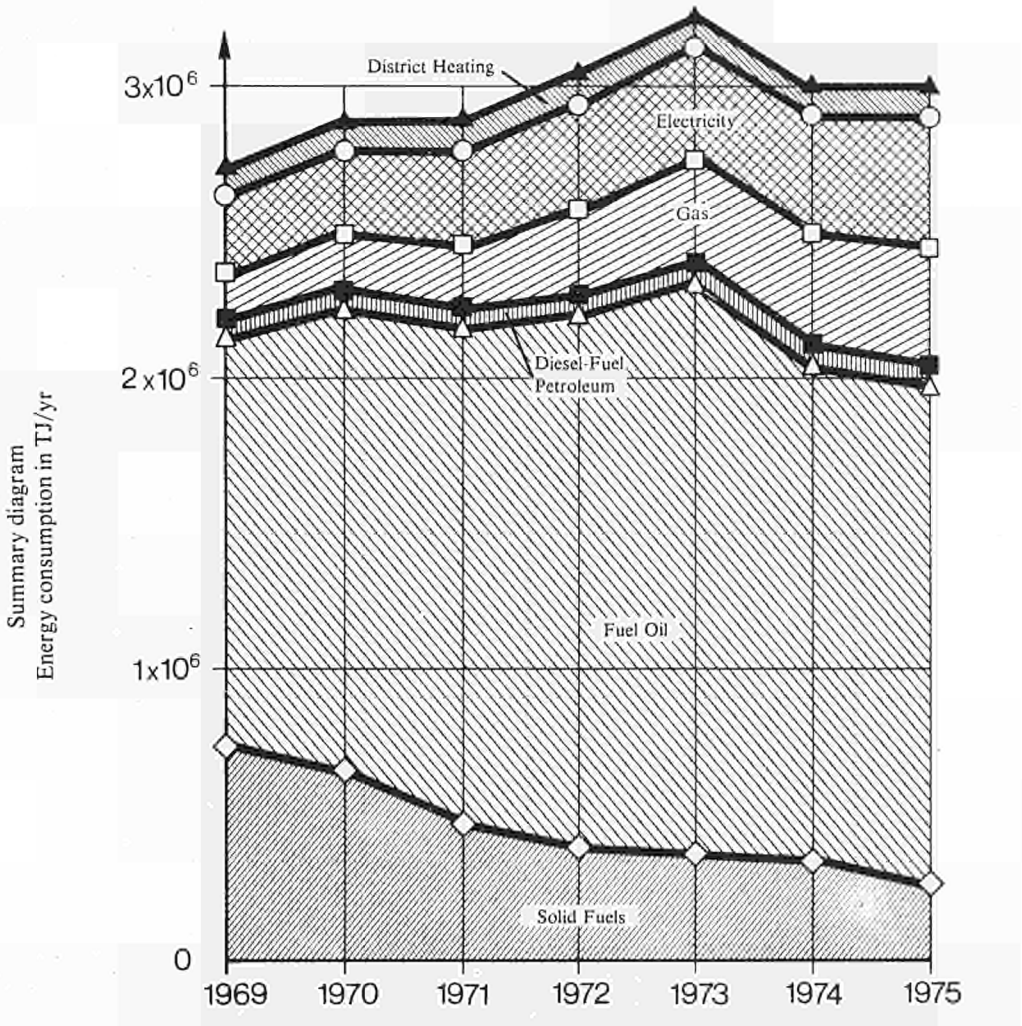


FIGURE 7

End energy consumption by households and small-scale consumers in the Federal Republic of Germany, broken down by energy carriers



1 TJ = 10^{12} Joules

FIGURE 8

Dust emissions from household and small-scale consumer heating installations in the Federal Republic of Germany

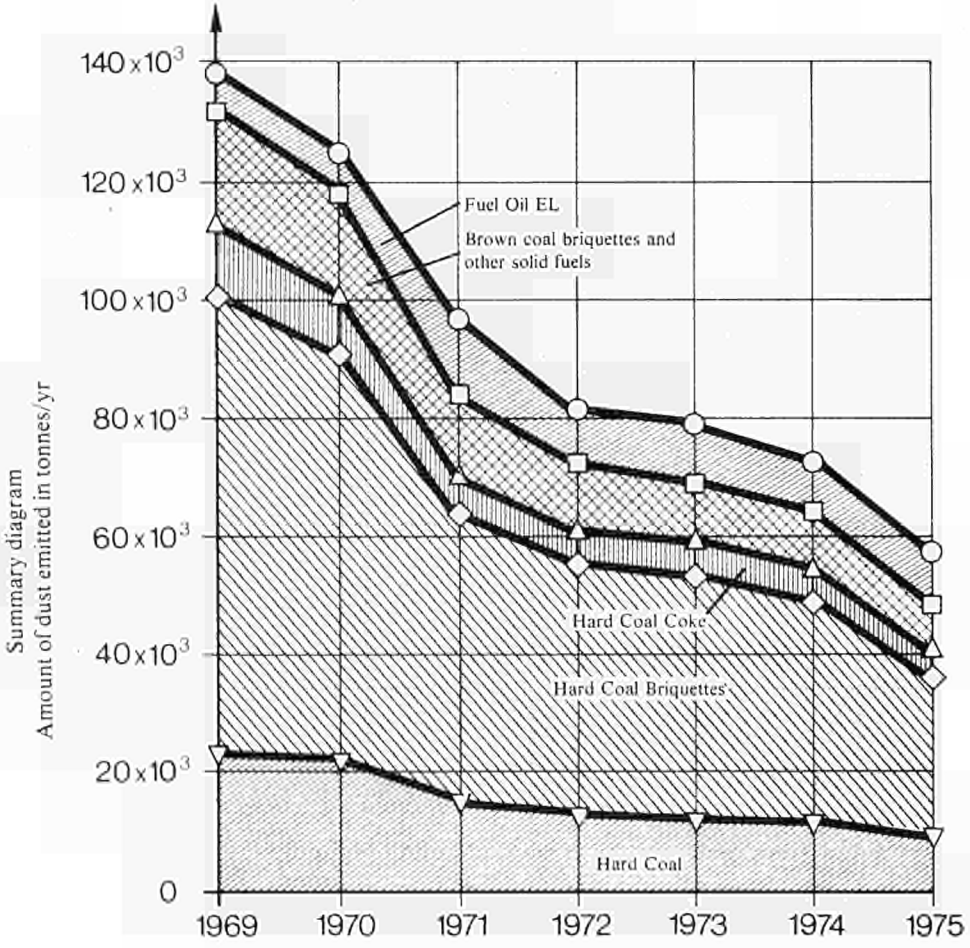


FIGURE 9

Dust emissions arising during pig iron production in the Federal Republic of Germany

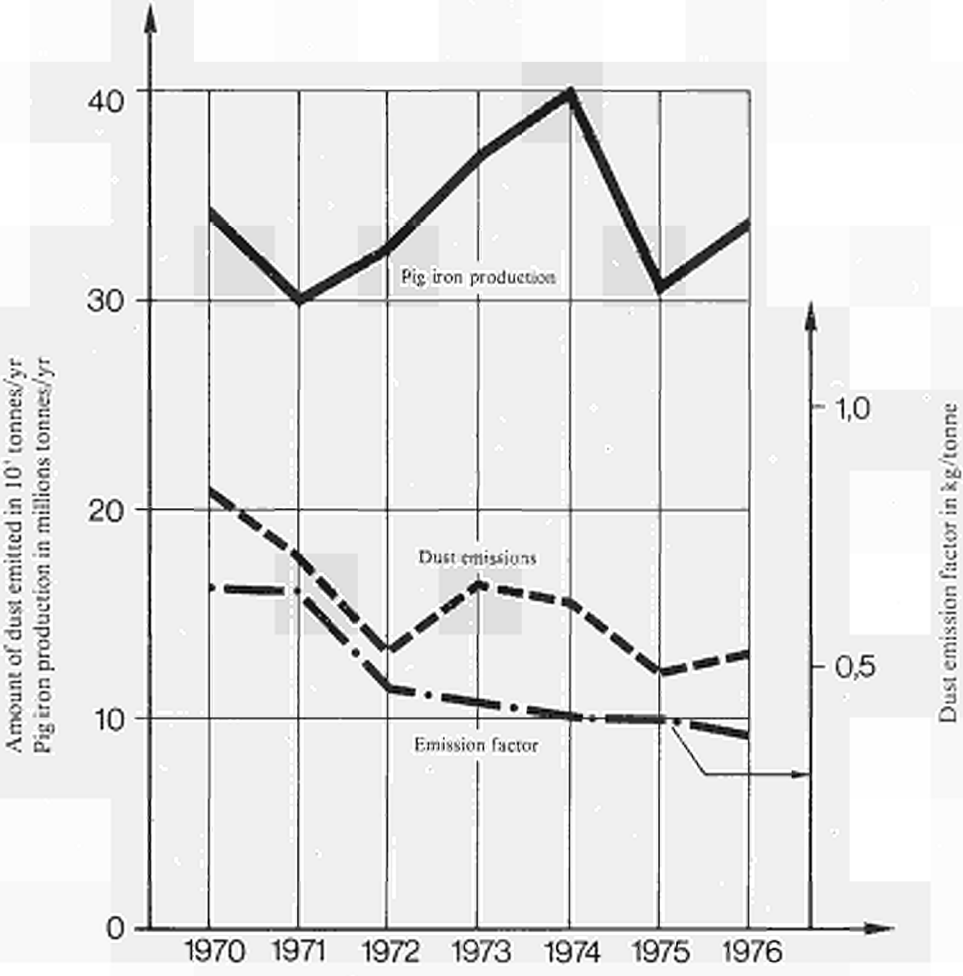


FIGURE 10

Dust emissions arising during crude steel production in the Federal Republic of Germany

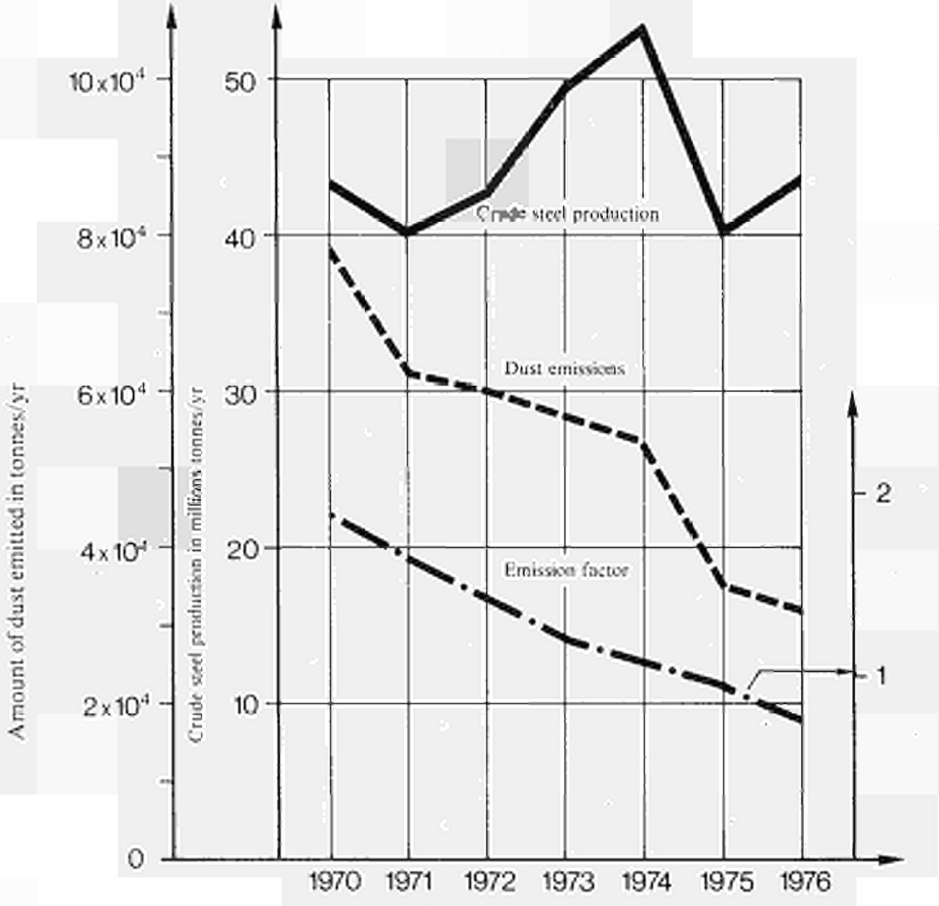


FIGURE 11

Dust emissions arising during cement production in the Federal Republic of Germany

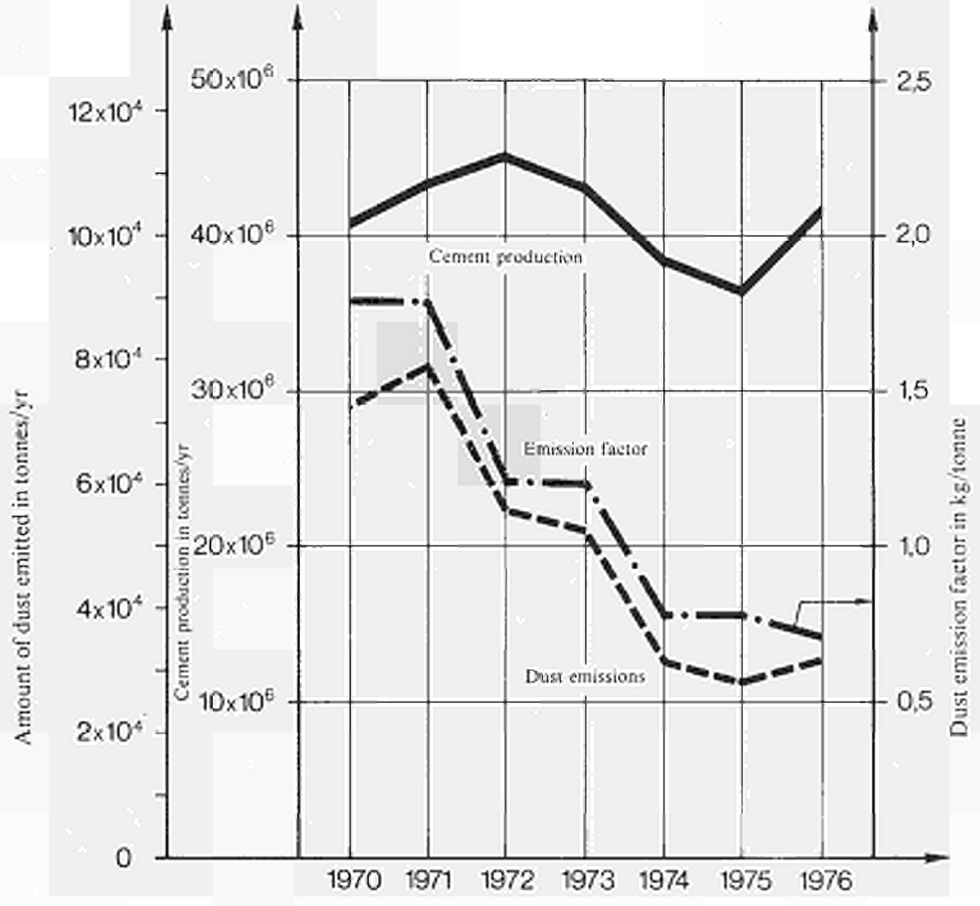


FIGURE 12

Dust emission during the production of road paving mix in the Federal Republic of Germany

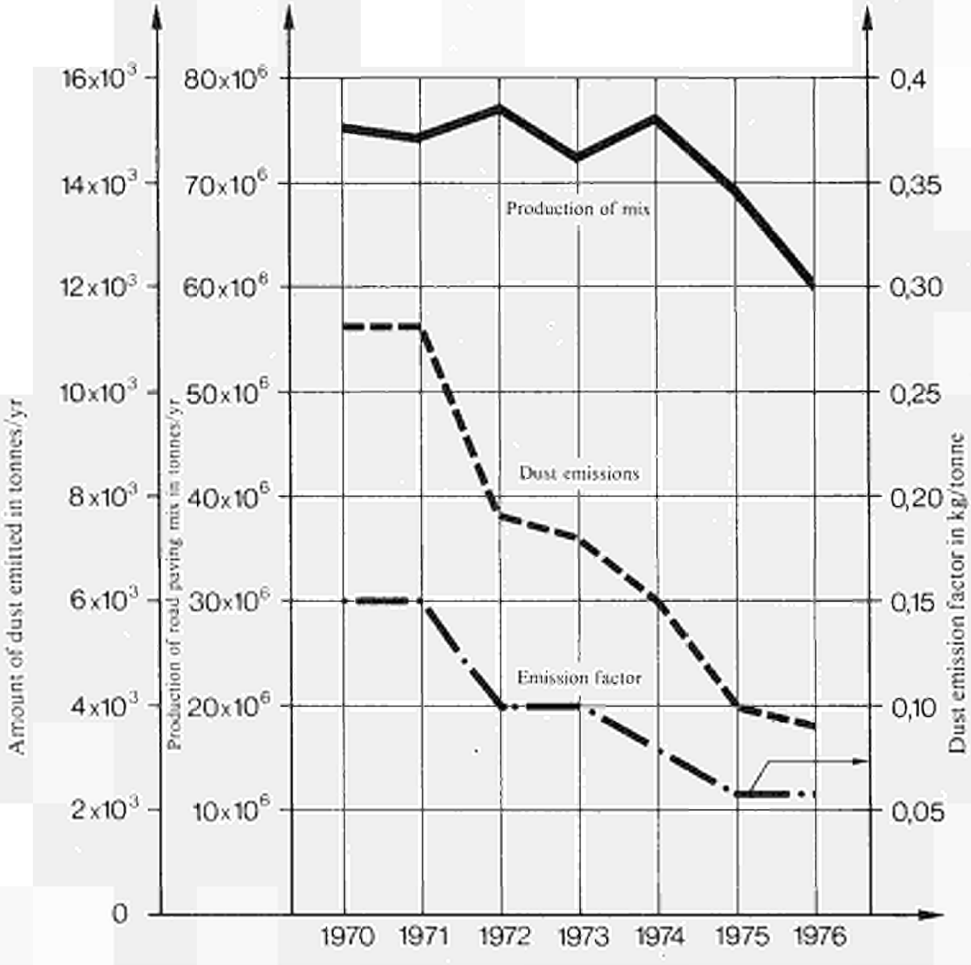
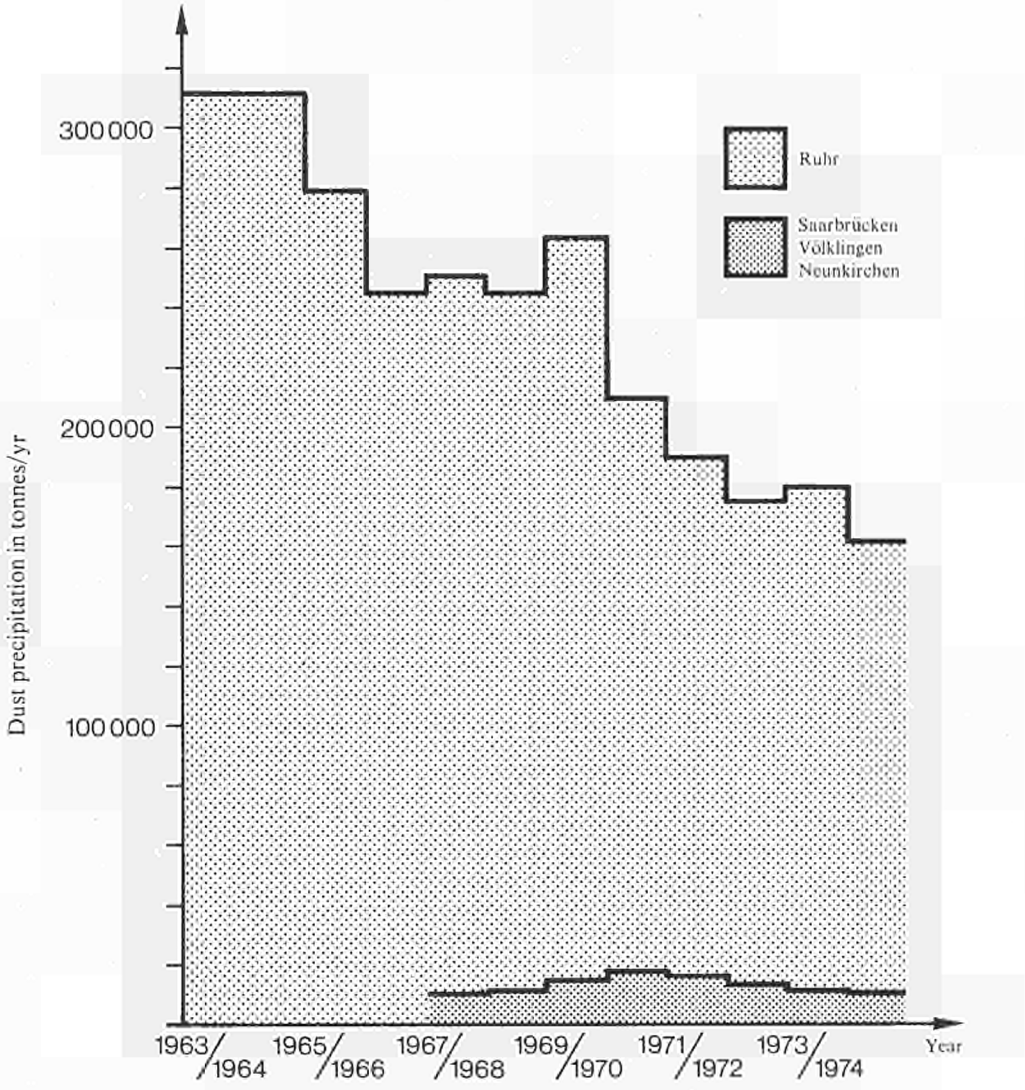


FIGURE 13

Total pollution due to dust precipitation in the Ruhr and three towns in the Saar, Federal Republic of Germany



c) National parks and other protected areas in Italy

As regards the classification adopted by the international bodies, notably the IUCN, there are various types of protected areas which in Italy can be divided into three main categories: national parks, natural parks, nature reserves.

A report on environmental policy in Italy in recent years as regards protected areas therefore means a description of these different types of area and an account of their history.

1. National parks

For Italy's four national parks (excluding that of Calabria, formally established in 1968 but whose area has not yet been defined) the laws setting them up which date back to 1922 to 1935, continued the objectives of environmental conservation and tourist development, and this has brought about an ambiguous situation which has contributed to the development of activities incompatible with the very concept of national parks (residential development, improved mountain access facilities and so on).

The most obvious environmental deterioration has taken place in the smallest of the four parks, the Circeo National Park, which is particularly vulnerable owing to its proximity to Rome and its attractions as a seaside resort.

In the Abruzzo, Gran Paradiso and Stelvio National Parks, disturbance has for the most part been confined to a few mountain slopes and valleys; and the present policy of differentiating the restrictions in accordance with the environmental and landscape importance of individual areas which the park boards are now pursuing in collaboration with the regional and municipal authorities, means that areas of most outstanding natural beauty will be preserved.

However, in recent years effective improvement provisions have been brought in to apply to all the parks which can be summarized as follows, starting with the smallest and most severely threatened one, the Circeo National Park.

Circeo National Park

Four fully protected (integral) nature reserves have been established within the State forest. Preparations for a centre open to visitors have been started at Sabaudia, consisting of a museum, a guest-house and a zoo representing the fauna of the park. Studies and research have been put in hand on the nature conservation aspects and on the socio-economic problems of such areas.

On 4 October 1975 the area of the park was enlarged from 7 500 to 8 300 hectares, including three coastal lagoons of great importance as resting places for migratory

birds, as well as for their landscape beauty. Since 1 March 1977 the Circeo State Forest has been included in the international inventory of biosphere reserves in Unesco's MAB project.

Abruzzo National Park

For some years work has been in progress to reorganize the visitor's centre near the park offices at Pescasseroli; the centre comprises a museum, a lecture hall, a zoo representing the fauna in the park and a small guest house. Information centres for visitors have been set up at various points in the park, paths have been signposted and some shelters renovated. Three areas have been set aside for the Appenine wolf, red deer and the roebuck; the last two animals have been reintroduced into the park with the help of foreign countries specifically under the 'pairing' arrangements between the National Park of Abruzzo and that of Bavaria. There are now a few hundred head of these animals in the Park. Almost a third of the area of the Park is directly managed by the Park Board, following agreements with the State Forestry Agency or contracts with the municipalities or private owners, and this area includes the most outstanding sites and landscapes, such as the Camosciara, which is administered as an integral and strictly protected nature reserve.

The park has recently been enlarged to take in a contiguous area which includes Mount Godi and Mount Marsicano, and the wooded valleys sloping down towards the River Sangro which are of interest as the habitat of the Marsicano bear.

The Abruzzo National Park was awarded the European Diploma of the Council of Europe in 1972, and again in 1976.

Gran Paradiso National Park

The activity of the park board has been severely curtailed by shortage of funds: for many years resources were almost entirely absorbed by the cost of the park wardens. In 1977, for the first time, a substantial grant from the State makes it financially possible — provided it is repeated on a regular basis — for the Park Board to launch its efforts for a conservation policy which is both worthy of the name and likely to bring economic benefits to the local population, in contrast with present restrictions in which the park has always appeared as an obstacle to socio-economic development.

Stelvio Park

The Stelvio Park, like the other national parks, also faces the problem of diversifying the restrictions to suit traditional activities; a systematic scheme should be drawn up by the joint management board now being formed by the State, the Provinces of Trento and Bolzano and the Lombardy Region, with the objective of harmonizing environmental conservation and the development of tourism.

2. Natural parks

At the present stage, there is no clear concept in Italy of a natural park (synonymous with a regional park or regional natural park) which would allow of a nationally accepted definition. In general, however, this concept is based on models in other countries of Europe, where the natural park is designed more for public recreation purposes than for the conservation of the eco-system, and intended to safeguard the more important features and local customs, which are traditionally agricultural, woodland and pastoral, and which find their primary expression in the man-made landscape.

As in the other European countries, this sort of park is well suited to the current situation in Italy, and therefore several are likely to be established.

The first natural parks in Italy to be set up — apart from a small one in the Friuli-Venezia Giulia region — are those of the Ticino in the Lombardy region and of the Maremma in the Tuscany region.

The first is designed to protect the Lombardy bank of the River Ticino, an area of natural beauty and considerable landscape and wildlife interest, and the protection arrangements are dovetailed with similar measures now being prepared by the Piedmont Region.

The Maremma park covers a coastal area, still in the natural state to the north of the Argentario peninsula, in the Tirreno and includes the Uccelina Mountains, the Trappola marshes and the mouth of the River Obrone, whose natural, environmental and historical characteristics it protects.

Several regions are not taking steps to establish natural parks in the near future, in areas which are the most representative of the outstanding natural features of the Italian peninsula.

3. Nature reserves

In 1959 the Ministry of Agriculture and Forestry, through the State Forestry Agency, started establishing nature reserves in areas managed by the Agency.

These reserves are of different types: fully protected (integral reserves), strictly administered, partial (zoological and anthropological), special (for specific protected natural sites and forestry areas and animal population areas) and biogenetic reserves; the classification follows the typology adopted by the Council of Europe.

The State Forestry Agency has established 99 reserves of different types, with a total area of 55 398 hectares.

Five of these reserves are in wetlands, totalling 330 hectares, and there are others of great interest, such as the island of Montecristo in the Tuscan Archipelago, not far from the island of Elba, the nature reserves of the Val Grande (2 257 hectares) in the eastern alpine region of Piedmont, and the nature reserves of the Bellunesi Dolomite in the Eastern Alps, comprising a total area of about 17 000 hectares.

Fourteen other nature reserves with a total area of about 7 000 hectares, have been established by the Friuli-Venezia Giulia and Trentino Alto Adige Regions, and also by the Universities of Pavia and Camerino.

Annex 1

List of the proposals adopted or being discussed by the Council — Situation at 31 March 1978

Commission proposals adopted by the Council

	Title	Date of the decision	References
(1)	Directive relating to the permissible sound level and the exhaust system of motor vehicles[1]	6 February 1970	OJ L 42 23 February 1970
	Adaptation (see decisions adopted by the Commission)	7 November 1973	OJ L 321 22 November 1973
	Modification	8 March 1977	OJ L 66 12 March 1977
(2)	Directive relating to measures to be taken against air pollution by gases from positive-ignition engines of motor vehicles[1]	20 March 1970	OJ L 76 6 April 1970
	Adaptations	28 May 1974	OJ L 159 15 June 1974
	(see Decisions adopted by the Commission)	30 November 1976	OJ L 32 3 February 1977
(3)	Directive on measures to be taken against emissions of pollutants from diesel engines for use in motor vehicles[1]	2 August 1972	OJ L 190 20 August 1972
(4)	Directive on the approximation of the laws of the Member States relating to detergents	22 November 1973	OJ L 347 17 December 1973
(5)	Directive on the approximation of the laws of the Member States relating to methods of testing the biodegradability of anionic surfactants[1]	22 November 1973	OJ L 347 17 December 1973
(6)	Decision concluding the convention for the prevention of marine pollution from land-based sources	3 March 1975	OJ L 194 25 July 1973
(7)	Decision concerning Community participation in the Interim Commission established on the bases of resolution No III of the convention for the prevention of marine pollution from land-based sources	3 March 1975	OJ L 194 25 July 1975

[1] These directives relate to the approximation of the laws of the Member States.

	Title	Date of the decision	References
(8)	Resolution on energy and the environment	3 March 1975	OJ C 168 25 July 1975
(9)	Resolution on the convention for the prevention of marine pollution from land-based sources	3 March 1975	OJ C 168 25 July 1975
(10)	Recommendation regarding cost allocation and action by public authorities on environmental matters	3 March 1975	OJ L 194 25 July 1975
(11)	Directive on mountain and hill farming and farming in certain less-favoured areas	28 April 1975	OJ L 128 19 May 1975
(12)	Regulation (EEC) No 1365/75 on the creation of a European Foundation for the improvement of living and working conditions	26 May 1975	OJ L 139 30 May 1975
(13)	Directive concerning the quality required of surface water intended for the abstraction of drinking-water in the Member States	16 June 1975	OJ L 194 25 July 1975
(14)	Directive on the disposal of waste oils	16 June 1975	OJ L 194 25 July 1975
(15)	Resolution concerning a revised list of second-category pollutants to be studied as part of the programme of action of the European Communities on the environment	24 June 1975	OJ C 168 25 July 1975
(16)	Decision establishing a common procedure for the exchange of information between the surveillance and monitoring networks based on data relating to atmospheric pollution caused by certain compounds and suspended particulates	24 June 1975	OJ L 194 25 July 1975
(17)	Decision adopting a programme on the management and storage of radioactive waste	26 June 1975	OJ L 178 9 July 1975
(18)	Directive on waste	15 July 1975	OJ L 194 25 July 1975
(19)	Resolution on the adaptation to technical progress of Directives or other Community rules on the protection and improvement of the environment	15 July 1975	OJ C 168 25 July 1975
(20)	Directive on the approximation of the laws of the Member States relating to the sulphur content of certain liquid fuels[1]	24 November 1975	OJ L 307 27 November 1975
(21)	Directive concerning the quality of bathing water	8 December 1975	OJ L 31 5 February 1976
(22)	Decision establishing a common procedure for the setting up and constant updating of an inventory of sources of information on the environment in the Community	8 December 1975	OJ L 31 5 February 1976

[1] These directives relate to the approximation of the laws of the Member States.

Title	Date of the decision	References
(23) Directive on the disposal of polychlorinated biphenyls and polychlorinated terphenyls	6 April 1976	OJ L 108 26 April 1976
(24) Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community	4 May 1976	OJ L 129 18 May 1976
(25) Directive on the approximation of the laws, regulations and administrative provisions of the Member States relating to the restrictions on the marketing and the use of certain dangerous substances and preparations[1]	27 July 1976	OJ L 262 27 September 1976
(26) Directive on biological screening of the population for lead	29 March 1977	OJ L 105 28 April 1977
(27) Directive on the approximation of the laws of the Member States relating to the measures to be taken against the emission of pollutants from diesel engines for use in wheeled agricultural or forestry tractors[1]	28 June 1977	OJ L 220 29 August 1977
(28) Decision concluding the Convention for the protection of the Rhine against chemical pollution and an additional Agreement to the Agreement, signed in Berne on 29 April 1963, concerning the International Commission for the Protection of the Rhine against Pollution	25 July 1977	OJ L 240 19 September 1977
(29) Decision concluding the Convention for the protection of the Mediterranean Sea against pollution and the Protocol for the prevention of the pollution of the Mediterranean Sea by dumping from ships and aircraft	25 July 1977	OJ L 240 19 September 1977
(30) Directive on classification, labelling and packaging of paints, varnishes, glues, printing inks and related products[1]	7 November 1977	OJ L 303 28 November 1977
(31) Decision establishing a common procedure for the exchange of information on the quality of surface fresh water in the Community	12 December 1977	OJ L 334 24 December 1977
(32) Decision adopting a European Economic Community concerted research project on the growth of large urban concentrations	7. February 1978	OJ L 45 16 February 1978
(33) Directive on waste from the titanium dioxide industry	20 February 1978	OJ L 54 25 February 1978
(34) Directive on toxic and dangerous waste	20 March 1978	OJ L 84 31 March 1978

[1] These directives relate to the approximation of the laws of the Member States.

Commission proposals adopted by the Council and/or the representatives of the Member States meeting within the Council

Title	Date of the decision	References
(1) Agreement of the representatives of the Governments of the Member States meeting in Council on information for the Commission and for the Member States with a view to possible harmonization throughout the Communities of urgent measures concerning the protection of the environment	5 March 1973	OJ C 9 15 March 1973
(2) Declaration of the Council of the European Communities and of the Representatives of the Governments of the Member States meeting in the Council of 22 November 1973 on the programme of action of the European Communities on the environment	22 November 1973	OJ C 112 20 December 1973
(3) Agreement of the representatives of the Governments of the Member States of the European Communities, meeting in Council of 15 July 1974 supplementing the Agreement of 5 March 1973 on information for the Commission and for the Member States with a view to possible harmonization throughout the Communities of urgent measures concerning the protection of the environment	15 July 1974	OJ C 86 20 July 1974
(4) Résolution of the Council of the European Communities and of the Representatives of the Governments of the Member States meeting within the Council of 17 May 1977 on the continuation and implementation of a European Community policy and action programme on the environment	17 June 1977	OJ C 13 13 June 1977

Acts adopted by the Commission

Title	Date of the decision	References
(1) Commission directive adapting to technical progress the Council Directive of 6 February 1970, relating to the permissible sound level and the exhaust system of motor vehicles[1]	7 November 1973	OJ L 321 22 November 1973
(2) Commission recommendation to Member States concerning the protection of the architectural and natural heritage	20 December 1974	OJ L 21 28 January 1975
(3) Commission recommendation to Member States concerning the protection of birds and their habitats	20 December 1974	OJ L 21 28 January 1975

[1] These directives relate to the approximation of the laws of the Member States.

Title	Date of the decision	References
(4) Commission recommendation to the Member States invited to attend the intergovernmental meeting in Barcelona	19 December 1975	OJ L 9 16 January 1976
(5) Commission decision setting up a Committee on Waste Management	21 April 1976	OJ L 115 1 May 1976
(6) Directive adapting to technical progress Council Directive 70/220/EEC of 20 March 1970 on measures to be taken against air pollution by gases from positive ignition engines installed in motor vehicles[1]	30 November 1976	OJ L 32 3 February 1977
(7) Commission decision appointing the members of the Committee on Waste Management	23 December 1976	OJ L 354 24 December 1976

Proposals being discussed by the Council

Title	Date of submission	References
(1) Proposal for a directive concerning forestry measures	26 February 1974	OJ C 44 19 April 1974
(2) Proposal for a decision concluding the European Convention for the protection of international watercourses against pollution	11 December 1974	OJ C 99 2 May 1975
(3) Proposal for a directive on the approximation of the laws of the Member States relating to ceramic articles intended to come into contact with food (limitation of extractable quantities of lead and cadmium)	31 December 1974	OJ C 46 27 February 1975
(4) Proposal for a directive on the approximation of the laws of the Member States relating to the permissible sound level for pneumatic concrete-breakers and jack-hammers[1]	31 December 1974	OJ C 82 14 April 1975
(5) Proposal for a directive on the reduction of water pollution caused by wood pulp mills in the Member States	20 January 1975	OJ C 99 2 April 1975
(6) Proposal for a directive on air quality standards for lead	24 April 1975	OJ C 151 7 July 1975
(7) Proposal for a directive relating to the quality of water for human consumption	31 July 1975	OJ C 214 18 September 1975
(8) Proposal for a directive on the approximation of laws of the Member States relating to the permissible sound level and to the exhaust system of motorcycles[1]	17 December 1975	OJ C 54 8 March 1976

[1] These directives relate to the approximation of the laws of the Member States.

Title	Date of submission	References
(9) Proposal for a directive on the approximation of the laws of the Member States relating to the permissible sound-emission level for current generators for power supply[1]	30 December 1975	OJ C 54 8 March 1976
(10) Proposal for a directive on the approximation of the laws of the Member States relating to the permissible sound-emission level for current generators for welding[1]	30 December 1975	OJ C 54 8 March 1976
(11) Proposal for a directive on the approximation of the laws of the Member States relating to the permissible sound-emission level for tower cranes[1]	30 December 1975	OJ C 54 8 March 1976
(12) Proposal for a directive on the use of fuel-oils with the aim of decreasing sulphurous emissions	30 December 1975	OJ C 54 8 March 1976
(13) Proposal for a directive concerning the dumping of wastes at sea	12 January 1976	OJ C 40 20 February 1976
(14) Resolution concerning the determination of criteria for sulphur dioxide and suspended particulate matter in urban atmospheres	25 February 1976	COM (76) 48
(15) Proposal for a directive concerning health protection standards for sulphur dioxide and suspended particulate matter in urban atmospheres	25 February 1976	OJ C 63 19 March 1976
(16) Proposal for a directive on the limitation of noise emission from sub-sonic aircraft	26 April 1976	OJ C 126 9 June 1976
(17) Communication concerning the objective evaluation of the risks to human health from pollution by some persistent organo-chlorine compounds	29 June 1976	COM (76) 312 f 24 June 1976
(18) Proposal for a directive concerning the placing of EEC-accepted plant protection products on the market	4 August 1976	OJ C 212 9 September 1976
(19) Proposal for a directive prohibiting the placing on the market and the use of plant protection products containing certain active substances	5 August 1976	OJ C 200 26 August 1976
(20) Proposal for a directive on the sixth modifcation of the directive of 27 June 1967 on the approximation of the laws of Member States relating to the classification, packaging and labelling of dangerous substances	21 September 1976	OJ C 260 5 November 1976
(21) Proposal for a directive relating to the quality requirements for waters favourable to shellfish growth	5 November 1976	OJ C 283 30 November 1976
(22) Communication from the Commission to the Council concerning the determination of criteria for noise	3 December 1976	COM (76) 646 f 3 December 1976
(23) Proposal for a directive on bird conservation	20 December 1976	OJ C 24 1 February 1977

[1] These directives relate to the approximation of the laws of the Member States.

Title	Date of submission	References
(24) Draft recommendation to the Member States regarding methods of evaluating the cost of pollution control to industry	16 December 1977	OJ C 10 12 January 1978
(25) Proposal for a Council Directive on the protection of groundwater against pollution caused by certain dangerous substances	27 January 1978	OJ C 37 14 February 1978

Annex 2

Studies conducted and published by the Commission, 1976-1977[1]

'Cadmium levels in biota and abiota from Lake Maggiore'
by R. Gommes, H. Muntal, JRC — Ispra
Reference: EUR 5411 EN, 1976

'Program unit'
by S. Amic, F. Sorel, JRC — Ispra
Reference: EUR 5424 FR, 1976

'Examples of application of a simple acoustic sounder for observation of meteorological parameters relevant to air pollution studies'
by H. Hasenjaeger, JRC — Ispra
Reference: EUR 5534 EN, 1976, MF

'The measurement at large distances of sulphur dioxide in the atmosphere'
by C. Cerutti, M. De Bortoli, S. Sandroni, L. Tortora, JRC — Ispra
Reference: EUR 5535 IT, 1976, MF

'Minor pollutants in the environment'
by C. Bigliocca, F. Girardi, H. Muntau, O. J. Pickford, G. Rossi, E. Sabbioni, JRC — Ispra
Reference: EUR 5533 EN, 1976 MF

'Production of animal feeds from waste materials'
by G. H. Frohn, EP Terpstra, The Hague, NL
Reference: Elsevier Sequoia S.A., Patent Report No 17, 1976 (EUR 5552 EN)

'Combustion devices fired by domestic and industrial waste'
by F. A. Blommenstein, EP Terpstra, The Hague, NL
Reference: Elsevier Sequoia S.A., Patent Report No 19, 1976 (EUR 5511 EN)

'Air sulphur dioxide concentrations in the European Community Report for April 1971 — March 1972'
by CEC, CEC-Luxembourg
Reference: EUR 5417 EN, 1976

'Occurrence of non-persistent organic compounds in water, soil and foodstuffs: pesticides'
by R. Mestres, Univ. Montpellier, F
Reference: EUR 5432 EN, 1976

'Reducing pollution from selected energy transformation sources'
by Chemical-Systems-International, Chem. Systems Int. Ltd., GB
Reference: Graham and Trotman Ltd., London GB, EUR 5438 EN, 1976

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[1] The letters in the references indicate the languages in which the report is available.

'Experiments of HE — NE Laser beam propagation in the atmosphere'
by S. Sandroni, C. Cerutti, JRC — Ispra
Reference: EUR 5427 EN, 1976

'A calibration device for long path sensors of atmospheric pollutants'
by S. Sandroni, E. Brambilla, M. Ceresoli, JRC — Ispra
Reference: EUR 5672 EN, 1976

'Principles and methods for determining ecological criteria on hydrobiocenoses, proceeding of the European scientific colloquium held in Luxembourg, November 1977 (1). Determinants in freshwater ecosystems and man modifiable factors inducing change in hydrobiocenoses (2). Ecological variables and their effect on aquatic fauna (3). Value of aquatic plants in the characterization of water quality and principles of the methods (4). Basic principles for the determination of ecological criteria for hydrobiocenoses of running water (5). The tolerance of aquatic life to chemical pollution and the idea of ecological limits in the management of international rivers (6). Biological monitoring of rivers in the Community (7). Comparative study of biological water assessment methods — practical demonstration on the river main (8.) Active surveillance and use of bioindicators (9). Relationship between laboratory bioassays and *in situ* experiments (10). Comparison of biological procedures for assessment of water quality. A comparative study of water assessment methods — practical demonstration of the River Main, Federal Republic of Germany (11). A system of tests for the assessment of potential effects of chemicals and quality data in the aquatic environment.'
by R. Amayis, J. Smeets, (1) H. A. Hawkes, (2) L. Tonolli, (3) J. P. Descy, (4) J. Verneaux, (5) H. van Genderen, (6) L. R. Pittwell, (7) H. Knoepp, (8) H. J. Hueck, (9) R. Lesel, (10) T. G. Tittizer, (11) H. J. Hueck, E. H. Hueck vander Plas, CEC — Luxembourg
Reference: Book, published by: Pergamon Press Headington Hill Hall, Oxford, GB 1976 (EUR 5523 EN)

'A study to determine the comparability of chemical analyses for drinking-water quality within the European Communities. Report of a working group of experts'
by H. Sonneborn, Institut für Wasser-, Boden- und Lufthygiene, Bundesgesundheitsamt, Berlin, West Germany
Reference: EUR 5562 EN, 1976

'Collection and cause of waste oils. Proceedings of the first European Congress of waste oils held in Brussels. March 18-19. 1976'
by CEC, European Union of Independent Lubricant Manufacturers, CEC — Brussels and European Union of Independent Lubricant Manufacturers, Paris
Reference: EUR 5625, DE-EN-FR-IT-NL, 1976

'A preparatory study for establishing criteria (dose effect relationships) for nitrogen oxides'
by H. M. Wagner, Institut für Wasser-, Boden- und Lufthygiene, Bundesgesundheitsamt, Berlin, West Germany
Reference: EUR 5436 EN, 1976

'Intercomparison programme on atmospheric lead measurements in Member States of the European Community'
by F. Arsac, A. Berlin, C. Boudene, J. Godin, E. Lahmann, M. Langevin, H. Muntau, B. Seifert, J. Smeets; CEC — Luxembourg and JRC — Ispra
Reference: EUR 5431 DE/EN/FR, 1976

'Hardness of drinking-water and public health. (1) Naturally hard waters, naturally soft waters: definition and classification. (2) Water hardness. (3) Human intake of minerals from drinking-water in the EC. (4) Present data on the amount of mineral substances ingested by man through his food. (5) Water hardness and cardiovascular mortality in England and Wales. (6) Other diseases related to the physicochemical qualitiy of drinking-water. (7) Cardiovascular diseases in relation to trace element balance. (8) Review and implication of ongoing and projected research outside the EC. (9) Consequences for public health. (10) Some epidemiological conclusions. (11) Some data from Canada. (12) Possible indications for public health in The Netherlands. (13) Research on water quality and CHD in 2 Finnish male cohorts. (14) Re-

lationship between drinking-water hardness and cardiovascular morality in Hannover. (15) Intake of mineral elements by man from drinking-water'
by R. Amavis, W. J. Hunter, J. G. P. M. Smeets, (1) S. De Fulvio, L. Olori, (2) A. Grohamann, (3) B. C. J. Zoeteman, F. J. J. Brinkmann, (4) J. Tremolieres, R. Lowy, R. Rozen, R. Amavis, W. J. Hunter, J. G. P. M. Smeets, G. Lacourly, D. Leijzer, (5) D. Clayton, (6) C. J. Roberts, (7) R. Masironi, (8) L. C. Neri, D. Hewitt, (9) L. Coin, (10) A. G. Shaper, (11) L. C. Neri, (12) K. Biersteker, (13) S. Punsar, (14) U. Keil, (15) E. J. Bigwood; CEC — Luxembourg
Reference: Proceedings of symposium held in Luxembourg, May 1975, Book published by Pergamon Press, 1976 (EUR 5447 EN-FR-IT)

'Arsenical effluents of industrial origin in the marine environment. Final report'
by CEC, CEC — Brussels
Reference: EUR 5532 FR, 1976

'Conference on the environment — A study of information sources'
by G. van Slype, Bureau Marcel van Dijk, Brussels (B)
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Annex 3

List of towns participating in the exchange of information on air pollution

The towns are listed in five groups, according to their population, and the number of monitoring stations in each is given in brackets. The following symbols are used for countries; Belgium — B; Denmark — DK; Germany — D; France — F; Italy — I; Ireland — IRL; Luxembourg — L; Netherlands — NL; United Kingdom — UK.

Towns of over 2 million inhabitants

Berlin, D	(6)	Greater London, UK	(6)
Paris, F	(6)	Greater Manchester, UK	(6)
Milan, I	(6)	West Midlands, UK	(6)
Rome, I	(4)		

Towns of 1-2 million inhabitants

Brussels, B	(5)	Marseilles, F	(6)
Munich, D	(9)	Turin, I	(5)
Copenhagen, DK	(6)	Glasgow, UK	(5)
Lyons, F	(6)	Merseyside, UK	(6)

Town of 0.5-1 million inhabitants

Antwerp, B	(6)	Dublin, IRL	(4)
Dortmund, D	(2)	Genoa, I	(2)
Duisburg, D	(2)	Amsterdam, NL	(8)
Düsseldorf, D	(2)	The Hague, NL	(2)
Frankfurt am Main, D	(5)	Rotterdam, NL	(2)
Nuremburg, D	(3)	Leeds, UK	(5)
Bordeaux, F	(6)	Sheffield, UK	(4)
Lille-Roubaix-Tourcoing, F	(6)	Tyneside, UK	(4)
Toulouse, F	(6)		

Towns of 100 000-500 000 inhabitants

Charleroi, B	(6)	Mannheim, D	(2)
Ghent, B	(6)	Regensburg, D	(1)
Liège, B	(6)	Wiesbaden, D	(1)
Augsburg, D	(2)	Würzburg, D	(2)
Erlangen, D	(1)	Ingolstadt, D	(1)
Karlsruhe, D	(2)	Fürth, D	(1)
Kassel, D	(1)	Mainz, D	(6)
Ludwigshafen, D	(5)	Clermont-Ferrand, F	(6)

Le Havre, F	(6)
Nantes, F	(6)
Rouen, F	(6)
Strasbourg, F	(6)
Cork, IRL	(1)
Bolzano, I	(5)
Pescara, I	(1)
Terni, I	(2)
Venice, I	(9)
Ferrara, I	(1)

Towns of under 100 000 inhabitants

Bruges, B	(1)
Kortrijk, B	(2)
Libramont, B	(1)
Namur, B	(3)
Aschaffenburg, D	(1)
Keeheim, D	(2)
Calais, F	(4)
Martigues, F	(1)
Vigneux de Bretagne, F	(1)
Galway, IRL	(1)
Ascoli Piceno, I	(1)
Belluno, I	(3)
Pistoia, I	(1)
Vercelli, I	(1)
Enschede, NL	(1)
Groningen, NL	(2)
Tilburg, NL	(2)
Utrecht, NL	(2)
Belfast, UK	(4)
Cardiff, UK	(4)
Edinburgh, UK	(4)
Portsmouth, UK	(4)
Teesside, UK	(6)
Luxembourg-Ville, L	(2)
Esch sur Alzette, L	(1)
Steinfort, L	(1)
Bussum, NL	(1)
Den Bosch, NL	(1)
Hilversum, NL	(1)
Maastricht, NI	(1)
Middelburg, NL	(1)
Zwolle, NL	(1)
Barnsley, UK	(2)
Bath, UK	(1)
Bedford, UK	(1)
Exeter, UK	(1)
Lincoln, UK	(3)

Illustration captions of the 2nd Report on Environment

I.2. A typical plant giving secondary biological treatment to waste waters. But environmental policy is now developing new tools for the future, not just installing pollution control equipment such as this. (See Chapter I.2. 'The changing direction of environmental policy')

I.3. Waiting to receive unemployment benefit. Environmental regulations are often accused of causing factories to close and creating unemployment. But in fact they also increase job opportunities! (See Chapter I.3. 'Environmental policy and employment')

I.4. Concorde taking off. Aircraft noise is one field in which new types of environmental legislation are being created. (See Chapter I.4. 'Some trends in environmental legislation')

II.2. A sufferer from Minimata disease. Japanese children like this one were the victims of the pollution of water by toxic substances. A Community directive will ensure that this cannot happen here. (See Chapter II.2. 'The pollution of water by dangerous substances')

II.3 A bathing beach in summer. A directive has been adopted to ensure that bathing waters within the Community cannot become a danger to health. (See Chapter II.3. 'Making Community waters safe for bathing')

II.4. All thermal power-stations produce sulphur dioxide. The Community has developed a comprehensive strategy for reducing it and its effects on the environment. (See Chapter II.4. 'The Community's work on sulphur dioxide pollution')

II.5. Demolition work in an urban area. The destruction of old houses can produce dust from the asbestos used in their construction, and lead to potentially lethal disease. (See Chapter II.5. 'The problem of asbestos pollution')

II.6. Price tickets on typical consumer products. There are many goods whose price is known exactly, but calculating the cost of pollution control is not so easy and requires a methodology of its own. (See Chapter II.6. 'Measuring the costs of environmental measures')

II.7. Picturesque Dutch houses. These houses with their white-painted gables are an asset to any environment, but keeping them spick and span is also a cause of pollution. (See Chapter II.7. 'The elimination of "red mud" from our seas')

II.8. A drum of toxic waste. The Community now has a directive on the safe disposal of all forms of toxic and dangerous waste. (See Chapter II.8. 'Dealing with toxic waste')

II.9. The white stork. One of Europe's disappearing species. A Community directive on bird protection can help to arrest its decline. (See Chapter II.9. 'Protecting Europe's birds')

III.1b. Residential housing in an industrial area. By planning ahead, the environmentally unsuitable location of human activities can be avoided in advance. (See Chapter III.1b. 'Environmental impact assessment')

III.1c. Fertile agricultural land, part of Europe's heritage. A detailed inventory of Europe's landscapes and their environmental characteristics is being developed as a planning tool for the future. (See Chapter III.1c. 'The ecological mapping of the community')

III.1d. A modern chemicals factory. The new chemicals which contribute so much to our daily life also bring potential environmental dangers. A system is needed to identify these in advance. (See Chapter III.1d. 'An identity card for new chemicals')

III.1e. A decontamination team in the town of Seveso. Environmental accidents such as the release of deadly gas from a chemicals factory at Seveso, Italy, in July 1976 must be eliminated as far as possible. (See Chapter III.1e. 'After Seveso — The prevention of accidental pollution')

III.2. Waste paper waiting to be recycled. One-third of all paper used in the Community is recycled. But a concerted action programme could double this proportion. (See Chapter III.2. 'Re-utilization of waste paper')

III.3. The Court of Justice in Luxembourg. Some day environmental action groups may be able to bring actions to improve the European environment. (See Chapter III.3. '"Citizen suits" and their importance for environmental protection')

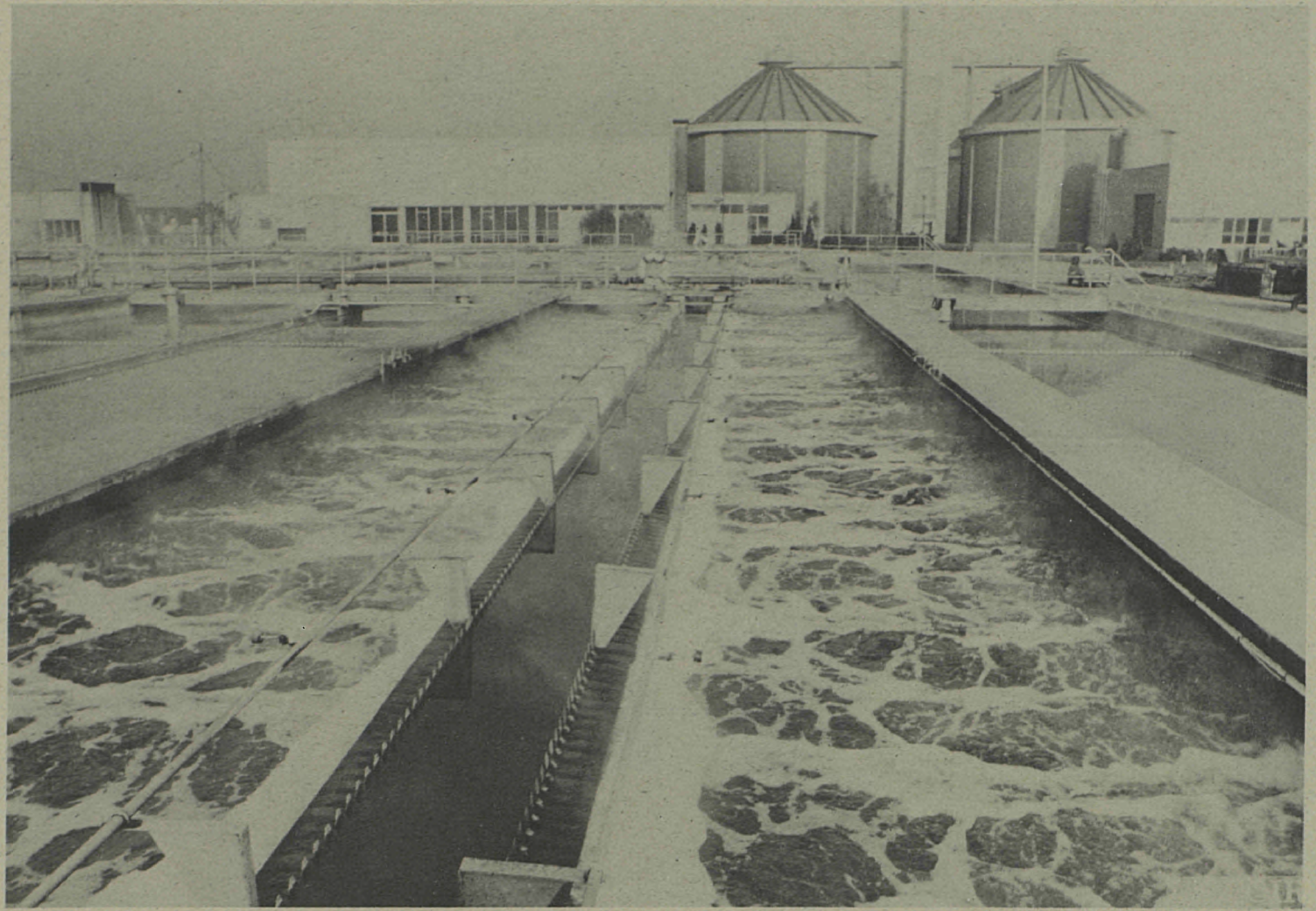
III.4. A quiet landscape, a haven from industrial pollution. Should all such areas be maintained as pure as they are now? (See Chapter III.4. 'The implications of the standstill principle')

IV.1. Instruments for monitoring air pollution. The measurement of trends in environmental quality is essential for judging the effectiveness of environmental policy. (See Chapter IV.1. 'Measuring environmental quality')

IV.2a. Tower Bridge in London. The waters running through London now have a large fish population, thanks to a successful clean-up programme. (See Chapter IV.2a). 'The cleansing of the Thames')

IV.2b. Düsseldorf. The old industrial area of the Ruhr has had a major success in its fight against air pollution. (See Chapter IV.2b. 'Reduction of dust emissions in Germany')

IV.2c. Chamois. One of the wild animals whose habitat is now protected by Italy's creation of national parks. (See Chapter IV.2c. 'National parks and other protected areas in Italy')




SERVICE DU CHÔMAGE
WERKLOOSHEIDSDIENST

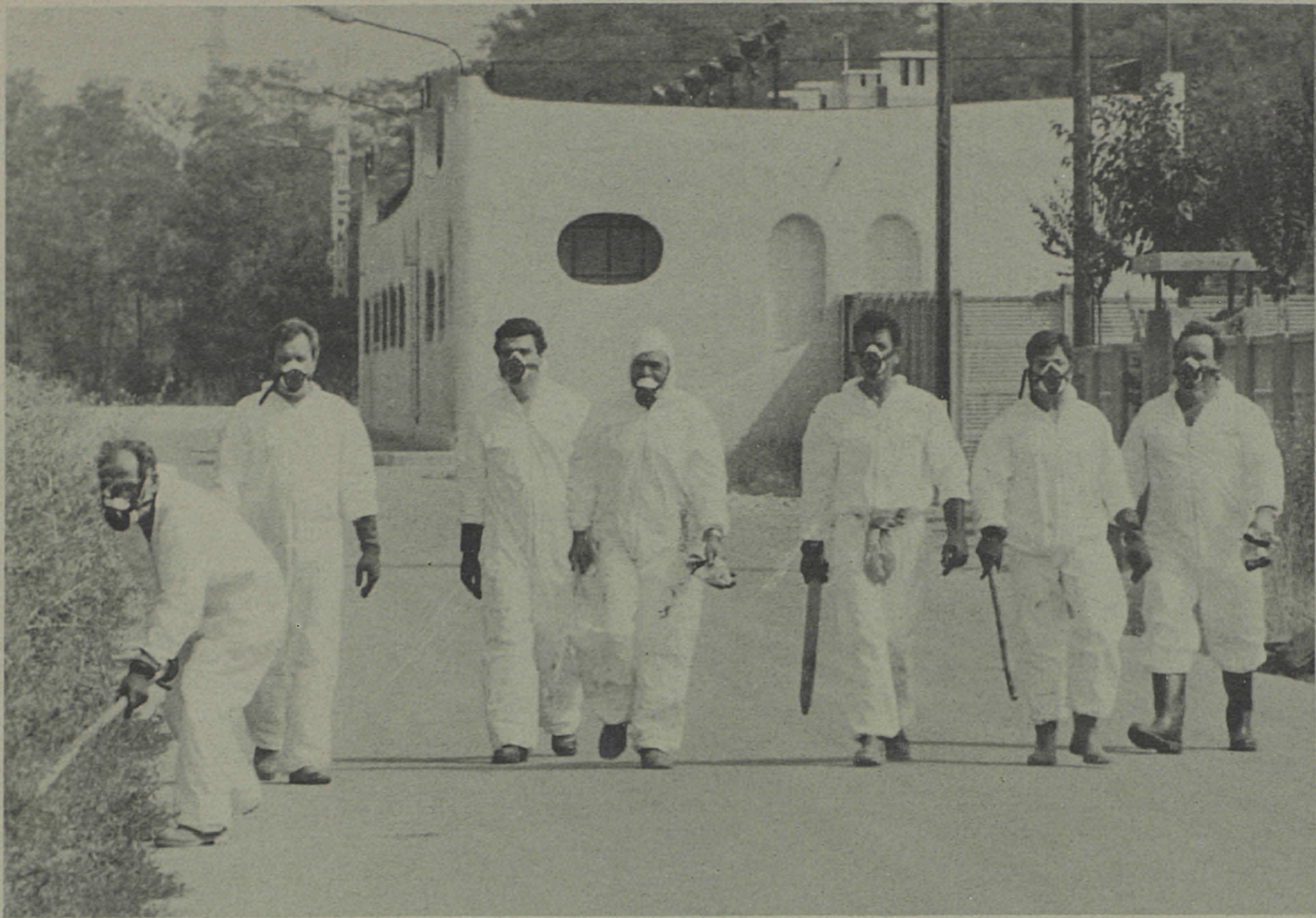
VI

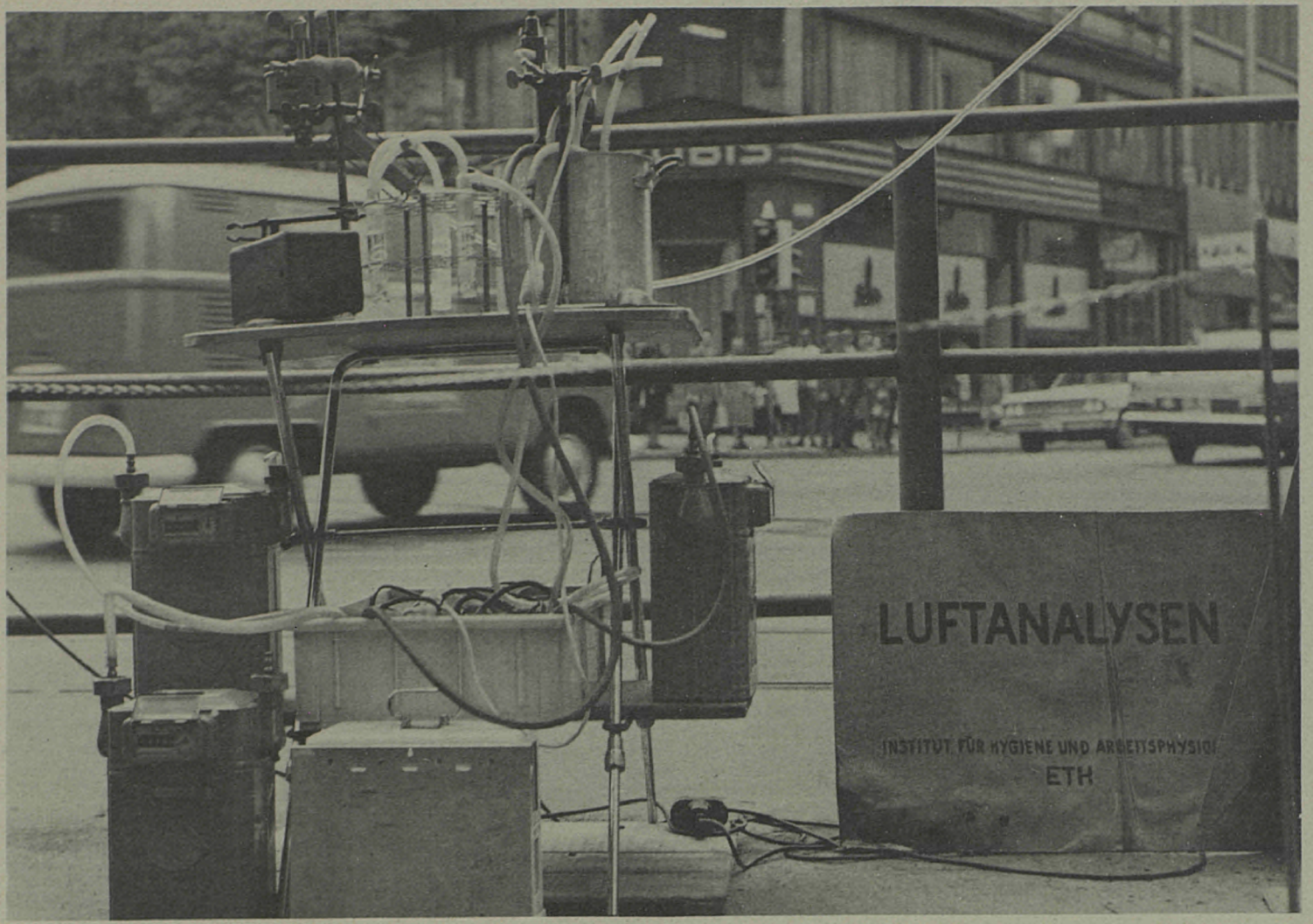
VIII


PRUNES
1 kg
1F85
ORIGINE
1 kg
1F55
POMMES
1 kg
2F25


POISON
NS1

XV

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European Communities — Commission

State of the environment: Second report

Luxembourg: Office for Official Publications of the European Communities

1979 — 127 p.: 19 graphs + XXIV: 22 ill. part. col. - 16.2 x 22,9 cm

DA, DE, EN, FR, IT, NL

ISBN 92-825-0936-2

Catalogue number: CB-24-78-152-EN-C

BFR 280	DKR 50	DM 18	FF 41
LIT 7 900	HFL 19,50	UKL 4.75	USD 9.50

This is the second report, in a regular series, on the state of the Community environment. It has been written in accordance with the commitment contained in the first Programme of Action of the European Communities on the Environment', approved by the Council of the European Communities on 22 November 1973, and in response to the wishes of the European Parliament.

In this second report no attempt has been made to give a complete overview of Community activity in the environmental field since the first report (September 1976). Instead, after an introduction which treats one or two general topics of particular interest, it tries to give a summary in layman's language of the major achievements during this period at Community level. It goes on to describe a series of problems which remain to be solved, and it concludes with a résumé of Community work on measuring the quality of the environment, and with three accounts of successful environmental policies pursued in the Community, kindly contributed by the Member States concerned.

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280	50	18	41	7900	19,50	4.75	9.50

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ISBN 92-825-0936-2

Boîte postale 1003 — Luxembourg

Catalogue number: CB-24-78-152-EN-C