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PHOTOGRAPHS

Cover: J. H. von Miserony

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EDITORIAL

Georg KAHN-ACKERMANN
Secretary General of the Council of Europe

Following European Conservation Year, organised in 1970 to promote a concerted European policy aimed at the rational, balanced management of the natural environment, the Council of Europe is now engaged in a large-scale campaign in the framework of European Architectural Heritage Year 1975, based on the theme "A Future for our Past". The declared objective is to awaken the interest and pride of Europeans in their architectural heritage and to combat the dangers which threaten it by instigating the necessary conservation measures.

The Year is the outcome of long and painstaking efforts on the part of the Council of Europe. The European Cultural Convention requires its signatory states to take appropriate measures to safeguard their contribution to Europe's common heritage. The legal framework having been thus laid down, the action of the Council of Europe has constantly expanded over the last ten years. Initiated in 1963 by the Parliamentary Assembly, developed and intensified by a series of symposia of experts and by the Brussels Ministerial Conference in 1969, which must take the credit for having proposed the proclamation of a European Architectural Heritage Year, the action of the Council of Europe was given strong impetus by the launching in Zürich in 1973 of the architectural heritage campaign, which will culminate with the Amsterdam Congress in October this year.

The studies, research, symposia and seminars have made it possible to investigate thoroughly the concept of the architectural heritage which concerns us. This concept has evolved considerably. Although it is an essential element in the memory of people alive today, the architectural heritage is more than a mere object of nostalgia. It is an important component of the eco-system. The cultural and legal conception of the heritage has widened in both space and time. From being confined to the most important monuments, the concept of the heritage has come to include whole urban units, historic districts, rural areas, and traditional villages. Today it includes very recent additions — popular architecture, even industrial structures. One often forgotten or neglected element — the green environment, especially parks — is also necessarily included. Over the years, the principles of a new conservation policy have been gradually identified and defined. They are based on a twofold concern, namely :

— to devise safeguards capable of resisting the undue pressure of economic and technical constraints on an extraordinarily rich and diverse collection of architectural treasures — constraints which often weigh even more heavily on the environment ;

— to generate awareness of the fact that a conservation policy, far from constituting a curb on social development and a barrier to progress, is in reality an essential factor in the humanisation of the surroundings in which we live.

This new policy which the Council of Europe is proposing to its member states, and for which European Architectural Heritage Year is unquestionably a test-bed, is based on the theory of integrated conservation of the architectural heritage.

Made up of elements of unequal value, which must nevertheless form a unified whole, the architectural heritage requires comprehensive protection. The policy of piecemeal preservation, which has ensured the survival of prestige monuments, has on the other hand left defenceless groups of unpretentious buildings whose value lies in the very fact that they are in groups. But the problem reaches far beyond the framework of the town. It arises wherever the work of nature and of man complement each other in symbiotic harmony, for example in unspoilt regions dotted with picturesque townships.

But if it is to be effective, conservation of the architectural heritage must become an integral part of people's lives, in the context of the social pattern. Accordingly, steps must be taken to ensure that the architectural heritage is a factor in town and regional planning. Its very future depends on its being taken into account in this way. This implies close, co-ordinated co-operation at all levels — national, regional and local — between those responsible for regional and town planning on the one hand and those responsible for the protection of the cultural heritage on the other.

The implementation of an integrated conservation policy also implies improved methods and techniques for the preservation, restoration and rehabilitation of this architectural heritage, and the availability of a sufficient number of competent professionals to do the job — which raises the crucial problem of the survival of local craftsmen.

In addition to the cultural and environmental value of the architectural heritage, of which people are now becoming more and more aware, there is also its utilitarian value. This is especially important at a time when the increasing scarcity and cost of raw materials and energy require the use of old buildings to satisfy housing needs, particularly for low-cost housing, as well as communal amenities.

This brief outline of the policy proposed by the Council of Europe affords a measure of what is at stake in European Architectural Heritage Year ; like European Conservation Year, it must mark not the end but the beginning of a new stage of European co-operation.

Having betrayed the architectural as well as the natural heritage, industrial civilisation has so exacerbated its contradictions that a turning point seems to be in the offing. Growing sections of the population, and particularly the young, are realising that contact with the past and with nature is a fundamental need of presentday man and must have its place among the social objectives of our governments.

The European Year provides an opportunity for the public to demonstrate their support for the policy of integrated conservation. In this task, the Council of Europe enjoys the active support of the twenty or so national committees engaged in the campaign, to which particular tribute is due.

The Amsterdam Congress, the crowning event of the Year which will take place in October 1975, will examine the main problems arising from the new integrated conservation approach. We hope that on that occasion the governments of the member states will proclaim in a resolution of the Committee of Ministers, their firm intention to commit themselves wholeheartedly to the architectural heritage, and draw up a charter setting out the general principles of integrated conservation.

At a later stage, recommendations will be made to the governments of the member states in order to initiate the necessary adaptation of laws and regulations to the needs of integrated conservation. Such conservation is in any event the only way of saving our architectural heritage, and thereby the true face of our civilisation.

In the improvement of man's surroundings, protection of nature and protection of the architectural heritage are two sides of the same coin. What would our towns be without their parks, gardens, squares and trees ? Their verdant setting highlights the beauty of the stone and guards against suffocation. But the problem goes even deeper. In many respects protection of the architectural heritage works through the protection of the environment. For instance, it would be an illusion to think that we can prevent stone from crumbling without solving the problem of air pollution. There is therefore close interdependence on many points, and it is on all these fronts that the Council of Europe must wage the battle for nature and for the architectural heritage.

ECOLOGY AND THE ARCHITECTURAL HERITAGE

What nature conservation and the protection of monuments have in common

Wolfdietrich ELBERT, Architect
Technical adviser for the "European Programme of Pilot Projects"
Council of Europe

"Nature Conservation for Monuments" — this was the headline carried by a newspaper article on the Launching Conference for European Architectural Heritage Year 1975, held in Zurich in July 1973. Our purpose here is to consider, on the basis of practical experience, whether this means anything and what the essential similarities and differences are between nature conservation and the protection of monuments.

European Conservation Year, proclaimed by the Council of Europe in 1970, was a success, and its effects will be felt for many years to come. Disturbed by what they saw, alarmed by reports in the mass media and confirmed in their fears by scientific findings, the public became aware that industrial society no longer presented a mere threat to the environment but was actively destroying it, and that immediate action was needed to arrest the process and reverse it. With Conservation Year, the Council of Europe was able to contribute usefully to this general awakening.

However, the realisation that the biosphere, seen as the human habitat, is indivisible, that the natural and the manmade environment are inseparably united and that both, perhaps, face danger and destruction from the same sources diverted the attention of the public to man's architectural creation. The Council of Europe has now followed up European Conservation Year 1970 with Architectural Heritage Year 1975.

The success of the opening campaign gives reason to hope that destruction of the man-made environment may soon be seen as constituting a threat to human existence equal in gravity to that posed by the destruction of nature.

This means that close co-operation between conservationists in both sectors is not simply a step towards an ideal solution, but a practical necessity, allowing each side to learn from the other.

It is not our intention to obscure the difference between the natural and man-made environment. The second is derived from the first, but it is not nature ; it is artificial and inanimate, the product of political and economic pressures, interests and decisions. Its articulation is not organic ; a city does not grow — it is built onto and into ; it neither lives, nor dies. It can be lived in, or it may be inimical to life. It is never anything more than the reflection of a social system and the historical changes which that system undergoes. Unlike a living organism, it has no ideal form — and this is what makes it so hard for townplanners to design the "right" city, and for conservationists to define the "essence" of an ancient city centre and protect it for the future against the dangers of the present.

Obviously, what the two movements have in common is their flight against the same excesses of the technological era : the cumbling of the statuary on a Gothic cathedral is directly related to pollution of the nearby river, and the chemical plant which turns out substances to help preserve the stone contaminates the river further in so doing. Curators are still clutching hopefully at this technological lifebelt, replacing sandstone putti with Epoxide castings ; nature conservation could teach them that partial solutions are useless, that the problem must be tackled at the roots. This enlargement of the scope is something which the nature conservationists have already experienced : one starts by trying to protect a declining species, then one establishes a protected habitat and finally one shifts one's sights to the overall environment. Monument protection is only on the threshold of this process.

With the concept of "integrated conservation", developed in the course of its work, the Council of Europe has laid the theoretical foundations for a broadening of perspectives ; the establishment of the Committee on Monuments and Sites, to which each country delegates a conservationist and a regional planner, has provided the practical prerequisite at international level.

The "European Programme of Pilot Projects" was launched in the realisation that successful conservation of monuments, in other words the pre-

servation, adaptation and appropriate use of historical buildings in the interest of all, is invariably the product of practical concern with specific cases. Seventeen countries have announced a total of 51 projects. The specified condition, that these projects should include every type of historic building, has been satisfied. Participants include big cities (Bologna), medium-sized towns (Chester), small towns (Rust), villages (Holycross) and landscapes (Zealand).

We shall use this last case to give a clearer idea of the way in which nature conservation and the protection of monuments can complement each other in the general context of regional planning.

Denmark has announced three projects for the programme – Christiansfeld, Elsinore and the "protected landscapes of central Zealand", that is to say, the region West of Roskilde between Lejre and Selsø. The last falls within the greater Copenhagen region, which embraces the provinces of Copenhagen, Frederiksvaerk and Roskilde. The area includes 10 % of Denmark's territory, but 1.7 million people, or ⅓ of the country's population, are concentrated in it.

In cultural terms, the "protected landscapes of Middle Zealand" are typically Danish. One must stretch the concept of "nature" considerably before it can be applied to them. Nature in the original sense of something untouched and virginal has almost ceased to exist in Denmark.

The ploughman, the sower and the builder have been everywhere, and this is particularly true of the area between Lejre and Selsø, one of the first in Denmark to show signs of human activity. Legend has it that Lejre was the seat of the first Kings of Denmark, and it is certainly true that the neighbouring town of Roskilde remained the most important in the kingdom from the time of the first historical King, around the year 1000, almost up to the Reformation. The Lejre-Selsø area is therefore rich in archaeological remains and in buildings dating from later periods, such as the village of Lejre, a typical example of Danish village architecture, and the castles of the rural nobility, many of them still occupied – all this in a landscape which is still, at least in comparison with most other European countries, typified by flourishing agriculture and forestry.

A high level of urbanisation in the Copenhagen - Roskilde - Køge triangle has been recommended. The pilot project has the important task of providing a recreation zone to serve the growing population of this conurbation.

From the standpoint of nature and monument conservation, it is important that this area's character should be preserved ; from the standpoint of regional planning, it is equally important that it should be made to serve the needs of the greater Copenhagen region.

The important thing is to coordinate these seemingly incompatible interests on the basis of legislation which has proved adequate in formal terms but has been largely implemented by the provincial and municipal authorities. In the country the central authorities have, however, reserved important supervisory functions to themselves.

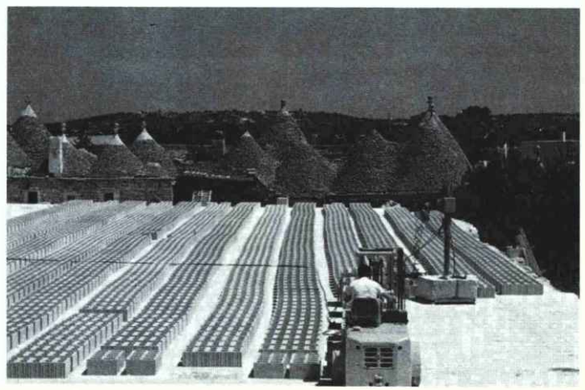
All planning in Denmark is based on the so-called Urban and Rural Zone Act, which restricts urban development in the true sense to the urban zones (approx. 5 % of the country), the only building authorised in rural zones (approx. 95 %) being that which is linked with agriculture, forestry or fisheries. Many historically important village groups are located in rural zones. Exceptions to these building regulations for the so-called rural zone belt are rarely tolerated, and then only to round off these village groups.

Needless to say, the existing boundaries between urban and rural zones are not sacrosanct. The Urban and Rural Zone Act, intentionally broad in its terms, is supplemented partly by general regional planning acts, such as that for the Copenhagen region, partly by planning acts designed for particular sectors.

In this connection, the laws on conservation of the natural and man-made environment are largely decisive for the Lejre-Selsø area, itself a part of the Copenhagen region.

The national and regional nature and monument conservation athorities take a share in this work, which starts with an exact scientific survey and analysis of all the features of the landscape. This first step, which is intended to culminate in the preparation of an inventory, is vital to the success of planning in the long term. The next step is assessment of the various features from the angle of nature and monument conservation and of recreational use.

In May 1971, the entire country was surveyed in terms of history, archaeology, monument protection and recreation, the aim being to divide it into zones, graded according to value. Three zones were scheduled, zone I containing the most precious areas. The main target here is to preserve the status quo : no new building projects, no extension of the infrastructure and authorisation only of such new activities as can be integrated within the existing framework. The north-eastern region of Zealand was divided into 10 zones, which embrace 25 % of the area and of which 70 % were already scheduled as protected landscape. One consideration in mapping out these zones was their



accessibility from the towns. Four alternative plans were prepared for the region and publicly discussed ; a final regional plan is the basis for individual projects. The overall aim of the pilot project is to show the interaction of the different planning instruments. In this context three specific projects will be carried out :

1. Restoration of the manor house at Selsø on the Roskildefjord, which dates from 1576, has stood empty for the last 150 years and is now to be restored as a museum of 18th century life-styles ; this is being financed from private sources.
2. Conversion of the Ledreborg estate — 1800 ha. of woodland, ploughland, lake and park, with an inhabited baroque castle – into a nature park, with the aim of both opening it to the public and protecting the landscape ; the compensation of 11 million Crowns is being paid by the state (75 %) and district (25 %) authorities. This does not imply expropriation, the Ducal family still living in the castle.
3. Presentation of the work done by the Historic Archaeological Research Centre at Lejre on the reconstruction of archaeological remains, and historic building and working methods of craftsmen and farmers.

We have described this pilot project, which is only one of 51, in such detail because it exemplifies the role which nature and monument conservation can play in the overall context of regional planning. Neither is an end in itself : together, they directly benefit both those who live in the region and those who visit it. Investment in the project can be justified in terms of hard economics, without there being any need to seek refuge in the misty realms of cultural aspiration.

The scientific preliminary examination of the existing situation, followed by prensentation of the results on large-scale maps and analysis of the impact of planning measures on the region, is consistent with the principles of "integrated conservation" proclaimed in Resolution 2 of the Zurich Conference.

Here natural and man-made environment, town and country, are clearly distinguished, while the existence of each is guaranteed. Town planning equals nature conservation. On the other hand, the landscape is not seen as devoid of human life – it is used by all, and not just by the privileged few. Projects like this provide a hope of checking the flight from the cities and of preventing the further overflow of the suburbs with concomitant destruction of the lanscape – but without imprisoning city dwellers amid concrete and "planned greenery".

What nature conservation, preservation of monuments and planning have in common here is a cautious approach to the solving of shared problems. A landscape such as that of Lejre and Selsø has been in the making for centuries : it must not be destroyed by drastic measures.

The benefit which the people of Copenhagen derive from preservation of the surrounding landscape is hard to quantify. Superficial cost-benefit analysis is of no use here. Where nature conservation is concerned, this has already been accepted but the man-made environment is still subject to economic pressures which it cannot always resist. An ancient tree is no more "profitable" than an old house. What conservationists in both sectors can do, however, is to overcome this short-sighted concentration on the present and substitute thinking which is geared to the future. This is the only way in which substance can be lent to the aspirations of Architectural Heritage Year.

CONSERVATION WITH A SOCIAL CONSCIENCE

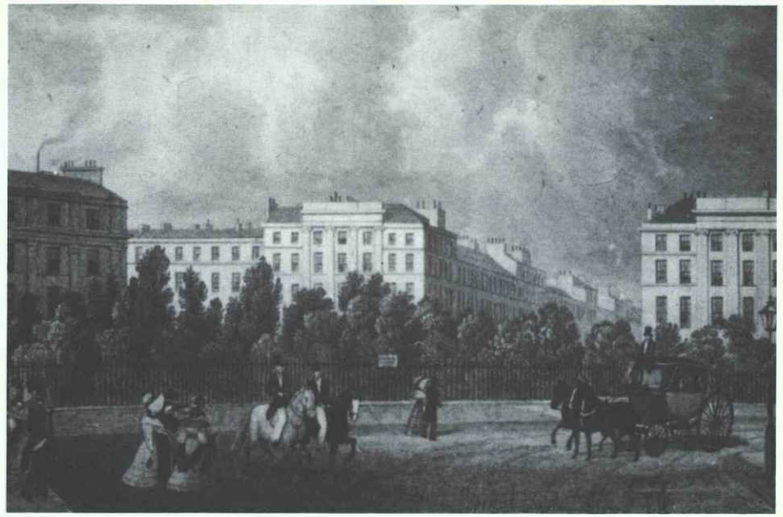
Tony ALDOUS,
Environmental and Architectural Journalist
12 Eliot Hill, London. SE13 7EB

The two-year run-up to European Architectural Heritage Year, 1975, has underlined as well as accelerated two changes that were already occurring in public and official attitudes towards conservation of old towns and buildings. The word "conservation" used in this context itself suggests the first of these changes. The old word was "preservation". You picked out perhaps half-a-dozen, perhaps 20 or 30 individual buildings in a town that were outstanding either for their architectural quality or their historic interest, protected them, and gave or lent money to restore them. But there were several flaws in that approach. First, a building's architectural quality might not depend so much on its intrinsic merits as its setting, its harmony with neighbours. Secondly, some of the most beautiful bits of the man-made environment are beautiful, not as collections of individual, historic buildings, but as groups. For example, only one building on the south side of a market square may be legally protected, but the loss of anyone of them and its replacement by something out of character or scale would ruin the overall picture. The total townscape, in other words, is more than the sum of its architectural parts. The third snag is, quite simply, that the views, landmarks, buildings and spaces which local people know, love and cherish may not seem to the expert to be architecturally so very special. The first known use of a certain building technique north of the Alps may send the architectural historian into raptures. It will leave the layman cold. What interests him is the way a building looks in the morning light, and the way a street or vista hangs together visually. It was for such reasons as these that delegates from 31 countries at the Heritage Year's launching conference in Zurich in July 1973 emphasised the value of the ensemble, Europe's towns, their older quarters, villages, even rural groups of farms, which constituted "an essential contribution to human civilisation". But, warned one conference resolution, "they are in danger of being irremediably destroyed through... uncontrolled acceleration of economic and technical mechanisms". In other words, large-scale unsympathetic development.

The Zurich conference also reflected a second change of attitude. Restoration and rehabilitation of old quarters "should not lead to the eviction of their inhabitants", delegates resolved, but on the contrary conservation policies should seek to encourage "a population diversified both socially and occupationally". The resolution thus reflected a growing disquiet and even disillusion with the conservation project that in visual terms looked splendid, but which had been achieved only at the expense of

squeezing the life out of the existing community. We must not, a British MP, John Roper, told a Council of Europe debate at the beginning of 1975, turn our historic quarters into rich men's ghettoes. "We must be aware of conservation's social and economic factors... We want housing at rents which make it possible for the original inhabitants to live there". These two changes of attitude – the move away from a narrowly "monuments and sites" approach, and the realisation that conservation must these days have a social conscience – in many cases go together. In that same debate at Strasbourg in January, a Norwegian MP, Jabok Aano, cited a convincing case from his own country. Planners at Bergen had long intended to demolish an extensive area of modest, whitewashed wooden houses. Redevelopment, it had always been assumed, would please the population by giving them modern homes, and it would also increase the number of homes there. But a closer look showed they would lose homes, not gain them. More important, a social survey in the area made it plain that the inhabitants were far from welcoming the destruction of their close and friendly community. To their credit, the town authorities then abandoned comprehensive redevelopment and turned instead to improvement of the existing houses and their surroundings.

Another case where the interests of conservation and social concern go together is the 18th century "New Town" of Edinburgh, one of the 50



Royal Circus, Edinburgh, in 1830 by T.H. Shepherd.

official Heritage Year pilot projects. Though nearly 9,000 of its 11,000 properties are now protected by law, the New Town's greatest quality is its extensiveness and completeness which has led one eminent authority, Professor Russel Hitchcock, to describe it as "the most extensive example of Romantic classical city in the world", and Count Sforza, the Council of Europe's deputy-secretary-general, to speak of it in the same breath as Venice. But look where that completeness is under threat ! Not in the grand terraces of Queen Street or George Street, where lucrative commercial uses ensure that, for the most part, the conservation the law requires will be carried out ; nor in Moray Place and Charlotte Square, the homes of wealthy advocates. No, it is the humbler terraces towards the northern and eastern fringes of the 18th century town that are under threat, because neither rents nor the incomes of owner-occupiers can readily support the expensive restoration work required. Edinburgh New Town Conservation Committee, which includes representatives of the city, the government and amenity groups, has pioneered a device to steer grant aid where it is most needed. Grants are given as a percentage of the cost of approved restoration works, and this percentage varies in inverse proportion to the value of the property as officially listed for local taxation purposes. Work in wealthy George Street might therefore rank for a 5 per cent grant ; at St. Stephen Street, which is neither fashionable nor wealthy, repairs to much humbler rows of shops and tenements qualify for 90 per cent aid. Even so, problems remain. One attractive row here is suffering from flaking stone facades. Full restoration would cost £ 200,000. Not all owners are willing or able to pay their share of even the residual £ 20,000 ; and the remaining 90 per cent would eat up the entire government allocation of money to the committee for one financial year. Yet St.Stephen Street is not only a crucial test of the policy of trying to preserve the New Town as an entity ; it is also a living social organism, with a mixed

population of working people, small shopkeepers and craftsmen. If conservation succeeds there, it will begin to convince many Scots who at present believe the contrary, that conservation is for ordinary people and not just to provide elegant offices for banks and insurance companies and expensive homes for the rich and trendy.

In one London district, Islington, the reverse happened. As its 19th century terraces became fashionable, unscrupulous property firms used offers of cash as well as threats and harrassment to persuade protected tenants to move out so that houses could be improved and sold at large profits. Sometimes a house that had been home to three or four families was seen, after improvement, to house one rich bachelor who owned it as much as an investment as a home. The word "gentrification" was coined to describe a process of driving out an indigenous working population for the benefit of incoming professionals and businessmen ; and for a time all conservation schemes in Islington evoked distrust for this reason, even if carried out by non-profit housing associations. In fact, of course, some leavening of an excessively proletarian population with a proportion of professionals can be a healthy trend. But if the process of rescuing attractive old buildings and converting them to new uses is to be a popular cause, with support from local councils of all political hues, it must not be labelled with an automatic "luxury" tag. It must be seen also to be providing good interior conversions at reasonable rents for ordinary working people.

Bologna, like Edinbourgh the venue of a Heritage Year seminar, is seeking just that kind of result with its restoration and conversion into municipal housing of historic buildings in the city centre. The city's Communist administration aims at a nil population growth as part of the policy framework in which such projects are undertaken. In the historic Danish seaport of Helsingör, the city administration is aiming at not dissimilar results in a very different legal and political framework. It consciously took the decision that any new shopping provision should not be in the old town, where inevitably it must cause fatal damage to a townscape of low, timber-and-brick terraces, but outside. It then had the task of explaining to the townspeople that the powers of the so-called Slum Clearance Act could, and in its opinion should, be used for rehabilitation rather than demolition and renewal. An extensive public participation exercise showed that, in fact, the townsfolk liked the old town better than newer developments outside and, once the blighting effect of uncertainty was removed, were prepared to put their own money and labour into bringing the interior living conditions of 17th and 18th century cottages up to present day requirements and expectations. The council's housing action team sees itself almost more as an advice centre and a persuasive catalyst to self-help than as a coercive agency proceeding by compulsory purchase and other legal "big sticks". Helsingör's planners believe persuasion and example are in most cases more effective than coercion, and more likely to broaden popular support for conservation.

Much, of course, depends on the particular traditions and social and economic conditions of a region. What is meat for Helsingör may be poison for Bologna and vice-versa. What is plain, however, is that conservation needs a broad popular base of support if it is to survive beyond a brief period of being fashionable. Ordinary people need grand palaces, castles and monuments to inspire them, to life them out of their workaday rut. But they also – if the governments they elect are to vote funds in times of austerity for more realistic conservation programmes – need to be assured that it has direct relevance to their own lives. Conservation must be proved to be as much an essential as main drainage and electricity supply. And conservationists must also work to drive home the message that, in a time of economic recession and shortages of energy and raw materials, sensible rehabilitation of attractive old buildings and their conversion to new uses may be, not a luxury, not romantic caprice, but in every sense of the word an economy.

URBAN PLANT LIFE

ARCHITECTURAL HERITAGE AND NATURE CONSERVATION

Paul DUVIGNEAUD
Professor at the Free University of Brussels

PLANT LIFE AND THE ARCHITECTURAL HERITAGE

Architectural Heritage Year is an appropriate occasion on which to ask certain questions and seek the answers. What is the architectural heritage ? What is an historic monument ? It may be a whole neighbourhood or even a whole town, or again it may be a man-made landscape, with or without an ancient castle.

The basic materials of architecture are generally taken to mean stone or bricks. Why should we not also include trees, or indeed any other plant ? Is a plant not comparable to a living brick ? Does not an arrangement of plants in a park or garden created by an architect or "great gardener", count as an architectural monument ? Certain historic gardens serving as a setting for famous buildings, be they Chinese, Baroque, Classical, Rococo, picturesque or scientific in style, are undoubtledly part of the architectural heritage.

Ever since the earthly paradise, the sacred forests of antiquity and the Hanging Gardens of Babylon, the history of gardens, an adjunct of the history of civilisation, bears witness to the consistent idea of harmonisation and even integration of plant with stone or brick.

In many a case man strove for a combined architecture of stone and plant. This should not be forgotten, despite the mania for wholesale destruction of the "plant" factor that has taken hold of certain misguided authorities today.

OPEN SPACES IN THE MODERN TOWN

Any green pockets left in the town in the course of its growth and development – historic or private gardens, parks, avenues, city or suburban woods – make up what are now termed "open spaces". According to OUDIN (1972) the process has been a **taming** of nature inside the town and not an integration of nature and town, and was recently described by CHALANDON as urban development amid the trees. It is essential to avoid confusion with the "garden city", which is simply a specific kind of open space.

OUDIN is largely right, but forgets that woods and other plant formation in the town have sometimes survived without any great change, to form a kind of urban nature reserve (see "Parc Naturel au Centre de Tokyo", Numata, 1973).

The XXth century has tended to squander this heritage by transforming such open spaces beyond all recognition, or, more frequently, destroying them out of hand.

Open spaces serve various purposes :
– prestige (remains of historic parks) ;
– social and educational ;
– ecological.

They may be classified as parks and garden squares, city woodlands, rows of trees, avenues, isolated or small groups of trees or shrubs, remnants of farmland (Paris vineyards), wasteland, river banks, etc.

Integration of brick and plant

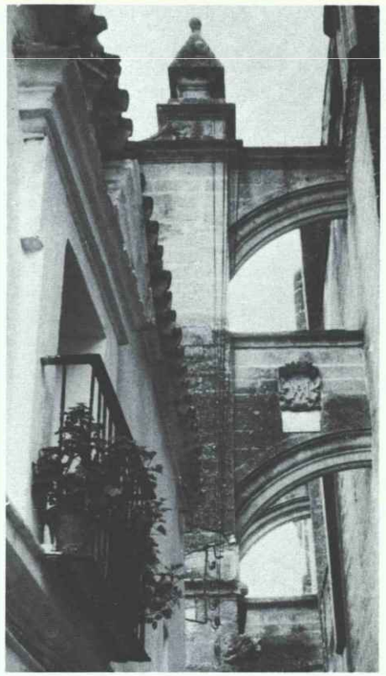
Mankind has always been attracted to rocky landscapes with woods or trees.

The history of gardening shows us certain types in which plant and mineral are mingled, a fact which bears witness to certain aspirations, and also to a certain necessity.

Monuments or architectural ensembles, such as cathedrals, which are hemmed in by skyscrapers (New York) or dwarfed by tower blocks (Sainte-Gudule in Brussels) often attract no more than a passing glance. In Paris the cathedral's attraction is enhanced by the space and trees around it.

To take another illustration, rows of trees may direct the eye towards an architectural object in a chosen perspective.

Trees play a major part as necessary contrast in an architectural system dominated by horizontal lines ; lawns, with their horizontal or undulating lines, make for a more restful picture.



Shapes and colours

Each species of tree has its own specific architecture, but man may alter the natural shape of trees and shrubs (box, yew etc.), by cutting, which has culminated in the art of topiary.

Colours have a relatively well-defined meaning : yellow, red and orange are active, stimulating colours ; violet and blue are passive or restful colours ; green, the colour of the shade, midway between the yellow of the sun and the deep blue of night, is an intermediate colour making for peace of mind.

Thus along busy roads, where alertness is essential, flowerbeds of yellow, red or orange are planted, while in places where people go in search of peace and quiet, blues and purples are planted, or at least pastel shades (cherry trees in Japan).

The leaves of trees offer an infinite range of shades which, for a given species, alter with the seasons (maples which turn from red to green or purple, and then again to red at the end of the season). Autumn trees range from gold to brown, via various shades of orange and red.

Even predominantly green plants offer a veritable symphony of greens, ranging from the light, pale green of the birch or lime in spring to the bright, luminous green of the plane tree in summer, and the sombre, dense, severe green of the chestnut.

There is thus scope for an infinite range of compositions, which can be played off harmoniously against the inert fabric of buildings.

Historic monuments in a setting of plants
Planted spaces

Planted or partly planted spaces forming an integral part of historic monuments or providing space around them include :

- market squares, usually located in the town centre and adjacent to the townhall (fish markets, vegetable markets, etc.). An effort is now being made to preserve these squares and, when destroyed by war or fire, to rebuild them more or less in their former state. Such squares are frequently tree-lined, which considerably enhances the aesthetic value and social atmosphere (meetings, conversations on park benches) ;
- cathedral or church squares are usually far smaller because churches were designed for integration with the neighbouring houses, which were intended to be dominated by the church and not to dwarf it, as occurs today in a setting of insolently overpowering tall buildings or tower blocks ;
- public squares were constructed over the ages to enhance the prestige of the ruler and to open up a space around his palace, at the same time off setting the severe lines of the building ;
- other squares, with trees, flowerbeds, fountains, etc., were constructed over the ages to provide a foreground for certain buildings used for artistic purposes (theatres, schools, museums, and more recently stations, post offices, broadcasting stations, etc.).

Rows of trees

Rows of trees were formerly planted along the avenues linking the towns with the parks or gardens of various kinds situated inside the town walls. The street that has now become Unter den Linden, in the centre of Berlin, used, in 1650, to serve as a bridle path shaded by lime trees between the palace and the zoological gardens.
The narrow city streets of the Middle Ages were widened and bordered with trees from the Renaissance onwards.
A certain harmony was thus achieved in the relationship between the green communications network and the urban fabric.

The garden city

This form of residential environment, made up of detached houses in a garden setting, advocated by Ebenezer Howard in the early twentieth century, generally provides the closest form of association between plant and brick. It has given rise to serious criticism on the part of many town planners, including Le Corbusier and Oudin, who consider it a waste of space.
Yet, the results are sometimes outstanding when the developers set to work in an ecological spirit (as le Logis and Floreal at Watermael-Boitsfort, Brussels).
The pattern created by the rows and clusters of trees and shrubs, hedges, ivy garlands and lawns is as carefully planned as the pattern of building materials in the low-cost housing with which the greenery is intermingled.
Such developments may rank as architectural monuments of our age, and are indeed visited by numerous walkers every weekend.

The green belt surrounding major cities

The urban fabric, as it spread outwards from the centre, has been held in check by more or less planned peripheral open spaces, as in the case of forests outside medieval town walls, the formerly rural but now urban (Bois de la Cambre, Brussels) or suburban (forêt de Soignes, Brussels) woodlands that survive today.
This green belt, which many town planners, following the example of Ebenezer Howard, have advocated setting up wherever it does not already exist, ought to be jealously guarded, preserving the original structures with certain improvements.

CONCLUSIONS

In this European Architectural Heritage Year, it is essential not to overlook the irreplaceable architectural heritage of historic parks and gardens, and city squares adjacent to town halls, theatres, stations, post offices, etc. An inventory and description of these assets seems both vital and urgent.
Attention should also be paid to the plants that, by their shape or colour, contribute to the beauty, balance and life of authentic historic monuments and sites. It is not only man's happiness, his mental and moral balance, today that is at stake, but perhaps a necessary factor for the world tomorrow.
There is today a lack of co-operation between town planners, geographers, sociologists, ecologists and art historians, resulting in a vague, incomplete definition of what we call the architectural heritage.
The new science that ought to be built up for the achievement of all our architectural heritage objectives in the broad sense, and more particularly the harmonious, regionalised interpenetration of human constructions of stone and plants with rural and natural landscapes, might be called "ekistics". Constantin Doxiadis has invented this term for the study of human settlements, on the assumption that their structural or physiological development is similar to that of living organisms. We must go even further, and integrate scientifically, and not merely haphazardly, the development of the urban fabric with zones of natural or cultivated plant life.

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NEW LIFE IN OLD SURROUNDINGS

P. L. de VRIEZE
Architect
Groningen

During reconstruction after the second world war, interest in old towns was focused mainly on technical and economic considerations, while social questions were largely neglected.
The continuous growth in prosperity produced a huge surge in the number of cars, which in turn greatly increased people's mobility. The townsman's ideal of owning his own house and garden in the country served only to strengthen aversion to the towns. Those with high incomes were the first to leave the inner cities ; others followed later, sometimes voluntarily, often under compulsion.

Inner cities fell into the hands of profiteers. Developers, powerful economic interests, banks, department stores, shops, newspapers, cinemas, universities all rushed to acquire the best possible sites in town centres. The delicate balance of inner cities began to be upset by units that were too big for them.

The larger shops with their sales areas continually growing upwards attracted more and more traffic, although the old pattern of the streets was largely preserved.

The next phase saw attempts to adapt the old urban structure to traffic by filling in watercourses and moats, opening up new roads, widening existing ones and building car-parks. Towns began to be ruined by the noise and smell of traffic, and by dust and dirt ; the decline of old towns into slum districts had begun. Houses were no longer kept up, because in the absence of any clear planning policy for inner cities owners and occupiers no longer dared to make the investment. Until then, renovation of old town districts had meant evacuating the residents. The upper classes had already left the old town and installed themselves in their "single-family units" in the country. They are the bad citizens, the deserters from the inner cities. The occupants of the poor but very cheap inner-city dwellings were then driven out by renovation work. Inner cities in western Europe thus became the playthings of politicians, economic groups and developers, and lost more and more of their identity.
For it should never be forgotten that the new estates on the outskirts of towns owe their features and identity to the centre, the old town with its individual character, style and atmosphere. It is in the new urban areas that we can see the inability of our times "to capture in visual terms anything of the essence of true urban living... the lack of impressiveness in areas of modern buildings has the interesting consequence that in most cases towns are still identified with their historic centres and not with the extensive overspill areas of more recent times, even if these are many times as large as the old town centre" [1].

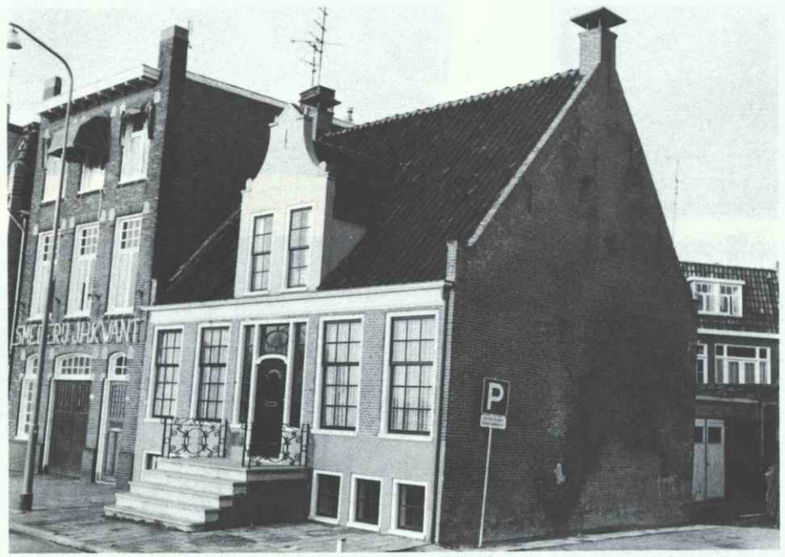
Protests against the loss of identity
Fortunately protests against these developments were raised everywhere in the 50s and 60s. In Amsterdam it was the young tearaways, the Provos, who attacked the sacred cows of the affluent society.
The older generation has learnt much from their protests and their methods. Matters have now gone so far – at least in Holland – that politicians, government and large sectors of the public have rediscovered the towns and particularly the old town centres. The emphasis in Holland is now being placed on **urban renewal.** Any town still without an inner-area plan can now take advantage of new insights and experience and a change of attitude on the part of both authorities and public.
If man needs a different kind of town, the town also needs a different kind of man and a different society.
The intiative in urban renewal or demolition must not be left to building firms and urban development corporations. Municipal authorities and the municipal council are responsible for shaping our environment.
The question is, should one **demolish and rebuild or alternatively restore, renovate and rehabilitate old town centres ?**
In other words, what is to be done to ensure that towns are better able to meet the demands which residents and users make on it ?

The building process as a tool [2]
Building is naturally an important instrument of urban renewal. But the tool must be very well fashioned for the purpose, a purpose that concerns our society and the relation between man and his constructed environment. We must regain the use of our eyes, which have become blind to our surroundings. In this way urban renewal relates to activities which are directed towards changing social relations.
If excess building capacity is allowed to continue unchecked in the form of large construction companies, whose particular organisation can produce only vast numbers of identical houses, the architectural heritage will inevitably be destroyed. Urban renewal must not be determined by building capacity ; rather, urban renewal should itself determine the production capacity that its own activities will call for.
Urban renewal is the goal, and building is a tool. The closely woven texture of old town centres must be taken into account and the delicate proportions respected. For this purpose one cannot employ the customary convenient techniques of mass construction ; generative techniques must be developed.
We are not dealing with an isolated historic district from which the residents must be driven out, nor with an old town centre as a whole, but in each case with an entire town as an integrated ensemble containing old and new districts.
This is why individually renovated parts of old towns such as the Stokstraat in Maastricht and the Bergkwartier in Deventer are bad examples-because they were rehabilitated as isolated districts. Better examples are provided by the Transvaalwijk in Leeuwarden and Oosterpoortwijk in Groningen, both of them residential districts dating from the end of the 19th century.

Renovated 17th Century dwelling at Groningen.

Before renovation.

After renovation.

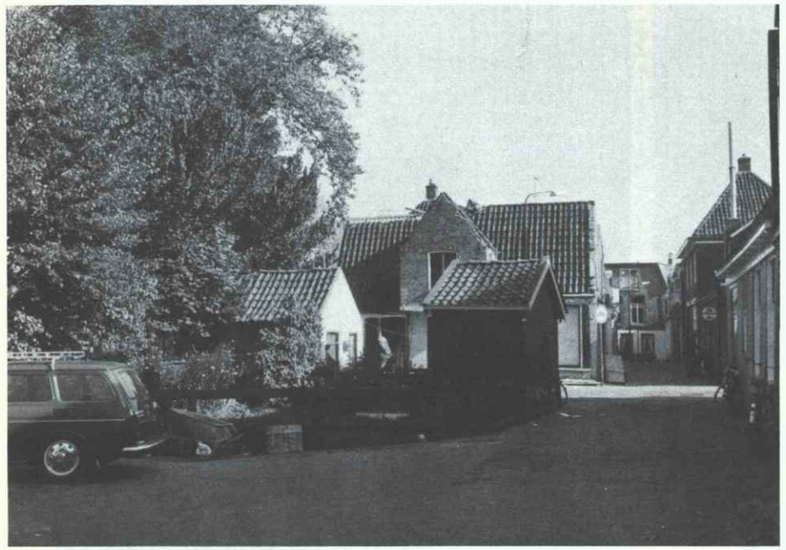


Urban renewal is a very complex problem. It primarily affects a varying number of residents with low or very low incomes, who are extremely dependent on the social context of the area concerned. Besides renovating housing and the environment it includes improving social, cultural and medical conditions. It is a continuous process which can only be carried on by teamwork involving sociologists, economists, traffic experts, building contractors, conservationists, planners, architects and landscape architects.

Public relations work is absolutely essential ; misjudgements are often due to ignorance of consequences and a lack of factual information [3]. If the public are a party to what is going on, they will recognise the difficulties involved and will wish to take part in solving them.
Work on urban renewal has been going on in this way in Groningen for 5 years now, with attention being paid to the inner city rather than to extending the town. The green belt was cleared of abandoned cars (roughly 400 of them). A team of experts from other towns was brought in, and in 2 years a masterplan for the inner city was drawn up. Such a plan was something quite new both for the Netherlands and many other countries ; it is now regarded as a miniature textbook for inner-city planning.
An "inner-city project" group is now working on a new type of structural plan, which should be ready by the end of 1975. The centre of the town and the 19th-century area which rings it have been divided into 18 districts. In each district a citizens' committee under the leadership of a so-called "andragog" appointed by the municipal council has been set up to democratise administration methods and to encourage participation by the public. Each committee has drawn up a report containing studies, surveys, recommendations and alternative ideas. The municipal council has drawn up a list of priorities and formulated particular objectives for each district. In the most deprived areas, working parties of experts and a few local people have been set up to produce and carry out the renovation plans in conjunction with residents and users of the area. First results are already appearing : new children's playgrounds on waste land, new parks and gardens, parking restrictions and new car-parks on the

(continued on page 16)

EUROPEAN ARCHITECTURAL HERITAGE YEAR 1975



A renovated shop with living quarters in the touristic village of Grouw in the Province of Friezland. The renovation was undertaken on the initiative of the local association for the conservation of monuments and sites.

Before renovation.

After renovation.

outskirts of districts. During 1975 it is planned to build, with financial help from the government, 140 new low-cost dwellings on "improved" sites in the centres of two districts. The old-established residents are slowly regaining confidence and are cautiously beginning to invest in their houses again. Former residents who were expelled and those who live in the poorest conditions in the district enjoy priority in renting the new houses.

Stadsherstel Groningen BV

In 1972 a company was set up specialising in urban improvement, particularly restoration and renovation of old town houses. The company is a private one with shareholders and was founded by a judge, an architect, a solicitor and a bank manager. The managing director is an architect, who is responsible to the board of directors and the municipal authorities.

When founded, the company had a capital of 250,000 guilders brought in by the shareholders, who included the municipality of Groningen (100,000 guilders), banks, shops, building societies and private individuals. If the company needs more capital, new shares can be issued. Until now the company's capital has consisted exclusively of registered shares. If the company's activities were expanded, it would be possible to issue transferable securities which could be freely bought and sold on the stock market, as already happens in Amsterdam. No dividend is being paid initially, but once the first few difficult years are over it will be possible to guarantee a dividend of 5 % per annum. In this respect, the following observation made by the company is of importance : "However tempting it may be to acquire as many buildings as possible in order to preserve them for posterity, the decisive criterion must be restoration. For only then can the company let premises and distribute profits. And it is only if profits are distributed that financiers can be found to provide capital" [4].

Profits exceeding 5 % will be saved and used to acquire buildings, since the declared aim of the company is to acquire more and more buildings in Groningen's old town. An increase in the dividends, on the other hand, is precluded by the terms of the company's articles, since the company operates largely on state funds : about 55 % of the available funds come from the central, municipal and provincial government. The remaining 45 % has to be raised by the "Restoration Company" itself.

The state allocations referred to are made not only for the exterior of buildings but also for interior improvements. Once the improvements have been carried out, the buildings are sold, subject to the approval of the appropriate minister. Some houses can be rented by anyone. The proceeds from sales and rent are used to cover all costs.

To date, the company has bought 6 historic buildings in Groningen. The aim is to acquire and restore between 5 and 10 buildings annually. The government hopes that the methods used by the "Restoration Company" will serve as a model for other Dutch towns, and that if possible they may one day be copied in other countries in western Europe.

Each town is to have its own company, thereby allowing the government to compare the achievements of individual companies with each other, in accordance with the "profit centre" principle. There are currently about 25 such companies in the Netherlands. Initially the plan met with a great many teething troubles. Since then, however, the attitude of both the public and the government has changed, the achievements in Amsterdam having provided a striking demonstration of the good purpose served by the company. Such achievements were of course only possible with energetic support from the government, which can make it legally compulsory for owners to improve their property. Property owners are given the choice of either making over their property to the "Restoration Company" or immediately undertaking restoration themselves. The aim of preserving the town's original character unaltered while at the same time improving buildings inside is thus always achieved one way or the other. Previously in such cases a demolition order would have been made without hesitation ; this method can now be said to have been superseded in such towns as Amsterdam, Groningen, 'sHertogenbosch and Deventer. With the restoration work being carried out in the best interests of the residents, and the shareholders receiving a modest dividend on their investment, the conditions necessary for such restoration companies to thrive are being met.

They are guided by the principles of supply, demand and profit, and thus fully exploit the opportunities which exist in our capitalist system. They are acting wisely from the business point of view, but at the same time within limits that are clearly determined by aesthetic criteria [4].

A renovated shop with living quarters in a prominent position in the town of Groningen (above: viewed from in front; below: viewed from behind). The renovation was undertaken on the initiative of a private company Stadsherstel Groningen B.V.

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EDUCATION AND ENVIRONMENT PROTECTION

Italo C. ANGLE, Ministry of Education
General Directorate of Adult Education
Piazza Marconi 25, Rome.

The history of man's relationship with his environment is one of alternating approaches. At first he learned to conquer the surrounding nature, which was indifferent if not hostile, and his feelings towards it were a mixture of fear, veneration and respect. Gradually he created his own environment alongside the natural one, an environment consisting of cultivated fields, villages, towns, cities and monuments. He came to love and respect that environment as his creature and an expression of his inner self. Thus there arose a balanced relationship between man, the environment he had created and the natural one which still survived.

Towards the middle of the 18th century, however, a radical change occured in the man-environment relationship. On the one hand, as a result of the industrial revolution and the ensuing urban growth, the environment became more than ever before an instrument for production, an object to be manipulated at will in order to extract the greatest possible profit ; on the other hand, thanks to the influence of Rousseau and the romantics, nature once more began to inspire feelings of love and respect, whilst under the effect of romanticism and a new approach to the history of art, attempts were made to conserve traces of the past, particularly monuments, even in isolation.

But this new attitude of respect and love towards the historical and natural environment affected only an elite : the school, as a mass phenomenon and a means for spreading education and culture took no part in this rediscovery of the environment as image and form, as history and science "in the flesh".

It is not hard to explain why. The school is and will long remain devoted to the cult of the book, the written text ; it makes little use of the image, which is regarded as a mere adjunct to the written page. The teaching of the sciences is still mainly carried on "through a glass darkly". It is bookish and has no contact with life or history or consequently the environment. Art is a marginal subject taught only in a few types of schools. Thus the great synthesis of history, art and science which had characterised the Renaissance and the age of Gœthe collapsed.

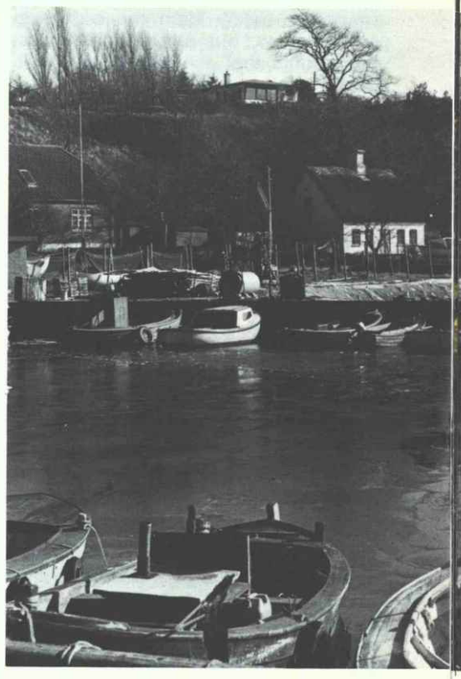
The spectre of ecological catastrophe has induced the schools, particularly in the Angle-Saxon countries, to provide instruction on the environment, and this has achieved remarkable results, particularly when taught along multidisciplinary or interdisciplinary lines. In this ecological dimension, the environment is regarded as a system of closely-linked living forces, a valuable system of balances which must not be disturbed. And the town, the urban environment, is a system of social, economic and also visual laws which must be defended or improved.

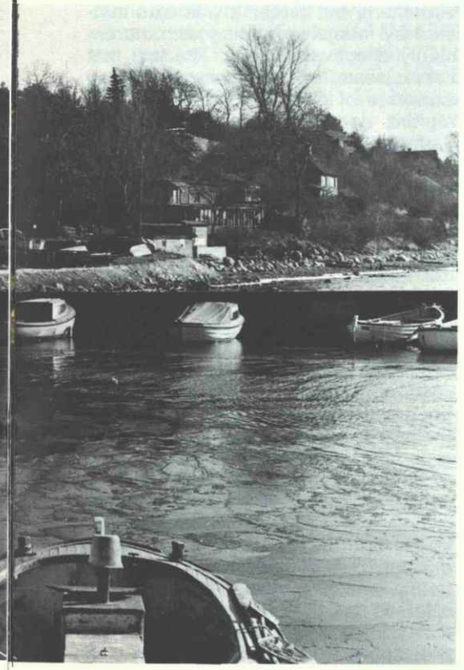
But however useful and essential instruction on the environment may be, it differs little from the teaching of the rules of hygiene or civics which takes place, with more or less success, in all schools. In this type of teaching, people lose sight of the truly educational aspect of study of the environment, with its great silent educative force.

To harness that force we must start from the idea of the natural and historico-artistic environment as an **unspoken language, a visual thought,** to be rediscovered through a process of reading and interpretation which seeks to understand the signs, meanings and forms of space.

According to Roland Barthes, space is always meaningful. It should be added that the meaning of space, in the sense of the environment, is conveyed by signs, the series of signs left by man during his age-old struggle to transform space with a view to creating his own environment, or again by the signs to which man attaches particular value because they reflect his aesthetic tastes, his preferences for specific aspects of the natural environment.

In both cases we are dealing with **visual language,** but in the former the predominant signs are the results of human action ; they could be described as architectural signs if we accept William Morris' view that architecture embraces all changes and debasements of the earth's surface. In the latter case the signs produced by natural forces are paramount. In both cases the signs combine in patterns to which man and society attach particular value.





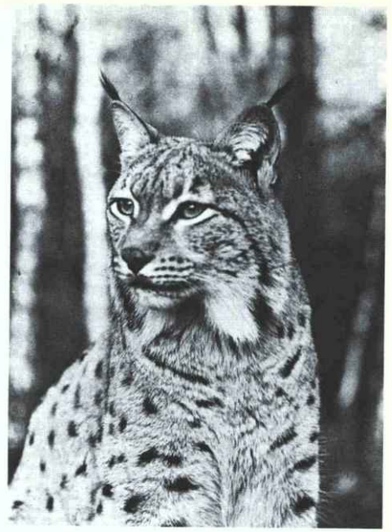
The essential factor in the first case is the form and image of the town, which is the product of history and whose structure and image make it possible to trace the events of the past, the history of town planning and architecture, the visual ideas of a specific society. In this context individual monuments, too, are particularly meaningful architectural assets in which the faith and culture of a community are expressed with particular energy and force. The agricultural landscape can be regarded as the transition between the architectural and the natural environment : for the work of man, even if concerned with production, has frequently succeeded in creating harmonious landscapes which also bear witness to the history of various types of cultivation and relationships between man and nature.

The natural environment is a pure and free manifestation of the natural forces in which we read the history of the earth and see the free manifestation of those forces, the spontaneity of nature, which in its turn arouses a feeling of freshness and spontaneity in man as he learns to look upon his environment with love and respect from scientific and aesthetic angles. Learning to understand the forms which are expressed in history implies reading and understanding the collective memory expressed in the town and in the countryside, which is also a construction and projection of human history.

Environmental education is thus an education in visual form and thought as a means of human enrichment and self-fulfilment. From now onwards the school must be able to provide educational instruments for reading the environment, in the form of multidisciplinary teaching, and thus also promote a more harmonious relationship between man and the environment, permit more balanced integration of modern human activities in surroundings which have been strongly marked by history and the forces of nature, both influences being regarded as expressions of the collective imagination of mankind.

Since the environment, as form and language, is the product of a collective effort, its protection must also be the result of a mass movement. Education in environmental protection must be conceived as team work involving participation by the whole school and community in saving those environmental values that are significant. One of the most effective methods is undoubtedly cataloguing, the systematic exploration of the historical and cultural environment, an operation which must be considered basic to the creation of cultural democracy and to democratic management of the environment.

THE LYNX CAN RETURN



Ulrich WOTSCHIKOWSKY
Oberfortstmeister
Nationalparkverwaltung
Bayerischer Wald
— Nationalparkamt — 8356 Spiegelau
Federal Republic of Germany

Among the many and varied current efforts to promote nature conservancy, the reintroduction of locally extinct or exterminated animal species ranks as spectacular. It is not, however, always the case that an objective evaluation of the situation proceeds these attempts. Frequently nothing is known about either the reasons for the disappearance of the species or about the requirements for its successful reintroduction. Arguments, both pro and con, are usually confused and emotional rather than objective in nature. Economic aspects — is the species "valuable" or "harmful" — play an important role, even among conservationists. Ecological implications, on the other hand, are difficult to grasp, and are frequently neglected.

In contrast to the effects of the introduction of a new species, those of reintroduction are somewhat simpler to calculate. Yet certain basic rules are often ignored. It is first necessary to know the reasons for the disappearance of the species in question and secondly to remove them. This is not as readily accomplished as it would seem. Reputable zoologists have suggested, for example, that the last otter in the Upper Austrian region of Waldviertel should be captured and released in Styria, although there is no indication that the otter could survive in the new surroundings. Another example concerns the "reintroduction" of ibex in the Allgau Alps, which was eventually stopped just in time due to the complete lack of sound evidence that the species was ever indigenous there in the first place.

The selection of qualified animals is important. The unsuccessful attempt to release in Bavaria young eagle owls able to fly but not fully independent is well known. Furthermore, the conditions required for this species' survival were apparently not met in the selected region which would otherwise have long since been populated by the species itself, by means of emigration of young animals from existing Bavarian populations. Moreover the release of hand-raised animals is particularly dangerous. They are not accustomed to the strenuous requirements of the natural environment, which is by no means friendly, and either succumb or go the way of least resistance. In the case of aggressive animals, they can be bothersome or even dangerous. Of primary importance is the negative influence that this can have on public opinion, which in turn can render other carefully planned endeavours more difficult. Worth mentioning in this connection are two unsuccessful efforts, whereby a tame lynx was released in Rominten, and two tame bears in the Trentino. The lynx developed into a troublesome chicken thief, and the bears begged on the street ; ultimately one, half-starved, had to be shot.

Finally, great attention must be paid to the selection of appropriate place of origin. The environment from which the animals are removed should bear the closest possible resemblance to that where they are to be released. The adaptive capability of species is not unlimited ; the natural development of countless ecotypes over a long period of time is no accident.

The significant number of cases of "bloodfreshening", particularly well-known from the hunt, generally in an attempt to obtain better trophies or larger harvests, is a dangerous intervention. The adaptability of local races is disrupted, and their existence thereby endangered. The lynx has always been something of an outlaw and its fate is still hotly disputed even today. In spite of this it has been reintroduced in several European countries using several different methods. In Slovenia, preparation for this event was well-handled by means of an intensive information campaign particularly for the benefit of hunters. In Switzerland, however, the stubborn opposition of hunters led to an illegal attempt to reintroduce the species. Similarly in 1970 in the Bavarian Forest several lynx "fell from the sky" before the hunters, who were already alarmed about plans to reduce the ungulate populations in the newly established National Park could be properly prepared for this event.

Many people feel that the proper home for lynx is only to be found in untouched, primeval forests. Since the animal has disappeared nearly everywhere in Central Europe, it is frequently regarded as one of the species whose habitat has been destroyed by the increasing cultivation of the land. EIBERLE has, however, convincingly documented that lynx in Switzerland did not die out because of a decrease in the quality of its environment, but rather it was exterminated by intensive hunting with increasingly effective firearms. The fact that the retreats of the lynx are broad expanses of often mountainous forest regions does not indicate that these biotopes are of particularly high quality. It is rather that these areas are extremely difficult to hunt. The lynx is relatively easy to trap and to hunt, so that its fate has followed it even to the most remote outposts of Central Europe.

The excellent adaptation of the lynx to life in forests is illuminated by an examination of its hunting technique. After evaluating 2371 kilometres of snow trails, HAGLUND has come to the conclusion that the lynx prefers to stalk its prey, and covers much ground each night. Very rarely does it ambush from a hiding place. It locates the prey with the help of extraordinarily sharp senses, whereby vision and hearing are more highly developed than the sense of smell. Using available cover, it creeps as close as possible to the intended victim and attempts to surprise and overtake it in a few fast leaps.

Since the European lynx occurs mainly in forests where prey is scarce, it is understandable that the active search for food offers better prospects for success than would passive waiting. Its chances are good only when it can manage to approach the victim without being noticed. HAGLUND was able to reconstruct 88 successful attacks on different animals. Of these 88, 60 were accomplished within 20 metres and only a few leaps. If the lynx is not able to surprise its prey within this short distance, its chances of success diminish rapidly. It is not even able to pursue prey over great distances. Its heart is quite small, and most prey can outlast and outrun it.

One of the most important species of prey for the European lynx is the roe deer, especially in winter when smaller animals are not to be found. In Scandinavia mountain hare and grouse are also of significance, while in the North, it is the reindeer. In this area the lynx was even able to populate new regions in the past 100 years ; the intensified breeding of reindeer, with numerous half-tame animals made survival possible. In Rumania, on the other hand, chamois play important role ; elsewhere hare or rabbits.

Thus the European lynx shows remarkable adaptability in its selection of food. It is not specialized for particular species, which is the reason it can inhabit forests of very different climatic zones. It generally lives on the species most easily caught. That is : it utilizes common species rather than rare ones, it captures healthy animals less freqently than sick or injured ones, it kills small animals more often than large ones. Although a lynx is able to kill animals the size of a female red deer, the spectrum of prey will depend less on its "inclinations", than on the available supply.

Among hunters, the lynx enjoys the reputation of being an uninhibited, unrestrained murderer, that kills much more than it can consume. But the lynx apparently lives very economically. Its need for nourishment is modest, particularly considering the long way it travels each night. One hare or half of the hindquarter of a roe deer is sufficient to last for a day. In the Bavarian Forest it is the rule that a lynx will return to its prey, red or roe deer, for weeks, and all that is ultimately left is hair, bones, intestines and lungs. Only in Northern Sweden does the lynx not return as regularly to a reindeer. It is apparently not able, with its small jaws, to tear apart meat that is frozen solid.

Adult lynx occupy large territories in which they tolerate no other lynx except their partners. The size of the territory apparently depends on the availability of prey. In Lapland HAGLUND ascertained up to 300 sq km for one lynx, while in Czechoslovakia 50 sq km often appear to be sufficient. It is remarkable that in spite of its relatively high rate of reproduction (2-4 young), lynx never outnumber their prey.

Healthy, experienced animals living in biotopes of adequate quality are relatively safe from their respective predators. Predators have good chances of success against individuals of reduced vitality or whose behaviour deviates from the norm. The durability of the coexistence of predator and prey depends on adaptation at two levels : both develop behavioural and physical attributes which provide the highest chances of survival. Many physical and behavioural characteristics of prey as well as predators are inexplicable without this interaction and mutual influence. The mechanisms that affect this selection are not always readily apparent. The "sanatory" effect that wolves exert on ungulate populations is quite easy to perceive : the chase by the pack of wolves is an excellent test ; inevitably the weaker animals fall victim to the wolves. From falconry we know that birds of prey capture injured animals especially easily. It is not generally accepted, however, that the lynx also exerts a similar selective effect, because it purportedly ambushes its victim from hiding places and allows it no time to prove its physical capabilities.

If we recall, though, the hunting technique of the lynx as described by HAGLUND, it becomes clear that the lynx primarily tests its potential prey as to whether it is alert, and its behaviour optimal. The "test" does not, as in the case of the wolf, take the form of a chase ; it is rather in the attempt of the lynx to approach its victim unnoticed. Thus inexperienced, mainly young, animals most easily fall victim to the lynx. In addition, sick, injured or senile individuals are naturally not as likely to be able to flee from the attacking lynx as strong, healthy animals. That is, the removal of less vital animals in the annual harvest has the result that a population of fewer, but strong and therefore highly productive animals survive the "bottleneck" of winter. The elimination of sick or parasitized animals reduces the danger of infection for healthy individuals. This results in decreasing competition for food among the remaining animals, and leads to a balanced social structure, since it is primarily individuals from the largest classes of juveniles and females that are removed. In general, the influence of predators has a braking effect on population dynamics and tends to bring about more regular, balanced production. Fluctuations in a population are reduced ; so-called catastrophic increases and collapses are less frequent. It may be added that large predators frequently prey intensively on their smaller competitors, for example lynx on fox.

Some people label the lynx "useful" or "valuable", for these reasons, and thus attempt to win sympathizers for its preservation. This well-intended effort to measure the ecological role of a predator with economic standards shows very clearly that the disastrous phase of "useful-harmful" thinking is by no means overcome.

A view of nature that is totally inappropriate in our day is generated when the financial inocuousness of certain natural elements must be assured before their maintenance can be approved. Moreover, the actual effect of predators, primarily the quantitative effect is frequently overestimated. Only in exceptional situations does a predator seem to be in a position to reduce the more numerous prey population. NOVAKOVA has established in Slovakian districts that the lynx utilizes a maximum of 3 to 5 % of the summer ungulate population compared to an annual growth rate of 40 to 60 % for these species ! Cases of more effective regulation of prey by predators are scarcely known in the literature. A great deal more speaks for the hypothesis that regulation occurs "from bottom to top", that is essentially through the food supply.

Therefore it is virtually impossible that the lynx could bring about a noticeable reduction in the generally very numerous roe deer populations of Central European forests. These forests today provide roe, as well as red deer a substantially better environment than they did as primeval forests. European virgin forests supply little food for herbivores. The primary production occurs in the canopy, and little vegetation can grow on the forest floor because of the shade. When the forest is utilized and the canopy opened, the increase in light promotes the growth of ground flora. A larger area is covered with vegetation in the early phases of succession, which can be consumed

Lynxes like to spend the day curled up on a rocky vantage point where they are difficult to surprise. Apart from tracks in the snow or scratches on a tree, one hardly ever sees anything of this rare predator.

by herbivores. Agriculture also tends to increase the food supply seasonally, and the bottleneck in winter is compensated by artificial feeding. The result is extremely large roe deer populations, which are insufficiently utilized because the methods of hunting are, in general, quite conservative. In many places in Central Europe today, roe and red deer are the limiting factor for the regeneration of mixed forest stands. This means, however, that there is a maximum supply of food for lynx. If one wishes, one could even consider the lynx under these circumstances economically "useful".

The lynx did not vanish in Central Europe because of environmental changes. Rather it was intentionally exterminated as a predator because its effect was exhorbitantly overestimated. The view that the lynx is a marauder of nature has been shown to be false. The environment for this predator cat is better today than it was previously in spite of the intensification of agriculture and forestry in Europe's large forested regions. The lynx is harmless for man, and its effect on domestic animals is minimal. The efforts of numerous specialists are justified, not only to maintain the lynx in Europe but also to reintroduce it in certain selected areas.

GEOTHERMAL ENERGY IN ICELAND
UTILISATION AND ENVIRONMENTAL PROBLEMS

Stéfan ARNÓRSSON
Orkustofnun - National Energy Authority,
Department for Natural Heat
Laugavegur 116, Reykjavik, Iceland

Geothermal Energy Utilisation

Until recently practically all geothermal energy utilisation in Iceland has been confined to space heating. During the last decade geothermal steam has also been used for industrial purposes and electric generation and further exploitation in these fields is in its preparation stages. Today greenhouses cover some 135,000 square meters requiring about 40 MW thermal. The present energy production of heating district services is some 400 MW thermal and will increase to about 590 MW during the next 4-5 years, when district heating services, which are definitely planned or are in the construction stages, will be in operation.

By 1980 electric power production from geothermal steam will amount to 73 MW and industrial use of geothermal water and steam will, at the same time, be in the range of 25 MW thermal.

The total population of Iceland is about 215,000. Before 1980 a little over 140,000 of the inhabitants will use geothermal water for house heating or close to 65 % of the population. House heating amounts to roughly 40 % of the annual energy consumption in Iceland.

In calculation of MW thermal it is assumed that the geothermal water will cool by 40°C, or from 80°C to 40°C, in the central heating systems, a value which is close to the true value for the majority of the district heating services.

Far the largest district heating service is in the capital, Reykjavik. It is also the oldest heating district service initiating a small scale operation in 1930 by exploitation of a geothermal field within the city itself. A major expansion took place in 1943 when water at about 90°C from the neighbouring geothermal field at Reykir was piped for a distance of 17 kilometers to Reykjavik. Further drilling at Reykir led to an increase in production in 1952 so at that time it amounted to 45 MW thermal. Little increase occurred until about 1960 following deep drilling (700-2200 meters) into the previously used geothermal field within the city of Reykjavik, recovering water at about 130°C. This drilling led to an increase in production by 110 MW. The discovery of a hidden geothermal field in 1966 with a temperature of about 110°C under the eastern part of the city led to a still further increase by 40 WM thermal. At that time about 80 % of the inhabitants used the geothermal water for house heating. The last major expansion has occurred after 1970. This expansion can be attributed to deep drilling (1500-2000 meters) at Reykir into highly permeable rocks and hydrolic cracking of the rock in the walls of the drillholes, which still increases the permeability and therefore the yield from the holes. The thermal water from these deep drillholes provides the rest of Reykjavik with geothermal water and all the neighbouring towns and villages, which have not been using geothermal energy for house heating. Construction of distribution pipelines in the neighbouring communities is now under way and will be completed by the end of 1976. At that time the thermal energy production of the Reykjavik district heating service will be about 420 MW thermal but now it is about 340 MW. The population of Reykjavik and the surrounding communities is about 110,000.

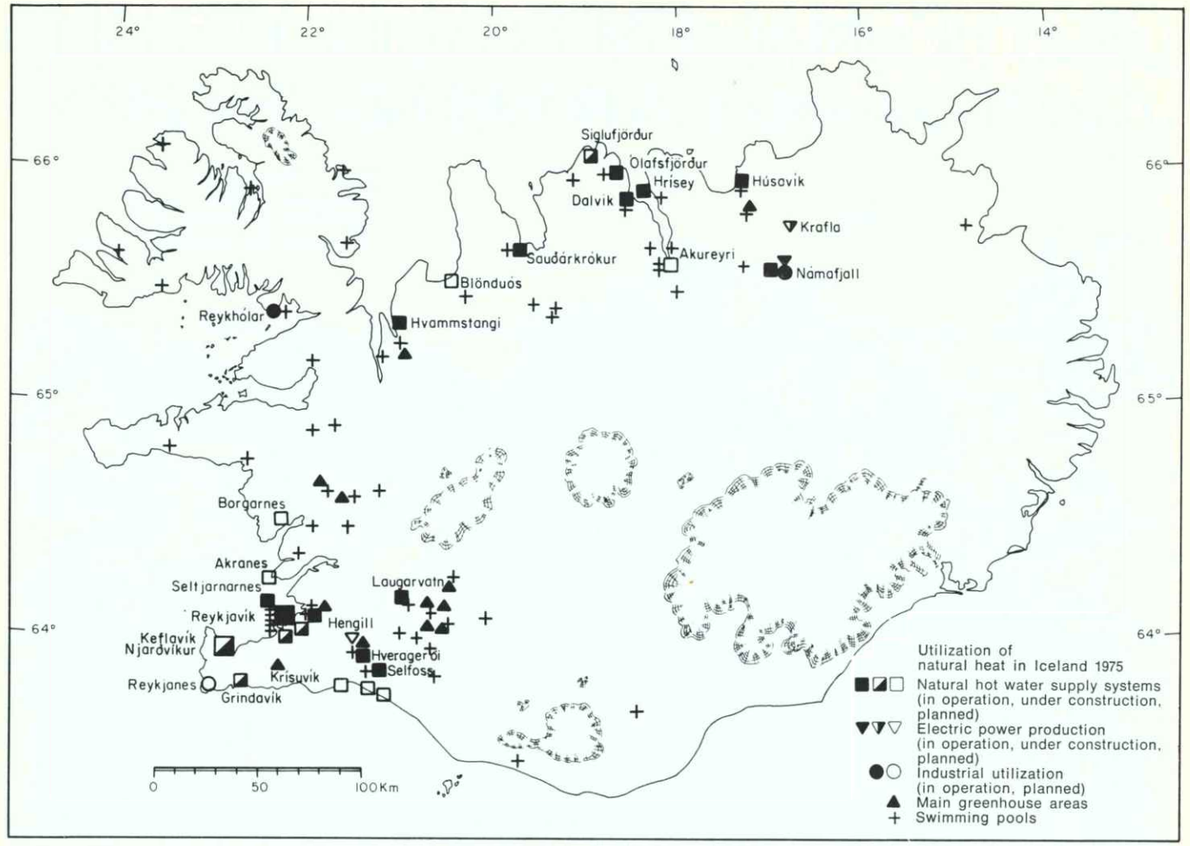
Outside Reykjavik district heating services using geothermal water are operating in 10 major villages and towns (13,000 inhabitants) apart from numerous smaller communities and school complexes in the farming areas. Building of district heating systems are in the preparation stages for 11 other villages and towns with a total population of about 17,000 inhabitants. Plans exist for more of the major communities but they are still at the exploratory stage geologically and economically speaking.

One of the pecularities of geothermal water utilisation in Iceland is reflected in the greenhouse centers and other communities which have built up around natural hot springs in the farming areas during the last 3-4 decades. Thus, it has been the prevailing policy to locate schools, and school complexes in the farming areas by natural hot springs wherever possible in order to receive low cost house heating and obtain easy facilities for swimming pools. Then there has been a district tendency for trading and industrial services for the neighbouring farming areas to develop in these "hot spring communities". Tens of such communities now exist, the largest with a population of about 1000.

Electric generation by geothermal steam was initiated in 1969 by the construction of a 3 MW experimental plant at the Namafjall geothermal field in northeast Iceland. Preparation steps have now been taken to build a 70 MW geothermal plant in a nearby geothermal field, Krafla. Production drilling will begin this year and the plant may be operating in 1977. At the Namafjall geothermal field, a diatomite factory has been using natural steam for drying of the diatomaceous earth which is extracted from the bottom of a nearby lake, Myvatn. A factory producing dry algae is in construction at Reykholar in northwest Iceland, which will be using geothermal water in the drying process.

The exploitation of the geothermal fluids in Iceland has been mostly confined to water of rather low temperature (less than about 130°C) from the so called low-temperature hydrothermal areas (non-volcanic hydrothermal areas). Further exploitation in the near future will concentrate more on the high-temperature hydrothermal areas (volcanic hydrothermal areas). This refers particularly to utilisation that demands steam such as electric generation and many industrial uses. Underground temperatures in the high-temperature areas may be as high as 300°C.

Iceland possesses valuably hydropower resources which have been competing with the geothermal steam for electric generation. One of the



reasons for not exploiting the geothermal steam for electric generation but hydro-power lies in the fact that geothermal utilisation involves much more elaborate technology and more costly research at the early phases of economic evaluation. It seems now, economically speaking, that geothermal steam is competitive with hydro-power for electric generation.

Geothermal Fluid Compositions

Most geothermal waters in Iceland are low in dissolved solids compared with the compositional range of such waters observed in geothermal fields in other parts of the world. This includes major as well as trace elements. The total dissolved solids content is typically in the range of 300 to 1500 ppm of which silica amounts to some 25 % to 50 %. The dominating ions are sodium, chloride, and sulphate.

Rather saline geothermal waters occur in Quaternary and Recent rocks near the coast, particularly in southwest Iceland. It is considered that the salinity of these waters has resulted from percolation of sea water into the bedrock and mixing with fresh ground water of meteoric origin in various proportions. At Reykjanes on the southwest tip of Iceland no such mixing has, however, taken place and the geothermal water presents heated sea water.

Where sea water does not enter geothermal systems, variations in the thermal fluid compositions can be related to underground temperature conditions and the solubility of hydrothermal minerals or ionic exchange reactions between solution and minerals. The overall low content of dissolved solids in the geothermal waters is believed to result from reaction between the water and basaltic rock, but as is well known, Iceland is almost wholly built up of basaltic rocks. Geothermal water in Iceland tend to be high in hydrogen sulphide. Its concentration in the water tends to increase with temperature. Thus, waters with a temperature of 100°C contain typically about 1 ppm of H_2S but waters at 250°C contain typically some 200 ppm. The relatively high hydrogen sulphide content of the Icelandic waters is to be related with their reducing nature, and possibly juvenile source of sulphur from basaltic intrusions or their differentiated products. Icelandic geothermal waters are very low in many trace elements. Thus, the contents of bismuth, cadmium, chromium, cobalt, copper, lead, nickel and zinc were below 2 micrograms per litre in over 100 samples of water from many of the geothermal fields, or well below acceptable limits for domestic supplies, aquatic life, irrigation, and stock and wildlife watering. In the same samples arsenic, iron, gallium, germanium, molybdenum, titanium, and vanadium were generally detected in quantities of about 1 to 100 micrograms per litre. Apart from arsenic, the data of which are not reliable, these concentration are also well below acceptable limits for the before mentioned uses. In the hottest geothermal water arsenic may be near the acceptable limit for domestic water supplies. However, during cooling of the thermal waters, their arsenic content is apparently quickly precipitated out as hydroxide. Therefore, it seems unlikely that arsenic derived from geothermal waste water will be harmful to its environment.

The concentration of boron tends to be in the range of 0.1 to 1.0 ppm, except for a few saline high-temperature waters where it may be as high as 10 ppm. Apart from the saline waters boron from geothermal waters is not expected to influence the environment with respect to aquatic or plant life.

The homogeneous rock geology of Iceland and the observed simple relation between geothermal fluid composition and underground temperatures and geology implies that present data on the fluid compositions are sufficient to define expected environmental problems from geothermal waste water. The present data covers drillholes in 6 of the 17 high-temperature geothermal fields and the major part of the low-temperature fields.

The Waste Water

The polluting effects of geothermal waste water can be classified into 2 categories, that is thermal pollution and chemical pollution. Any chemical pollution from the low-temperature geothermal waters is at minimum because of their composition, which is not drastically different from that of cold ground waters. Waters from the high-temperature areas contain, on the other hand, a few compounds in sufficiently high concentrations to be potentially polluting chemically speaking. Those compounds in these waters, which should be particularly focused on in this respect include hydrogen sulphide, silica, and phosphate.

The rather extensive use of low-temperature geothermal water for space heating during the last 3 decades or so has practically ignored any possible environmental influence. This influence is, of course, non-existing in many of the "hot spring communities" in the farming areas where only water flowing naturally from springs is utilised. It seems also that no measurable impact upon the environment has occurred in those towns where the water is extracted from drillholes. In this respect one should bear in mind the relatively small size of all towns in Iceland.

It is evident that, apart from electric energy, geothermal energy has important advantages over other energy resources for house heating, such as coal and oil. Air pollution from coal and oil may be quite substantial but non-existing in the case of geothermal energy. This fact is evident in Reykjavik, the "smokeless city".

Very limited experience has been gained on the environmental influence of large quantities of waste water from the high-temperature areas where only the steam is exploited. The water fraction from the wet-steam drillholes in such areas is dicharged at temperatures as high as 180°C and it may amount to as much as 80 % of the total flow from the holes. Discharge of such hot waste water is to be contrasted with the effective use of geothermal energy for space heating where the waste water is discharged at a temperature of about 40°C. For example a 50 MW geothermal electric plant may produce waste water of some 500 litres per second at 150°C whereas the Reykjavik district heating service, when producing 420 MW thermal, will discharge less than 2500 litres per second of water at about 40°C.

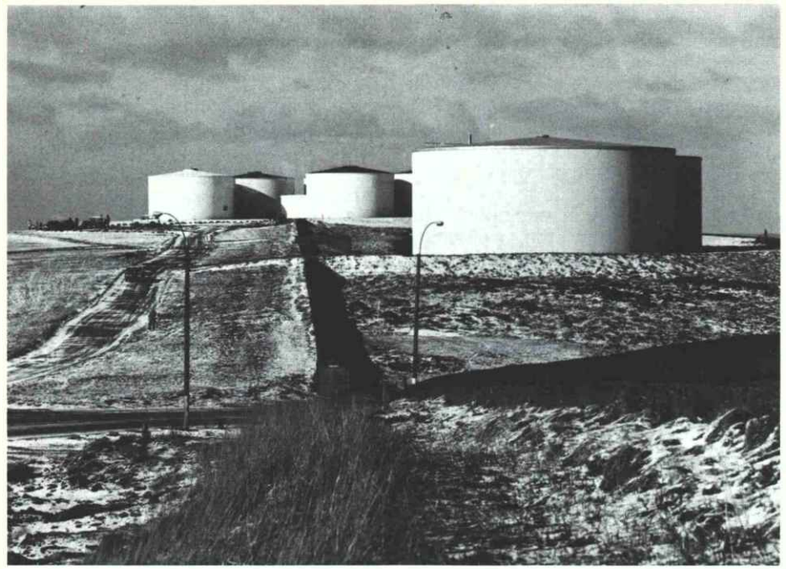
Environmental influence, including thermal and chemical pollution, accompanying geothermal energy exploitation is dominantly a localized problem. In respect to large scale exploitation of steam from the high-temperature areas in Iceland in the near future, views on nature preservation will play an important role. Some areas in the vicinity of these geothermal fields may have such pecularities geologically, or from the faunal and floral point of view to make an objection to any substantial geothermal energy utilisation. Disposal of untreated waste water into rivers and lakes will little doubt not be accepted in many areas on the same grounds. Iceland is in a possession of many very valuable salmon rivers and trout lakes.

The harmful effect of hydrogen sulphide in the waste water lies in its toxic nature, particularly to aquatic life. For example mortal concentrations for trout are about 1 ppm for exposure of 24 hours. An exposure of the waste water to the air in ponds or dams allows most or practically all of the hydrogen sulphide to be removed from the water and into the atmosphere. Air stripping of the waste water will have the same effect. Thus, it is planned to discharge all the waste water from the planned 70 MW geothermal plant at Krafla into a depression of an explosive crater. The waste water will loose its hydrogen sulphide and cool down to 10-20°C in this discharge reservoir so thermal pollution of surface and ground waters is eliminated.

The influence of phosphate involves its role as a fertilizer. In the cold climate of Iceland chemical weathering of the basaltic bed rock is at minimum and as a result the phosphate content of the pore water in soils is extremely low. Geothermal waters may cointain some 0.1 ppm of phosphate. It seems, however, very unlikely that phosphate in geothermal waste water will be troublesome, especially when other sources of phosphate, for example fertilizer, related to human activity are taken into consideration.

The problem with silica results from its precipitation from the water. If the waste water has to be discharged into the ground, this precipitation leads to the sealing of cracks and openings in the bedrock and the formation of impermeable beds in streams and lakes formed by the waste water. With time the streams and lakes become more and more extensive as has been observed at the Namafjall geothermal field where steam has been utilised for the last 6 years for industrial purposes and electric generation but the waste water emerging from silencers at 100°C has been flowing into the surrouding young lava fields, which were originally very permeable.

The concentration of silica in the high-temperature geothermal waters is determined by the solubility of quartz. The solubility of quartz increases with increasing temperatures. Thus, the silica concentrations in the geothermal waters increase with increasing temperatures. The rapid cooling of the geothermal water, which occurs as it flashes in a drillhole, leads to silica supersaturation with respect to quartz solubility. However, precipitation of quartz from a supersaturated solution is extemely sluggish and experience has shown that precipitation of silica from solution is not to expected until the geothermal fluid has cooled sufficiently to reach opal saturation. Opal, the amorphous form of silica, is much more soluble than quartz at all temperatures, and like quartz the solubility of opal increases with temperature. It is thus evident that the problem of silica precipitation from geothermal waste water is directly proportional to the temperature of the geothermal water in the underground reservoir. The relation between opal saturation and reservoir temperatures are complicated by the fact that the flashing of the high-temperature water leads to an increase in its pH. This in turn may cause



The storage tanks for geothermal water of the Reykjavik district heating service.

some of the dissolved silica to become ionized and this ionized silica does not precipitate in equilibrium with the solid phase. The effect of raised pH by the flashing involves, therefore, lowering of the opal saturation temperature. If reservoir temperature is 260° C opal saturation is reached at 160°C, if pH effects are ignored, and cooling below that temperature is likely to result in some silica precipitation. If, on the other hand, the pH is raised to about 9.6 through the flashing, opal saturation is reached at about 125°C.

The rate of silica precipation is related to factors other than reservoir temperatures. The precipitation may never be sufficiently rapid to bring all the silica from solution, which is in excess of opal saturation. External conditions that will aid precipitation include the salinity of the waste water, the extent to which silica in excess of opal saturation is polymerised, the degree of supersaturation, the temperature of saturation, turbulence flow, and the material with which the water comes into contact.

Experience has shown that the silica precipitates relatively easily out of waters with salinity similar to that of sea water. Thus, after 5-7 days storage, all silica in excess of opal saturation has been precipitated. If such saline waste water is stored in reservoir lakes all the silica may be brought out of solution and silica sealing will not be troublesome where the waste water is made to seap into the ground. This will not be so for the typical non-saline high-temperature waters in Iceland. Insufficient experimental results are available which demonstrate the rate of silica precipitation from such waters. It is conceivable that a chemical treatment of the water to precipitate silica would be regarded as economically acceptable in order to avoid sealing in the downflow zones of the waste water.

ENVIRONMENTAL EDUCATION AND THE SPECIAL TASK OF THE MUNICIPAL OFFICE FOR SCHOOLCHILDREN'S GARDENS IN THE HAGUE

Harry WALS, Director,
School- and Children's Garden Service
(Gemeentelijke School-en Kindertuinen)
Raaltestraat 4, The Hague, Netherlands

Historical developments

The Municipal Office for School Children's Gardens in The Hague dates back to 1919. In the early days, the emphasis put on work towards children's gardens was as a means to serve an end (the welfare and happiness of the child). After 1945, population growth and increasing industrialisation led to nature being interfered with more and more.

Convinced that the realization and appreciation of the value of nature by a wider public would in the future lead to better protection of the natural environment, Mr. J. A. Nijkamp, until 1970 director of the Municipal Office for School Children's Gardens, obtained permission from the then alderman to lay greater emphasis on nature conservation within the framework of the Municipal Children's Garden's work. The didactic staff of the Service, still under the directorship of Mr. Nijkamp, devoted themselves increasingly to problems of the environment. The resulting ideas were checked out, for example, against the results of IUCN and UNESCO conferences held at Nevada USA in 1970 "Environmental Education in the School Curriculum", the CRM conference at Rotterdam in 1971 "The Ninth Regional Conference of the North-West Europe Committee" and at Ruschlikon, Switzerland in 1971 "European Working Conference on Environmental Education".

Present Aims

With the background of the environmental crisis, there arose the necessity, in addition to nature conservation, of including environmental education in the aims of the Service. By including nature conservation and environmental education in its aims, the Service is following similar lines as other countries. The words "Environmental Education" are assuming an increasingly wide range of meanings in English and American literature.

Environmental Education is taken to mean :

"The process of becoming aware of values, and the assimilation of ideas so that abilities are developed and attitudes acquired which are necessary for understanding and appreciating the interrelations between man, his culture and his bio-physical environment" [1].

This definition should act as the guiding principle in describing the Service's aims. A subject of fundamental importance in this educational process is the role in these aims of active biology teaching along ecological principles [2].

Only a well considered confrontation with living nature can clearly show that :

a) man is an inseparable part of nature ;
b) life in its natural surroundings obeys laws which to a large extent also apply to man ;
c) by his knowledge and his technological achievements, man is able to intervene in natural processes ;
d) the only sensible intervention in natural processes is one consistent with the "laws of nature" ;
e) transgressing the laws of nature can have disastrous consequences ;
f) the responsibility for intervention is not borne only by those who actually intervene, but also by "other people" who allow it to be done, passively sitting by, or even lending their support.

By drawing on present-day attitudes in psychology, pedagogy and didactics, efforts are being made to give a proper framework to environmental education.

Education trends

Developments in society confront children outside school continually with problems related to the environment. It is necessary for children to gain an insight into these problems and especially into the role that they themselves — both now and later — are to play. It is therefore especially

[1] Illinois - Northern Illinois University 1970.

[2] Mens en Natuur, 22nd year, no. 4, 1970, J. A. Nijkamp, H. Wals - « De natuurbescherming in de educatie ».

For those children living in the centre of town, with little opportunity to encounter plant and animal life, a special lesson about farm animals has been developed.

Even nursery school pupils have their own little gardens to tend.

A botanical and landscape garden is of great value for teaching purposes.

The study of freshwater life is given special attention for pupils of primary and secondary schools.

gratifying that many school timetables devote plenty of attention to educating children to be aware of the environment.
This means that the classroom teacher has the task of teaching matters associated with the environment and also educating children to an awareness of the environment. Environment cuts right across the divisions into "subjects" which still exist to a greater or lesser extent depending on the school. It may be assumed that children experience the world about them as a whole. The environment, of which the child is himself an interacting part, does not appear to children to be an assortment of disconnected units. Environmental education, breaking away as it does from the rigid classification of school subjects, parallels to a large degree the motivation which a child receives from his contact with the environment. It can therefore be seen that environmental education leads to a fusion of traditionally separate subjects. It has long been known in pedagogy that pupils experience great difficulty in unifying knowledge learned in the framework of separately taught subjects. Thus environmental education contributes of the discontinuation of the "systematic separation" process. Many teachers frequently feel the need for an alternative to the exclusively verbal confrontation with the environment and the elements from which it is made. "See it", "experience it", make a far deeper impression on children that "hear about it".
It was on this very point that the Municipal Office for School Children's Gardens tried to come to the school teacher's aid. The backing-up role of the education provided by this office means that it will have to be **multi-disciplinary.**
This teaching should preferably also be of a very concrete nature. It must present children with familiar situations or situations with which they can easily familiarise themselves. These are primarily to be found in and around town and form a basis for the necessary interest at a global level. In the context of "environmental education", knowledge of the town and its surroundings encompasses knowledge of the work of several public services (waterworks, gas and electricity supply, waste incineration, sewerage, etc.), as well as parks and public gardens, facilities for sport and recreation and – not to be forgotten – townplanning.
Knowledge of such activities can be presented to children as a "separate" subject or as part of an overall plan. It goes without saying that the latter is to be preferred by far. Knowing about the work and aims of the public services is extremely relevant to making an efficient use of raw materials and energy sources. Understanding the significance of parks and public gardens and the need for their preservation is also very important. Learning where to find out about town planning and a citizen's rights and duties in this respect must also not be underestimated as it encourages the citizen's involvement in his town. Every one of the services mentioned actually needs information for educational purposes.

The task of the Office

In order to enable teachers to carry out their task of environmental education as effectively as possible, the Office for School Children's Gardens can offer them the facilities which they miss by their lack of know-how, specialised up to date information, time and space in their school environment. These facilities may consist of demonstrations and excursions, both particularly well suited to a physical confrontation with the environment, but can also include classroom teaching aids (syllabuses, lending out of animals, supply of plants, etc.).
In addition to formal teaching, the Office is also engaged in education of lasting value. The adult world is constantly changing and the knowledge gained in youth often appears insufficient to equip a person for the modern world. The Office also tries to contribute to lasting education in the field of environmental problems.

NATIONAL AGENCIES OF THE CENTRE

AUSTRIA
Dipl. Ing. K. FASCHING
Dokumentations- und
Informationszentrum für
Natur- und Umweltschutz
Heinrichstrasse 5/11
A - 8010 GRAZ

BELGIUM
Ministère de l'agriculture
Service des réserves
naturelles domaniales et
de la conservation
de la nature
auprès de l'Administration
des eaux et forêts
A l'attention de
M. M. SEGERS
29-31, ch. d'Ixelles
5e étage
BRUXELLES

CYPRUS
Dr. A. S. PISSARIDES
Nature Conservation Service
Ministry of Agriculture
and Natural Resources
NICOSIA

DENMARK
Statens naturfrednings-og
Landskabskonsulent
Nyropsgade 22
DK - 1602 COPENHAGEN V

FRANCE
M. L. DOMINICI
Chef de Service d'information des relations
de l'action éducative
Centre de documentation du S.I.R.A.E.
Ministère de la qualité de la vie
Environnement
14, bd du Général-Leclerc
92521 NEUILLY-SUR-SEINE

FEDERAL REPUBLIC OF GERMANY
Bundesanstalt für Vegetationskunde,
Naturschutz und Landschaftspflege
Zu Händen von
Dr. W. ERZ
Heerstrasse 10
D - 53 BONN-BAD GODESBERG

GREECE
Société hellénique pour la
protection de la nature
M. Byron ANTIPAS
Secrétaire général
69, rue Anagnostopolou
ATHÈNES 135

ICELAND
Mr. Arni REYNISSON
Iceland Conservation Council
Laugavegur 13
REYKJAVIK

IRELAND
Mr. E. O'CONNOR
Department of Lands
Forest & Wildlife Service
22 Upper Merrion Street
DUBLIN 2

ITALY
Ministero dell'Agricoltura
Ufficio delle Relazioni internazionali
All'attenzione della
Signora Dott. E. MAMMONE
ROMA

LUXEMBOURG
Conseil supérieur
de la conservation de la nature
à la Direction des eaux et forêts
34, avenue de la Porte-Neuve
LUXEMBOURG-VILLE
Case postale 411

MALTA
Director of Agriculture
Department of Agriculture and Fisheries
14 Scots Street
VALLETTA

THE NETHERLANDS
Mr. J. J. ZWEERES
Voorlichtingscentrum
voor Natuurbescherming
Warmoesstraat 39
AMSTERDAM

NORWAY
The Royal Ministry
of Environment
Myntgaten 2
Oslo-Dep.
OSLO 1

SWEDEN
Mr. S. LUNDSTRÖM
The National Swedish Environment
Protection Board
Smidesvägen 5
Fack
S - 171 20 SOLNA 1

SWITZERLAND
Ligue suisse
pour la protection de la nature
A l'attention de M. Jürg ROHNER
Wartenbergstrasse 22
4052 BASEL

TURKEY
Mr. Hasan ASMAZ
President of the Turkish Association
for the Conservation of Nature
and Natural Resources
Tuna Caddesi No. 5/C
YENISEHIR-ANKARA

UNITED KINGDOM
Miss Shirley PENNY
Librarian
The Nature Conservancy Council
19 Belgrave Square
LONDON SW1X 8PY