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PLENARY ADDRESS

Ecological Crisis in Post-Communist Central Europe

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INTRODUCTION

The countries of Central Europe which liberated themselves from Communist rule in 1989 (Czechoslovakia, Hungary, Poland and former East Germany) have inherited a weak economy and a severely deteriorated environment. The poor state of these countries is the result of the wasteful Marxists' attitude toward natural resources and of their small respect for environmental protection and nature conservation. The "new democracies" of Central and Eastern Europe are now facing a serious ecological crisis which is coupled with their economic difficulties. I will confine my presentation of this situation to the aforementioned four post-Communist countries situated at the heart of Europe while most examples will be drawn from my home country, now divided into the Czech and the Slovak Republics.

SYMPTOMS OF THE ENVIRONMENTAL CRISIS AND ITS CAUSES

In all four countries, the ecological crisis shows similar symptoms. Among the most conspicuous ones are drastic changes in the hydrological balance of whole regions, especially increased instant discharges caused by large-scale drainage of agricultural land, high levels of air and water pollution, heavy eutrophication of many standing and running waters and soils, and the acidification of others. Further symptoms, often associated with the previous ones, are a deterioration of soil quality (soil degradation), especially reduced soil humus content and waterholding capacity, and damage to forests leading even to forest dieback. The severe damage to some forest-tree species [especially conifers such as Norway Spruce (*Picea excelsa*) and Silver Fir (*Abies alba*)] is paralleled by an equally severe damage to some species of aquatic and wetland plants such as some water lilies (*e.g.*, *Nymphaea candida*, *Nuphar pumila*), bulrushes (*e.g.*, *Scirpus*

lacustris) and reeds (*Phragmites australis*). The generally raised nutrient concentrations in rainwater, soils, and surface and ground water bring about an impoverished species composition of biotic communities, due to the enhancement of just a few species populations that can make use of increased nutrient inputs and outcompete other species populations. Acidification has a similar effect: it is only the acid-tolerant species that can relatively thrive in areas which are strongly affected by acid rain and snow fall. These are areas with shallow podzolic or semi-podzolic soils on acidic geological substrates, mostly in the highlands or mountains. A decline in biodiversity and dying out of some species of green plants and associated fungi and animals are thus the result of both eutrophication and acidification of soils and waters. On top of that come the direct effects of environmental pollution, with all three main biosphere compartments (atmosphere, hydrosphere and pedosphere) acting as its vectors.

Human health is also adversely affected by the unfavorable environment. In most post-Communist countries, the average life expectancy is shorter by several years than in other comparable countries of Europe. The direct effects on human health are largely due to air pollution; the indirect effects are still rather obscure, but high concentrations of nitrate in many sources of drinking water and residues of agricultural chemicals and maybe PCB's are among the likely reasons, though bad food habits of the majority of Central European people can also be blamed (Figure 1). The environmental awareness of the general public is still relatively low although it is growing slowly. However, at present most people seem to be most interested in improving their economic situation, and environmental considerations play a secondary role in their decisions (perhaps with the exception of the people living in regions with the most severely deteriorated environment). Systematic environmental education, especially of the young people and children, is essential for improving the situation. A consumers' society should not be our goal!

In short, it may be stated that under Communism we lived at the expense of our children and grandchildren. In the new

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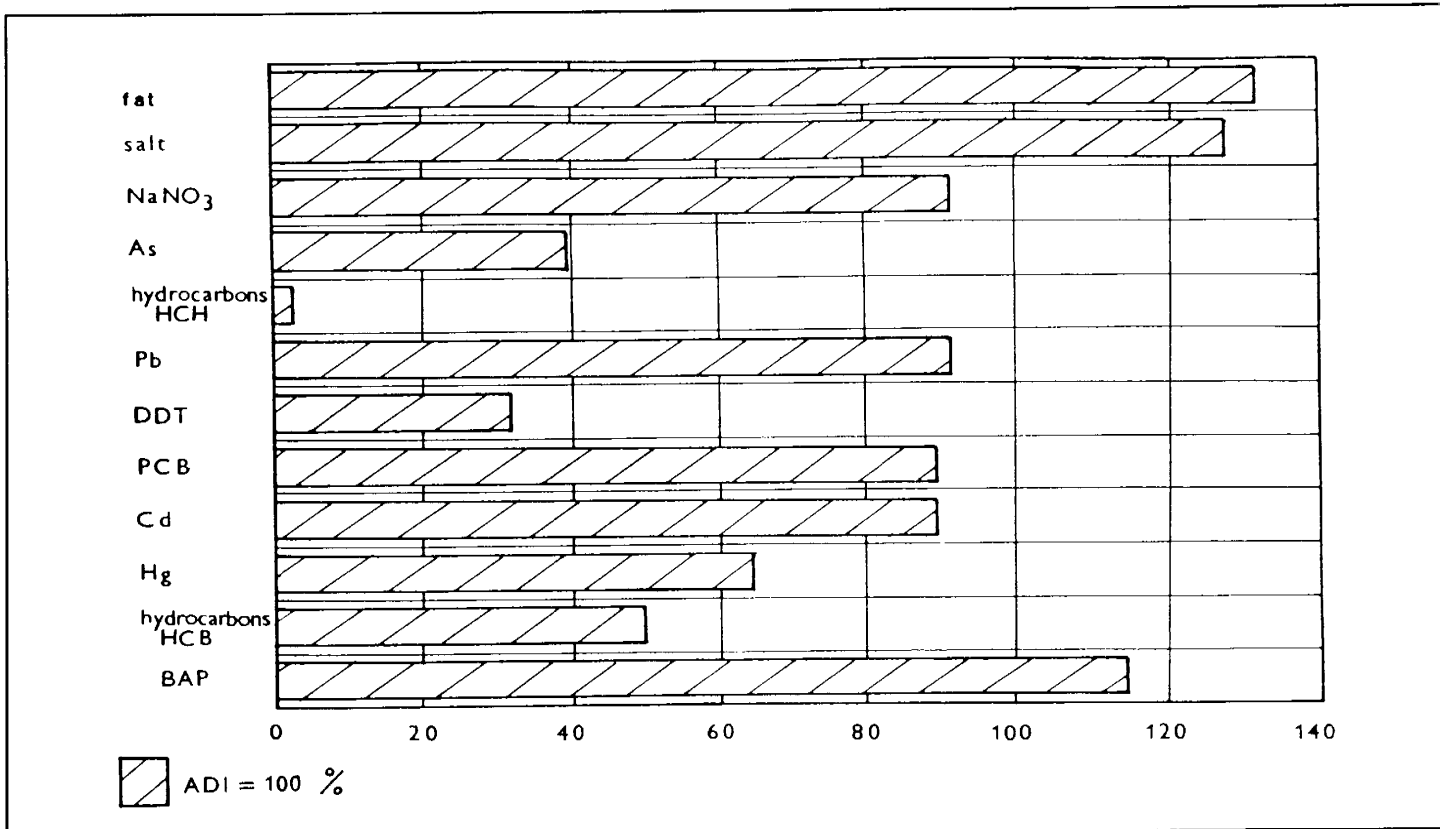


Figure 1. Contents of certain components and pollutants in the food of an average inhabitant of Czechoslovakia in 1989, expressed as percentages of the acceptable daily intake (ADI = 100%) of the respective components as defined by the World Health organization (after "Environment in the CSFR," 1991).

political and social climate, this absurd situation should change as quickly as possible. But the implementation of a profound ecological reform together with the undoubtedly necessary economic reform and restructuring of the "new democracies" production potential will be neither simple nor easy. A good many of the new politicians are inclined to favor technocratic rather than ecological thinking and "sustainable development" means hardly anything to them (not to speak about the more radical concept of "sustainable life"). The politicians must also resist the temptation to satisfy the people's material and social demands, however justified they may be, at the expense of the environment. This is difficult to achieve in stabilized democracies and seems hardly possible in the still unstable "new democracies." But the postponement of the solutions to an unspecified "future" would be much more costly and hazardous.

The above brief description of the new democracies' environmental problems shows that their ecological crisis is accompanied by a crisis of moral values: no unquestionable moral rules seem to be valid in these countries' transitional situation between a Party-controlled and a free society. The quickest remedy might seem to be a rapid restoration of

traditional values of the pre-Communist "good old times" in which, however, ecological ethics was an unknown term. That is why it is so difficult to convince the majority of both lay people and politicians of the necessity to incorporate ecological considerations in the rules for the present political, economic, and social reforms of the post-Communist societies. For example, a long-lasting effort to have an "ecological" chapter in the new constitution of the Czech Republic has been unsuccessful although Czechoslovakia has probably adopted the greatest number of "environmental" laws of all European post-Communist countries. Nevertheless, the unfavorable environment in which people and other creatures have to live can be improved only if the causes of the environmental crisis are understood and practical lessons are drawn from this understanding.

WAYS OF SOLVING THE ECOLOGICAL CRISIS

A complicating and somewhat obscuring circumstance is that the ecological crisis caused by the Communist system has occurred against the background of a global or continental environmental deterioration (greenhouse effect, overall

atmospheric pollution, acid rain, increased atmospheric inputs of nitrogen and mineral nutrients, etc.). This circumstance is often misused to weaken the ecologists' critical evaluation of causes of the ecological crisis in the post-Communist countries. But it is clear that the transformation of industry, agriculture, transport and the tertiary sphere toward the use of cleaner and/or environmentally less hazardous and more energy-saving or energy-efficient technologies did not occur under the Communist rule while it has occurred (at least to a significant extent) in most economically advanced countries of Europe. The Communist countries' seemingly strict environmental regulations had numerous weak spots and gaps and were never consequently implemented, being a part of the Communist "window-dressing" toward the rest of the world. The present democratically elected parliaments of the post-Communist countries and their governments hold several keys to an environmental improvement in their hands. They must use them wisely.

The first key is the improvement of environmental legislation which, indeed, has made substantial progress in Czechoslovakia and its constituent Republics as well as in Hungary and Poland. Former East Germany (DDR) has adopted West German (FRG) laws and each new "Land" has adjusted its own regional laws to the federal ones. Czechoslovakia, for example, has got new laws on environmental protection, nature and landscape conservation, environmental impact assessment, waste management, and air pollution as well as stricter standards of water quality. In general, the environmental standards of the Central European post-Com-

munist countries are being adjusted to those of the European Communities. Some countries, e.g., the Czech and the Slovak Republics, have created, by law, special funds to support projects aimed at environmental improvement.

The next key, of which full use has not yet been made (mainly out of fear of social unrest), is the introduction of realistic prices of energy and raw materials. Yet, these changes are now gradually taking place though different and often greatly contrasting concepts of energy policy (non-nuclear against nuclear electricity; modernization of thermal power plants; centralized against decentralized management of energy supplies; electricity and gas imports and exports; different prices of oil, etc.) are still debated among specialists as well as politicians. All parties concerned, however, acknowledge the importance of energy savings in industry, transport and agriculture, to be achieved through their modernization and increased energy efficiency (Figure 2). It is also acknowledged that the present prevalent dependence of Czechoslovakia, Poland, former East Germany and to some extent Hungary on energy from brown coal with a high sulphur content contributes significantly to air pollution and acidification in Europe (Figure 3). Remedies are being sought but they are neither quick nor cheap. A large-scale change to predominantly nuclear electricity would, in addition to its known hazards, consume the money which could be used for modernizing the thermal power plants. On the other hand, brown coal is a valuable chemical raw material: burning it all would not therefore be wise either.

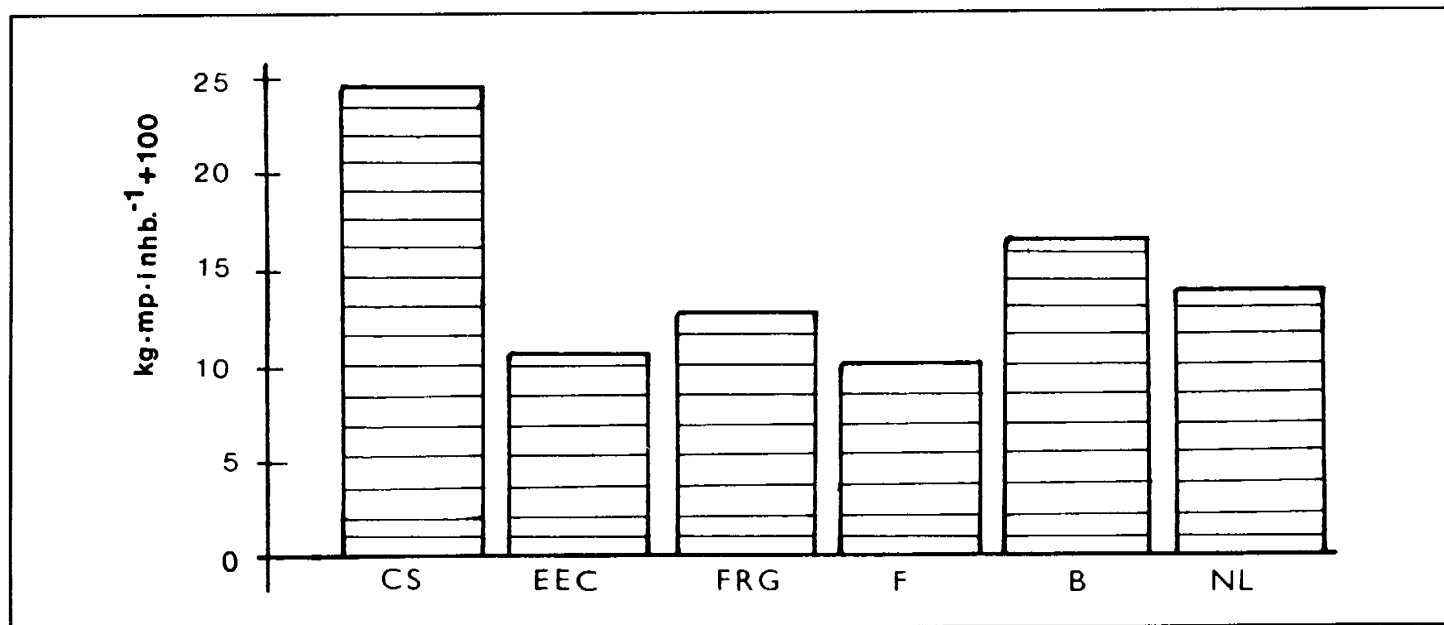


Figure 2. Per capita consumption of electric power by the industry in Czechoslovakia (CS), the whole European Economic Community (EEC), former West Germany (FRG), France (F), Belgium (B) and the Netherlands (NL) in 1988 (after "Environment in the ČSFR," 1991).

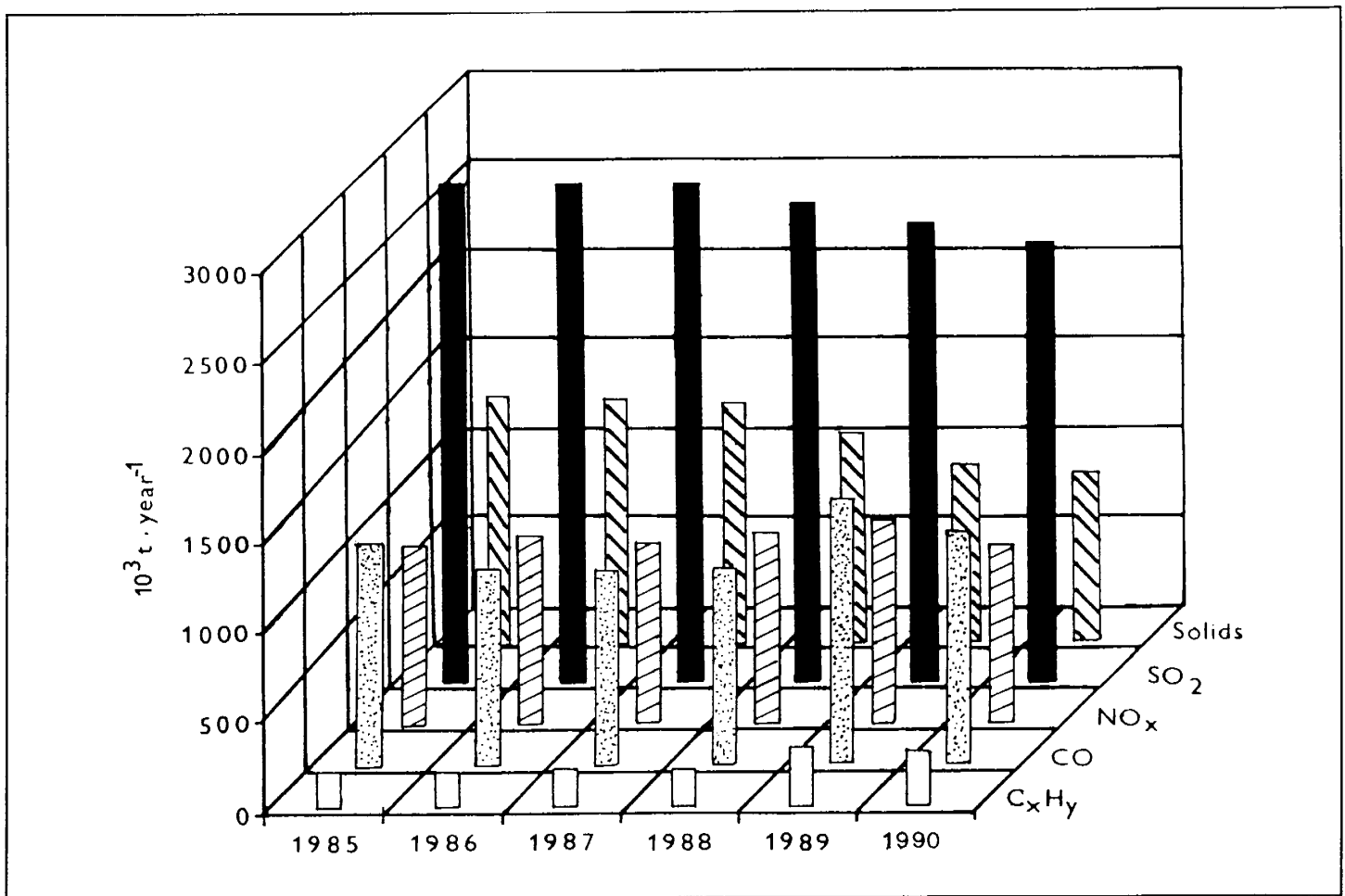


Figure 3. Czecho-slovakia's total annual emissions of the main atmospheric pollutants in 1985 to 1990 (after "Environment in the ĀSFR," 1991).

The third key, closely linked with the previous one, is the wide introduction of recycling technologies minimizing the production of residual wastes, for whose processing modern and ecologically safe technologies have to be introduced. These measures must be coupled with a modernization of transport systems, shortening of transport pathways from raw materials to final products, and an economic stimulation to public transport and ecologically less harmful means of transport such as waterways and railways. The tendency to favor road transport is still strong, but it is short-sighted and can bring only short-term benefits.

The fourth key involves the adoption of ecologically sound land-use planning and the elaboration of ecologically sustainable regional economic policies. A return to a greater variety in land use and town development, linked with more variety in the processing of local and regional resources, can help restore a healthier, more diverse (in terms of species richness), and more beautiful countryside and nicer human settlements, in contrast to blocks of prefabricated apartments which were commonly built in all Communist countries on a

large scale. Larger parts of the countryside should be reserved for nature conservation and recreation without substantially limiting agriculture or industry. Such land-use decisions leading to the restoration of the "network of ecological stability," and the support of "soft" tourism can also bring good economic returns.

Some elements of a far-sighted environmental policy, based on the strategy of sustainable development, have already been adopted by the post-Communist countries. In Czecho-slovakia, for example, the subsidies to gasoline and oil prices have been largely removed. Already in 1990, higher oil and gasoline prices have resulted in a 15% drop of oil imports. Agriculture is gradually returning to a higher share of grassland within the total cultivated area. Higher fees for waste disposal stimulate waste recycling. On the whole, however, the adoption of all the above and other desirable measures leading directly or indirectly to environmental improvement is limited by lack of funds in the post-Communist countries. The difference between the costs of the most urgent measures and the funds available is enormous in all of

them. In the Czech Republic alone, the 1992 budget has set aside some 13 billion crowns for environment-saving measures, but at least three times as much money would be needed to bring about a sufficiently fast and visible improvement. This example shows that even the most economically developed regions of post-Communist Central Europe cannot make a breakthrough in environmental improvement without substantial financial and technical assistance from abroad. This should preferably be in the form of long-term credits with low

interest rates for the purchase or development of modern technologies and machinery, and for the restoration of damaged ecosystems. Lecturing, transfer of know-how and elaboration of management plans by Western firms are useful, but expensive, and thus little effective. Often local firms or specialists could accomplish most of these tasks more cheaply and equally well, and the money could be spent directly on the accomplishment of projects for environmental improvement.

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Processes of Aquatic Weed Invasions: The New Zealand Example

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ABSTRACT

Aquatic weed problems in New Zealand are caused by introduced submerged species, particularly those of the family Hydrocharitaceae. Introduced submerged species have successfully dominated the native flora in the depth range of 1 to 6 m and spectacular invasions are still occurring. Their growth is particularly marked in clear oligotrophic lakes where weed bed heights of > 4 m and biomass values of up to 3000 g m² (dry mass) have been recorded. Turbulence due to wave action appears to be the major factor controlling the upper limits in natural growth for some species, but low nutrient level is a barrier for others. Weed movement between lakes is facilitated by interlake recreational boat movements. Native plants can re-establish in oligotrophic lakes if the invading species are controlled (e.g. by mechanical harvesting). Published literature shows that well-planned scientific experiments on weed management strategies (with adequate experimental controls) are not common. For instance, data show that large-scale natural declines in weed populations can occur which complicate the interpretation of management methods.

Key words: mechanical harvesting, dispersal, *Hydrilla*, *Hydrodictyon*, *Ceratophyllum*, *Rorippa*, *Lagarosiphon*, *Elodea*.

INTRODUCTION

New Zealand has all the world's worst aquatic weeds, and hence has a long history of aquatic weed management. Almost 20% of the country's aquatic and wetland flora are introduced (Johnson and Brooke 1989), and invasions by these species have had a major impact on the fresh waters of New Zealand. The most significant problems are caused by submerged species, in particular coontail (*Ceratophyllum demersum* L.) and members of the Hydrocharitaceae, notably lagarosiphon (*Lagarosiphon major* (Ridl.) Moss), elodea (*Elodea canadensis* L.) and egeria (*Egeria densa* Planch).

Aquatic weed problems in New Zealand lakes are largely manifested as commercial losses to hydropower stations and threats to recreational waters. Some herbicidal control is used by applying Diquat (the only herbicide registered for use in New Zealand's natural waters) from barges with spray booms, and large-scale experiments using triploid grass carp are underway (Clayton et al. 1992, Clayton 1992). However, most of the practical weed control work is done by mechanical means. This includes harvesting and routine control by:

- a. Floating booms at an angle across the current to collect floating weed masses and concentrate them at a single site on the shore for removal (Johnstone 1982).
- b. Mechanical screen cleaners which rake the penstock intake screens to hydropower stations pulling off vegetation as it accumulates. Johnstone (1981) estimated that partial blockage of screen intakes can result in losses of up to 60,000 MW hr⁻¹

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