In Commemoration of the Visit to Sapporo of
His Majesty King Carl XVI Gustaf of Sweden

Abstracts of

Symposium on Environmental Challenges of Today

17 March 1990
Sapporo

Executive Committee for the Symposium on
Environmental Challenges of Today

Preface

Kenzo Yagi

The U.N. Conference on Human Environment held in Stockholm in 1972 attracted the attention of the world to the importance of the global environment problems, and its motto "Only One Earth" raised our affections for our Planet. The reason why this Conference was held in Stockholm was obvious : because of the high awareness of environment protection among the Swedish people.

Therefore, we were deeply impressed when it was informed by the Royal Swedish Academy of Science and Technology in fall of 1989 that they wished to have an international symposium on environment between Sweden and Hokkaido on the occasion of the visit to Sapporo of H.M. King Carl XVI Gustaf of Sweden in March 1990, and that this plan was based on an idea put forth by H.M. himself.

In responce to this proposal, an executive committee headed by Mr. T. Tojo was organized by the representatives of Hokkaido Government, Hokkaido University, Northern Regions Center, Nature Conservation Society of Hokkaido, and many other organizations.

Through a close contact between the Swedish Academy and the Committee, the outline of the symposium was decided as follows :

The symposium would be held under the joint auspices of the Royal Swedish Academy of Science and Technology, the Sweden-Japan Foundation for Research and Development, and many organizations in Hokkaido.

The title would be "Symposium on Environmental Challenges of Today" in commemoration of the visit to Sapporo of H.M. King Carl XVI Gustaf of Sweden. Four speakers from Sweden and two from Japan would present their papers, and four commentators from Japan give their comments on Swedish papers. It would be chaired by Mr. Axel Iveroth, Honorary Chairman, Sweden-Japan Foundation for Research and Development, and Dr. Norihito Tambo, Professor, Faculty of Engineering, Hokkaido University. Presentation would be either by English or Japanese, and with simultaneous translation.

Based on this plan, the following speakers were chosen :

Swedish speakers :

Dr. Lars A. Kristoferson, Vice Executive Director, Stockholm Environment Institute

Prof. Lennart Schotte, Chairman, Royal Swedish Academy of Agriculture and Forestry

Dr. Valfrid Paulsson, Director General, National Environmental Protection Board.

Mr. Jens Wahlstedt, Secretary-General of WWF-Sweden

Japanese speakers :

Dr. Shizuo Tsunogai, Professor, Faculty of Fisheries, Hokkaido University

Dr. Yukio Kurimura, Director General, Department of Health and Environment, Government of Hokkaido

Japanese commentators :

Dr. Etsuo Yamamura, Professor, Graduate School of Environmental Science, Hokkaido University

Dr. Sachio Ohta, Associate Professor, Faculty of Engineering, Hokkaido University

Dr. Yugo Ono, Professor, Graduate School of Environmental Science, Hokkaido University

Dr. Kenzo Yagi, Emeritus Professor, Hokkaido University

Dr. Saburo Okita, Chairman, WWF-Japan

Prior to the Symposium on 17 March 1990, a meeting of specialists was held in the morning, and the speakers and commentators discussed their problems in a friendly atmosphere.

The Symposium was held in the afternoon of the same day, according to the following program. Abstracts of the papers and comments are given in the following pages.

PROGRAM

Opening Address : *Mr. Takei Tojo*
Chairman, Executive Committee for the Symposium

Welcome Address : *Mr. Takahiro Yokomichi*
Governor of Hokkaido

The Speech from His Majesty King Carl XVI Gustaf of Sweden

Presentations :

1) Environment and Energy—the Global Challenge
Dr. Lars A. Kristoferson
Comment
Dr. Etsuo Yamamura

2) Acid Rain and Forestry
Professor Lennart Schotte
Comment
Dr. Sachio Ohta

3) The Sea Protecting Our Planet
Dr. Shizuo Tsunogai

4) Hokkaido's Approach to Environmental Problems—Think Globally, Act Locally
Dr. Yukio Kurimura

5) Development of Environmental Policy—the Swedish Experience
Dr. Valfrid Paulsson
Comment
Dr. Yugo Ono

6) Protection of Nature—World Wild Fund and Global Conservation
Mr. Jens Wahlstedt
Comment
Dr. Kenzo Yagi
Dr. Saburo Okita

Summation : Co-Chairmen
Mr. Axel Iveroth
Dr. Norihito Tambo

The Speech from His Majesty King Carl XVI Gustaf of Sweden

Opening Address

Takei Tojo

Today, the environmental crisis is attracting the world's attention as a problem that will affect the survival of human race. For this reason, it is a great honor and pleasure for us to hold the Environmental Symposium here in Hokkaido with His Majesty King Carl XVI Gustaf of Sweden, and, in cooperation with Prof. S. Olving, Chairman of Royal Academy of Science and Technology, Mr. A. Iveroth, Honorary Chairman, Sweden-Japan Foundation for Research and Development, Mr. T. Yokomichi, Governor of Hokkaido, Dr. Y. Ban, President of Hokkaido University, and all Swedish and Japanese people concerned.

Our planet is now suffering from unprecedent phenomena, such as global warming, changes in climates, destruction of the ozone layer, and acid rain. When we consider that most of them are the results of technological development, all the countries and all the citizens now have to take radical measures in order to get the solution.

In this Symposium four Swedish experts and two specialists from Hokkaido will present the means by which they are wrestling with environmental problems. I strongly hope that Sweden and Hokkaido will share their mutual understanding of our environmental crisis through this Symposium, in order to build our further cooperation in this field.

As a matter of fact, the concept of this Symposium is based on an idea put forth by His Majesty the King of Sweden himself, and became possible under the joint auspices of the Royal Swedish Accademy of Science and Technology and the Sweden-Japan Foundation for Research and Development, and through the great cooperation of other influential people. I wish to take this opportunity to express our great gratitude and respect to His Majesty and all Swedish people concerned. I wish also to express my thanks to all organizations in Hokkaido for their strong support to make this Symposium possible.

Last I do hope that this Symposium will be fruitful for all the attendants here, and that His Majesty and the Swedish delegates will enjoy their stay in Hokkaido.

Welcome Address

Takahiro Yokomichi

It is a great honour for us in Hokkaido to receive the delegation headed by H.M. the King of Sweden. On behalf of the 5.7 million people in Hokkaido, I would like to extend our hearty gratitude and welcome to you. We are very pleased to hold this Symposium on the environment here in Hokkaido with the attendance of H.M. I wish to express our great gratitude to H. M., and the representatives of the Swedish Royal Academy of Science and Technology, and the Sweden-Japan Foundation for Research and Development for their support for this Symposium.

We are now facing the ruin of the global environment, such as acid rains, global warming, destruction of the ozone layer, etc. For the protection of the global environment, we have to work together beyond national boundaries.

It is quite appropriate to hold this Symposium to listen to and discuss many problems with many specialists from Sweden, which is well-known for the protection of nature. The needs on a global scale for the construction of communities with rich greens are now increasing. We are now trying to build a model for the harmonious coexistence of human beings and nature here in Hokkaido, too.

We wish to learn much from the Swedish experiences for protecting the beautiful natural environment in your country, covered with forests and lakes.

Again, last but not least, I wish to express our gratitude to H. M. for his attendance, and also to the Swedish delegates and Japanese people for their strong support for this Symposium.

The Speech from His Majesty King Carl XVI Gustaf of Sweden

The environment is a global net, tieing all people and all nations together. The motto of the First U.N. Conference on the Human Environment held in Stockholm in 1972 "Only One Earth" has proved to be more accurate than ever guessed at that time.

Of course the real question is what the world of tomorrow with population of 10 billion people looks like. Can we build really good envronment for every one to live in?

Today lack of resources leads to environmental decline in the poor countries, and in rich countries life style leads to waste and pollution. But it is also clear that we can combine a good standard of living with clean envrionment. This requires both clean technology and sensible way of living.

History has made remarkable development of highly industrialized societies, which have been deeply effective on environment.

In order to avoid future catastrophy, mankind has to take full responsibility for its future, and becomes a true planetary manager.

To preserve an environment fit for survival is a challenge. We cannot solve the problem of this extent individually or in one nation. We have to cooperate on international level. Highly industrialized societies like Japan and Sweden have special responsibility. These countries have resources and technology, and can show examples for other countries to preserve clean atmosphere, water and nature.

I am convinced that this Symposium is one important step towards further cooperation between two countries.

Distinguished experts who have gathered here guarantee a high level of discussion. I therefore look forward very much to next few hours, and hereby I declare the "Symposium on Environmental Challenges of Today" is open.

Environment and Energy —— The Global Challenge

Lars A. Kristoferson

In the last decade, the global outlook has certainly changed dramatically. Here I would like to introduce a discussion on these important topics, particularly as regards the growing impotance of environmental factors in shaping the global energy future on both national and international levels.

Energy is but one sector that gives environmental concern. It may, therefore, be of interest to put energy in context of overall environmental issues and discuss its relations with a number of other important global matters.

We now have profound changes : Ozone depletion and the "greenhouse effect". An equally powerful constraint on environmental improvement is the growth of population. It seems inevitable that the 5 billion population of the world today will reach 10 billion in the early 21st century. How can we turn the currently high unsustainable world onto a future path of sustainability?

Global and regional energy/environmental aspects are now rapidly entering international politics and show signs of becoming permanent features on the international scene. Energy issues figured high in the 1987 report of the World Commission for Environment and Development (WCED) has lead to many follow-up actions.

All enrgy systems, including energy supply, conversion and use, have adverse as well as beneficial impacts on the environment. What is important to recognize is that the impacts are different in both quality and quantity. In some cases the impact occurs on the same group of people who enjoy the benefits, and in other cases it could be a different group either in space and in time. In many cases their costs are borne not by energy producer or user, but all distributed over society as health care costs or water purification costs. It is important to improve the existing methods of planning, analysis and comparison of energy systems with regards to the true cost to society.

Fuel-cycle approach facilitates comparison between various energy/environmental policy initiatives or choices of energy sources. Fuel-cycles of fossil fuels (coal, oil, and gas) and nuclear and renewable energies are briefly commented upon. Obviously coal is more difficult to control than oil and gas for most of the pollutants.

Acidification is the single largest environmental problem connected to energy today. Following an intensive debates and international meetings, more countries are now joining the so-called "30 % Club". If the political momentum is to stay, and if the introduction of new technologies continues, elimination of large scale acidification may become a major environmental success story by the turn of the century.

Nuclear power represents one of the few nonfossil energy sources with a real growth potential, but its future is covered with clouds, because of the enomous potential for environmental and health damages.

Climatic changes and greenhouse gases are now most important problems. Release of CO_2 and other gases result in a build-up of "greenhouse gases", which may lead to a global increase in mean temperature of some 1.5—4.5 ℃. Profound changes in precipitation patterns, and a rise in sea-levels of between 20—100 cm are anticipated. These changes are, however,

still diffuse concepts in the minds of most energy analysts and policy makers. Both the acidification and the greenhouse effect have the possibility to strongly affect the future of fossil fuels.

In the "Energy for a sustainable world" Goldberg et al. argue that global economic and development goal for the next several decades can be met with about the same level of energy use as today. Summing up, it is quite clear that sustainable energy futures are possible from a technological point of view, at least given the definition offered by the Commission (WCED).

The most important factor in achieving the goal of energy sustainability is to slow down enrgy growth in industrialized countries, which will buy time, give better possibilities for the developing countries to find energy policies that support a sustainable improvement in their living conditions.

Adequate energy provision and a good environment are able to coexist.

Adaptation to a Sustainable World

Comment by Etsuo Yamamura

Many global environmental problems are induced by the consumption of energy. In turn they are now putting strong constraint on the energy supply. How can we change the present lifestyle characterized by overuse of energy, in order to realize a sustainable world?

Saving of energy is one of the most important options.

Walk vs taxi, Use of public transportation vs driving of private car, Alternative energy (solar, wind, biomass) vs fossil fuels.

Now about 70—80% of the world population live in the urban areas, where energy is overused. Therefore the present urban areas should be reformed into compact cities, which do not require much energy. Two million people can live in a compact city, with a radius of 2,640m and a height of 144m. For transportation in such cities people need only walk or an elevator, resulting in great saving of energy. Actually in Calgary, Canada, high buildings in the downtown are connected with skyways. When such compact cities are built in the desert, solar energy can be used.

CO_2 generated in the industrialized countries is first liquefied and then carried to the developing countries, where H_2 is produced by solar energy. Thereafter the ethanol formed by the reaction of H_2 and CO_2 can be used as fuel.

It is important to turn the present world with overuse of energy onto the energy saving one, following the model of a sustainable world.

Acid Rain and Forestry

Lennart Schotte

Air pollution has been one of the most serious threats to our environment. Lakes and soils have been acidified. Forests are damaged in vast areas. We are dealing with chemical stress factors causing disturbances in ecosystems.

While the scope of the problem is international, the scale of each instance is local to regional, due to two sets of factors. One, the forests are different from region to region, and are differentially susceptible to air pollutants and other stress factors. Two, the spectrum of air pollutions differes from region to region. Thus strategies to combat forest decline should be related to the local or regional scale, yet the strategies must be set firmly in a context of the international arena to take account of transboundary air pollution and trades in raw materials.

The necessary solution to the problem means a complete control program of emission from different sources of sulfur dioxide, nitrogen oxides, hydrocarbons, heavy metals and oxidants. The complete control of the air pollution problem is in hand of mankind and no doubt possible to achieve.

Let us consider the present emission pattern over Europe. Improvements in terms of reduced sulfur dioxide emissions in Northwestern Europe but only minor changes in Eastern Europe are obvious. Expectation of improvement for nitrogen oxides emission is only marginal.

Theories and opinions about forest damage mechanisms are numerous. There are three major chemical stress mechanisms involved. First, the direct impact on needles and leaves by different chemicals such as sulfur dioxide, nitrogen oxides, ozone or hydrocarbons. The effect might be leakage of K, Mg, Mn, etc from leaves. Water balance of the tree is disturbed. In highly polluted area forests decline or even complete forest death is likely to be observed.

Second, another mechanism involves nitrogen saturation. Although nitrogen oxides deposition has a role of fertilizer, this eventually turns into an excess of nitrogen, and nitrate ions leaving ecosystems together with other metal ions from nutriments. Ca and Mg are leached from the system. Third, the mechanism of acidification. In the range of pH 4.3—4.4 Al ions are released from big organic complex, aluminates, which means a possible root injury. The relation Ca vs Al is critical, and this quotient should not be below 0.5.

Thus acid rain creates ecosystem disturbances in different ways. The negative effects are related to the amounts of deposits and also to the sensitivity of the forests. By definition damage is considered with losses of foliage more than 10% for non-coniferous species and more than 25% for coniferous species. The decrease in million m^3 per year in potential wood supply during the next 100 years with the present deposition patterns up to year 2000 is about 85, which corresponds to 20% of the present removals in Europe.

Against this background, the concept of critical loads limits of survival on a sustainable basis for sensitive species in different ecosystems should be adopted all over a nation as a target for emission reductions. Although the concept is rather pragmatic, the fact that most of the European forest have depositions by far exceeding the citical loads is alarming.

Among the components of forest management the development of tree species with a better resistance to chemical stress factors plays an essential role, mainly in Central East Europe.

Affected ecosystems have to be rebalanced and protected by vitality fertilization, including liming and treatment with dolomite, with K, P, etc. Such a fertilization cost 350—400 US$ per hectare.

There is a strong call for international cooperation in any efforts to combat the consequences of continued forest decline.

Acid Precipitation and its Effect on Forests in Japan

Comment by Sachio Ohta

Japan Environmental Agency (JEA) has made measurements of the acid rains at 29 stations in Japan during 1984—87. The average pH measured at each station ranges from 4.5 to 5.1. Since natural rain without human effect has pH 5.6 at 20℃, so we can say that acid rains fall all over Japan. Annual mean deposition of non-sea salt SO_4^{2-} ions (due to only human activity) over Japan is $3.8\,gm^{-2}yr^{-1}$, and attains to $6.0\,gm^{-2}yr^{-1}$, which is even more than the values of $3.0—4.7\,gm^{-2}yr^{-1}$ in the U.S. Annual mean deposition of NO_3^- ions is $1.7\,gm^{-2}yr^{-1}$ over Japan. The Metropolitan areas are likely to have deposition peaks of NO_3^-, which are the same level as those in the U.S. During 1975—79 we measured highly acidic fog with pH less than 2.80 on the top of Mt. Tsukuba near Tokyo.

JEA made survey on the effect of acid rains on the soil and growth of plants using the soils collected from 12 sites in 4 prefectures in Japan. In the experiments artificial acid rains with pH 3 and 4 were run through the soil columns for four years (1983—87). As compared with blanck test using distilled water, the amounts of leached cations were the same in the case of pH 4, but were doubled in the case of pH 3.

In the planting experiments of buckwheat on the three kinds of soils, no difference was observed in the way of sprout. However, clear difference was present on the height of plants as follows :

Soil treated with distilled water	normal
Soil treated with acid rain pH 4	-10～-20%
Soil treated with acid rain pH 3	-30～-50%

The Sea Protecting Our Planet

Shizuo Tsunogai

The total mass of the ocean water is 270 times as much as the air mass and its heat capacity is indeed 1100 times as much. This is the reason why the earth has so mild climate, suitable for human survival.

The role of CO_2 as a greenhouse gas has been paid much attention in recent years, but this shoud be discussed in the context of the geochemical cycle of CO_2 chiefly through the atmosphere and the sea. The amount of CO_2 dissolved in the ocean is 52 times as much as that present in the atmosphere. The concentration of CO_2 was 280 ppm at the beginning of the Industrial Revolution age, but attained to 350 ppm in 1989. It is generally understood that the global climate warming in the recent years is due to the greenhouse effect of CO_2 and other gases, but the effect is rather complicated. This effect keeps an average temperature of 15℃ at the earth's surface, while it would be −25℃ if this effect was absent.

In the past one million years, the glacial ages (CO_2, 200ppm) and the interglacial ages (CO_2, 280ppm) appeared alternately each 100,000 year interval (the Milankovitch Cycle). This change has been proved to be coupled with the change in the atmospheric CO_2 content, which might be caused by the small change in the solar irradiation due to small fluctuation of the earth's orbital elements. This means some feedback processes have worked between the atmospheric CO_2 and the earth's climate, and I expect the important role of the ocean in the feedback processes.

The most characteristic feature of phenomena occurring in the ocean is of a long time-scale. The cold and saline deep water is formed in the North Atlantic and flows to the North Pacific via the Antarctic Ocean. It is estimated to take about 2000 years for its long journey. As the ocean is strongly stratified, the deep water altered by human activities is preserved for a long time. This indicates that we should consider the environmental problems in the seas by a scale of 1000 years.

Eutrophication of the sea caused by the human activity may steadily increase the area of anoxic water found in the eastern Pacific even now and change the marine ecosystem. The chemistry of seawater seems to be important for the change. The eutrophication increases only phosphate and nitrate, but not silicate which is essential only for diatoms. This means the eutrophication induces the increase in flagellata and dinoflagellata including poisonous plankton. The change in the primary producers in the ocean may also change the secondary and tertiary producers (zooplankton and animals), which were prosperous in the Mesozoic era. We have found the propagation of calcareous organisms in the eutrophic water lacking in silicate, which causes the escape of CO_2 from the ocean to the atmosphere (opposed to the formation of organic matter as a sink of the atmospheric carbon).

Long range researches on the geochemical cycle of carbon between the atmosphere, the sea and oceanic sediments are necessary for the future earth in good conditions.

Hokkaido's Approach to Environmental Problems
—— Think Globally, Act Locally ——

Yukio Kurimura

Hokkaido, occupying 22% of the total area of Japan, is famous for its spacious natural beauty and has many national parks such as Daisetsu, Kushiro, Shiretoko, etc. Recently, however, we also have many environmental problems, including urban pollution, pollution due to insecticides, destruction of nature, etc. Below some major problems are described, together with our approach to them.

First, air pollution in the urban areas caused by the use of spike tires has become so serious, that the Hokkaido Government set an ordinance to provide strict regulation for the use of spike tires, aiming at their final prohibition. In 1989 the "Plan for Environmental Management" was formulated, which is expected to be a basis for the protection of nature and establishment of a pleasant environment. All the plans of facilities related to the environment should be regulated by this plan.

The "Direction for Protection of the Environment" also formulated in 1989, will serve as a guide for the long range conservation of the environment, and also the protection of endangered species such as fish-owl, etc.

"Tokyo Conference on the Protection of the Global Environment" sponsored by the Japanese Government in 1989 declared a statement to attain the goal of sustainable development. In cooperation with this Conference, the Hokkaido Government has been trying to raise awareness among the public on the environmental problems by means of lectures, panel exhibitions, demonstration of eco-mark goods and recycling, etc. Surveys and research on acid rain and its effects on forests and lakes are promoted. We give regulations to factories not to use freon or related gases harmful to the environment.

Hokkaido has sent many specialists to developing countries, such as Turkey, Korea, and Malaysia, etc. since 1984 for technology exchange in the field of environmental protection. We hope to expand this plan, including cooperation with Sweden and other northern countries.

The "Assessment of Environmental Effects Ordinance" already passed by the Hokkaido Diet in 1978 has been effective in preventing damage to the environment through large scale construction. We have now 116 plans for resort development in Hokkaido, and proper arrangement is indispensable for protection of the environment and prevention of pollution in the water and air.

We are now trying to invite a conference of the Ramsar Convention for marshland protection to Kushiro in 1993. The "Hokkaido Fund for Environmental Protection" proposed for the Diet is to raise a 600 million yen fund for environmental education, fostering of voluntary leaders, monitoring, and related activity.

In conclusion I wish to emphasize the importance of the motto "Think globally, act locally" when we are considering the environmental problems.

Development of an Environmental Policy
—— The Swedish Experience ——

Valfrid Paulsson

Sweden has taken an active part in international cooperation since the 1972 U.N.Conference on the Human Environment in Stockholm.

Major pollution problems : National problems comprising air pollution due to automotive traffic or house heating have been much improved. Transboundary problems, however, are more serious. Large quantities of acid sulfur and nitrogen compounds released upon burning fossil fuels have given rise to acidification problems, which is one of the most important environmental problems of the 1980s. It is estimated that some 15,000 lakes and 100,000km of streams are damaged. A special problem is that about 90% of the acid deposition in Sweden comes from foreign sources.

Organizational arrangements : Responsibility for environemental matters is vested in the Ministry of Environment and Energy, and the National Environmental Protection Agency is the central administrative authority in the environmental sectors. The main responsibility for environmental protection at the regional level rests with the 24 County Administrations.

Basic legislation comprises the Environmental Protection Act (1969), the Environment Protection Ordinance, the Act of Chemical Products (1986), the Ordinance on Vehicle Exhausts (1986), the Planning and Building Act (1987), and the National Resources Act (1987). The elements of a national environemental policy are dependent on political decision, which in turn is influenced by public opinion, national economy, scientific and technological information. The objective of the policy is to stop current damage and to restore environment which has already deteriorated. Sustainable development is a goal for an environmentally sound economic development.

Specific goals : Three different categories of substances are considered. Persistent organic synthetic chemicals (DDT, PCBs, CFCs, etc), persistent natural substances(metals, CO_2, NO_2, etc), and the others. In environmental assessments of organic synthetic chemicals, the terms "persistence", "bioavailability" and "ecotoxicity" are central. Ultimate aim of environmental management is to ensure that persistent compounds do not enter the environemnt.

Pollutants with negative effects upon health comprise carcinogenic and genotoxitic substances and generally toxic substances. According to the extrapolation model, one can not state any "safe" level of exposure. Risk of damage decreases with decreasing exposure and is only zero when exposure is reduced to zero, i.e. there is no "threshold value".

Sector planning : Sustainable development is a basic requirement for all sectors of society, such as energy, transportation, industry, agriculture and forestry. Economic measures have so far been used on a limited scale to achieve environmental goal in different sectors, and can create incentives for a more efficient use of resources, and new environmentally sound technologies.

Awareness raising and public participation: The concern for the environment is strong in Sweden. One explanation for this is the common law of free access to the natural environment. The old right to move freely in the countryside and to pick up wild berries and mushrooms promotes the public's involvement and feeling of having a say in the use of

natural resources and the attitude to nature.

International cooperation : Principle 21 of the Declaration of the Stockholm U. N. Conference 1972 declares that states have the responsibility to ensure that activities within their jurisdiction do not cause damage to the environment of other states or areas beyond the limits of national jurisdiction.

Industrialized countries carry the main responsibility for problems like climate change and depletion of the ozone layer. International cooperation in research and monitoring and in the development of abatement strategies is essential.

We must think globally but act locally.

Environmental Policies in Japan

Comment by Yugo Ono

Environmental controls in Japan bagan in 1960s after experiencing a series of serious pollution problems such as Minamata disease (caused by organic mercury poisoning) and Itaiitai disease (caused by cadmium poisoning). Basic laws for environmental pollution control were established in 1967, and the Environmental Agency was established in 1971. Most of industrial cities and large urban areas established regional pollution control programs between 1970 and 1977. They cover air and water pollutions, soil degradation, noise, vibration, ground subsidence and offensive odors. The level of environmental quality standard (EQS) is high, especially in the counter measeures of air and water pollutions.

Natural conservation measures designated five widerness areas (5,631ha), nine nature conservation areas (7,550ha) and four hundred and ninety-six prefectural conservation areas (71,800ha). Furthermore, Japan has twenty-eight national parks, fifty-five quasinational parks and two hundred and ninety-nine prefectural natural parks. They cover 5,330,000 ha which corresponds to about 14% of the national land area. However, the management of Japanese national parks has several problems for the purpose of natural conservation : lack of strong counter measures for the developmental activities in the park, and insufficient number of officials.

As for a global environmental problems, Japanese contribution increases every year in view of financial aid and technology. Especially for the solution of environmental problems of Eastern Europe, there will be possibility of closer cooperation between Sweden and Japan.

Protection of Nature—World Wildlife Fund and Global Conservation

Jens Wahlstedt

WWF—formerly World Wildlife Fund, and now World Wide Fund for Nature—was founded in 1961, at a time when few people were aware of the threats to wildlife and to our natural environment. Few cared, and hardly anyone did anything about them.

In spite of our youth, WWF is today the leading non-governmental organization in the world for conservation of nature and environment. We now have Affiliated National Organizations in 23 countries, including WWF-Sweden, and WWF-Japan, and Associate Organizations in 4 countries.

HRH the Duke of Edinburgh, Prince Philip, is a very active chairman of WWF-International and H.M.the King of Sweden, Carl XVI Gustaf is chairman of WWF-Sweden. Here in Japan, HIH the Prince Fumihito is President of WWF-Japan and Dr. Saburo Ohkita is Chairman.

WWF's mission and conservation programme have evolved in four stages.

First stage of WWF: The first stage was to get across our conservation message and to raise funds for fire brigade actions. WWF at first concentrated on spectacular endangered species such as rhino, tiger, polar bear, and thousands of other endangered species around the world.

Second stage of WWF: However, we soon came to realise that concentrating on species and protected areas was not enough. We needed to pay attention to important ecosystems, which led us to our second stage to protect areas such as tropical forests, wetlands, and mangroves, the Antarctic and the Arctic, and coral reefs. Our strongest motive has been and still is, an ethical one.

Thirs stage of WWF: However, to gain wide support, we also had to deal with the socio-economic implications of nature conservation. In particular partnership with the World Conservation Union and the United Nations Environment Programme (UNEP), WWF developed the World Conservation Strategy which was unique, because, for the first time, it showed that long term conservation and development were not in conflict, but to the contrary, necessary, one for the other.

In order that this strategy caught the attention of decision makers, it was launched, in the presence of heads of state and government, on the same day, 5 May 1980 in 32 capital cities in the world.

In 1986 we marked our 25th anniversary in Assisi, by establishing an alliance with representatives of the leading religions of the world, to emphasise our deep commitment to the principle that other forms of life have a right to share this Earth with us.

Fourth stage of WWF: The fourth stage is to expand our mission and scientifically based programme to tackle these root causes. We shall attack the problems of wasteful consumption and pollution by providing advisory services to the general public. We are demonstrating to governments and industry how to work in harmony with nature.

Conservation of the tropical forests: Finally—when we have so many important people from Japan here today, I would like to emphasize the case of the tropical forests. The rapid destruction of tropical forests is now a tremendous threat to unique biological diversity. Every year an area more than that of Hokkaido

will disappear. The Japanese industry is responsible for more than half of all world trade with tropical hardwood.

On behalf of WWF, we would like to take this opportunity to plead to all of you, who feel responsible for the survival of the tropical forests : Please try to do your utmost to influence the industrialized countries including Japan, to reduce the present destruction of tropical forests, before it is too late.

Conservation and development must not be competitive, but work together, as they are dependent on one another.

Japanese Attitude to Protection of Environment

Comment by Kenzo Yagi

Japanese people have been known as lovers of nature for many years. However, we have not had enough awareness of nature conservation or protection of environment, probably due to the following reasons. First, in Japan plants can grow easily and recover even after destruction owing to our mild climate and sufficient precipitation. Second, Japan is completely surrounded by oceans and has no border with other countries, and third, the lack of environmental education for children. Fourth, the Japanese have lost their simple life style during the miraculous economic development after World War II, and have become too much economy-oriented. As the results of these facts, public concern for the environment is not strong in Japan, when compared with other countries, especially Sweden.

Thus the "Assessment on Environmental Effect Act" which should impose strong regulation on development, finally could not pass the Diet, whereas the "Resort Act" was approved at once in 1987, resulting in the rush of resort planning all over Japan. Here in Hokkaido we now have 116 projects, including construction of many golf courses.

When these plans were completed, many will not survive due to intense competition, leaving badly destroyed nature behind them. Now many people are beginning to worry about the situation, and there are many grass root movements against such overheated planning of resort development. Through these activities awareness of the importance of environmental problems has been raised among the political and industrial leaders and also many people.

Some examples follow : Governor Yokomichi proposed a 21% increase in the 1990 budget for environmental protection in Hokkaido. An advisory committee of the Ministry of Forestry proposed "A Decade Plan for Protection of Tropical Forests", and Prof. Miyawaki presented his plan for restoration of devastated tropical forests based on his study. And so on.

In conclusion, Mr. Wahlstedt mentions "Conservation and Development must not be competitive, but work together". I agree with him. Economy and Ecology have the same root of Greek "oikos" meaning house. Now, let us start our international cooperation between Sweden and Japan for the goal of "sustainable development", including the prompt action to protect the tropical forests.

Activities of WWF-Japan

Comment by Saburo Okita

Recently awareness of nature conservation has been rising in Japan. Members of WWF-Japan increased from 4,000 as of February, 1989 to 6,700 in February, 1990, although still far less than those of many other countries. H.I.H. Prince Fumihito President of WWF-J has much interest in its activities.

Our generation has been so deeply involved in the reconstruction of the defeated economy that we could not pay much attention for environmental problems. However, Japan is now responsible for contribution to the global environment through its economic, scientific and technological abilities.

First, I will mention the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington Treaty) for protection of endangered wildlife ratified in 1980, when I was the Foreign Minister. TRAFFIC Japan established as an *ad hoc* committee of WWF-J has been working as a monitoring arm of the international trade of wildlife in Japan. Conservation of the South-western Islands (Nansei Shoto) is another big issue. The Duke of Edinburgh, President of WWF-International, stressed the importance of their protection as world heritage when he visited Japan some years ago.

As for the tropical forests, International Tropical Timber Organization (ITTO), whose headquarters is located in Japan has been trying to contribute for the protection and utilization of tropical forests through channelling funds. Kushiro City is now going to invite the General Meeting of the Ramsar Convention for protection of marshland in 1993.

Recently, the Japanese Government begins to place much emphasis on global environmental problems. In the Paris Summit in 1989, the Japanese Prime Minister made a commitment to donate 300 billion Yen (2.2 billion US $) for the environmental protection in developing countries. By this fund plans for establishing research institutions for environmental problems are now going on in Beijing and Bangkok.

As a result of the Japanese proposal in the Nairobi Conference in 1982, to establish an international commission for global environmental problems, the World Commission for Environment and Development (WCED: chairman, Brundtland, Prime Minister of Norway) was established in the United Nations in 1984, and the Tokyo Declaration, appealing for "Sustainable development", was issued at the Conference of WCED in 1987.

We wish to continue and strengthen our efforts to contribute for the protection of the global environment.

Summation 1

Axel Iveroth

At first co-chairman and I made an agreement not to push alarm bell during the discussion. We now live in the society full of ecological and environmental problems. The responsibility of the industrialized countries is great. How we are using energies and natural resources, and producing the wastes? If nothing is done, the result will be aggravation of the environment, followed by the ecological crisis.

World population which was 5 billion in 1987 could probably be 10 billion in the middle of 21 century. When all these increasing people have basic needs to maintain living levels, this will increase burden on the natural resources and environments. All nations are now convinced that most of the great environmental subjects will be either won or lost in 1990s, and by the next century it is too late.

It should be remarked that the destruction of environment occurring in one country is never limited within that country. Pollution is really international, crossing over the national boundaries, as remaked by all speakers today. Basically every country should try to adopt common world strategy, besides its own strategy, knowledge and technology on local condition. It is important to create technology to overcome the environmental problems by international response and international policy.

Technology transfer or transfer of resources to developing countries should be encouraged also in the fields of environmental problems. Especially the aids for Eastern Europe is urgent. How far can we clean up the already degraded environment, or how can we make products which do not destry the environment is very important. Sustainable development is our final goal. For this purpose we have to check the manufacturing process of the products and the service in many fields.

We have to emphacise the way of clean usage and recycling as adovocated by the Greens. Establishment of healthy policy for environmental problems is the responsibility of all nations, and this should be pursued in parallel to the economic activity.

Ecological progress on a large scale is not possible without the international consensus. We have to find out some systems, similar to those in the international trade exchange, also in the field of global environmental problems.

Japan and Sweden have lot common characteristics, especially in the field of environment, and both countries have been active for protection of environment. Possible international cooperation comprises treatment of wastes, adoption of Japanese technology for clean environment, exchange of delegations of specialists, etc.

In conclusion we wish to express our hearty thanks to H.M. the King of Sweden. As he remarked this Symposium is the first step to the solution of the environmental problems. We are also grateful to the various organizations in Hokkaido and many Swedish people for their support for this Symposium.

Summation 2

Norihito Tambo

Today we are recognizing various fatal deterioration of our living environments on the global scale. In addition to this many potential difficulties are about to occur. All these phenomena indicate that modern structure established during the last 200 years are now about to cease with global scale. This modern society has been dependent on the high speed mass transportation technology driven by fossil energy. The performance of the society has been evaluated by quantitative measures.

Various environmental issues on this planet discussed in this afternoon request a pressing need for a quick change in the human way of life. Now we shall have to transform the modern society of quantitative scale and growth orientation into a qualitative matured society with multiple measures.

It is indeed necessary to reconsider this quantitative modern society based entirely on the western scale. Simple measurement and analysis of the details of our environment will not solve the problem. Prompt change-over of the present style of living to that of the matured qualitative society is essential to meet today's environmental issues. Environmental problem is essentially the problem of human issues. Now let us start the construction of a new life style based upon multiphase qualitative way of living.