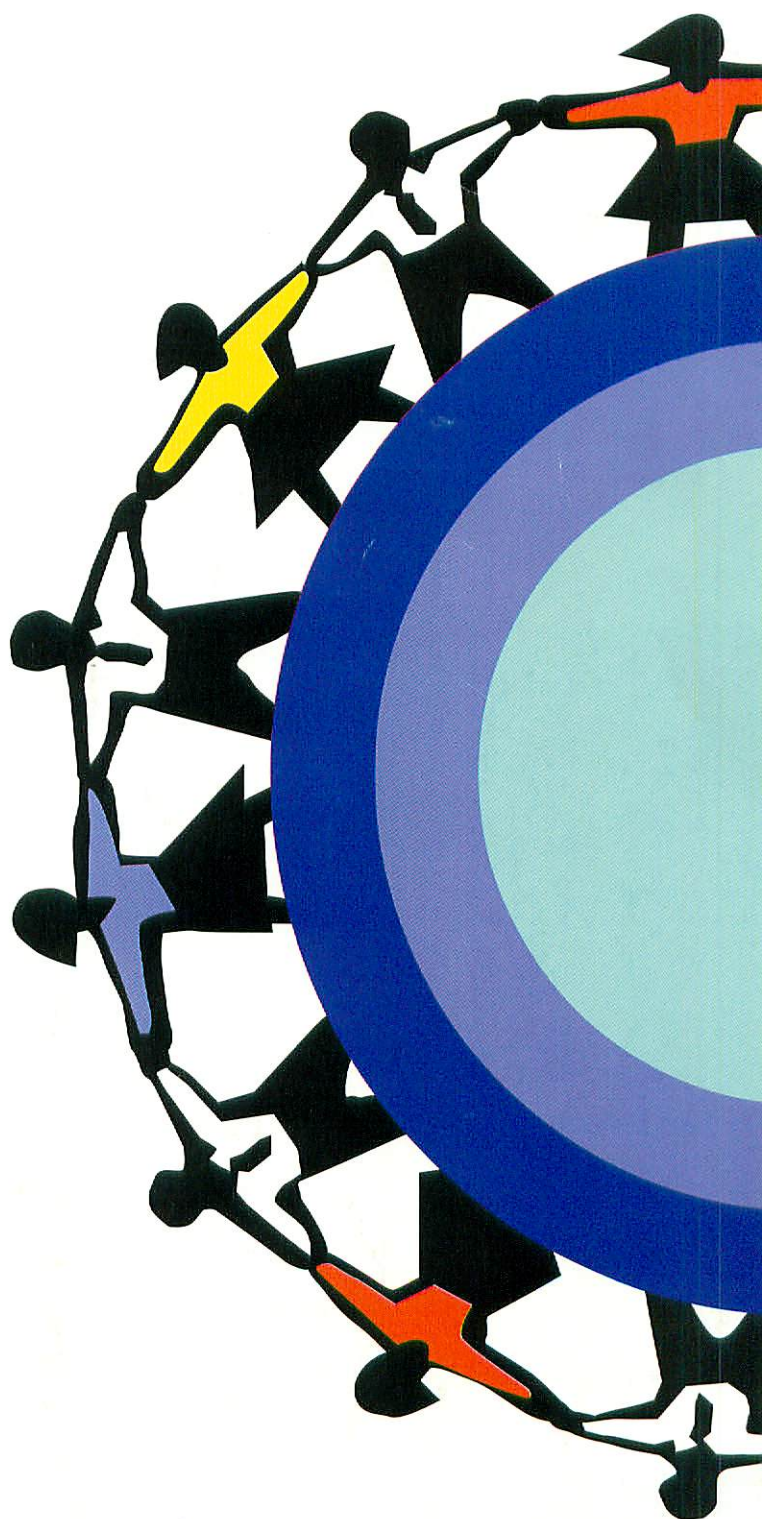


Population Issues

—The Conditions of Human Survival and
Future of our Society—

Report of 20th Anniversary
APDA International Forum

1982-2002



The Asian Population and Development Association (APDA)



**APDA
International
Forum**

Population Issues

—— The Conditions of Human Survival and Future of our Society ——



Message ●

Thoraya A. Obaid

Executive Director
United Nations Population Fund
UNFPA



Japan was the first country outside Europe and North America to make the transition from high fertility and mortality to low fertility and mortality. Its example has given hope to many high-fertility countries in Asia and beyond.

APDA was established in February 1982 as a result of a strong request from the participants at the Asian Conference of Parliamentarians on Population and Development (ACPPD) held in October 1981, who felt there was a need to create an institutional basis for supporting parliamentarians' activities on population and development. Since its establishment, APDA has not only supported various parliamentary activities but has also conducted numerous surveys and research projects on population and development in Japan and other countries in Asia. Through its work, APDA has contributed to enhancing health and welfare and promoting economic and social development in Asia.

The ACPPD also led to the creation of the Asian Forum of Parliamentarians on Population and Development (AFPPD) in March 1982. Since then AFPPD has taken on vital issues of population and development in close collaboration with parliamentarians throughout Asia, taking into account the unique situation in each country. At the base of its activities was the pioneering initiative of the Japan Parliamentarians Federation for Population (JPFP), which, since its establishment in 1974, has been replicated in other parts of the world as a model for parliamentarians groups on population and development.

APDA is both the Secretariat of JPFP and the Tokyo Office of AFPPD. At the same time, it maintains close relationship with United Nations bodies and parliamentary organizations throughout the world, receives the cooperation of the Japanese government and related organizations and countries outside the region, and develops activities concerned with the ever-diversifying population and development issues in Asia and Japan. As such it makes a unique contribution to population and development.

UNFPA has proudly worked and continues to work with APDA, JPPF and AFPPD in a collaborative effort to advance the understanding and implementation of population programmes throughout Asia and the world. Together we concentrate on funding and creating an enabling environment for the implementation of the Programme of Action of the International Conference on Population and Development (Cairo 1994), with a crosscutting focus on gender equity and women's empowerment. We at UNFPA are proud of this important partnership and look forward to future years of collaboration and continued success in the pursuit of the mission we share.

Thoraya A. Obaid
Executive Director
United Nations Population Fund

Message ●

Angela Gomes

President
International Planned Parenthood Federation
IPPF



It is an honour for IPPF to share this anniversary year with the Asian Population and Development Association (APDA). 2002 marks 50 years of work that the Federation has done in sexual and reproductive health, and it is serendipitous that APDA observes their 20th year of focusing on population and development issues. APDA has been not only supporting the activities of Asian Forum of Parliamentarians on Population and Development (AFPPD), but also carrying out the research and advocacy activities and acting as a secretariat for Japan Parliamentarians Federation for Population (JFPF).

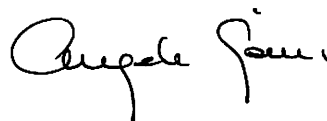
IPPF is not alone in relying on APDA's information support; seminal research on population and development in Asia has contributed cutting-edge insights, which the Japanese government, for example has been able to make use of in the forging and review of population aid policy.

The information that APDA contributes to parliamentarians has also been critical, informing - and therefore shaping - crucial legislative processes. APDA's organ magazines and publications reach further than parliamentarians and the general public have found them useful too. With such sustained support to law, policy and opinion building, APDA's activities have had substantial impact on global advocacy, networking and partnerships; this is by no means a new function but has been conducted consistently over the last 20 years.

I applaud and encourage the presence of a particular mutual goal that IPPF and APDA share: that of supporting parliamentarians. I don't need to stress how vital the role parliamentarians play is, and can only urge APDA and IPPF to continue this fruitful relationship.

IPPF strives worldwide to provide quality sexual and reproductive health care.

provide access to family planning, battle HIV/AIDS, empower women and young people, and remind men of their responsibility. We appreciate the valuable, ongoing support received by AFPPD and APDA. I take this particular opportunity to extend, on behalf of IPPF, our most cordial congratulations for 20 years of responsible, envisioned, unrelenting work.

A handwritten signature in black ink, appearing to read "Angela Jones". The signature is written in a cursive, flowing style.

President
International Planned Parenthood Federation

Taro Nakayama

Chairman
Asia Population and Development Association



This publication entitled "A Review of Population Issue — Conditions for Human Survival and Future of Human Society" is a record of an open forum held at the Main Conference Room of Japan Press Center in Hibiya, Tokyo on March 26, 2002 in celebration of the 20th anniversary of the founding of the Asia Population and Development Association.

Needless to say, population is the most important issue that has direct bearing on the future of humanity, conservation of the global environment and pursuit for peaceful co-existence between the Earth and humanity. Nevertheless, interest in this issue is dwindling in Japan today.

Japan succeeded in attaining the transition from high fertility and mortality rates to low fertility and mortality rates (demographic transition) in an extremely short period of time after the Second World War and the experience was seen as "miracle" by the rest of the world. As a result, the population issue in the sense of dealing with excessive population no longer exists in Japan today. In fact, dwindling birthrate and aging population that inevitably emerge as a result of this demographic transition is generating pressure to carry out a major transformation of social structure and take urgent measures against this issue.

Meanwhile, population continues to increase amidst poverty in the least among less-developed countries of the world and is predicted to exceed 9 billion by the middle of the 21st Century. It is an astounding number when seen in the context of the Earth's carrying capacity with no guarantee that the Earth can support population of such magnitude. For instance, it is not commonly known that humanity is already using more than 50 percent of freshwater resources that are available to them. It is also said that no additional freshwater is available for human consumption.

However, freshwater is indispensable for food production and as drinking water and industrial water. The impact of adding another 3 billion to the population on the human society defies our imagination.

The Asian Population and Development Association (APDA) is the only NGO in Japan working

in the interrelated fields of population and sustainable development. APDA was founded in 1982 with the main aim of conducting research on population and sustainable development while engaging in educational campaign on the subject of population and sustainable development while supporting parliamentary activities related to the issue of population and development. Through its activities, APDA has been offering a wide range of proposals and data in connection with the issue of population and sustainable development.

Waning interest in the population issue among the majority of the Japanese people is a serious problem for a NGO working to solve the population issue. The single largest factor behind such phenomenon is the fact that population issue has become irrelevant to the people. However, a country's problem will exert serious influence to the rest of the world with the advancement of globalisation. A large food-importing country like Japan will be affected directly by these changes. Moreover, dwindling birthrate and aging population, which is the most urgent issue that Japan must address today, emerged as a consequence of demographic transition. Japan enjoyed a demographic bonus of having small elderly and young dependency population and large labour force population during her high-growth period that contributed enormously to the economic development of the country. The current dwindling birthrate and aging population is evidently a population issue in the sense that it emerged as a result of the aging of the population that was active during the economic growth period and dwindling of birthrate at an unexpectedly high rate.

Another main cause behind the obscurity of the population issue in the present day in Japan is the specialised and unfamiliar nature of its terminology that is making demographic subjects alien to the general public. The activities of different groups working in their respective fields of interest are also making it very difficult to understand what constitutes a population issue.

The keywords colouring today's population issue include "reproductive health", "reproductive rights", "HIV/AIDS", "empowerment of women", "refugees", "displaced persons", "gender", "violence against women", etc. Numerous terms have their own meanings and activities related to these terms are being carried out by an array of organisations based on their own interest. As a result, the issue has become very diverse, making it quite difficult to see the overall picture and understand what impact it will have on our lives and our future.

While this multitude of activities and terms represents the permeation of population

issues, it is accelerating the waning of public interest in this issue at the same time.

APDA thought that the most important task in regaining people's interest in the population issue is to spread the understanding of what population issue is. For this purpose, it is important to take a bird's-eye-view of a range of population issues that have become overly diverse and grasp their essence. The purpose of the 20th Anniversary International Forum therefore lied in creating an opportunity for regaining the interest of the Japanese people in the population issue through such effort.

Our hope is to back the efforts for solving the population issues of the world by regaining the interest of the Japanese people and offering support for the international efforts actively being pursued by the Japanese government from the public opinion side.

Consequently, prominent lecturers that are world-class in their respective fields were invited to give their talks at the International Forum. We asked Dr. Takanori Matsui, Professor of the University of Tokyo to deliver the keynote address. The First Session entitled "What are Population Issues?- Focusing on Environment, Biology, and Food-Conditions of Human Survival" was moderated by Dr. Shigeto Kawano, who is Professor Emeritus at the University of Tokyo and Person of Cultural Merit, and consisted of lectures entitled "From the Viewpoint of a Biologist" by Dr. Motonori Hoshi, Professor of Keio University and Professor Emeritus at Tokyo Institute of Technology "From the Viewpoint of Environment" by Dr. Takeshi Hara, Professor of Waseda University, and "From the Viewpoint of Food Production" by Dr. Zenbei Uchijima, President of Miyazaki Municipal University.

The Second Session was entitled "What are Population Issues? - Focusing on Public Health, Social System, and Bioethics - Future of Human Society" and was moderated by Dr. Toshio Kuroda, Chairman of JOICFP, member of board of Directors of APDA, and the U.N. Population Award laureate. This session consisted of lectures entitled "From the Viewpoint of Health" by Dr. Masataka Murakami, Director of Ibaraki Occupational Health Promotion Centre, "Impact of Falling Birth rate and Aging Population on Society" by Dr. Naohiro Ogawa, Deputy Director of Nihon University Population Research Institute (NUPRI) and "From the Viewpoint of Bioethics" by Dr. Hyakudai Sakamoto, Professor Emeritus at Aoyama Gakuin University.

I would like to express my deep appreciation to all the distinguished lecturers representing their field for delivering their valuable lectures amidst their extremely busy

schedule. I would also like to thank the Japanese Government, Ministry of Health, Labour and Welfare, Ministry of Foreign Affairs, and Ministry of Agriculture, Forestry and Fisheries as well as many institutions concerned including UNFPA, IPPF, AFPPD, JOICEF, and NPO 2050 for their support and cooperation.

It would be of utmost pleasure as the publisher of this publication if it could lead to understanding of the population issue and contribute in some way to its solution.

Dr. Taro Nakayama
Chairman
The Asian Population and Development Association

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Keynote Speech

Population Issues from the Viewpoint of Geo - cosmology

Takafumi Matsui

Professor
The University of Tokyo



Keynote Speech

Population Issues from the Viewpoint of Geo-cosmology



Takafumi Matsui

Professor
The University of Tokyo

My name is Matsui and I am a professor at the University of Tokyo. It just so happens that I was attending the Lunar and Planetary Science Conference that was held two weeks ago in Houston for one week. This conference started at the time of lunar exploration by the Apollo Project and celebrated its 33rd anniversary this year. It is a scientific meeting for discussing how the structure of the solar system to which our Earth is a part of was born and how it is evolving. I attended this conference in Houston and then participated in the conference in Monterey, Mexico. This conference was held under the theme of "Education for Development" and had been jointly held by 10 or so local universities in connection with the conference sponsored by the U.N. for supporting the developing countries. I was invited to that conference and participated in the discussion about the meaning of education and research in the future development process of the developing countries.

This week, I am delivering a keynote speech at this forum on population issues. As you can see from what I have told you so far, I am not an expert on population issues. I am studying how a planet such as Earth that supports life is born into the universe and how it evolves. It is a study in the field of the so-called natural science. I have been working hard particularly in the past five years to launch a completely new field of science and learning in the 21st Century called "astrobiology".

This discipline of astrobiology is very relevant to the theme of this conference today. A major theme that has been defined as the goal of study in astrobiology is "where intelligent life like us and other life forms on this planet came from and where they are going". That's why today's theme of "Conditions for Human Survival and Future of Human Society" has become our major research target. So we are working towards launching this new field of natural science.

Astrobiology is a completely new field of science in the 21st Century that started after being coined by NASA about three years ago. As I mentioned earlier, its objective lies in finding out where we came from and where we are going. Other themes we are working on include whether we are an omnipresent existence in the universe or do we exist only on Earth, and whether intelligent life exist all over this universe.

The so-called natural science that existed until the 20th Century was basically comprised of two ideas. One of them was duality, a view that divided human and nature. It was a view that looked at various aspects of nature based on the premise that people are completely detached from nature. Duality takes the position that human beings are the subject that recognises

nature which is the object.

The other was a view that tried to look at the target of thought with more detailed framework after detaching humans from nature. Using a more detailed framework for the object of thought will clarify the nature of the problem. The basic approach used in natural science until the 20th Century was to clarify the problem within the detailed framework in order to solve it. Modern science was developed based on such mode of thinking.

I myself have been conducting my research on the themes I have mentioned earlier based on such view. However, areas in which these ideas do not hold true started to emerge. For example, when we think about the population issues that are discussed at this open forum and issues like the future of human society — we live on this Earth, and when we ask ourselves whether we are totally detached from nature, the answer is “not necessarily so”. That is the essence of the global environmental problem, the resource and energy problem, the food problem and the population problem.

Therefore, a big question arises when traditional dualistic approach would hold true as the basis of understanding on the macro level, not to mention the micro level. This kind of question was already recognised on the micro level at the beginning of the 20th Century. The discipline of quantum mechanics that deals with a very micro realm had shown that dualism no longer holds true because of the “observer issue” in which our very act of observation had influence on the natural state.

In the latter half of the 20th Century, another question came up as to whether an elementalistic approach of trying to clarify things by dividing the subject into small elements could lead to full understanding of the entirety. For instance, chaos and complex systems emerged as new areas of science. We started to realise that when we divide the subject into smaller and smaller elements and identified the properties of those elements, we could not express the entirety, which was the combination of these elements, by merely adding up the elements. It is becoming clear that the 20th Century-oriented approach is not sufficient in understanding nature and that it has reached its limit in many ways.

So it became necessary to think about various problems such as “who we are” and “where we are going” — and about “the future of human society” and “population problem” on this Earth — from a holistic point of view. The discipline of astrobiology is an attempt to learn through trial and error about how to deal with these problems, including the new methodology for doing so.

What I am thinking about talking to you today is how we should approach this forum's theme when one looks at it from such standpoint. I used the term “astrobiology” that NASA gave, but I myself have been referring to the comprehensive discipline based on similar ideas as “geocosmology” for the past 10 years. I have been making such attempt, thinking that there is

a need to establish a new discipline or intellectual system called "geocosmology" in order to deal with the issues that are related to humanity and civilisation from the standpoint of natural scientist.

The term "geocosmology" — pronounced "chikyugaku" in Japanese — is used to include "Earth", the subject of study including us and nature, and also to suggest "chikyu", which, in Japanese, connotes "search of intellect". I have been using the Japanese term lately. In English, I have been referring to it as "geo-cosmology" with the intent of thinking about how to look at the entirety including us included in that entirety — what to make of our existence in that entirety.

Although no such concept has been proposed to date, I am using for the time being the system-oriented approach and the historical perspective. System is one of the ways for grasping the big picture and history is meaningless if broken up into elements to begin with.

I would like to talk about what kind of existence we currently are on this Earth from such viewpoint so that we can understand the present state of affairs. I think the greatest characteristic of our present existence is the fact that we have become a "visible existence" from space. For example, if you see Earth at night from space, you will see an ocean of light shining brightly. In other words, we have now become an existence that could be seen from space and we need to think what to make of this fact.

I think there were two schools of traditional humanics. One concerns human beings from a biological point of view, humanics in the sense of being one of biological species — I'm sure you will be hearing many relevant talks on this subject later on in the day. The other is the traditional philosophical humanics of "cogito ergo sum" — "I think, therefore I am". There was a discussion about human beings from this standpoint — what kind of existence we are as a recognising entity.

However, as I mentioned just now, it is difficult to discuss about us who are an existence that could be seen from space though biological or philosophical humanics. My idea is that a completely new fabric of argument is needed.

The fact that we are an existence that could be seen from space does not simply mean we could be seen in terms of visible light. Our existence could also be recognised electromagnetically if some entity on a planet in our Galactic System looks for such electromagnetic wave in the direction of the Solar System. In other words, it is possible to recognise the existence of intellectual life on Earth from those planets. Taking these matters into consideration, I would like to first think about what to make of our existence which can be seen from outer space. From space, Earth can be seen as a single system. By "system", I mean it is comprised of various components and the system can be defined as a whole as an aggregate of such components.

The fact that we are an existence that could be seen from space means that we are a component of a system called Earth. What are the elements comprising the Earth's system? Earth is made up of many material spheres; atmosphere, ocean, continental crusts, mantles and cores — these can be regarded as components. Living organisms are also creating one of the components called biosphere. For instance, soil contains complex organic matter and constitutes a material sphere called pedosphere. A component named biosphere can be defined by putting together the material sphere comprised of organic matter such as this soil, forests and grassland. You can say that, like atmosphere, ocean, continental crust and biosphere, we human beings are living today by creating a material sphere, that is, a component. And we can be seen from space as a result. Such existence of ours is named "ningen-ken" after "seibutu-ken (biosphere)" and "taiki-ken (atmosphere)" in Japanese. It is a coined word with no English equivalent but I call it "homo-sphere" or "human sphere".

Actually, humanity went through a major transition 10,000 years ago and became an "existence that lived by forming a homo-sphere". For this reason, I, in my words, refer to the future of human society as the future of homo-sphere.

You may wonder about the difference between the terms you have been normally using such as "human society" and "world" and the term "homo-sphere". Actually, this is very simple. You are using the expression "human society" and "world" by living on Earth and looking at homo-sphere from inside that homo-sphere. I look at it from outside and call the world you live in as homo-sphere.

Where would this difference in standpoint manifest? By looking at Earth in the context of homo-sphere, we become aware human species are one of the components of a planet named Earth. From this point of view, you will see that, like other components, there will have to be a boundary condition for formation of homo-sphere in Earth's system in order for homo-sphere to exist. In other words, you will realise that we exist within this boundary condition. You refer to this as "world" or "human society", and you think that countries and regions exist in it. From my point of view, it is the internal structure inside the homo-sphere. Nation state, for example, is a unit that make up the internal structure of this homo-sphere. So the homo-sphere is a system comprised of such units.

You may see this as a mere rephrasing, but difference in viewpoint gives rise to totally different perception. From a historical viewpoint, for example, humanity has been existing on this Earth for almost 5 million years, as has been confirmed through fossil records. We are related to this 5 million year-old human species in a biological sense but the meaning of existence is quite different.

This difference in viewpoint has a decisive impact when dealing with an issue such as this. From my viewpoint, a component such as homo-sphere actually did not exist in the period that

started 5 million years ago and lasted until 10,000 years ago when people lived on hunting and gathering. According to this viewpoint, we existed as one of the species of biosphere. Existing as one of the biosphere species means that we were no different from other from the viewpoint of Earth. Such existence and the existence that went out of biosphere to live in homo-sphere are completely different. This kind of awareness is an outcome of having the viewpoint that I have.

As for the question of when homo-sphere was born, I already gave you the answer. It occurred about 10,000 years ago when we started living on agriculture and stockbreeding. It can be defined as a point in time when people started to live in the way that would make it possible to recognise Earth as a system from space by creating a separate box called farming/stockbreeding-oriented homo-sphere.

To put it another way, we became an existence that lives by utilising the flow of energy and matter in the entire planet Earth. Farming and stockbreeding is a way of life that uses the flow of all energy and matter existing in planet Earth. In contrast, hunting and gathering can be defined as a way of life that utilises the flow of energy and matter in one of the components comprising Earth.

You often hear an expression "earth-friendly" nowadays, but living on hunting and gathering as a species in biosphere is an "earth-friendly" way of life in a true sense of the term. Since changing a component of planet Earth means appearance of a new component, flow of energy and matter in the entire planet is naturally disturbed. This is not "earth-friendly" from the viewpoint of earth-friendliness.

However, if you ask whether we are capable of living in an earth-friendly manner, the answer is "no". As far as Earth is concerned, we have been an existence that changes the pre-existing state ever since we started to practice farming and stockbreeding, that is, to live by creating homo-sphere. We are now unable to change our way of life to that other than farming and stockbreeding no matter what. The population in excess of 6 billion in the world cannot survive by way of hunting and gathering. This becomes clear from a quantitative analysis of material and energy flows within the biosphere. Number of people that could be supported through flow of energy and matter within it is estimated to be around 5 to 10 million at the most. The fact that this capacity has been exceeded and more than 6 billion people exist today means that we have no choice but to rely on farming and stockbreeding to support them. In this sense, we cannot afford to give up our way of life based on creation of homo-sphere on the planet we call Earth. And as long as we do that, it becomes unfriendly to Earth no matter how you look at it.

Thus we can construct an argument that is completely different from its common counterpart by recognising our world as "homo-sphere". We will have to go beyond that and think about population problems and the future of human society from such viewpoint: I think we are

unable to grasp the nature of things that are taking place today by seeing and analysing the situation within the conventional way of thinking.

Starting from such understanding, I will now talk about the problems currently faced by humanity, what the future holds for homo-sphere and what are the potential problems that may occur in such event.

I'm getting things out of sequence, but there is a question of why we started farming and stockbreeding some 10,000 years ago, or why we started living in homo-sphere. Actually, this involves several problems that are unclear. In terms of environment, the global environment experienced a drastic change around that time. It was not a man-made change; rather, it was a slight change in the system of the planet Earth. It might be easier to understand if I refer to it as "change in climate".

The so-called glacial period ended and was taken over by the interglacial period about 10,000 years ago. This can be seen by drilling the ice that has deposited in thick layers on ice sheets in Greenland and South Pole, taking out a sample from deep underground and analysing the ice in it. Today, it is possible to analyse what the climate was like hundreds of thousands of years ago. Based on such analysis results, we know that climate stabilised notably 10,000 years ago. Annual average temperature fluctuated violently prior to that time. Annual average temperature was changing 6 degrees over a 10-year period, but about 10,000 years ago the range of fluctuation was reduced to within 1 degree.

Stabilisation of climate meant that people that have been living on hunting and gathering — setting aside the question of hunters — the gatherers were able to have some regularity of being able to collect same items at certain times of the year. So it is no wonder if they went in the direction of cultivating the items that they used to gather. This is one possible reason for agriculture having started 10,000 years ago.

I think there was another reason intrinsic to us human species. Fossils show that human species existed 5 million years ago and various kinds of people have appeared on this Earth since then. We call ourselves *Homo sapiens sapiens*, and we know that the human species alive today were born between 150,000 to 200,000 years ago in Africa.

We actually do not know precisely how *Homo sapiens sapiens* are connected to human species that lived before us. We fall under the same category of human species; but, for example, a human species different from us called *Homo sapiens neanderthalensis* lived in Europe until 30,000 years ago. The direct ancestor to *Homo sapiens sapiens* also lived in Europe at the time. Both the ancestor of *Homo sapiens sapiens* and Neanderthals lived in the Eurasian Continent around that time, but Neanderthals became extinct and we have built the prosperity we have today.

Why did one species prosper and the other become extinct under similar conditions? It is a

biological issue concerning ourselves — and when it comes down to this point, some things are scientifically clear and others are quite unclear.

One thing that is clear to us is that we *Homo sapiens sapiens* have a “grandmother”. We know this from study of fossils. I call her “grandmother” not simply because she has grandchildren, but because females can live for more than 10 years after her reproductive age is over or even longer, for decades. We cannot find existence such as this in species that are closely related to us such as anthropoid ape nor among mammals. In natural world, animals die several years after passing their reproductive age.

Monkeys and even also chimpanzees cannot raise the last child they give birth to because mothers die. However, the fair sex of *Homo sapiens sapiens*, for some reasons not known to us, continue to live. They live past the age others would usually die. Let us call them “grandmothers”. When grandmothers are there, knowledge about childbirth that they experienced would naturally get passed on to the next generation. Grandmothers also look after their daughters' children.

If we assume the reproductive period to be 15 years and 5 years were needed for child rearing if grandmothers were not there, a woman can only give childbirth once every 5 years, which means that she can give birth to 3 children at the most. However, if she is relieved from child rearing after 3 years by having the grandmother look after her child, for instance, she could have 5 children.

Therefore, the existence of grandmothers may be a factor in population increase. *Homo sapiens sapiens* is said to have spread from Africa to rest of the world more than 50,000 years ago. It is referred to as “Exodus from Africa” after the Old Testament and marked an occasion in which human species that was originally living in Africa spread worldwide in a very short period of time. That is why we exist all over the world today — and one way to look at this is that population increase was one of the reasons behind it.

Another reason — although this has not been scientifically confirmed to what extent it is true — is the fact that we seem to be able to speak the language clearly. Because of the structure of our throat and tongue, we are able to clearly pronounce “a”, “i”, “u”, “e”, and “o”. The extent to which Neanderthals was able to pronounce clearly is said to be very questionable. The ability to speak a language clearly meant that they could convey to others not only the things that are happening in front of one's eyes but what he or she experienced prior to that — “what happened on the way coming here today” or “what happened during the hunt”, for example. Being able to speak clearly significantly enhances one's communication skills. In terms of the level of the brain, it is not a question of whether brain capacity is large or small but how the circuit inside that brain is connected. *Homo sapiens sapiens* seem to have circuit connection that sets them apart from human species that existed prior to them.

So my theory is that our ancestors created the homo-sphere and started living in it when the two elements — climate change and change in our own biology — combined some 10,000 years ago.

You will be able to engage in abstract thoughts in your head once you figure out how to connect your brain circuit. I call this "collective illusion". You must have ideas about various concepts that distinguish human beings from others. For example, 20th Century-oriented concepts may include "democracy", "human rights", "love", and "god" ; these are a few of many things that we are thinking inside our brains.

When such concepts are born, many communities will emerge in the homo-sphere by using it as unifying force. As a result of various communities being born inside it, the system of homo-sphere becomes diverse. That's what I see as the history of civilization.

Incidentally, I define civilization as our way of life realised by creating homo-sphere in the Earth system. This civilization becomes increasingly diverse as a system when various communities are born in it. This development of homo-sphere can roughly be divided into two stages.

What I mean by this is that — while I mentioned that system is made up of components — there is another important issue of "relationship between components" and "driving force". A phenomenon similar to movement of matter that occurs between the components comprising a system is "relationship". And some kind of "driving force" is needed to bring about movement of this matter.

In the case of Earth system, radiation energy from the sun and energy inside Earth are the driving force. Although not usually recognised, the energy inside Earth moves what's inside Earth and creates a convective movement of mantle, for example. As a result, materials near the Earth's surface move horizontally—this is called "plate tectonics — and subducts into Earth's interior while materials inside Earth's interior come out of mid-oceanic ridges. In short, it is triggering a material recycling that connects Earth's surface with Earth's interior.

The development stage of homo-sphere can be roughly divided into two parts by directing our attention to driving force. Homo-sphere is also one of the Earth system's components and is therefore involved in the flow of energy and matter in the entire planet. One conceivable stage is us simply bypassing that flow of matter to maintain our homo-sphere. The other stage is that in which we possess the driving force within the homo-sphere and create a movement of matter in the entire planet Earth. I think you can see that there are these two stages of development in the system of homo-sphere.

To put it in simple terms, the first stage, for example, can be likened to an agricultural civilisation. It is a way of life that maintains the entire homo-sphere by simply allowing the

flow of energy and matter in planet Earth to bypass the homo-sphere. In contrast, the second stage involves maintaining the homo-sphere by having a driving force inside the homo-sphere and creating new overall flow — you may want to call it “industrial civilisation”. It is a way of life that digs out fossil fuel and other things from other components of the Earth system and uses it as driving force to create its own flow of matter in the entire planet.

The constraints that determine the size of homo-sphere will naturally differ when these two stages are compared. The flow per unit of time is called “flux”, and the size of homo-sphere it can sustain will be limited to certain scale if this flux is constrained by the flow of matter in the planet Earth.

You can think about Japan in the Edo Period to get an image of this. The lives of people in Japan in those days were based on the plants that grew over a period of one year using sunlight. In other words, they were creating homo-sphere by relying on sunlight almost exclusively for circulation of energy and matter. When that happens, the size of material and energy circulation would remain the same because the amount of rain and sunlight available in one year was obviously constant. As a result, population did not change much for several hundred years in the Edo Period, although it did increase by some 5 million through expansion of cultivated acreage.

Meanwhile, when you look at present-day Japan, all kinds of energy and matter are coming from all over the world. The Japanese population, which once remained between 30 million to just over 30 million, has now increased to 120 million. Japan's population increased by nearly fourfold in the 100 years since the beginning of Meiji. This means that we were able to amplify the flow of matter by having our own driving force and that homo-sphere became large as a result of such amplified flow entering the homo-sphere.

This is what led to population increase and expansion of homo-sphere. There are these two stages. Today, homo-sphere is no longer created by depending on the flow of energy and matter on planet Earth; instead, you can say that we are creating the homo-sphere by having our own driving force and creating the flow of “matter” and “energy” to suit our desire in a planet we call Earth.

As a result, how big did homo-sphere become in the 20th Century, for example? If you base your judgment on population, you can say that it increased by about four times. This fourfold increase in population means that the size of homo-sphere has expanded by four times in the Earth system, so relocation will naturally occur in terms of distribution of matter. That is the problem we now call “contamination”. The problem is manifesting in the form of a disturbance in flow of energy and matter or a change in accumulation of respective components on this planet Earth.

It is meaningless to try to solve this problem as a mere ethical issue or an issue of right and

wrong. I don't think we can solve this problem unless we think about what is the harmonious homo-sphere within the Earth system. There is no point in using a sentimental expression such as "earth-friendly", either. We must sort out the problem by thinking about the adequate size of homo-sphere in the Earth system and about the kind of flow of energy or matter we should use. I think that is the stage we are now in.

The 20th Century was a period in which the population quadrupled in 100 years. I would like to do the following experiment to show you how abnormal this is. Let us think how long it would take the population increasing by fourfold every century to reach the same weight as the mass of Earth. You may think a fourfold increase over a century is not much of an increase, but actually, it only takes two thousand and several hundred years for the weight of human beings to reach the mass of Earth. It means that our weight would reach the mass of Earth in a much shorter period of time than our history of creating and living in the homo-sphere. However, this simply will not happen. This will not happen because we are now living by renting a part of matter in this planet we call Earth. However, this is the result of a simple calculation based on the increase rate in the previous century. Furthermore, 60 to 70 percent of our body is water. So there's no use in comparing our weight with the entire planet Earth. We should be comparing it with the mass of the ocean because that's where the largest quantity of water exists on Earth's surface. When population quadruples every 100 years, Earth's population will reach the mass of the ocean in only 1,500 to 1,600 years.

If you compare the increase rate of human mass with the speed of Earth being formed some 4.6 billion years ago in the Solar System, it is more than 10,000 times faster. In terms of flow of energy and matter in planet Earth, you can say that we are creating and living in homo-sphere by moving matter at the speed more than 10,000 times faster than the flux of energy and matter.

We talk in scales of time such as 1 year and 100 years. But in this case, we are now living on this Earth by accelerating Earth's physical flow by about 10,000 times to create the homo-sphere.

In this context, you will see that our notion of 1 year or 100 years has tremendous significance when seen in scale of the whole Earth. The history of creating civilization and homo-sphere over a period of 10,000 years corresponds to 100 million years when seen in time scale of movement of physical matter on Earth. While many components of the Earth system exist today as a result of branching of material sphere throughout Earth's history, this means that homo-sphere emerged on Earth in the same manner as oceans and continental crust were born. Having this awareness will give us a better understanding of the significance of our decisions about the future is actually determining our future including that of the planet Earth.

So you can say that our ideas about what we are going to do in the future will determine our future in the next hundred years. There is nothing we can do about it unless we have some

clear idea about "what we are going to do". When I say "there's nothing we can do about it", it means, for example, that we are going to collapse if we think about the 21st Century based on the concepts and systems that we obtained under such boundary conditions of the homo-sphere. Dreadful future lies ahead unless we design the homo-sphere of the 21st Century based on a completely different way of thinking. In my view, thinking about these matters is in fact what it really means to think about the future of human society and the population problem.

In conclusion, I would like to say a few words about how we should think about our future. What do we do when we think about the future? We analyse history, which consists of various things that occurred in the past, and extend it in terms of time to think about the future. That is why we cannot think about the future unless we understand what happened in the past. From the viewpoint of homo-sphere-based mindset, it is not possible to think about the future of civilization if we approached history from such short time span. As I mentioned earlier, civilization is a way of life based on creation of homo-sphere. It is therefore meaningless unless history is at the level in which homo-sphere is discussed as its component.

It means that, in order to have a discussion about whether homo-sphere is a stable existence in the Earth system, we must talk in the time scale of how this component was born and what would happen to it. We also need to discuss in the time scale of what the components other than homo-sphere were like. It means that we cannot discuss the future of homo-sphere unless we understand history in the same time scale as the history of Earth and the history of universe.

That is why we cannot discuss the future of homo-sphere for the next 100 years based on the mere history of civilization; I think it is necessary for us to engage in discussion about how we should live from now based on — and from the viewpoint of — 15 billion years of history of universe, 4.6 billion years of history of Earth or 3.8 billion years of history of life on the planet.

What is history when you look at it in time scale of 15 billion and 4.6 billion years? In a word, it means "differentiation", which means to divide and transform. Matter is differentiated. The same term is also used in biology. You talk about "differentiation of species". The term "differentiation" is commonly used in natural science. Actually, the direction of history is basically determined based on the concept of "differentiation".

Big Bang, the beginning of the universe, was a completely homogeneous state. There was no differentiation. There was no distinction between energy and matter. Varieties of matters were also very simple. There were particles of a type that fell under the category of ultimate component. They were differentiated in various ways to create a wide range of matters in the universe today. This is differentiation. The same can be said about Earth. It was in the form of a fireball when it was born and was made up of an ocean of magma and primordial atmosphere, which was a volatile element surrounding it. This turned into Earth we have today which is divided into various material sphere such as atmosphere, ocean and earth crust.

which, in turn, is divided into continental crust and oceanic crust, with mantle underneath them, and mantle is divided into upper mantle and lower mantle. The core, which is a mass of iron-nickel alloy, is further divided into the outer core and the inner core. Diversification continued as organisms were born in it and created the biosphere, and as we were born in it and created the homo-sphere.

It is considered that only one kind of life, one kind of cell was born on Earth at the beginning. Numerous varieties of life, probably in the tens of millions, were born on Earth from this single life. This is also diversification.

For this reason, the basic understanding is that history is a differentiation process. Then arises the question "Why did nature diversify?" This is also a very simple matter; Diversification of the universe, diversification of Earth and diversification of life all occurred as a result of cooling. The history of diversification is the outcome of cooling of the universe, cooling of Earth and cooling of the global environment.

That is why we must think about the meaning of differentiation in homo-sphere, or the meaning of the cooling of homo-sphere, when we think about the internal system of homo-sphere, assuming that homo-sphere will stabilise inside the global system. This corresponds to the discussion of what the internal structure of homo-sphere is going to be like and what kind of units it would actually be comprised of.

What we will need to do from now on is not to rely on the single mode of life we call "civilization". I think that the true meaning of "differentiation of homo-sphere" based on the history of universe and life on Earth lies in discussing how we should go about creating the internal system of a new homo-sphere on top of what we have been referring to as "civilization". — the way of life that have been fostered under various regions and climates.

The kind of unit that we are going to create as the internal structure or internal system of homo-sphere is a very important issue when we think about the future of homo-sphere. I think such discussions are taking place in various places, although they may not necessarily be coming from the idea I mentioned here today.

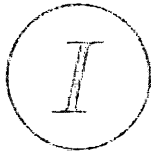
When we think about the future of human society — or to use my expression "the future of homo-sphere" — at the beginning of the 21st Century. I think we would not be able to come up with a good directionality unless we take a bird's eye view and see or grasp the problem from the viewpoint of the universe and Earth.

Thank you.

I. Conditions of Human Survival

Focusing on
Environment, Biology, and Food





From the Viewpoint of a Biologist



Motonori Hoshi

Professor
Keio University

My name is Hoshi and I am a professor at Keio University. Dr. Matsui just delivered a talk on astrobiology. And now I would like to talk to you about how we look at the population problem from the viewpoint of biology (fundamental biology).

In response to the talk given by Dr. Matsui just now, I would like to begin by telling you about how complex the biological system is.

Our body, the body of an adult person, is made of 60 trillion cells. They start out as a single cell, a fertilised egg, and this fertilised egg divides successively into 60 trillion cells inside our body. This is an incredible number; it is said that, out of these 60 trillion cells, you string together only the blood circulatory system cells, for example, and it would be 100,000 kilometres long. We can live for 60, 80, and 100 years without any problem in particular as our blood cells move inside the blood circulatory system of 100,000 kilometres long. That is the kind of system we have. Also, as you may know, our genetic information consists entirely of substance called DNA. It is said that DNA comprising a cell would amount to 2 metres in length when unwound. Although there are cells like red blood cells that have abandoned their DNA, the majority of cells have DNA. If we string together a person's entire DNA, its length would exceed the orbital diameter of Pluto, the most distant planet in the Solar System. Pluto's orbital diameter is about 1010 kilometres. The length of a person's DNA far exceeds this and amounts to 1011 kilometres. Its actual length is beyond our imagination. All of that is actually contained here inside our bodies and stores all the genetic information in them. That is the kind of system biology deals with.

A moment ago, Dr. Matsui talked about the need for complex system, a systematic or a bird's-eye point of view instead of a simple idealism. That is how biology is structured in the first place. To begin with, organisms have a history of about 3.8 billion years, just a little short of 4 billion years.

What I am referring to here is "organisms living on Earth" because — even though there may be organisms outside this Earth — we are presently not aware of them.

To think of them in terms of size, starting from the largest, a very tall tree would only be about 100 metres high at the most. Whales, which are very large among animals, are only

a few tens meters long. On the smaller end of the spectrum are small organisms that are about a millionth of a metre in size.

Such diverse world of organisms works as a very orderly system and is manifested in certain hierarchies. For example, here is a wolf, but a wolf never exists by itself. They always form these packs, or wolf communities. They ultimately form their own ecosystem and the world of organisms further expands to biosphere, stretching out of the surface of entire Earth.

To look at this from the other end, you keep going down, down to the level of cells, intracellular organelles, supramolecular structures, molecules and atoms. Each level has its hierarchy with unique logic at work at each hierarchical structure, in the structure of individual, on the level of organs or on the level of cells. Simply adding up what's working at one level would therefore not allow you to go up to the next hierarchy. New characters are being added one after another as a result of moving up the hierarchy. Therefore, biology deals with many subjects and it is not easy to overview the entirety even you if limit the scope to biology alone.

Where are organisms living now? They are living on the surface of Earth. How thick is this surface? It exists approximately between 10,000 metres above sea level and about 10,000 metres below the water surface. By the way, we have many guests from overseas attending this conference. When they come to Japan, they fly at altitude of 10,000 metres or so. It is said that we *Homo sapiens* are the most commonly found species at this altitude. Since we fly at an altitude of 10,000 metres when you travel on a jumbo jet, we can say that *Homo sapiens* live there.

Some bacteria are found at even higher altitudes, but they do not actually live there. They just happen to be there. The thickness of the 20 kilometre layer inhabited by life is hardly visible to the naked eye if you shrink the Earth to the size of a globe and hold it in your hand. It is only a thin layer of skin on the surface of the Earth.

In terms of weight, the weight of all life put together is said to amount to a mere one-10 billionth of the Earth's mass. One-10 billionth means that all life combined — including giant trees and everything — weighs less than an eyelash if you liken the weight of the Earth to our body weight. So I jokingly say that the world of organisms is a world of an eyelash. It is an extremely insignificant world on the physical level. Although some exceptions have been found lately in the deep sea, all life is dependent on photosynthesis. All life activities are carried on using about 1 percent of the energy coming in from the sun and reaching the Earth's surface. It is also extremely insignificant in this sense.

To put it in another way, organisms are like dust, a completely trivial existence from the viewpoint of physicochemistry. But this dust-like existence has been affecting the entire

planet and changing its surface in a significant manner. In fact, the oxygen we are breathing now has been created entirely by life and did not originally exist in atmosphere.

Impact of organism activity is also seen clearly on iron ore, for example. In other words, the activities of life which is extremely trivial and comparable to dust in quantity are drastically changing the Earth at least on the surface.

As mentioned by Dr. Matsui in his presentation earlier, various calculations have been made on the number of varieties this trivial existence can be divided into. However, even a moderate estimate is in tens of millions. Just recently, everyone involved in the taxonomic community in Japan got together and formed the Union of Japanese Societies for Systematic Biology. According to the declaration of establishment at the time, there are estimated 200 million species of life forms on the planet. Some say there are even more. As for the ones we are aware of, the pamphlet prepared by the Union of Japanese Societies for Systematic Biology says that 1.75 million species have been described so far. A slightly older data says 1.5 million. The fact that this many species are known only means that they have been named; it does not mean we know how they live in details.

As I mentioned earlier, we have named 1.75 million species so far. However, people in the taxonomic community are saying that there are 200 million species in this world, so we don't even know 1 percent of the entire species in reality. The fact that they have not been named means we do not know they exist, so we don't even know the existence of the remaining 99 percent. We do know that they exist but we do not know who they are. In other words, it means that people say biologists know well about organisms, but we actually do not know even 1 percent of the species existing on Earth. Various people have made strenuous efforts over the past 250 years or so to give scientific names to life, but this is all that we know. To put it differently, various organisms are disappearing one after another before we even know they exist.

Organisms have been divided into five major groups. The world of bacteria is one. Actually, there are two types of bacteria, but we'll just call it the "world of bacteria" for now. There is also the world of eukaryotes like us. As I mentioned earlier, eukaryotes have their DNA, the substance that carries genetic information, stored in a safe we call "nucleus". These eukaryotes having this "nucleus" consist of 4 groups. Animals are one of them. Animals have to eat to live. Plants form another group. They can synthesize organic matter from inorganic matter through photosynthesis. Fungi, represented by mushrooms, are another. They play a very important role in the sense that they take dead organisms, such as dead trees and dead animals, and transform them into forms that can be reused. That is, they are the recyclers of resources in the living world. Organisms in all of these groups have multiple cells. The last group, protista, is mainly made up of unicellular organisms.

Among these five groups, vast majority of those that have been named are animals. This means that we have given more names to creatures that are deeply related to our lives and creatures that we are interested in. I would like to stress here again there are vast number of species that have not even been named.

These creatures are living in their niches in a very complex manner. For example, many organisms are segregated on a rock surface in shallow sea that is receiving a lot of sunlight. Ocean surface has the strongest light and abundant oxygen. Amount of light and oxygen decreases as you go deeper. Different bacteria are segregated according to slight difference in environment inside this 1 millimetre layer of a biological mat covering rock surface and are living in it by creating their own system. This is the kind of life system that exists on a rock surface

To give you an example that is more familiar, cherry blossom is very pretty right now at the Meiji Shrine. As you know, Meiji Shrine is an artificial forest that was built after the demise of Emperor Meiji. In addition, it is located in the middle of Tokyo, one of the largest cities in the world. Moreover, Tokyo is located in the temperate latitudes and is relatively low in terms of biodiversity. Actually, more than 90 percent of biodiversity exist in the tropics. However, you'll find more than 3,000 ticks, almost 2,000 earth worms and nearly 75,000 nematodes under your foot once you walk into this forest that was built less than a hundred years ago in the centre of one of the largest cities of the world in the temperate latitudes. These are the numbers of various organisms living under your foot.

These values have been actually studied by a group led by Dr. J. Aoki, professor emeritus Yokohama National University and the director at Kanagawa Prefecture's Planet of Life Museum. There are this many ticks once you step into this artificial forest. You may not like them too much, though. Dr. Aoki is famous for his study of ticks. Incidentally, the majority of ticks are not parasitic on humans. Parasitic ones are extremely exceptional. These small ones are called nematodes. These majority of these odds and sods actually do not even have a name. So if you want to find new species, you can do so by going to the Meiji Shrine and looking under your foot. This beautiful forest exists thanks to the existence of all of these creatures. We say that "we fail to see the forest for the tree" and that "we fail to see the tree for the forest". But actually, these staggering quantities of creatures live under our feet. Forests do not exist had it not been for them.

Another characteristic of life is the fact that all life forms are descendants of a single lineage. If you look at a genealogical tree of life forms, it branches off from a single organism. Some have reached a dead end and become extinct. To be more precise, 99 percent of species that existed have become extinct. It has now branched off into people and to various animals and plants. I believe that among the species that existed in the past, there were those that originated from different lineage but have become extinct along the way. So, at least all organisms that we know of have originated from a single

lineage, i.e. single ancestor. So in this sense, all life forms are connected with one another. I am now past 60. But from the standpoint of life, my life itself is connected with all life forms since life first began. So, in a sense, you can say that my life is 3.6 billion years old.

An American biologist named E.O. Wilson said that the greatest mystery of life phenomena after taking all of these matters into consideration is “*The most wonderful mystery of life may well be the means by which it created so much diversity from so little physical matter*”. There is no life that can live on its own. All life forms more or less live as an intertwined whole. So the surface of this Earth is filled with life. Life exists in every nook and corner with no ecological gaps in between. But when there is a forest fire like the one that occurred just recently and the entire forest is burned to ashes, a new space is created there as seeds germinate and new creatures arrive to start a new cycle.

To sum all this up, we must conclude that it is impossible to think about life without considering the entirety. In other words, we cannot think about life unless we look at the entire flow of time on vertical axis as a system and the entire biosphere as spatial expanse. Dr. Iwatsuki, who now teaches at the University of the Air, came up with a new word called “spherophylon”. It is a combination of a word “biosphere”, which represents the entirety of organisms from the viewpoint of space, and “phylon”, which represents the entirety of organisms from the viewpoint of axis of time. All life is connected through time. He proposed this term “spherophylon” by combining the two. This term that he coined has been well-accepted in the rest of the world as well. In Japan, we call it “seimei-kei (life system)”. Therefore, he is suggesting that we use the term “life system” when we refer to all life forms.

I assume that the ages of people that are with us today range from those in their twenties to those over eighty. Their age difference is about 60 years, but from the viewpoint of life system, this age difference of all of you here is totally irrelevant because all lives are 3.8 billion years old. To put it another way, plants and meats that we eat from day to day all come from our fellow creatures. All life originated from the same system.

As Dr. Matsui mentioned, we *Homo sapiens* have very unique characteristics. I may be preaching the converted here but one of such characteristics, as all of you here today know well, is the dramatic growth of population. As for the process of this population growth, farming started about 10,000 years ago. Population remained at extremely low level for a long time but started to increase rapidly after a certain point in time. When Buddha was born, the world population was less than 100 million. But it reached 3 billion in 1950. It has increased dramatically in the recent years, and, as all of you know, has already exceeded 6 billion today.

Number of an organism's population is bound to change. They never stay at the same level of population. But their number is almost constant in the long term. It is almost

constant for all organisms. Needless to say, various things happen when some drastic change occurs but the population is immediately restored to a certain range. That happens when various organisms live and interact in a very complex manner.

However, human beings are the only exception to this rule. There was a talk about population quadrupling in the 100 year period of the 20th Century. Generally speaking, human race has been increasing by four-fold in 100 years, by ten-fold in 400 years, a hundred-fold in a little less than 3,000 years. In addition, it increased by a thousand-fold in 10,000 years. There is no other species like it.

Moreover, this rapid increase has occurred only over the last 10 generations. It increased considerably over a period of 10 generations. Dr. Matsui also talked about this but it is said that our ancestors and chimpanzee branched off about 5 million years ago. In terms of generations, 5 million years correspond to only 500,000 generations, assuming that takes 10 years to get offsprings for each generation. So we are newcomers to the world of organisms but have increased rapidly in number over a period of last 10 generations. And our population already exceeded 6 billion as a result.

I think you are also familiar with this fact but the number of people living on Earth today has exceeded 5 percent of the sum of population that has even existed since *Homo sapiens* came into this world. As I mentioned earlier, there are numerous varieties of life but the fact that several percent of the population that has existed since the origin of the species being alive today is a totally unprecedented phenomenon. We are truly exceptional in this sense.

I once calculated the weight of various species. Actually, we *Homo sapiens* are a very large animal. People often disagree when I say people are large. There are animals larger than us in reality, but a very large number of animals are so small that we need to use a microscope to see them. Some animals are larger but they are extremely limited. In the ocean there are whale sharks that are more than 10 metres long and whales that are even bigger. We also have elephants on land. But they are very limited. When you line up the species in order of the size of individuals, we fall under the category of very large animals. And the question is what would happen when there are 6 billion of these very large animals (Table 1).

Please take a look at the results of the weight of species. There are 6 billion people and if you assume their average weight to be 50 kilograms — it may be less than that in reality because people vary in size from babies to grown ups — total weight of humanity would roughly amount to 300 million tons. I said that there are very large animals when you take a look at all the animals that presently exist. Among them, whales, blue whales in particular, are the largest animal alive today. However, aggregate weight of blue whales is less than 1 percent of our weight because they are very few in number. African

elephants are the largest animal on land but their aggregate weight is also insignificant compared to that of ours. You can understand how large our population is. A calculation of the aggregate weight of other species based on FAO's data from 1999 shows that cows are actually the heaviest and weigh about twice as much as people. They are followed by sheep, pigs and buffaloes among others. They are all livestock that are being raised by people for their own subsistence. So the large population of *Homo sapiens* is accompanied by enormous numbers of large mammals that are used for their activities.

Table① Number of Species

Name of species	Population	Weight (million tons)
Cow	134×10^7	670
Antarctic krill	—	~500
Human	600×10^7	300
Water buffalo	16×10^7	80
Pig	92×10^7	40
Sheep	107×10^7	30
Horse	6×10^7	30
Goat	71×10^7	20
Blue whale	14×10^3	2.2
African elephant	250×10^3	1.3
All organisms		$10^6 - 10^8$

The only non-livestock species heavier than us is Antarctic krill, on which whales feed on them. They look like shrimp and are seen in Japan on store shelves these days. About 500 million tons of them are born in some years. Like us *Homo sapiens*, antarctic krill exist as a single species and exceed us in aggregate weight in some years. They are the only exception.

I have done a lot of research myself but even the animals that are believed to exist in considerably large numbers are usually insignificant in terms of aggregate weight compared to us. It means that *Homo sapiens* and livestock exist in such large numbers compared to others.

Dr. Matsui talked about the path human species have treaded. It was on an issue of the Nature magazine that was published two years ago, but our ancestors started to spread out of Africa about 100,000 years ago and went all the way down to the tip of South America. Human habitation kept expanding to cover the entire Earth over a period of approximately 100,000 years. This is also very extraordinary. You may think 100,000 years is a long time; however, it is an instant from a geologic point of view. Such global spread by a very large animal is unprecedented and no other mammal has done this in the past. It is overwhelming just to think that all of our ancestors walked all the way from Africa, but, as Dr. Matsui mentioned earlier, it all became possible as a result of farming and hunting.

Evidence shows that *Homo sapiens'* brain developed to a certain level for some reason that enabled them to hunt skilfully and feed on large quantities of large mammals and large

earthbound birds.

For example, the number of large mammals such as kangaroos in Australia has decreased considerably tens of thousands of years ago. In North America, elephant population dropped sharply. Also, the population of large birds that cannot fly rapidly declined about a thousand years ago in Madagascar and New Zealand. Such sharp declines in population coincide with massive invasion of human population to those places. These large mammals decline in number sharply as they are eaten by human beings arrive at those places in large numbers. Humanity spread on the planet by repeating this process and has reached the population of 6 billion as a result.

I mentioned earlier that 99 percent of species that have existed up to now have become extinct. So from a biological viewpoint, it is not rare for species to become extinct. It occurs very commonly. However, extinction occurs less frequently the higher up you go in taxonomic division — such as “phylum”, which is the group above “species” and divisions above that. The world of animals is roughly divided into 30 groups that are called “phylum”. We are part of a phylum called “chordate”. As you may know, sea squirt belongs to the same chordate phylum.

If you study the Earth’s history, you will note that major extinction has taken place five times. The majority of life actually exists in the sea. When you look at life using large group life “genus”, most life exist in the sea. Sea is also regarded as the place where life originated. It is also the place where life evolved and diversified.

As I mentioned earlier, things change very frequently on the “species” level, so I would like to talk about this matter from the level of “family”. We are classified as *Homo sapiens* of the Hominidae family, Homo genus. And we will look into it from this level. If you look at the changes by million years, it increases gradually until you reach a certain point where it experiences a big drop. The severest drop occurred at the last phase of Permian Period when about half of the marine organism families disappeared. Turning points in geological periods are symbolised by some drastic change and results in significant changes in organisms. The major extinction of the Permian Period eliminated half of marine organism families. It is said that 96 percent of marine life became extinct at the time on the “species” level. That was the severity of the change that occurred at that point. It recovered after that and fell sharply again at the end of the Cretaceous period. Today, the number of families in the sea has been increasing. Generally speaking, diversity of organisms has been increasing over time but suddenly drops once in a while. There are various theories about the cause of this sudden drop — such as collision of a meteorite — but we don’t know what really happened. At any rate, it suddenly drops here. Many organisms disappeared at the end of the Permian Period and created an ecological vacancy all over the place. Reptiles that survived proliferated and diversified rapidly and created the age of dinosaurs. However, the dinosaurs eventually went extinct

and our ancestors — the mammals that lives maintained low profile — flourished rapidly and created the Earth we have today.

Let us now take a look at how much we are consuming. Plants are said to be producing approximately 1011 tons of carbohydrates in one year. Actually, human beings are said to be consuming about 5 percent of this. Consumption in this case includes indirect consumption of animal feed. We also use plants for clothing and to build houses. So the amount we consume in total is estimated to be close to that produced by plants. I don't know if this estimation is truly correct, but that's what is said in the books anyway. To put it another way, *Homo sapiens* are using a considerable portion of the plants that are being created each year. The same is also true with freshwater. Water is also found in rocks under the ground, but we are unable to use it. So if you just calculate the freshwater on earth surface, we are using about a third of freshwater.

We are exerting severe impact on the overall system of Earth in this manner, and, as a result, the present rate of extinction is said to be faster by three to four digits than the extinction that occurred during the Permian Period, the greatest extinction from a geological viewpoint that eliminated 96 percent of species and half of families in the sea.

The time scale of extinction I mentioned earlier was based on the unit of million years, so we are thinking in terms of millions and hundred millions of years. But in this case, a decline of 20 to 30 percent have has occurred over the last 2 to 3 hundred years. The major extinction of the Permian Period occurred over a period of millions of years. In contrast, today's extinction is occurring over a period of hundreds of years. Almost identical phenomena are taking place in time scales that are tens of thousand times apart. This is not a question of whether it is good or bad. This is what is happening in reality.

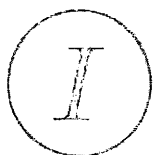
As I mentioned at the outset, even we biologists do not know the existence of 99 percent of life on this planet. Many species of life are rapidly disappearing. I also do not have the answer as to how we can solve this problem. I do not have the answer, but I think that there is no tomorrow unless we concentrate the wisdom of the people who have gathered here today — the politicians, the bureaucrats and experts in various fields as well as many guests from abroad — to avoid the problem.

We talk about a range of today's issues such as environment and food, but from my point of view, they all originate from the problem of population. Humanity has no future unless we solve the population problem.

There are at least 3 ways to go about solving this problem. One is to "kill each other", or "starve to death" or "become fatally ill", as we see happening now in some parts of the world. We may succeed in solving the population problem if did these all over the world. But we cannot afford to solve the problem through such horrible means.

An alternative to this would be to aim for a softer landing. Biologists of earlier generation suggested we call our species *Homo sapiens*, which means "wise man". I think we can solve this problem if we are really wise and "sapiens". but I do not know the concrete method for doing so.

Thank you for your attention.



From the Viewpoint of Environment



Takeshi Hara

Professor
Waseda University

Good morning. I am studying the subject of environment and sustainable development — a difficult issue to come up with any answers — with young people at the Graduate School of Asia-Pacific Studies of Waseda University.

Today, I would like to talk about what the mutual relationship between population and environment is bringing to our society and to our natural ecosystem. I would like to shed some light on its problems and how we should go about solving this extremely difficult situation in the future from the context of relationship between Japan and rest of the world.

What is important when dwelling on the issue of population and environment is the fact that two types of environmental destruction is taking place in the world at the same time. One is the pollution of affluence — a destruction of the environment owing to affluence — that is taking place in industrially advanced countries that we live in. On the other hand, pollution of poverty — a destruction of the environment owing to poverty — is taking place in the developing countries in a significant manner.

I wrote here a very well-known formula that has been proposed for many years by Dr. Paul Ehrlich who is engaged in the study of animal behaviour at Stanford University; "I=PAT". "I" stands for "environmental impact". "P" stands for "population" and "A" is "affluence". "Affluence" is a term that primarily refers to "material richness and abundance", although in this case it is freely translated to represent "per capita consumption". "T" stands for "technology including the social system".



Photo:1

The factors that determine the product of "population" and "per capita consumption" include income and social system — for example, whether a country has legal and administrative systems that leave pollution to take its own course... Or an issue of

people's awareness. These are the factors that determine the outcome.

The third variable is "technology". For instance, in the case of agriculture, agricultural technology relying on the use of large amounts of agricultural chemicals is causing contamination of water and soil worldwide. Agricultural technology involving input of chemical fertilisers and agricultural chemicals in vast quantities is placing heavy burden on the environment.

For instance, Japan has a law called the Water Pollution Control Law, and 23 varieties of hazardous chemicals are constantly monitored in accordance with this law. Indeed, 16 of them come from agricultural chemicals. In other words, the sum total of the product of $I = PAT$ can be reduced if technology that lessens the burden on the environment emerges through innovation of this "technology", or if social system can be changed or if awareness can be changed. Dr. Ehrlich is arguing that technology has potential for reducing its burden on the environment depending on how it is used.

This formula is very convincing when you live in a developed country and thinking about this problem. It is a waste of resources and energy or environmental destruction originating from abundance. On the other hand, however, I think that it contains a kind of optimism often found in civilization theories of industrially advanced countries, particularly in the U.S., or a way of thinking detached from the realities of the developing countries.

This is Ohmori Recycle Center of the Tokyo Metropolitan Cleansing Department; not a furniture store (photo). This is what it looks like when you collect the furniture thrown away at dumpsites of Tokyo and line them up. My impression after traveling all over the world is that no other country comes even close to Japan when it comes to using things in such an expendable manner. They are sold at very low prices so people who don't mind used furniture can obtain them at dirt cheap prices.

This is garbage piled up out in the open at Disposal Site No. 13 outside of Yumeno-shima Island (photo). Huge amount of furniture is disposed after the staff reassignment and moving during the graduation/enrollment in March, for instance and exceeded the incineration capacity of the disposal facility. If you look closely, you will see massive amounts of paper and wood in the garbage. They consist of fragments of furniture and containers among other things, but what is very important is what we see behind these things. Some may see the destruction of tropical rainforest.

You can also see black-headed gull, the symbol bird of Tokyo. What this means is that there is raw garbage underneath (photo). Seagulls are omnivorous so they eat raw garbage. As you know, Japan's food self-support ratio is below 40%. This is by far the lowest among the OECD member countries which means that Japan is dependent on

import for very large number of items. We need to keep in mind the fact that there are staving people of the developing countries, estimated at 700 to 800 million, at the backdrop of the garbage that the seagulls are scavenging.

It makes sense when we apply Paul Ehrlich's concept that I just mentioned to Japan because Japan's population is predicted to reach its peak in another 5 years in 2007 to reach 127.78 million, and will continue to decrease thereafter. Births and deaths become almost equal and population becomes constant when a male and female couple has 2.08 children in average. The present average birth rate in Japan is between 1.33, and is low as 1.01 in Tokyo. Population is decreasing at such a steep angle and predicted to go down to 100.5 million by 2050, which means that there will be a rapid decline of 27 to 28 million people in 50 years from now.

If we take a look at the reality of our consumption, we live in abundance and basically have everything we need. Domestic demand shows no signs of increasing despite all the efforts that are being made in that direction. It is very difficult to think about further economic growth and consumption in such context.

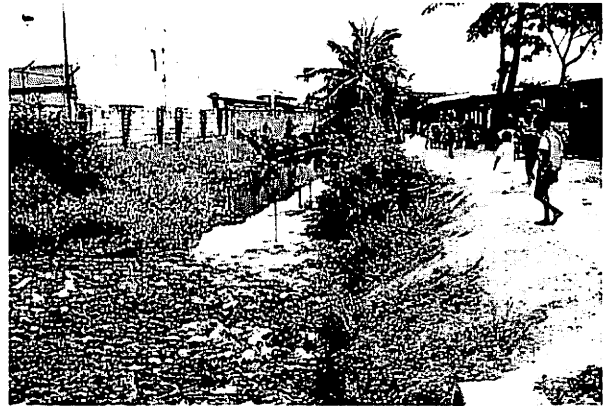


Photo 2)

Moreover, people's awareness has gradually shifted from pursuit of material wealth to search for richness of spirit. Paul Ehrlich's concept is very effective and convincing when applied to a country like Japan.

However, the situation in the developing countries is totally different. I would now like to change the point of view to the developing countries. Typical destruction and contamination of the environment due to poverty continue in these countries.

This is a goat climbing a tree. This goat climbed a tree because goats are special in the sense that they dig out the root of grass with their hooves after eating up all the grass. Cows and sheep do not do that, so the grass will grow back in the meadow even after it is eaten up by a large herd. However, goats dig up the root of grass with their hooves. When a large number of people become



Photo 3)

refugees in arid regions with ongoing war such as Afghanistan and Pakistan, millions of people build camp. Naturally, they seek refuge by travelling with one or two goats. More goats become necessary as new babies are born to the refugee families. Then the goats run out of food and eventually start climbing trees. Such tragic situation is taking place, offering an example of how increase of population beyond the mechanism of production would bring about critical environmental destruction.

For example, this kind of landscape can be seen in the slopes of Bhutan and Nepal facing the Himalayas where population is rapidly increasing. Livestock continue to increase rapidly towards the threshold limit of its subsistence. Top soil erosion is taking place in a very intense manner and turning the ecology unsuitable for habitation by humans and other organisms. In such a place, people have no choice but to live like this.

I will tell you what this would bring about down the road. When it rains in this condition, waterways are naturally created and rapidly wash away the top soil. This is called "gully" in English. When rainwater flows down repeatedly from cultivated land to topographically lower areas, top soil becomes completely lost in extreme cases such as this to make production impossible.

When this happens, it is no longer possible to restore the original condition. In other words, it is an irreversible change. People will have to abandon their land.



Photo ④

You may have a premonition that China's food policy would have a decisive impact on the future of Japan. I am doing a project study with my students at my seminar. Two years ago, we started a project with the Beijing University Graduate School to verify from the viewpoint of agriculture and environment whether China is capable of becoming a stable and sustainable society. Various observations can be performed depending on what aspect of China you look at, but our hypothesis is that very dangerous situation is in progress.

China's population is increasing at a horrendous rate and is estimated to have come close to 1.3 billion. One-child policy is a policy that is implemented for urban residents and is not applied to rural areas. To put it in extreme terms, conditions are being applied with more lenience in rural areas in that couples could keep having children until they have a son. There are also many children that are not included in the register. For example, children disappear in a flash when we visit rural villages because the person accompanying us as a guide is often a member of the local communist party. You sometimes see 5 children in a household that is supposed to have only 1 child. Kids that are prowling about here and there are not on the register so it's inconvenient for them.

You witness a situation where children scatter like birds in reality.

Furthermore, China is a multiethnic nation but all ethnical minority groups are excluded from the one-child policy. We actually do not know how fast population is increasing among ethnical minority groups. In spite of the organization prevalent in the Chinese society, dynamic trends in population are not clear.

A major policy worthy of attention is currently under way in China. It is called "Tai Ko Kan Rin." These four Chinese characters stand for "retreat", "cultivate", "restoration", and "forest", respectively. As you can see from these characters, this is a policy encouraging people to abandon farming and plant trees on their farms with the intent of returning it to forest. It is being implemented simultaneously in 17 provinces of China as a major policy of Prime Minister Zhu Rongji.

The reason behind the need to implement such policy is the worsening situation with the drying of the Yellow River. For example, the water of Yellow River dried up along the way and did not reach the sea in 270 out of 365 days in 1997. Meanwhile, the situation of the Yangtze River is that major floods, typified by that of 1998, has been occurring repeatedly. Therefore, the flooding of the Yangtze River and drying of the Yellow River are shaking the colossal rivers that are the two major resources of China and threatening the agricultural and industrial production of their regions.

It is said that there is only one cause for this flood and drought. Forests from midstream to upstream were cleared and converted into farmland. Marginal lands and steep slopes that were not suited for farming were reclaimed partly because of the self-reliance policy of Mao Tse-tung. As a result, soils started eroding in large quantities due to wind and rain. So people in China are desperately planting trees and grass, making the area off-limits to keep away people and livestock. Agriculture has been abandoned and efforts are being made to recover forest at all slopes having gradient of 25 degrees or higher.

Farmers that have abandoned agriculture receive, in the case of upstream basin of Yellow River, 100 kilograms of grain for every 0.7 ares of land from the government. The policy differs from river to river but covers all rivers.



Photo 5

After studying these sites for a long time, it appears to us that about half of such efforts have failed. Trees dry up and do not take root because of the low water-holding capacity of slopes.

Why did the Chinese government resort to such a policy? To put it simply, our impression is that the agrarian

civilization in the Yellow River basin that had continued for 6,000 years started its major withdrawal strategy as a result of population pressure. We can say that human activity and capacity of nature are reaching an impasse in this manner. This is an issue of fact that cannot be helped by ideology. People at Beijing University share this view of ours.

The fact that they had no choice but to launch this unprecedented policy of such grand scale with no economic prospects shows how difficult it is to maintain the ecosystem with human activities, population increase and food production taking place within it.

This is Ocher Plateau. Ocher Plateau stretches from Xian to Yinchuan, a region in Islamic China where the Great Wall of China starts to disappear. Soil does get eroded by wind and rain in these areas but the situation rapidly got worse. People are cultivating land in the upper parts of the slope as cliffs slip with their fields on them.

The caves that you see here and there are traditional dwellings of this region called yaoton. Many people still live in these caves that they have dug and this kind of major collapse is really taking place. People are compelled to plant trees in these places and adopt the policies of returning farms into forests and closing off mountains to plant trees.



Photo⑥



Photo⑦

An ironic way to put this would be "political tree planting." Japan's Forestry Agency would definitely refuse to plant trees on places like this if you ask them. It would be difficult for seedlings to take root on such steep slope with precipitation of only 200 to 300 millimetres. However, China does have her great side. As the proverb "Persistence moves mountains" suggests, this is a very critical scene representing such prevailing way of thought in China. This is a tree planting site. We cannot even imagine what is going to happen here in the future.

You see these slogans. "Plant trees and make the mountain beautiful" or "Invite affluence through trees" everywhere. I wanted to convey what is happening at the frontline of returning farms into forests policy to

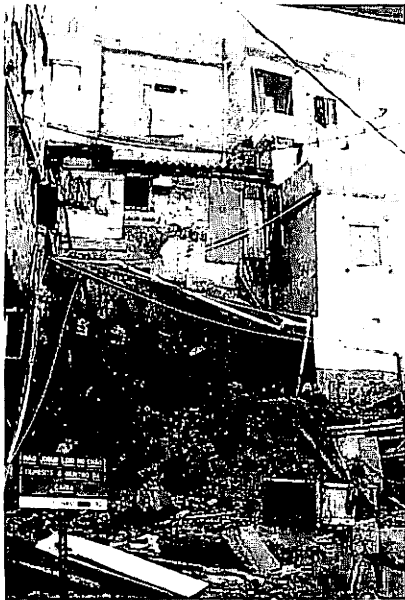


Photo 8

give you a glimpse of what people have to do when population and human activities go out of alignment with nature's carrying capacity.

I mentioned at the outset that Paul Ehrlich's "I = PAT" formula holds up in developed industrial countries but is not convincing to developing countries. As several lecturers have pointed out earlier, the theory of demographic transition emerged as a result of analysing the European society to find out how has population shifted. According to this theory, people give many births and many people die in the first stage. In the next stage, following advancement of industrialisation, for instance, people continue to give many births but fewer people die thanks to immunisation, food aid, higher agricultural productivity and abundance of commodities. This is the stage of high fertility and low mortality. Then comes the next stage in which people start having less children as a result of advancement of women into workplace, higher literacy and

clearer self-determination on the individual level. Education also costs money. People then start to bear and raise less children as the society enters the stage of low birth/low mortality. Population is said to reach a static state after going through these 3 stages.

However, there is a term "demographic transition trap" that refers to the situation in which population increase continues instead of becoming transitional in the second stage when people continue to bear many children but stop dying as food and medical facilities are improved. There are many countries in Asia and Africa that are suffering from such phenomenon. When this occurs, population will have to keep increasing as the country gets caught in a demographic transition trap.

Having worked for many years as a journalist, I participated in three Environmental Summits — starting from the first conference in Sweden in 1972, the second in Kenya in 1982 and the third in Rio in 1992 — and saw all kinds of situations at the scene. At the Earth Summit in Rio de Janeiro, Secretary-General Maurice Strong said at the opening speech that there were two reasons for holding the Environmental Summit. First is the problem of explosive increase of population in which 250,000 people are added to the population every day in the developing countries. Second is the problem of expanding disparity in wealth in which 75 percent of humanity is intent on obtaining daily bread. He clearly declared that Earth Summit was being held to solve these two problems.

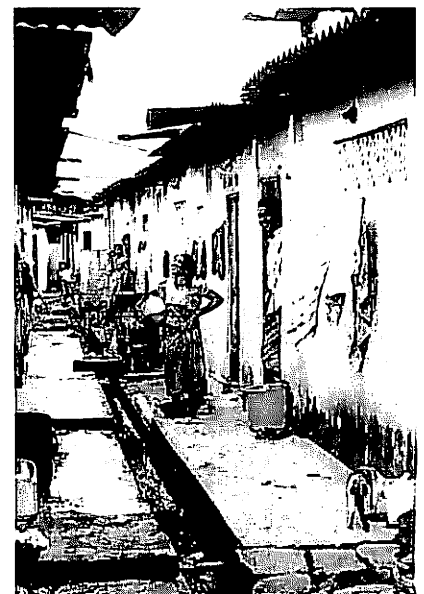


Photo 9

He also said that concentration and rapid increase of population in developing countries and concentration of wealth in developed countries is creating unsustainable imbalance in both realms of environment and economy but situation such as this would not continue for a long time. Then he went on to say that population increase would have to be restrained and stabilised at once; otherwise, nature would control the population in a much merciless manner.

That was the Secretary-General's opening address at the United Nations Environmental Summit in Brazil. He said that if people did nothing, nature would control the population in a much ruthless manner. This is in line with the indications made by the scientists earlier today.

At this conference, Rio Declaration and Agenda 21 were adopted with the aim of urging the governments to implement adequate population policy, establish proper population dynamics and incorporate it into the policy and aim for integration of population, environment and development. They also asserted that improvement of women's status and improvement of their education were of crucial importance.

An inner party (preliminary sectional meeting) was held in London prior to this conference. At that meeting, Dr. Strong made a very interesting remark. He told me that many of the comments made at international conferences held on the agenda of decreasing population were blatant dissenting opinions that would destroy the conference itself. He did not get into the details of who said what, but generally speaking, there were different views of life as represented by Islamic fundamentalism and Roman Catholic Church (Holy See). They were the source of movements that directly oppose abortion and birth control.

Then the International Conference on Population and Development (ICPD) was held in Cairo in 1994 and international community adopted an action plan centred on two policies of reproduction health and rights, and empowerment of women which sought to support improvement of education and social participation of women. It was adopted through agreement of all participants including Islam, Vatican, planned economy and market economy. The action plan had two main pillars. The first was to make efforts so that people can enjoy reproductive health including safe and reliable family planning by 2014. The second was to set intermediate goals for 2004 and 2014 and attain the goals of average life expectancy and infant mortality rate set respectively for these stages. Efforts are currently being made to attain these goals.



Photo10

There is a big question as to whether such efforts are bearing any fruit. As many of you who are here may know, there is a doctor from Ghana named Dr. Fred Sai who served as the president of International Planned Parenthood Federation (IPPF). Like the Asian Population and Development Association (APDA) which is sponsoring this lecture today, IPPF is an organisation with a very strong character of NGO. I once interviewed Dr. Sai in Geneva. According to Dr. Sai, population and fertility have started decreasing in more than 80 countries over the past 20 years. World's fertility rate was increasing rapidly at 2.1% on a year-on-year basis in the 1960s but has now dropped to 1.3%.

The reason behind this was the further promotion of the policy realised by international cooperation and assistance to developing countries that encouraged and supported the politicians of these countries. Dr. Sai stressed that the efforts of him and his colleagues were bearing fruit. In response to this question about the relationship between population and development, Dr. Sai said, "Population is the instrument of development and progress and at the same time is the consumer of the fruits of development. Well-educated population that has been trained in social participation raises the technical level of industry or becomes a resource in nation-building. However, the levels of education, medical care and employment are very low in Central Asia, Central Africa and West Africa. Population continues to increase at more than 3% under such circumstances. For example, Afghanistan and the Arab countries that are fighting Israel have population increase rates on the 3 percent mark, but it is already clear that such situations are disastrous".

We have been addressing the population problem and have made various efforts to date to solve the problem. We are also determined to continue such efforts. I think that Japan's first goal in international contributions in the nearest future should be the support from government agencies to NGOs that are working in the field. I think that the activities of Asian Population and Development Association should be rated very highly in this regard. Thank you very much.



From the Viewpoint of Food Production



Zenbei Uchijima

President
Miyazaki Municipal University

My name is Uchijima of Miyazaki Municipal University. I studied the relationship between agriculture and climate for a long time — about 37 years — at a laboratory of the Ministry of Agriculture, Forestry and Fisheries. I have shifted my direction somewhat to the realm of global environment since then and currently spending a considerable portion of my research on the issues of food production and global environment.

Today, I would like to talk about a rather basic approach for the population issue from the standpoint of food production.

We ourselves are living organisms, and organisms can be roughly divided into plants and animals. These organisms have three major characteristics. The first characteristic is that they are isolated and protected from the outside world by biomembrane consisting of macromolecule. The second characteristic is that organisms live by taking in vital energy, i.e. food, from the external world, and then metabolizing and eliminating it. The third characteristic is that organisms have the ability to reproduce themselves by using DNA information. One can define “organism” as an entity that controls these three abilities in a unified manner in the process of ontogenesis and phylogeny.

Individual organisms have a significant characteristic of ingesting vital energy, i.e. food, from the external world, and staying alive by metabolizing and assimilating it inside its body. Since we are unable to survive as an organism without this function, I think the issue of food is very important for our continued existence.

This figure shows the flow of energy between the sun, Earth, biosphere and noosphere. As for the amount of energy that flows in one year, the sun, which is shining at a distance of 150 million kilometres from our Earth, is putting out enormous amount of energy into space of 121.8×10^{29} kJ. The amount of solar energy that reaches the surface of Earth, located 150 million

Feature of organisms

1. Isolated and protected from the outside world by biomembrane consisting of macromolecules.
2. Organisms live by taking in vital energy such as food from the external world and then metabolising and eliminating it.
3. Organisms have the ability to reproduce themselves by using DNA information.

One can define “organism” as an entity that controls these three abilities in a unified manner in the process of ontogenesis and phylogeny.

Table 1

kilometres from the sun, accounts for about one-2 billionth of the energy emitted by the sun in one year. Forty-five percent of this one-two billionth of energy is spent on evaporating water from the surface of Earth, a planet known as “planet of water”. Another 41% is lost through infrared radiation, which is not visible to us, and 13.7% is released in the form of sensible heat transfer.

You can say that the climatic conditions that enable the survival of organisms are created by these activities. Then what kind of energy does the biosphere — including our world population of 6.1 billion — use after seemingly having conquered Earth? The answer to this question is that we live on energy that has been fixed by plants. The solar energy fixed by terrestrial and aquatic plants accounts for mere 0.11% of the 28.5×10^{20} kJ that reaches the Earth’s surface. It is also estimated that the food energy — energy that can potentially be used for food — accounts for about one-hundred thousandth of the solar energy arriving on the Earth’s surface.

This is what all organisms, all organisms living on Earth, rely on for subsistence. However, we human beings invented farming about 10,000 years ago and are currently producing a large volume of food thanks to this invention. To calculate this using the data for the latter half of the 1990s, we were obtaining 34.4×10^{15} kJ of food energy per year. It supports the lives of 6.1 billion people and a large number of cows — as many as 1.3 billion head. This energy quietly flows back into space in the form of invisible infrared radiation after giving rise to all kinds of phenomena including our intellectual and physical activities.

We human beings started using large quantities of fossil energy after the first industrial revolution that started around the end of the 17th Century. In particular, we are spreading our civilisation of science and technology throughout Earth by spending approximately 10 times more energy — energy derived from fossil energy and nuclear energy — than the food energy that we consume. And we are artificially creating the noosphere — a sphere that is largely different from that of other spheres.

Among various energy sources currently used by human beings — with the exception of nuclear energy — this food energy is energy arriving from the sun at present. It is fresh solar energy. In contrast, fossil fuel can be seen as solar energy that arrived on Earth during the old geologic era. It is fossilised solar energy.

So the fundamental difference between humanity and other organisms is the fact that all other organisms are living on fresh solar energy currently arriving from the sun while only human beings are using fresh solar energy of the present and solar energy from the

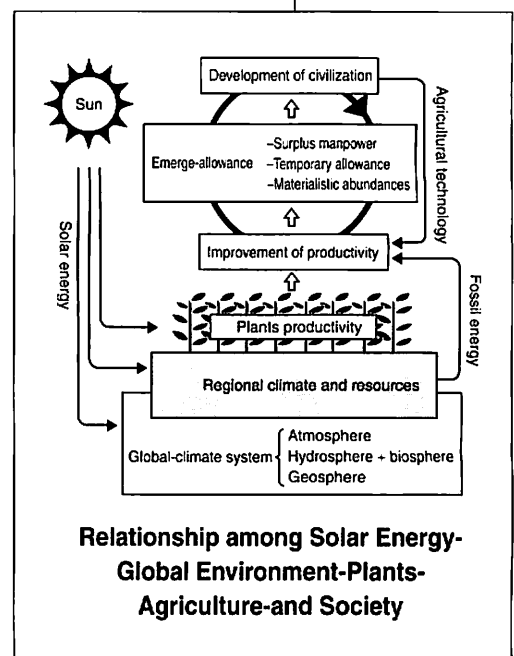


Fig.1

past, that is, fossilised solar energy. Although we have built a magnificent civilisation by utilising this energy, we are exerting catastrophic influence on Earth.

Now let us take a look at agriculture that produces our food. This is what agriculture looks like when seen in terms of the solar energy system. As mentioned in the lectures by Dr. Matsui and Dr. Hoshi, the elements that comprise the global system include biosphere and noosphere, and the energy that enters from the sun drives the global climate system such as atmosphere, hydrosphere and geosphere to create global and local climates. Plant productivity of various regions on Earth is determined at the backdrop of these local climatic conditions.

Humanity has succeeded in converting this plant productivity into food productivity by using crops and livestock. Improvement of food productivity has given rise to leeway in terms of food that enabled people to have extra time, such as time for intellectual work, and culminated in development of civilisation.

Agriculture and Food Production are;

- ① Most important for human survival
- ② Oldest industry
- ③ Emerge civilization

Most important activities in the world

Table 2)

This development of civilisation brought about technological development, which, in turn, propelled our progress over the last 10,000 years by being fed back to food production for further improvement of food productivity.

For this reason, agriculture and food production that support our existence — the existence of humanity — can be regarded as the world's oldest industry and the most important industry for the survival of humanity. This oldest industry can also be seen as the most important human activity that gave rise to and supported the civilisation. One can also say that the productivity of plants of each region existing in the global climate supports this activity.

Plants sustain ecosystem

Plants have evolved from primeval micro phototrophs which appeared around 4 billion years ago. Plants sustain all depending living things.

Therefore, plant called Green Atlas who is supporting world living things on his shoulders.

What is power of Green Atlas

Power to support all living things is derived from solar energy fixed by Plants.

Net Primary Productivity of Plants

This indicates plant biomass which is produced by vegetation on some land area during a season and/ or year.

Table 3)

As mentioned earlier, plants have their origin in the photosynthesising microorganisms that appeared on this planet about 4 billion years ago. All living organisms live on the products of photosynthesis. Therefore, plants can be likened to the "Green Atlas", the Green Giant that continues to carry all of the planet's organisms on his shoulders.

The power of this Green Giant depends on the amount of solar energy that has been absorbed and fixed by the plants, their net primary productivity. For this reason, one can say that net primary productivity of natural vegetation in a certain region represents the most important biological element that determines the activity level, biodiversity and the size of the ecosystem of the region.

A rough calculation of the productivity of each region using a climatological model shows that the present global climate conditions are influenced by the climate conditions shown in this figure and are changing dramatically in quantity and distribution.

Taking the example of high temperature and humidity, islands in Southeast Asia have annual plant productivity of nearly 30 tons per hectare. The regions indicated as shadow in the figure correspond to high productivity regions with high annual plant productivity exceeding 10 tons per hectare. You can see that such regions are extremely limited in the vast land areas of Earth.

Meanwhile, this irregular-shaped circle represents regions where agriculture has been practiced since prehistoric times, or since three to four hundred years ago in the case of New Continent. As you can see, humanity has subsisted by converting into food the plant productivity that had been made available by the natural environment and Earth throughout their long historical development in the form of crops and livestock.

Weather observation started worldwide in or around 1850. This figure here shows in a very straightforward manner the changes in global climate, the changes in population and the changes in food productivity over the past 150 years.

This shows the changes in the global average temperature. This shows the changes in

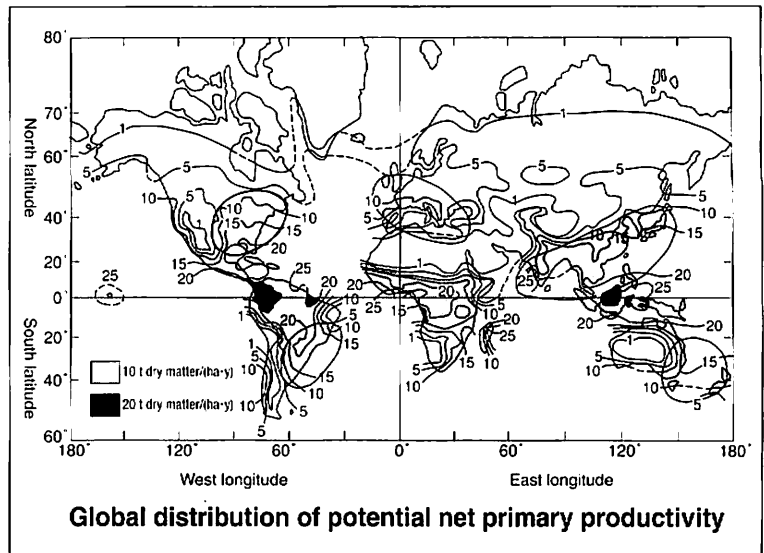


Fig 2

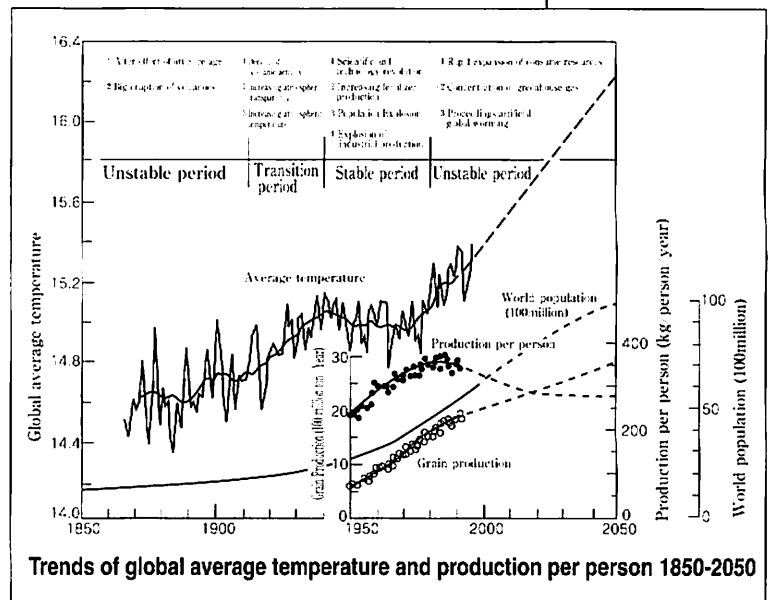


Fig 3

total global population. And this shows the increase in production of grains, the world's most important food resource. This line represents the volume of grain production per person.

Global climate has changed dramatically over the time span of 150 years. After going up gradually from the 1920s to around 1945, the temperature slightly dropped over the next 25-year period after going through some fluctuations to maintain the temperature at an almost constant level. However, it started to rise sharply since the latter half of the 1970s. The man-caused phenomenon of global warming that resulted from massive use of fossil fuel is said to be at the background of this phenomenon.

The world was producing about 600 million tons of grains per year in 1950. In the mid-'90s, grain production exceeded 2 billion tons. Thus the grain production per capita has been increasing steadily at the rate exceeding the rate increase in population during that period. However, a very pessimistic view is becoming increasingly dominant when it comes to what the future would hold. One of the predictions is that the rate of increase in food production would drop to half of what it is today.

The agricultural technology of today that attained more than threefold increase in grain production over the past 50 years can be referred to as high-productivity agriculture or high-yielding agriculture. You can also say that this high-productivity agriculture spread by using the four resources — environmental resources, biological resources, technological resources and energy resources — as required, in sets and at low prices.

When deploying this high-productivity agriculture in each region or country, it is very important to have a very sophisticated capacity for scientific and technological research and a highly developed industrial production system. When you look at the food exporting countries of the world today, they are primarily developed countries and not developing countries. It is an indication of the importance of various technological and resource utilisation capacities in the deployment of high-productivity agriculture.

I have mentioned that humankind learned to till the land about 10,000 years ago. Since then, many people have strived to increase production and obtain stable yield. In addition,

Major four resources for sustain high yielding agriculture	
①	Environmental resources (air, solar energy, water and soil) Climate
②	Bio-resources (high yielding crops: improved domestic animal)
③	Technology related resources (effective fertilizer and agrochemicals, high efficiency agricultural machinery, irrigation and drainage system, technology information system, industrial production system)
④	Energy resources (coal, petroleum, natural gas, nuclear energy)

Table 4

Super Elite of Plants-Crops	
Total number of plants species : 100 thousands?	
Edible crops: 900 species	(rice, wheat, barely and oats etc, beans, potato, vegetables, fruits.)
Material crops 11,000 species	(cotton, hemp, palm, sugar cane, beat, sugar crop, gum tree)
Fodder crops and green manure 400 species	(gramineous grass, legumineous grass)
Total 2300 species	

Table 5

new types of farming and crops have been created to suit the condition of each region. About 900 species of crops are currently being used for human consumption. In addition, 1,000 species of crops are used to produce industrial raw materials and 400 species are grown to produce feed and green manure.

About 2,300 species of crops are known to be under cultivation in the world today, although we are only able to see about 10% of them. Since there are approximately 300,000 plant species that have scientific names, the crops that support our lives can be regarded as the elites of the plant world. One can safely conclude that the history of human agriculture consists of selection, fostering and improvement of these crops.

In particular, the 15 species of crops that I have listed here — wheat, maize, rice, potato, barley, soybeans, sweet potato, cassava, sugar cane, sorghum, oat, rye, peanut, bean and beet — are 80 to 90 percent responsible for supporting the world's 6.1 billion population today.

As you can see from this figure, the crop species supporting our lives — the lives of 6.1 billion people — are extremely limited.

Now let us take a look at the volume of crops we are producing by using these crops and advanced agricultural technology. Total land area in the surface area of Earth is 14.889 billion hectares. Among them, about 1.38 billion hectares are used for growing annual crops, 129 million hectares for growing perennial crops and 2 billion hectares for grazing meadows. All of these combined amount to over 3 billion hectares. Two billion tons of grain, 567 million tons of potatoes, 150 million tons of soybeans and 120 million beans are grown on these lands. Growing these crops and using some of them to raise livestock keeps the world population of approximately 6.1 billion alive.

On the other hand, we obtain 80 million tons of fish, 12 million tons of shellfish and molluscs, and 12 million tons of seaweed from the vast surfaces of the sea. In addition, we use the amount of wood shown in the figure every year from 3.454 billion hectares of the world's forests so that we can live a civilised life in abundance.

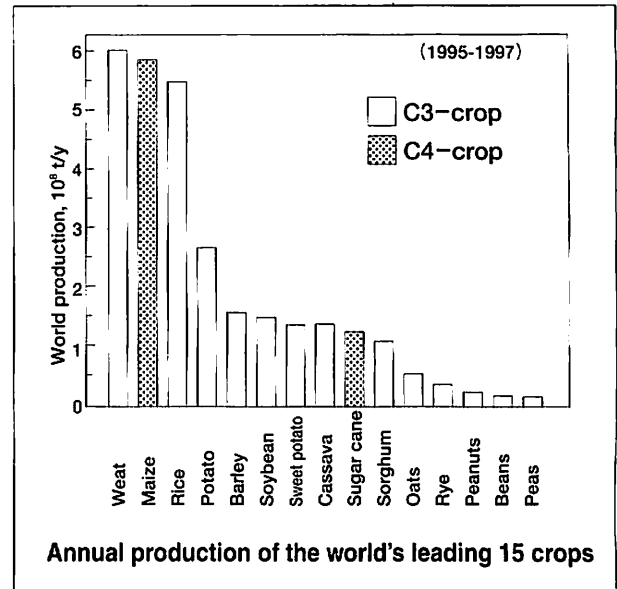


Fig.4

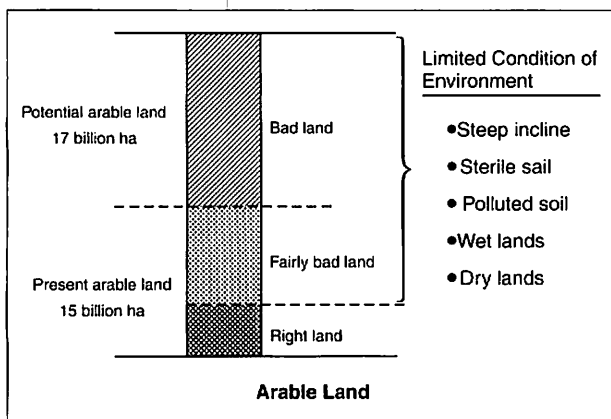
Major factors affecting long term supply-demand of food	
Demand aspect	<ul style="list-style-type: none"> ○ Population growth especially in developing countries ○ Increasing consumption of fodder crops according to increasing affluence
Supply aspect	<ul style="list-style-type: none"> ○ No further expansion of cultivatable and crop yielding land ○ Slower trend of increasing productivity of agricultural production per unit area ○ Degradation of cultivatable land and desertification ○ Shortage and degradation of fresh water resources ○ Extraordinary climate events, such as global warming and drought ○ Shift to low input sustainable agriculture ○ Magnifying and aggravation of arable land degradation due to human activity

Table.6

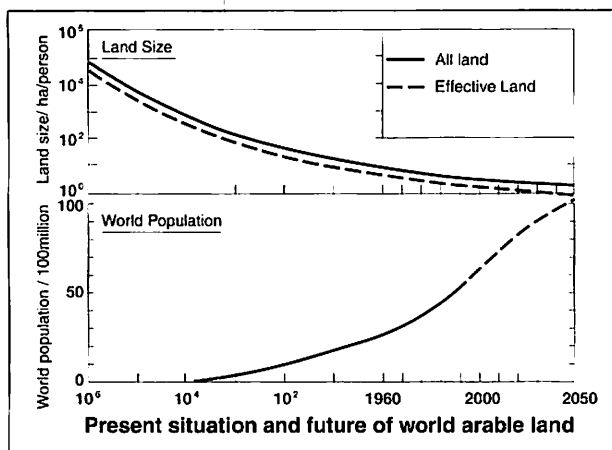
From this viewpoint, it is possible to roughly determine the wide variety of purposes we have for the plant production from terrestrial plants.

Another important question we need to ask ourselves is the major factors that may influence the supply and demand of our food in the near future. Firstly, in terms of demand, there is a problem of population growth taking place mostly in the developing countries. Secondly, there is a problem of feed crop consumption accompanying increase in abundance. In terms of production, cultivated area and grain harvest area are already starting to level off.

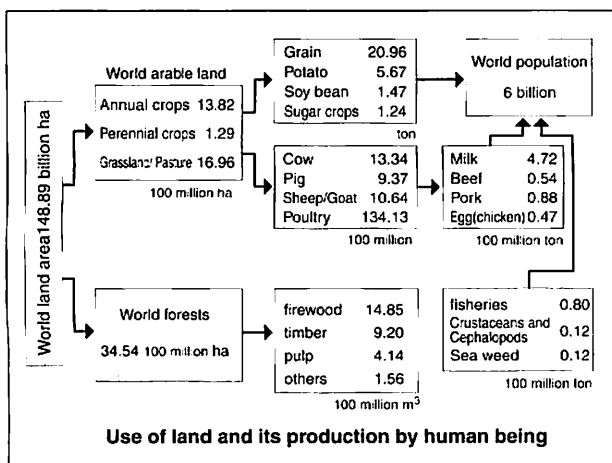
Thirdly, the increase in growth of yield per hectare has been slowing down particularly in the recent years. Fourthly, desertification is advancing owing to deterioration of farmland and overgrazing of livestock. Fifthly, there is a problem of tightening and deterioration of freshwater resources. Tightening of freshwater resources will become a very serious problem in many of the developing countries located in the semi-arid region. The next potential problem is that of intensifying unusual weather caused by global warming among others that are predicted to continue in the future. On the other hand, there is heightened interest in environmentally sound farming methods and transition to such methods in the developed countries. Lastly, there is a problem of expansion and intensification of deterioration in farmland environment owing to human activities, which makes it very difficult to simply project the previous trends into the future when forecasting the future increase in food production.



Fig(5)



Fig(6)



Fig(7)

poor natural environment.

Factors contributing to poor environment include steep slope, poor soil, soil contamination, poor drainage and precipitation shortage (being located in arid zone). For this reason, developing the remaining 1.7 billion hectares of proposed sites for agricultural production would be accompanied by considerable difficulty.

Another important fact is that these proposed development sites offer safe habitat for many wildlife and produces its own vital energy.

It is also important to pay attention to the land area per person for the humanity as a whole. As I mentioned earlier, we only have 14.88 billion hectares of land area including the Antarctic Continent and Gobi Desert. Since the world population is estimated to reach 9.3 billion by 2050, land area per person would amount to about 1.5 hectares. However, the area is reduced to 0.75 hectare per person after taking into consideration the fact that only half of this land has climatic and soil conditions that are suited for plant growth. This 0.75 hectare is about the same land area as the area of land we are currently using for food production. This suggests that agricultural production will be facing an absolute shortage of land resources by the year 2050.

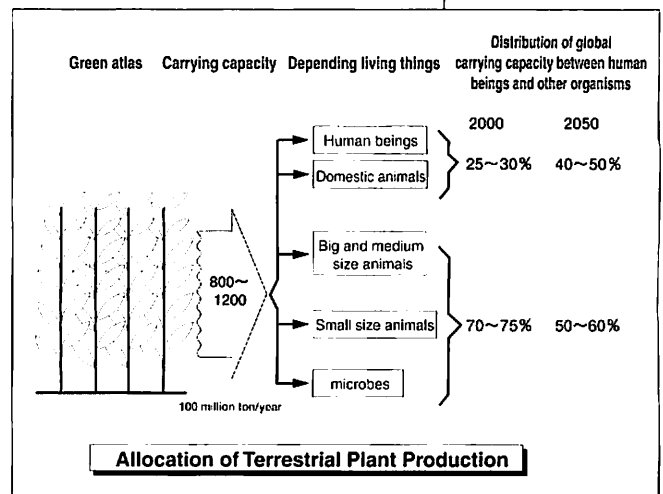


Fig.8

Another important issue is that of allocation of plant production on land. The volume of terrestrial plant production which takes place on the 14.889 billion hectares of land area is estimated to reach between 80 and 120 billion tons a year and distributed among humans, livestock, poultry, large and small animals, and microorganisms. In other words, carrying capacity of Earth is determined based on this output of 80 to 120 billion tons a year.

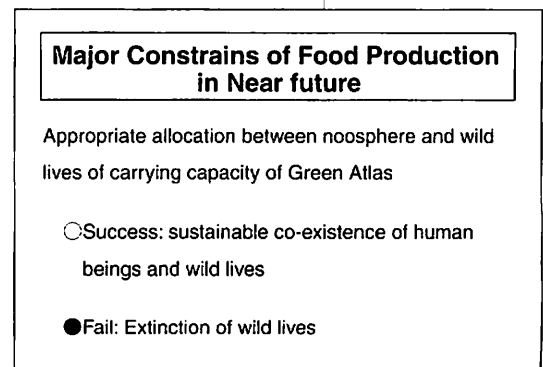


Fig.9

According to our estimate, humans, livestock and poultry are already using 25 to 30 percent of global plant production for their survival. This means that 70 to 75 percent are currently left for other organisms and wildlife. However, at population of 9.3 billion in 2050, taking into consideration the improvement of diet and increase in GNP, humans, livestock and poultry are predicted to consume 40 to 50 percent of global plant production for their survival, leaving only 50 to 60 percent of plant production for wildlife. This means that humanity would be using more than half of

global plant production, i.e. Earth's carrying capacity. These figures show that this planet Earth — a place that has already become a difficult place to live for wildlife, our companion with nearly 4.0 billion years in history of evolution — would become an even more difficult place to live and that there is a possibility that mass extinction comparable to that which occurred during the Cretaceous period 65 million years ago would occur again.

I think that how we may be able to avoid this is the great challenge facing all of us living in the world today and the people that will be living in this world in the future.

What are the biggest constraints for our food production in the near future? Global environment is one of them. However, I think that the greatest constraint that determines food production is the adequate allocation of the carrying capacity of the Green Atlas between humans and wildlife.

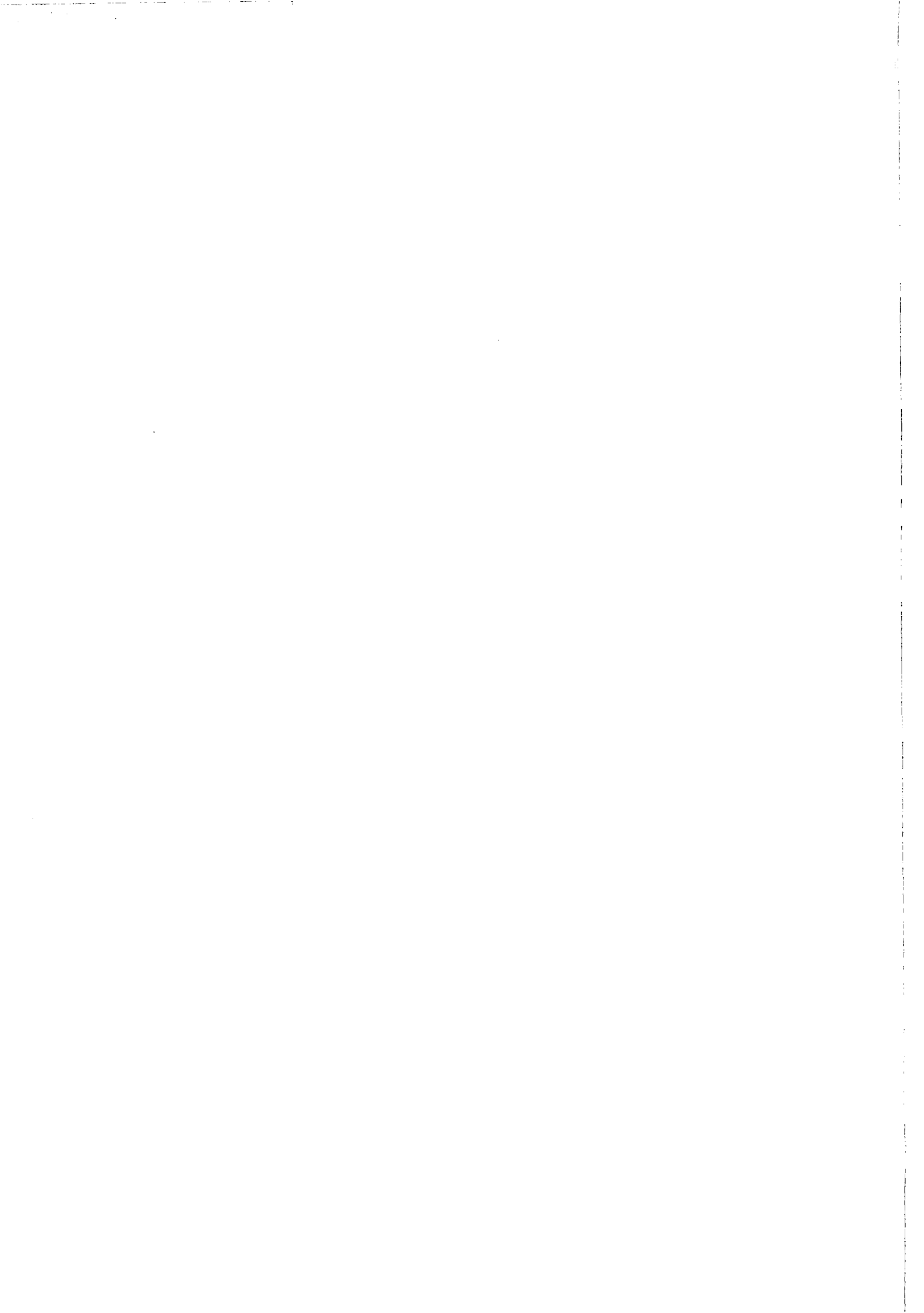
If we succeed in adequate allocation of the carrying capacity of the Green Atlas, we should be able to realise a sustainable symbiosis between humans and wildlife. If we fail in this endeavour, a massive extinction of wildlife would occur.

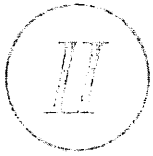
From this perspective, the issue of population is not just an issue for us human beings, but a major issue for all forms of life that survived much longer history of evolution than humanity. I think that our lifestyle holds the key to their existence.



II. Future of Human Society

Focusing on
Public Health, Social System, and Bioethics.





From the Viewpoint of Health



Masataka Murakami

Director,
Ibaraki Occupational Health Promotion Centre

Introduction

I currently work for Ibaraki Occupational Health Promotion Centre, an organisation mentioned just now. This centre belongs to the Labour Welfare Corporation which is an organisation affiliated with the Ministry of Health, Labour and Welfare and supports the activities of companies in preventing occupational injuries and creating comfortable working environments.

As you know, Industrial injury hospital is a place for treating the workers and those suffering from job-related diseases and injuries. Starting about 10 years ago, Occupational health promotion centres have been built at many prefectures based on the idea that it is not sufficient to treat people with job-related diseases and injuries and that more emphasis should be placed on prevention. Today, the coverage has reached all but a few prefectures. Although Ibaraki Occupational Health Promotion Centre is a very small organisation of 6 persons, it cherishes a very high philosophy and purpose. Government has been backing the efforts by companies to protect the health of their workers. An example of such efforts is company visits made by labour standards inspection office for offering guidance.

However, such practice has fallen out of step with the times. Instead, companies are making voluntary efforts to eliminate illnesses and injuries. Occupational health promotion centres were created to support these efforts by the companies. In reality, however, customers rarely utilise these centres. The centre staff including myself, companies and government will therefore have to work together more closely so that this wonderful system would be able to produce more results. I think about this as I perform my work from day to day.

Population problem

Let us move on to today's theme of population. I agree with the presenters at the morning session about the gloomy picture. However, we naturally have to take some measures for our survival and for the happy life of future generations.

I am not an expert on population problems or international health care. I graduated from medical school and then studied public health. I worked for National Institute for

Environmental Studies and also worked in the field of industrial health which I am currently involved. In this sense, I am an expert in the field of environmental issues such as air pollution. Today, I would like to talk about my views on the population problem from the viewpoint of a person that studied public health. I would also like to offer some answers in my own terms.

We ask the question "What is population problem?" My answer to this question is as follows. This earth where we live is home to various countries and regions. As people lead their lives by clinging to these countries and regions, one question we need to ask ourselves is the amount of life resources that the earth and these regions can offer for the survival of people living on them. I believe that this morning's lectures touched on this question. However, I think that there is another way to look at this issue. In other words, we need to pay attention to each and every individual comprising the population because each individual is living and existing in its community, giving birth to its future generation and raising them. I would therefore like to rephrase the question to "How much resources are available to individuals for this purpose?"

The right of individuals to live and exist is clearly stated in the Constitution of Japan as "All people shall have the right to maintain the minimum standards of wholesome and cultured living". The Constitution goes on to say that "In all spheres of life, the State shall use its endeavors for the promotion and extension of social welfare and security, and of public health" as it proposes the goal that the country should aim for. Furthermore, it is stated in the Preamble that "We desire to occupy an honored place in an international society striving for the preservation of peace, and the banishment of tyranny and slavery, oppression and intolerance for all time from the earth" and that "We recognize that all peoples of the world have the right to live in the peace, free from fear and want". In other words, one can say that Japan has proudly declared to contribute to the international community as a country and is making efforts in that direction.

Turning our eyes to the international community, UNDP's Human Development Report (1997 edition) asserts that poverty can mean more than a lack of what is necessary for material well-being. It can also mean denial of opportunities and choices most basic to human development". It emphasises the technical assistance for promoting development in all socioeconomic areas of the developing countries by pointing out that disparity in wealth is creating inequalities beyond regions and generations to hinder sustainable development not only of the region but of the entire world. While a big question remains as to whether such task is attainable, making efforts in this direction has become the norm of the international community.

When you face reality, however, you will see that the Sub-Saharan countries are cited as extremely poor countries and that their income has not changed since 1950. To make things worse, their foreign debt continues to increase. Furthermore, it is indicated that

living conditions of the region has deteriorated considerably in the recent years due to war and excessive development and that people are being driven into poverty as they are deprived of essential life resources such as clean water, nutritious food and hygienic housing. This news has been covered by TV and newspaper, and you will find an article about this in every issue of Time. Nevertheless, we, including myself, seem to be reacting to the situation with a sense of distance.

On the other hand, many people living in Japan and other countries and regions that have accumulated wealth from all over the world are not facing extreme poverty, but are suffering from numerous kinds of stress in the industrial society in which extreme efficiency is pursued.

Thus people on earth are living in their respective regions with marked gap in distribution of economic and living resources. The level of health for individuals and population groups formed by these individuals represent a multitude of conditions by corresponding to the level of living resources of that region such as environmental hygiene, food hygiene and health and nutrition. For instance, a study of physical constitution of population group shows that increase in height and weight of Japanese has changed dramatically since 1950. This may be common sense, but the same can be said about physical strength. Disease structure and mortality structure, which represent patterns of health impairment, are also determined according to the level of living resources.

Comparison of Indonesia, a developing country, and Japan, a developed country

Since we may not go anywhere if we simply talked in general terms, I would like to make a comparison between Indonesia, which is a developing country, and Japan. I had the fortune of hearing a precious story about Indonesia from Professor Shousuke Suzuki of Gunma University who has been involved in offering support to public health activities in Indonesia for many years.

Indonesia has GNI (gross national income), an index for economic production capacity per capita of a country, of 2,700 dollars — about one-tenth of the same index for Japan which is 25,000 dollars — ranking the country as a developing country of intermediate level.

There is a problem with drawing any conclusions based on statistical data across the board because the poorer the country, the greater the economic disparity between urban and rural areas. But let us take a look at Indonesia as a whole based on statistical data in any case. The county currently has a population of 210 million which is 75 percent larger compared to 30 years ago. In the case of Japan, the population 30 years ago was about 100 million, which means that it has increased by 20 percent and will reach a stable level in not too far future.

While Indonesia is said to have a large population, current population size of an average household is 4.5 persons. I am now 67 years old. And in Japan, back when I was young, I had a friend who was the eighth son of the family. I myself had 4 siblings. There is an expression "The poor have large families", but in those days, I remember there being very many children in the community. In Indonesia's age structure, children aged 15 years and under account for one-third of the entire population while those aged 65 years and above account for 4 percent. Average life expectancy is 66 years. Since Japan's average life expectancy was 66 years in 1960, it appears that Indonesia is currently at this level.

Taking a look at vital statistics of population of Indonesia for every thousand population, fertility rate is 23, mortality rate is 8 and infant mortality rate is 41. Maternal mortality rate for every 100,000 births is 470, which is very high compared to maternal mortality rate of 176 around 1950 in Japan. With the exception of maternal mortality rate, Indonesia has the same level of age structure and population dynamics as Japan around 1950, immediately after World War II. Incidentally, present day Japan surpasses all other countries in the world in these areas with fertility rate of 10, mortality rate of 7, infant mortality rate of 4 and maternal mortality rate of 12.

Let me reiterate the fact that age structure and population dynamics of today's Indonesia is at almost the same level as those of Japan around 1950. Professor Suzuki has said that it took the enormous efforts that were made toward the improvement of health and sanitation over the past 20 years to reach this level.

Let us analyse the disease and mortality structure in some more detail. The most common cause of death in Indonesia today is perinatal death. In other words, there are many deaths of newborn babies. This is followed by heart disorder, stroke, respiratory diseases such as influenza and pneumonia, tuberculosis and traffic accident. The largest cause of death in Japan back in 1950 was tuberculosis, which was common among young people, followed by stroke, cancer, heart disorder, accident, pneumonia and suicide. Today, deaths from tuberculosis became rare and the order has changed to cancer, heart disorder, stroke, pneumonia, accident and suicide.

In the case of Indonesia, a concern exists over significantly high incidence of perinatal death, rather high infant mortality rate and high prevalence of infectious diseases. However, this does not necessarily mean that larger number of people die from infectious diseases such as typhoid, amebic dysentery, diphtheria, tetanus, rabies and tuberculosis compared to other diseases. We must understand that Indonesia has also overcome infectious diseases and malnutrition as causes of death and that her disease/death structure has shifted in the direction of increasing incidence of adult diseases that are largely affected by lifestyle. I think that it is necessary to have exchange with and offer

support to the people of the country by understanding the conditions of their health.

Indonesia currently spends 0.7% of her national budget on health and medical expenses. I assume that there is a limit to the amount of money that can be spent in this area with GNI of 2,700 dollars. However, the reality is that disease/death structure has shifted in the direction of adult diseases becoming more predominant and average life expectancy has gone up to 66 years in spite of this income level.

People becoming ill and dying mainly of adult diseases is a phenomenon observed in developed countries that requires large amount of money for prevention and treatment. This can be understood instantly if you look at the case of Japan. Eight percent of our gross national income is spent on national health and much debate is currently taking place on the subject of medical reform. I assume that it will cost a lot of money for Indonesia in the future.

Japan's course towards becoming a developed nation

Let me put aside the topic of Indonesia for now and look back on the course that Japan took towards becoming a developed nation after 1950. Please remember, if you will, the severe food shortage immediately after the war and the increase in food production. Petroleum took over as the main energy source, but there was a period when coal mining was encouraged to increase energy production. Then Japan produced large quantities of high add-value products by making the shift from materials production industry to light industry mainly comprised of manufacturers, and earned foreign currency by exporting these products to overseas. Japan's rapid economic growth was made possible by this export.

In addition, high-quality labour force was supplied through migration of young population from rural to urban areas. Infrastructure such as water supply and sewage systems and transportation network was rapidly built at the same time. Another important element was the improvement of social security system including National Health Insurance. Advancement in establishment of health care system played a role as income standard, living standard and health standard of the Japanese people reached their favourable condition today.

Needless to say, the efforts of the entire population from the leaders of all sectors of society to the labourers as well as the rapid economic growth triggered by war boom from the Korean War and Vietnam War played an important role in the process. However, what I would like to stress here is the fact that untiring efforts of the people at the front line of the administrative authorities and private companies, as well as of the experts and the people of each community, towards the improvement of living standard were largely responsible for this feat. It makes me reaffirm my determination to exercise ingenuity like our predecessors in the Occupational Health Promotion Centre work I am

currently involved, in an effort to obtain greater results. I think that there is a need for such effort in all sectors of my country.

Experience of filarial control

Now I would like to talk about my experience in the concerted efforts among government, experts and community. It is an old story that offered me the opportunity to work in the field of public health as a researcher.

It goes back to the late 1950s to the early 1960s when I was a young medical student. I was involved in a research for one month at Okino-Erabu Island of the Amami Islands as a member of the filarial control study group organised by Professor Manabu Sasa of the Institute of Infectious Diseases in Mejiro.

In the old days, 20 to 40 percent of the people living in islands south of Southern Kagoshima were infected by filaria. Filaria is a 10cm long and 1mm thick parasite that lives in people's lymph vessel and causes elephantiasis by blocking the lymph vessel. It also causes fever and chylous urine, a disease in which absorbed nutrients drain into urine from intestinal tract. Treatment of people with this parasite and extermination of common house mosquitoes are the measures available for control. I went to the field with Professor Sasa to exterminate the mosquitoes. Dr. Takeshi Yoro, who is often on TV, and Dr. Hiroshi Yoshikura of Institute of Infectious Diseases were among the members. This experience was very valuable for me because it taught me how a well-trained team could work closely together to attain remarkable results.

Extermination of filaria requires extermination of mosquito which is an intermediary host for filaria. This requires steady efforts such as placing lids on crocks used for keeping domestic water, eliminating puddles and spraying insecticides. In addition, as filaria larvae only come out of lymph vessel into blood vessel at night, we had to collect blood from earlobes of the local resident after 8pm to check if they had any filaria larvae.

Then we had to administer drugs to filarial carriers. A specific medicine against filaria named "spatoin" became available at that time. However, it cost 500 yen per person which was a lot of money then. Moreover, the local people with filaria were not aware of the fact that they were ill. There was a famous story about Takamori Saigo's hydrocele testicle, but he did not take it seriously. It therefore took much convincing to have the people receive treatment. It was only possible through the effort of the study group over the 5 year period as well as the efforts of the Ministry of Health and Welfare, local government and all the residents.

Family planning activities

To tell you another story from the same period, I stayed in Sarufutsu Village in Wakkanai, Hokkaido for a month as a member of visiting medical team for medically underserved

areas. The leader of the visiting medical team was a health nurse named Ms. Wakana Ohnishi, a member of National Health Insurance Association who was in charge of the vast wilderness of Hokkaido. I worked with her and heard stories about her decade-long activities in the field of maternal health including family planning and movement for the improvement of living conditions. It was way back in 1960 when Japan had already entered the stage of demographic transition.

This will get things out of sequence, but before that in 1955, an international conference named International Conference of Planned Parenthood was held in Tokyo. According to a record of this conference, Chairman Shimojo talked about the status of population in Japan and Japan's approach towards family planning. The conference was held in Japan because of the extraordinary interest among the participants in how Japan, a developing country at the time, succeeded in birth control. In response, Chairman Shimojo made the point that family planning was a movement for liberating Japanese women who were suffering from poverty and high rates of birth and infant mortality. Meanwhile, Ms. Shizue Kato reported as an important conclusion of the discussion reached at this meeting that people were able to confirm the effectiveness of family planning proved only after fully mastering the contraceptive measures as an alternative to artificial abortion that had been widely practiced in Japan.

Ms. Ohnishi was a midwife in addition to being a health nurse. She was also a passionate person who worked as an actress in Tokyo in her younger days. She was working as a midwife in addition to offering guidance on planning and operation of collective cooking, nutritional improvement with emphasis on conception control and health management for prevention of parasites and adult diseases for the housewives who were busy from early in the morning till late at night working in the field and taking care of housework in the reclaimed land amidst the wilderness of Sarufutsu. I remember her saying that it started as a meeting of housewives but their husbands also started taking part in the conception control guidance and the meeting turned into a family planning movement for the entire village filled with jokes and laughter. Although her commitment partly contributed to this, she seemed to have an inborn gift of solving many problems that lied ahead of her.

What she was practicing at that time with the villagers was "reproductive health and rights" which is now a much-talked subject. At the time, I interpreted the work she was doing in the field of maternal and child health and daily activities to be more of "a movement based on her own creativity and ingenuity" than "frontline activities of administrative authorities. However, I started realising recently that today's Japan was built by many people like Ms. Ohnishi who were working in the field of government, community and business.

Conclusion

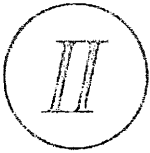
At the beginning, I mentioned that population problem is an issue about how to make

available the means and resources for guaranteeing survival and livelihood to each and every person comprising the population. The people of Indonesia are seeking life of affluence with the rapid advancement of industrialisation and urbanisation. As I mentioned earlier, the country has now reached the level of Japan in 1950 as far as population structure and disease structure are concerned. Her ratio of dependent population is declining and is predicted to reach the bottom in 20 years. JICA launched a family planning project in 1969 and has been implementing a project on maternal and child health handbook. I am sure that Japan's experience in family planning and maternal and child health is being utilised in such project. I would very much like to know its outcome.

As for the path towards affluence for the people of Indonesia, I assume that their situation is quite different from that of Japan back in 1950. Aspects such as standard of living and education, values including religion, international situation and information environment should be completely different from those in 1950. The Japanese experience and wisdom shall be utilised along the direction of development, economic growth and QOL that they themselves are thinking about and are seeking.

With regard to the most underdeveloped sub-Saharan countries, demands are being made to build the system itself by relying entirely on Japan to solve all the problems. However, it is basically necessary for the people of those countries to think about how to obtain their own happiness. The goal, at least for the time being, is to attain the level of health, social welfare, social security and public health enjoyed by the developed countries that they see in front of their eyes. No one should be able to deny their rights to enjoy them. In reality, however, the gap between the rich and the poor is expanding. On the other hand, increasing number of regions are succeeding in demographic transition, as can be seen in the countries of East Asia including Japan, and are striving towards their economic independence.

Developed countries need to be more active in offering funds and wisdom to the most destitute countries suffering from high rates of birth and infant mortality. The world population is estimated to reach 9.1 billion in 50 years. While I am doubtful whether we would be able to secure sustainable resources to support such population, we do need to think more seriously about the population issues in other countries.



Impact of a Falling Birth Rate and Aging Population on Society

Naohiro Ogawa

Deputy Director of Nihon University Population Research Institute



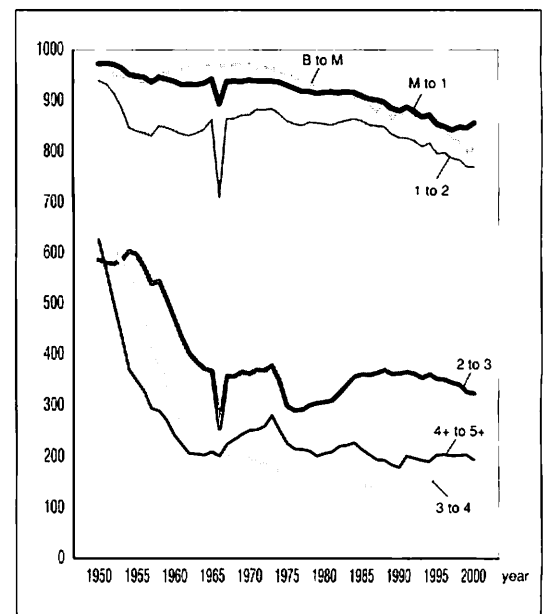
Good afternoon. My name is Naohiro Ogawa. Today I will be mainly talking about Japan.

When we think about the meaning of an "aging population", there is in fact no clear definition. There is no official definition of a certain percentage of elderly people in the population that would constitute an aging society. In a 1957 U.N. report, "aging society" is defined as "relative increase in elderly persons and relative decrease in youth". In short, we can say that aging society is brought about by two factors: "people not being born" and "people not dying".

To look at the first factor of people not being born, this graph representing the probability of birth and marriage from 1951 to 2000 shows a sudden and clear change around the time of the oil shock in 1975. (Fig①)

By analogy, we can compare this to hurdles in track and field. Using this approach, we can consider marriage and having children as a series of hurdles over the period from 1951 to the oil shock in 1973. Everyone was able to clear the first hurdle of marriage without any problem. You can see that it was not so difficult to have the first child, and that having the second child was not much of a problem either. Having the third child and fourth child was difficult, and that put the brake on fertility. Rapid decline in births of a third child and fourth child owing to hardships of life and other reasons lowered Japan's fertility rate and gave rise to the norm of having two children in the family. (Fig②) (Fig③)

A completely different picture emerged after entering the '80s. The first hurdle, marriage, became very difficult to clear and not everyone could get over. This relates to the phenomenon known as "late marriage". The first child also became a high hurdle. However, the third and fourth child became less of a hurdle, which means that couples



Fig①

often gave birth to a third and fourth child once they had one child. It was in the '80s that couples were polarised to those with no children and those with three or four children.

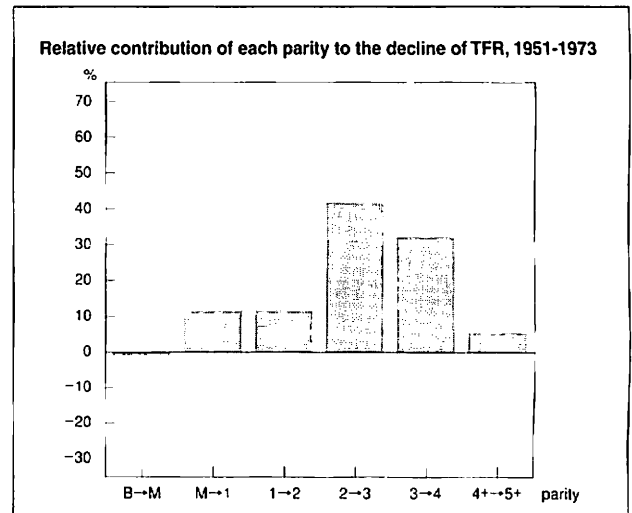
The situation changed considerably again in the '90s. Marriage was still a major hurdle and the probability of having the first child after marriage increased even higher. The definition of DINKS (double income couples with no kids) may vary but their situation is changing dramatically. (Fig④)

This is the graph for the year 2000. Marriage represents a very high hurdle again in recent years and has reached an unprecedented high level. A point that is surprisingly overlooked is that late marriage is becoming the largest cause of the falling birth rate. We therefore need to give this phenomenon more consideration.

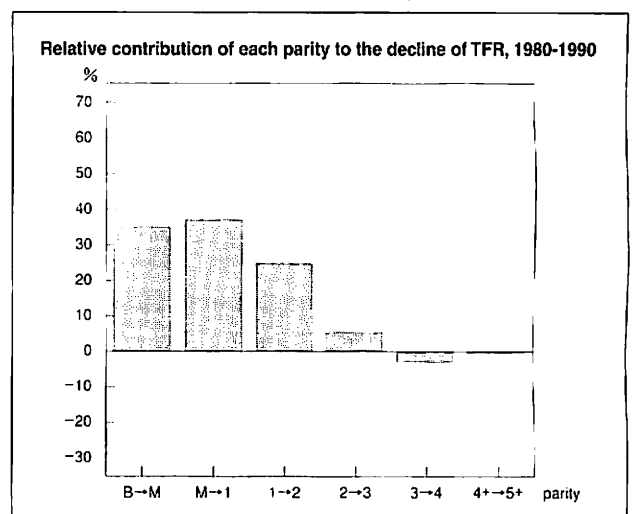
Another significant characteristic is the fact that giving birth to a second child has become quite a large obstacle. Having the first child was difficult in the first half of the '90s and having the second child was difficult in the second half of the '90s.

Incidentally, if the current situation, shown in the previous graph, continues, 20 percent of Japanese women will remain single throughout their lives. The percentage will be nearly 30 percent for men. You may think these estimated values are surprising, but are there male persons living in Tokyo in the audience? If you are almost 40 and single, the statistical chance of you getting married is almost zero. About 35 percent of men in Tokyo are currently unmarried and the percentage of unmarried persons is predicted to go up considerably in the future.

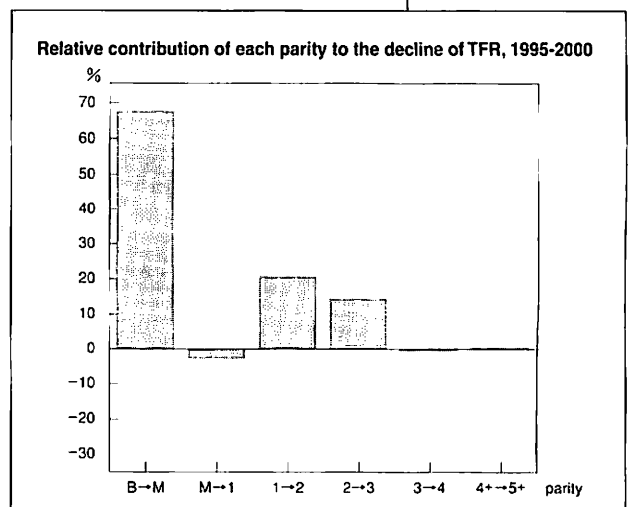
The situation is so pressing that it requires fundamental reconsideration for planning and development in the Tokyo metropolitan area. The topic also came up at the National Land Development



Fig②



Fig③



Fig④

Council when it discussed development in Tokyo. For example, it may perhaps be better to develop communities with many convenience stores to meet the needs of single men than pursuing policies for families such as building parks. The magnitude of change is large enough to force such a fundamental shift in our outlook and lifestyles.

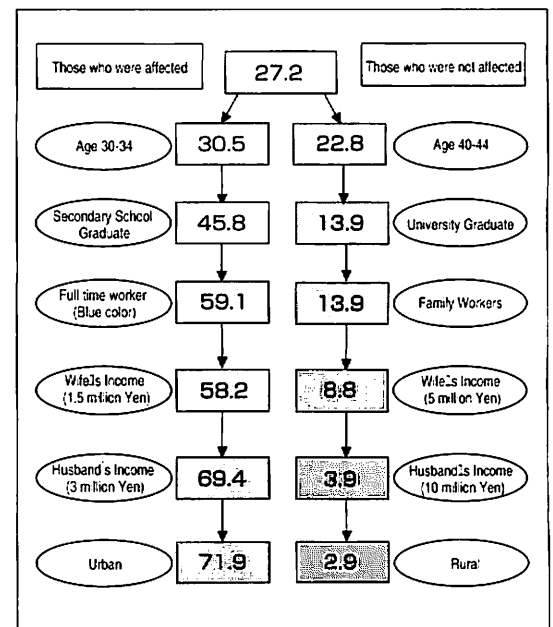
The wage function has been estimated from micro-data gathered in a public-opinion survey conducted by the Mainichi Newspapers. The result (relevant table omitted*) shows the wages for men and the rate of returns for junior high school, high school, junior college and college graduates based on their annual income. For instance, if you compare the difference in income between junior high graduates and college graduates in 1990 and 2000, the income has slightly improved for college graduates in 2000.

The scenario is totally different for women, with college graduates demonstrating a very favourable return. The percentage of women proceeding to junior college and college has increased rapidly in Japan, and, as you may know well, exceeded that of men in 1989. There were more women in school than men at junior colleges and colleges combined. I often tell my male students that they do not need to go to college because it's not efficient. It may be better to have more women enrol in college because they statistically yield better return on their investment towards education.

This may also serve to increasingly change their ideas about marriage. Since education is the greatest reason from the statistical viewpoint for delaying marriage, the age of marriage may be delayed all the more.

Another major factor that determines aging in addition to marriage is the delay in birth of a second child that I mentioned earlier. Also using a survey conducted by the Mainichi Newspapers to analyse this, we can see that 30 percent of the respondents throughout Japan responded "Yes" to the question "Did the collapse of the bubble economy influence your decision about when or whether or not to have a child?" There was a significant difference in the socio-economic status of those affected and those who were not.

When classified by age, academic background, job type, wife's income, husband's income and urban or rural residence, roughly 72 percent of the respondents of lower economic status said they were affected while only 2.9 percent of these of higher economic status said they were not. (Fig 5)



Fig(5)

However, with a third of the overall population being affected by the collapse of the bubble economy the seriousness of the situation is revealed. Furthermore, the group of people affected by the collapse of bubble economy represented every segment of Japanese society. In short, not being able to expect long-term income stability had become a factor contributing to fertility decline.

The bubble economy started collapsing around 1991, and inappropriate measures taken by the Japanese government gave rise to serious problems as well. As you may well know, measures taken against the collapse of bubble economy were delayed because it was initially seen as a part of the economic cycle. In 1996, Japan demonstrated a growth rate of 3.4 percent, which was the highest growth rate among the developed countries. Looking back, it was a temporary recovery made possible by the permeation of government investments and loans offered after the Great Hanshin Earthquake. The economy fizzled out again after these measures lost their effect, and appropriate measures were not taken by the Hashimoto Administration. The delay in taking subsequent measures by the Obuchi Administration made the situation worse.

It took Japan 20 years after the reform carried out by the Thatcher Administration of the United Kingdom to realise the need to carry out structural reform due to globalization. Surprisingly, the impact of globalization has been working as a very important mechanism behind the present decline of fertility in Japan. This implies that the speed of recovery of the Japanese economy would have a big impact on the country's fertility. A report from the Council on Fiscal and Economic Policy announced January 19 of this year presented a scenario of the Japanese economy recovering to stable economic growth by 2004. There is no telling whether or not this would be realized as it relies on the extent of meeting all the preconditions attached to it — i.e. raising the consumption tax by 1 percent and cutting public spending such as government investments and loans by 3 percent every year from the level of the previous year.

Therefore, proper macro-economic management is an important key to recovering Japan's fertility. If macro-economic management is performed properly, there is at least a possibility of solving considerably the problem of delays in terms of timing of births. In short, I think government management that would enable the people to have a positive outlook for a stable economy is very important.

You will see things differently if you look at the issue from a micro-level. Interesting results are obtained when you analyse the results of the Mainichi survey on a personal level.

To begin with, those showing the highest concern about the falling birth rate and aging population are mostly men. The concerns are over the future of their pensions and the

vitality of Japanese society. However, these same men are neglecting or have neglected a role they could play to contribute to improved fertility. The Mainichi survey results show that whether or not a woman wants to marry at an early age depends on the amount of cooperation her father offered to the family around the time when she graduated from elementary school. In other words, the extent to which men participated in the household has become the greatest determining factor in whether a daughter would want to marry at an early age or not. In sum, fertility will not recover without implementing reform on the micro-level. It is therefore similar to environmental problems in that we have to "think globally, act locally". We have to start working on the family level. Going home and helping with household duties may be the quickest route to recovering fertility in Japan, although it would take 15 years to do so.

Let us also take a look at the peak of fertility. There is hardly any time for taking measures against fertility decline and the problem is imminent. This is because the number of women of child-bearing age will increase for the next 3 to 4 years but will decrease rapidly thereafter. This is probably the last time we will have so many women of child-bearing age. It means that the second baby boomers are reaching their child-bearing age. There won't be another chance for taking fertility measures after this. The number of births will take a sharp decline after this. Policies will have to be implemented within the next 3 to 4 years to be effective.

Previously, I said that aging of population is the result of people not dying and not being born. This is what you'll find from an analysis of the mortality rate and fertility rate. Initially, babies not being born was the dominant factor behind rapid advancement of aging. The situation will change drastically from here on as the mortality rate starts to have a larger impact than the fertility rate. Everyone in the media is now using the phrase "falling birth rate and aging population", but there is a big pitfall to this. If you analyse the present situation, the falling birth rate is becoming less of a problem than before. Longevity is starting to have greater impact on population aging and is becoming a factor that cannot be ignored. Aging of population is ultimately determined by what happens to the limit of human longevity. I don't think any of you here today would want to die soon, but we drift into a dilemma of population aging advancing the longer we all wish to live.

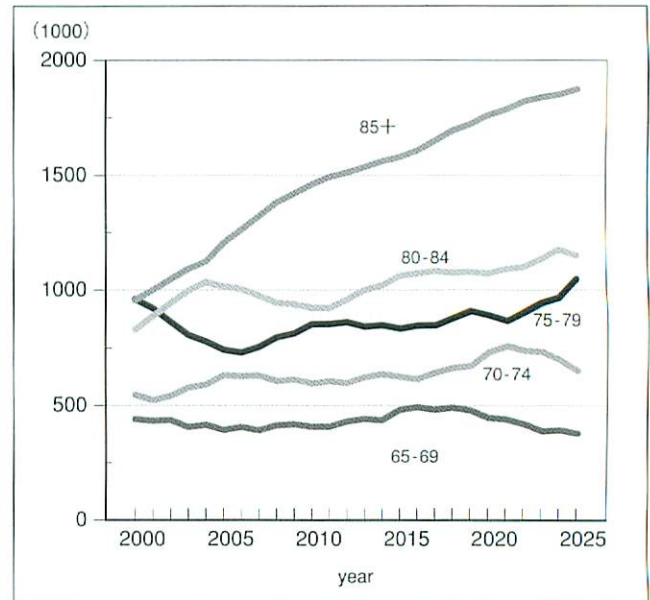
To analyse longevity, we calculated at the Population Research Institute the average age of 50 of the oldest people that died every year. The calculation has been completed for the years 1950 through 2000. The average age was increasing slowly from 1950 to 1975. However, the highest age of death started increasing notably from 1975 onward. The average age of 50 of the highest ages of death for women is currently 108 years. The average age of the oldest 50 persons has been increasing at an incredible rate every year. A couple of days ago, a Japanese man became the world's oldest living male at age 112. Our institute is currently studying super-centenarians — people aged 110 years and

above. Since the number of these people is becoming too large to ignore, we are planning to conduct a joint project with France and Sweden. In view of these matters, there is scope for further extension of longevity.

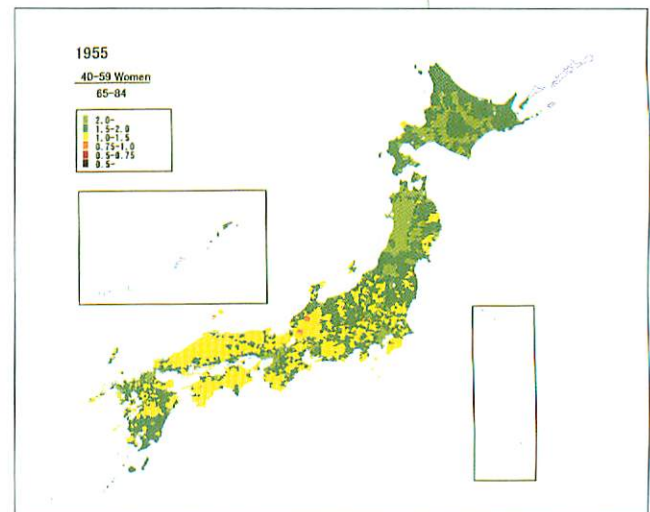
However, many problems start to occur when the elderly population increases to this extent. The first patrol car appeared in Tokyo in 1950. Arrival of a full-scale motorized society is a very new phenomenon. Driving by the elderly is accompanied by a very difficult problem. I think many of you here own a driving license but the big question would be the age to which people should be allowed to drive. I am a little worried what would happen when the streets become full of elderly drivers, as is expected to occur quite soon in the early part of this century. (Fig⑥)

Then we have the problem of the higher percentage of women among the elderly. The number of women among the population aged 65 years and above is starting to exceed that of men at a striking rate. This figure shows that grandmothers aged 85 years and above are going to increase at an overwhelming rate in the population bracket aged 65 years and above. There will be a problem of who is going to look after this age group. Senile dementia develops at very high rates at ages 85 years and above. That is why senile dementia will become a big problem and will turn into an overriding predicament unless some measures are taken against it.

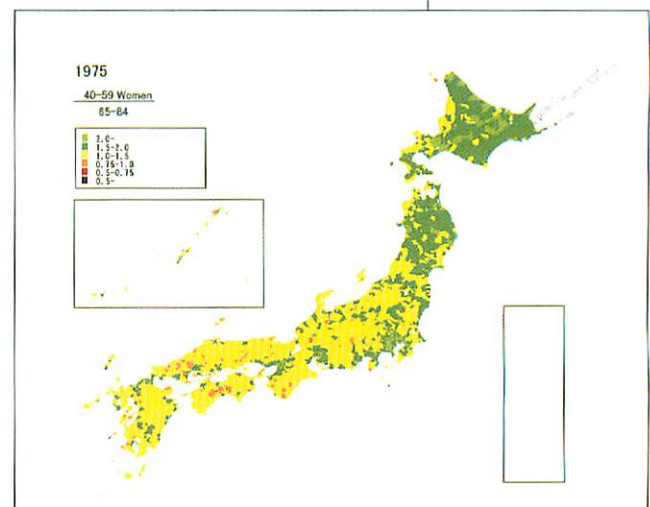
Then we have the problem of who would be looking after these demented and bedridden elderly. If you conduct a survey on this topic with married couples, most husbands say that their wife would take care of them, while wives assign this role to their daughters. This is because women are smart and know that they would outlive their husbands. However, there is a question as to whether they



Fig⑥



Fig⑦



Fig⑧

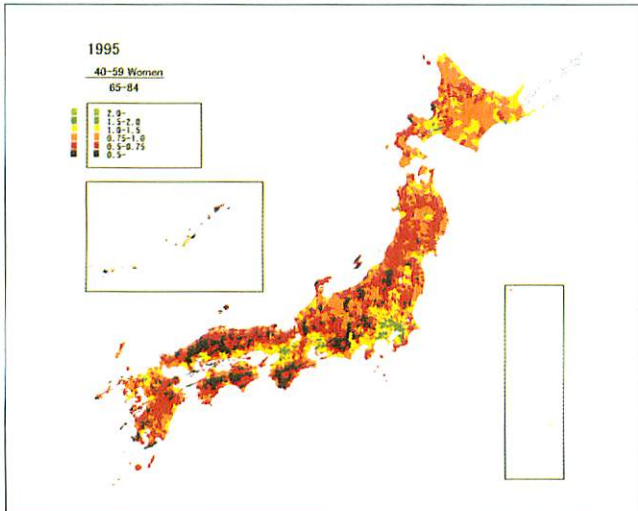


Fig9

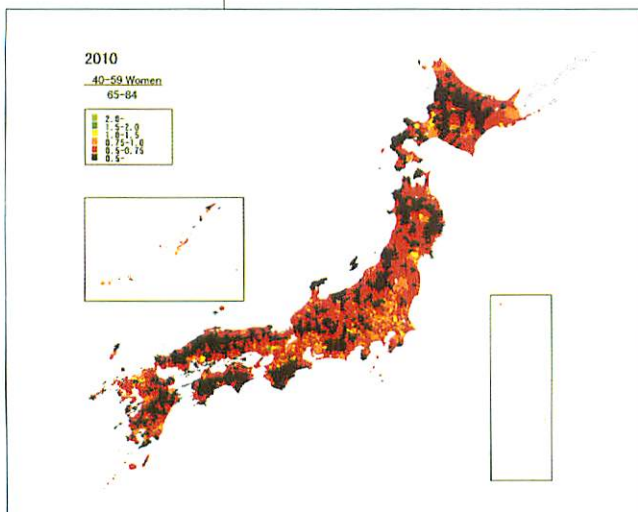


Fig10

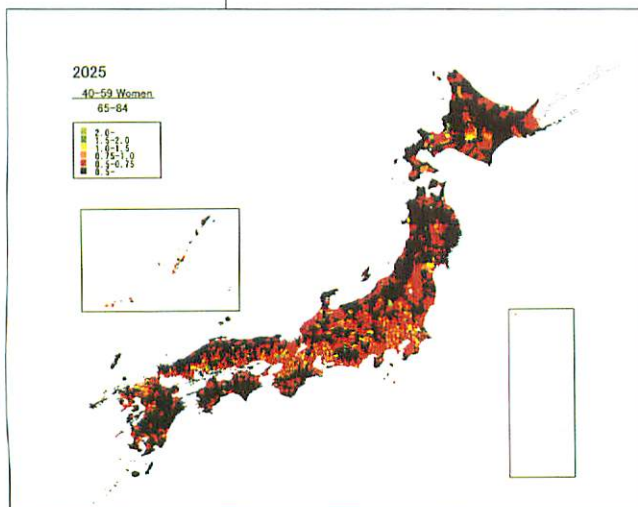


Fig11

could actually rely on their children.

It is indicated here in the following five figures. These figures were obtained by dividing the number of women of ages 40 through 59 by the number of the elderly of ages 65 through 84. I'm not suggesting that women should look after the elderly by any means. I prepared these figures simply based on the present situation where women are playing the central role in caring for the elderly in approximately 90 percent of such cases. I am not by any means affirming this situation. I am only trying to explain what would happen if the present situation continued. I would like to stress that it is outside of my value judgment. I say this at the outset because I've been criticised by a newspaper about this once.

(Fig7) (Fig8) (Fig9) (Fig10) (Fig11)

There are approximately 3,300 municipalities in Japan. Plotted on a map, yellow points were dominant in 1955. A yellow point means there were two persons to take care of each elderly person in a particular municipality. The nursing population was twice as large as patient population. Those were the good days. Green points started to increase in 1975 and the dominant colour had changed to red by 1995. Red is bad news. A red point stands for less than 1 person, meaning 0.05. This translates to two elderly persons for every caretaker. The points will change to black in 2010. At a village in Kumamoto Prefecture, there are 100 elderly persons for every five potential caregivers. This prediction will come true with near-certainty. The supporting capacity of the family is clearly limited throughout Japan and will reach the world's lowest level in 2005.

Nursing care insurance is being created under these circumstances, but a concern exists that there won't be enough people to look after the elderly. How the government is going to maintain this system will become an important issue in the future.

How far can we go in terms of financing? This table (relevant table omitted*) shows the financial crises that have occurred around the world over time. This is the extent of the Japanese government's financial crisis in 2000. These figures represent the number of years it would take to pay back this debt with taxes. Japan needs 15 years. It takes Japan 15 years to pay back this debt if the entire tax revenue of the country is spent on paying back the debt and not spending a cent on anything else. It is a colossal amount. Italy was once said to be experiencing a serious crisis among the EU countries, but the amount was only this much. I think you can understand the magnitude of the financial crisis in Japan today.

Let us divide the amount further to see it on an individual level. When applied to your households, it means that you have an average monthly income of 574,676 yen, of which you send 170,000 yen to your relatives in your home town (central government's subsidy to local governments), pay 180,000 yen to pay back the loan (government bond) and spend 510,000 yen as living expenses. It means that you are 290,000 yen short every month and that you have a home mortgage of nearly 50 million yen on top of that.

This is the reality Japan is currently in, and we have to somehow pull our country together. How we overcome this is a major problem.

I don't want you to think I am an outrageous guy that tells people these horrible stories all the time, so I will offer you some choices we have for solving the problem. First, we could change the definition of "elderly". This has been initially proposed by Dr. Kuroda. Elderly persons account for only 17 percent of the population today. What we need to do is create a society in which only 17 percent of the oldest segment of the population qualify as the "elderly population". To do that, all you need to do is gradually raise the definition of the elderly over the next 25 years to "those aged 75 years and above". You can adjust everything including employees' pensions and the age of retirement accordingly.

Another idea is to approach the issue from a completely different point of view and introduce a health hierarchy system. This would require help from the medical community but what we do is select several indices for determining the health of individuals and start the payment of pension to those individuals in accordance with their health status.

Healthy people would continue to work instead of collecting pension. Dr. Kuroda, for example, is so healthy that he has no need to be on pension. I think we have a choice of creating such a society.

Many people in Japanese society see elderly people as a burden. I personally consider this to be a very unfortunate situation, and feel that the key lies in creating a society that

sees the elderly as growing asset. It would be important to carry out social engineering for this purpose.

I had an opportunity after being in the same session at a population conference in the U.S. to talk with Professor Walt Rostow, who served as President Kennedy's economic advisor. As you may know, Professor Rostow coined the term "economic takeoff". The paper he presented at this conference was very interesting. It was entitled "Japan's Fourth Challenge". The first challenge came in the 1600s when three generations of the Tokugawa Shogunate closed the country to foreign commerce. The second challenge was the Meiji Restoration, in which prominent statesmen of the Meiji era demonstrated tremendous leadership in modernizing Japan and adapting Western ideas and lifestyle. The third challenge was the reconstruction of the country after World War II.

And then Professor Rostow said that the falling birth rate and aging population is the fourth challenge for Japan. Wonderful political leadership was demonstrated in Japan in the past three occasions to overcome the challenge. Therefore, the extent of leadership demonstrated by politicians would have a very important impact in whether the country could overcome this fourth challenge.

Efforts on both the macro-economic and micro level are important, but I think that what Japan really needs now is political leadership that could generate a long-term and stable outlook for the country.

Thank you.



From the Viewpoint of Bioethics



Hyakudai Sakamoto

Professor Emeritus,
Aoyama Gakuin University

My name is Sakamoto and I have been given the theme of thinking about the population problem from the viewpoint of bioethics. I launched the first Bioethics Society in Japan about 15 years ago. I visited China 5 or 6 years after that and founded the Asian Bioethics Society in Beijing. I have been studying and promoting bioethics in Japan and in Asia as a whole through the activities of these two societies. Today, I would like to introduce one of the ways for approaching the population problem that I have obtained through these activities.

I have always regarded the population problems as an extremely important subject when thinking about bioethics. Surprisingly, population problem is rarely discussed within the bioethics society. However, I personally think that this is a major issue that has bearings on the fundamental character of bioethics.

I would therefore like to begin by talking about what "bioethics" is all about. In a word, one can define bioethics as ethics that has been applied to life phenomena or life activities that various living beings, including humans, are involved on this Earth.

Being a part of ethics, bioethics must think about what is right and what is wrong by following the convention of ethics. Dr. Matsui who gave today's first talk has said that population problem is not a problem of right and wrong. I disagree slightly with this view and think that population problem can be analysed from the viewpoint of reflecting on right and wrong.

Then an issue arises as to what bioethics should do in connection with the right and wrong of life activities. There is one ethics-related superstition in connection to this; it says that ethics generally has some big and absolute ethical value to which one can appeal and deduce in a top-down manner all kinds of ethical phenomena, i.e. what's right and wrong. In fact, there is a history of having considered ethics in such manner.

For example, Kant, who is regarded as the greatest authority on ethics, has formulated a theory in his book entitled "Critique of Practical Reason" in which he presented a major fundamental and abstract ethical principle and tried to derive all concrete ethical criteria from that principle. Frankly speaking, however, I think that one of the conclusions regarding the phenomena of ethics is that this kind of approach has lost its validity

through the transition from modern era to present-day.

In short, you see a diversification of values; there are people with varying range of values in this world which make it nearly impossible, if not extremely impractical, to deduce ethical criteria that can be applied to all societies from one big absolute value. The greatest cause is the trend of diversifying values in the present. This, of course, includes discovery and entry of Asian values which are quite different from their Western counterparts. I think it is not possible to come up with an exclusive and absolute system of ethical values that encompass the entire world after including such new values.

However, an approach that brings forward several principles and attempts to interpret all ethical phenomena through these principles still exists today. For example, in the field of bioethics, there is a research institute named Kennedy Institute of Bioethics at Georgetown University. A group at that institute talks about the four principles of bioethics. They have presented the four principles of bioethics and appear to think that all criteria for bioethics can be derived by looking at life activities, life phenomena and life science in the light of those four principles.

Included in these four principles is "justice". In other words, they believe that universally correct criteria that is in line with the principles of bioethics

However, "justice" is probably a concept that is more diversely interpreted by varying values than any other term existing today. For instance, as can be seen from the current issue over Afghanistan, justice for people on one side is injustice for people on the other side. That is why insistence on justice by two parties inevitably results in war. I see the recent war in Afghanistan as a perfect example of this.

As can be seen from these examples, I think it is no longer possible to interpret bioethics by bringing up a basic principle or some golden rule.

Then what should we do? My idea is that we should follow ideas and norms that are functioning in reality and are concrete and easy to understand for everyone and take a bottom-up approach from there, instead of following the conventional ethics approach of formulating a certain principle and deductively amplifying it. That way, we should be able to obtain ethical principles and ethical norms that can be applied worldwide. I also think that population problem should be approached from such point of view.

I believe that the value notion that can obtain greatest social acceptance today is "fundamental human rights". Although we may not be sure of its grounds or its essence, fundamental human rights can be unanimously accepted in the sense that it is something people consistently feel that they have to defend and that it should not be infringed.

In short, I think the most proper and effective way would be to build the criteria for right and wrong of bioethics starting from concrete standards such as "not infringing on fundamental human rights", "carrying out life activities without infringing on fundamental human rights", or "applying life science to real world without infringing on fundamental human rights". Therefore, according to the definition I just gave, the most effective way to formulate the actual ethical criteria in bioethics would be to seek ethical integration without allowing new phenomena and situations related to human life activities such as population problem or intervention of science and technology to infringe on fundamental human rights.

However, a very serious problem arises when you look at population problem from such perspective. It is the fact that most population problems are based on infringement of basic human rights that becomes clear when we try to formulate policies to solve the problem.

In brief, population problem boils down to the issue of how to go about controlling the population. However, this concept of controlling population becomes an infringement of fundamental human rights from a certain perspective. People are alive and they also given life to this world. Since giving birth to as many children as a couple wants when they want them is one of the most fundamental human rights, placing restrictions on this right can be seen as one of the greatest infringement of fundamental human rights for humanity.

The most effective way to control population, which has actually been practiced throughout history, is to kill people. Nazi actually reduced population through this means. War also achieves this goal. Wars of grand scale have been occurring frequently in the recent years. Historians say that large wars have been occurring every 100 years in the modern age. These large wars reduce population. The famous Thirty Years' War is said to have reduced the population of Germany to one-third. These things have been occurring every 100 years. It is the most effective method for reducing and controlling population.

However, we can no longer do this, and, according to some predictions, outbreak of large wars is becoming less and less likely. We therefore cannot resort to such method to reduce population. To begin with, homicide is the greatest infringement of human rights.

Another factor that came up many times today is epidemic. In the past, epidemic occurred whenever population density became high and brought about large reduction of population. In Europe, it was the black plague. Black plague became prevalent regularly and reduced the population by a large margin. However, we cannot rely on this in the future either because of the rapid advancement of medicine and the much talked about improvement of health conditions. These things will probably not occur again.

Thus the only option that is left to us is to rely on the fertility side. That is, we need to prevent excessive number of babies from being born in order to control population. However, bearing children is one of the most important rights among fundamental human rights. The so-called feminist groups are particularly keen on this. They argue that the choice of whether or not to bring life into the world and to give birth to the desired number of children at a certain point in time is the greatest fundamental human right, particularly the right of women.

What should we do then? If we cannot check population growth without infringing on human rights, we have to conclude that human rights infringement and population control contradict are totally incompatible. Population problem in bioethics has to start from this very fragile ground.

Actually, United Nations and UNESCO have been the active proponents of fundamental human rights. The foremost assertion of the U.N. has been stated in the form of principles for realising fundamental human rights in this world. This means that we cannot control population under the principles of the U.N. They are helpless when it comes to the population problem.

The desperate but ingenious measure that the U.N. appears to have set forth under the pressure of necessity in these circumstances was the concept of reproductive health/rights that started to become popular around the time of Cairo Declaration. Now, the meaning of the slash you see between "health" and "rights" is rather difficult to understand. In theory, "reproductive rights" and "reproductive health" are in complete contradiction with each other because "health", in reality, cannot be attained solely through assertion of individual rights and freedom. Health is a social product. Society as a whole will have to reach a certain level to guarantee the health of individuals. On the other hand, health of society as a whole requires improvement of social medical technology and full equipment of medical system. Under a democratic system, this would also require fair distribution of medical resources, which means that freedom and rights of certain individuals will have to be controlled in some instances.

Therefore, the concept of reproductive health/rights that has been put forward by the U.N. and started to become popular around the time of Cairo Declaration and Action Plan was, in my view, an expression of a measure for watering down the idea of fundamental human rights and discussing it by striking a balance with health issues. In other words, it was a political wisdom for approaching the population problem after slightly narrowing the scope of fundamental human rights.

In sum, assertion of individual rights concerning birth at a time when entire society or entire humanity is working out various policies for their survival, particularly in

connection with population problem, would not work. More likely, we will not be able to address the population problem of the 21st Century unless we take the approach of restraining individual rights and give higher priority to total — I allow myself to go ahead and use this term “total” — welfare from a more social and community-oriented viewpoint.

Reproductive health/rights is a way of thinking which asserts that population increase will be controlled by increasing the options and decision-making power of women by securing the health and rights of women, particularly those related to reproduction, in a well-balanced manner. However, when you take the nature of the problem into consideration, the nature of reproductive health/rights was never a kind of problem that the U.N. has asserted it to be. “Rights” is an individual issue while “health” is a social one — you might say it is an environment that society as a whole presents to individuals. Introduction of “health” in addition to “rights” will consequently internalise social constraints in individuals in the form of self-restraint. An ingenious approach of internalising this social constraint within the realm of rights was taken here, I think.

Reproductive health/rights must have been the concept that emerged out of awareness among population experts that mere assertion of rights as approved by the U.N. cannot solve the problem. The concept of “health” is just as important as the concept of “rights”. Health is clearly a social product. I think that the population conference has indicated a very ingenious policy by announcing a direction for solving the population problem from the standpoint of improving the overall balance by incorporating such concept to control its counterpart, i.e. the right to give birth.

I just used the word “total”. This “total” also refers to “total economy”. As have been mentioned in the presentations by various lecturers today, economic condition is bearing down heavily on the rights. At least, it is becoming a hindrance to health. In short, it is unbalance of economy. In a sense, the world economy has attained enormous development in the process of globalisation. But there is a fact that there is an economic development in one developed country means that its prosperity is giving rise to poverty in most destitute countries. There are various empirical evidences regarding this matter.

In other words, uneven distribution of wealth is creating huge poverty and sapping the health of such poverty-stricken people as a result. For this reason, this is not simply a population problem but seems to be related to a problem of economic nature.

It is also accompanied by environmental problems because health can only be maintained in good environment. I am not referring to the health of individuals here. A good environment is clearly needed when one thinks about overall health — health of the entire society, entire community, entire country and entire humanity. And I think that good environment, in a way, is supported by affluent economy and impartial economic development.

In this sense, the term "sustainable development" has been widely used since the Agenda 21 and Rio Declaration in the Rio de Janeiro Summit in 1992. And I think that this slogan of "sustainable development" offers a very good viewpoint for looking at the population problem. One of the aspects that need to be "sustained" is economy — the global economy. You also need to sustain the global environment — the ecosystem. I feel that there is a need for viewpoint that carries out economic progress and environmental development while sustaining these aspects.

Seeking to solve the population problem from such viewpoint may mean placing a limit on the free economic activities of advanced liberal societies and advanced liberalism states. However, following such policy may meet the two urgent global demands of solving the population problem and attaining sustainable development in view of maintaining balance between reproductive health and reproductive rights while simultaneously achieving both economic development and environmental conservation all over the world. It is only after this is attained that the best path for human survival will be presented to us.

I think that this concept of reproductive health/rights should be carried out as an effective and ingenious policy in spite of its potentially large impact on economic and environmental issues.

As easy as it is to put this into words, its actual implementation will generate enormous controversy. An example of this is China's one-child policy. I think we have representative from China here today, so your attention will be very much appreciated.

When the Fourth World Conference on Women (FWCW) was held in China in 1995, China's one-child policy came under criticism from the Western countries. Even Mrs. Clinton came to the conference and criticised China's one-child policy, condemning that it is an infringement of human rights in the greatest magnitude — particularly the rights of women — and that such policy should not be implemented. However, the Chinese government did not budge an inch. The country continues to implement her one-child policy with very strong confidence.

The stance that the Chinese government took was similar to her response against the criticism she had received earlier from overseas during the crackdown on pro-democracy demonstrators at Tiananmen Square. I think the fundamental human right that was mainly at issue at the time was freedom of speech. The Chinese government came under criticism for infringing on freedom of speech. America was at the forefront of such criticism. But the Chinese government was adamant. China argued that, for China, fundamental human rights meant "people staying alive without starving to death". They also said that they can do without human rights that would become a hindrance to people's survival. Surprisingly, this stance had won the support of the Chinese people.

Based on the approach I have just mentioned, Western criticism would not apply to China's one-child policy. In reality, the Chinese government can be praised for implementing a very ingenious population control policy similar to that put into practice by the U.N. One-child policy has actually succeeded in controlling population to a considerable degree. It has played a part in realising the prosperity and economic development China is enjoying today. Improvement of health condition in the country has also been remarkable.

Various efforts must have been made to realise this. There was an expression "Look East". Now people are looking at China. China is currently on an ever-improving path and I see one-child policy as one of the factors behind this prosperity.

In another lecture today, there was a comment that China's one-child policy is not necessarily succeeding — that it is only practiced in urban areas and not practiced in rural areas. Such regional difference may indeed exist, but I think it is producing significant results on the whole. In this sense, from the standpoint of bioethics, I think it is unreasonable to criticise China's one-child policy on the basis of fundamental human rights. Rather, I think we should applaud them for having implemented a good policy.

China's one-child policy is accompanied by another serious problem of eugenics. Although the Chinese government has not made any definite comments regarding this point, such trend can be clearly seen in the actual policy it is implementing. It is a mind-set that requires the one child born to a family to be eugenically superior. There exists an implicit mentality to avoid giving birth to a child with hereditary problems and have only eugenically superior child since you can only have one child.

Eugenics is a globally infamous concept. There are still quite a number of people today who would be upset by simply hearing the word "eugenics". In particular, Jewish people who were persecuted by the Nazi on the grounds of eugenics will become furious if someone uses the word "eugenics". Thus "eugenics" has become a taboo word that should not be used.

Also, from the viewpoint of bioethics, in other words the fundamental human rights I have been talking about, eugenics containing discrimination clearly constitutes an infringement of fundamental human rights. Even if eugenics did not correspond to the so-called racial discrimination, it is regarded as a serious infringement of fundamental human rights because it would lead to discrimination of handicapped children and people with hereditary illnesses.

However, I feel an urge to defend China in this area as well because I think that there is an element here that is similar to reproductive health. What is reproductive health or

reproduction of healthy population? For instance, one may ask himself whether being born with some kind of genetically determined disease is reproduction of healthy population. I must ask you to pay attention to the fact that I am not saying this with the intent of discriminating handicapped children. When such children are born, we must help them with utmost consideration and make efforts so that they can enjoy fundamental human rights of all kinds. It is a matter of course.

However, the action that is taken before such child is born is another matter. Granted that you recognise the individuality of foetuses, women have the right to make the choice of whether or not to give birth. Moreover, if an eugenic element is included in the choice made by the woman in question in the form of education or consideration — and not in the form of coercion — it should not by any means be regarded as a taboo. I would like to think that eugenic element should be utilised in the concept of reproductive health by bringing this matter into the population problem.

In other words, China's one-child policy — although I feel slightly uneasy about its coercive colour — should not necessarily be subject to criticism in that regard as well. China's population problem and one-child policy contain these serious problems as tangible problems. While they appear to contradict internationally-accepted ideas on the surface, my idea is that it is surprisingly compatible with the U.N.'s effort to develop "health", which is a social element, and "rights", which is intrinsically an individual element, in a balanced manner through the concept of reproductive health/rights.

Now, population problem started out as being a very simple problem at first. All one had to do was control the population. However, as Dr. Ogawa had mentioned in his presentation, there are countries that are suffering from decreasing population. Population problem used to be limited almost exclusively to developing countries, but this problem of decreasing population is the problem of the developed countries. Fertility rate has dropped considerably in some of the developed countries. Among the many reasons for such decrease, economic capability and substantiation of education appear to be dominant. In other words, I think the idea that it is better not to increase population if one is to seek healthy life for himself or his family has been established as common sense in the society. Economic affluence surely had an effect on this, and suggests that lowering of infant mortality rate brought about by medicine and health status and spreading of education have occurred as a result.

Then we will understand that blindly trying to control population is not the proper way when thinking about the population problem of the future. It is necessary to see the whole picture and develop the entirety in a well-balanced manner.

What does "well-balanced development" boil down to when you are dealing with the population problem? I would like to propose a new way of thinking here. I think we

should drop the idea of controlling population and take a new approach of designing population for the future.

Increasing population where it is needed and decreasing it where it is needed, instead of trying to controlling it. I think it is necessary to design the course of population in a balanced manner by thinking about "how humanity should survive" and "how humanity should make a living" on this planet as a whole, instead of simply increasing or decreasing it. That would involve economic problems, environmental problems and problems about application of medicine and technology in accordance with the characteristics of each region. There are also political problems. A new mind-set for designing the balance of optimal population for the entire earth by taking all of these matters into consideration and formulating policies for controlling and mobilising population according to such design is needed. "Formulation of population design and policy" is considered to be the urgent task that has been placed upon future population conferences.

I started my presentation by talking about bioethics and ethics. After touching on various subjects, I will now come back the question of what ethics is and would like to redefine ethics by dramatically changing the conventional ideas about ethics.

In short, "ethics" is a "skill for social adjustment". Imposing some absolute values or supreme virtue is not "ethics". Rather, it can be seen as a skill for value adjustment skill for the purpose of enabling the society to function properly, i.e. maintaining the entire society towards the future by avoiding crises.

Applying this idea to bioethics, the purpose of adjusting the society through bioethics boils down to "survival". Humanity is now facing the risk of survival. People have never been conscious of their own survival in the past. People have been living by thinking that they will keep living no matter what — that nature will reduce the population if it increases beyond the limit.

But this will not hold true in the future. I think that we will have to actively design our own future. The purpose of such design is "survival of humanity". It is this human survival that is at risk. We will have to avoid such risk and make adjustments to the society so that people can survive in a balanced manner. We will have to develop social adjustment skills particularly in the field of life phenomena and life activities. That is the population problem as I see it in the context of bioethics.

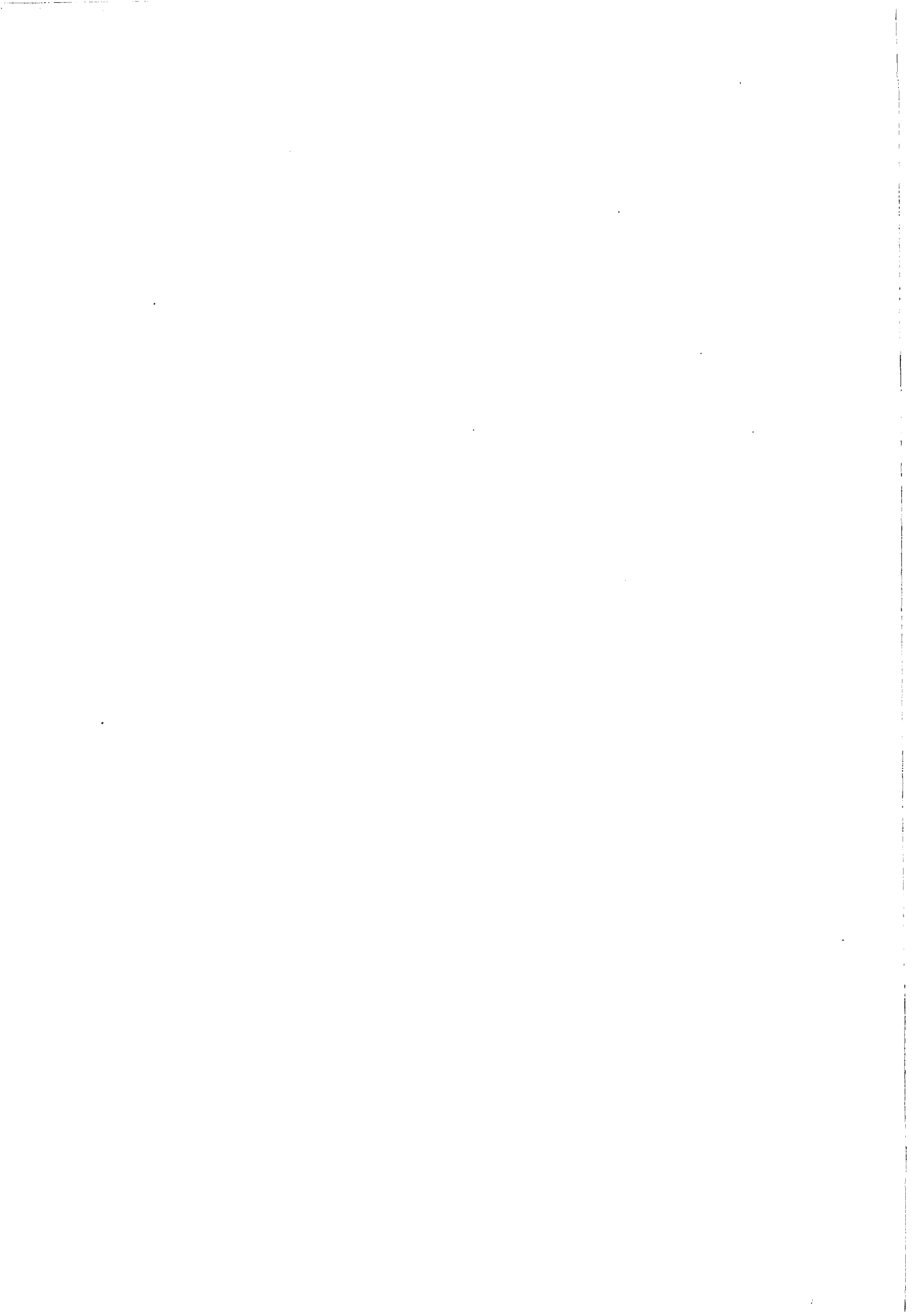
Survival may give rise to assertion of individual rights in an attempt to achieve the goal by hook or crook. It is possible that the strong will achieve the goal of survival by trampling down the weak. There is no justification for social adjustment being made in such manner. Although we will be facing a very difficult problem, I think there is now a need to make

social adjustments for the survival of the entire humanity while preventing socially disadvantaged people from being treated unfairly compared to the socially advantaged people. I think that the viewpoint of reproductive health/right will become extremely valuable in this respect.

In closing, I would like to make some radical proposals that may sound slightly bizarre with regard to the measures that should be taken towards the future in order to fully carry out the social adjustment including the population problem.

First, we will have to back up the concept of liberalism considerably. The alternative that would be available to us would be a new form of communitarianism. In other words, I think that we will not be able to carry out social adjustment in global scale — including that for the population problem — unless we place considerable restriction on individual freedom from the viewpoint of community. It will be replaced by the viewpoint of community. Individual freedom will no longer be absolute and will have to be restricted considerable from the viewpoint of community. There are various types of communities. A community can be formed when several people get together. When a new country is formed, it will be a community. If you look at the earth, you can say that all life existing on the planet are forming a single community. I think that an attempt to carry out social adjustment at any stage would entail thinking from a holistic viewpoint of maintaining and preserving the entire society. Although you may find this to be a totalitarian approach, I am feeling the need for switchover to such communitarian way of thinking as we look at the population problems in the future.

III. A Twenty - Year History of APDA



Mother and child consumed by malnutrition..

Look into the emptiness in those big eyes...

Children born on the street only to die there.

Can we allow this misery on this earth?

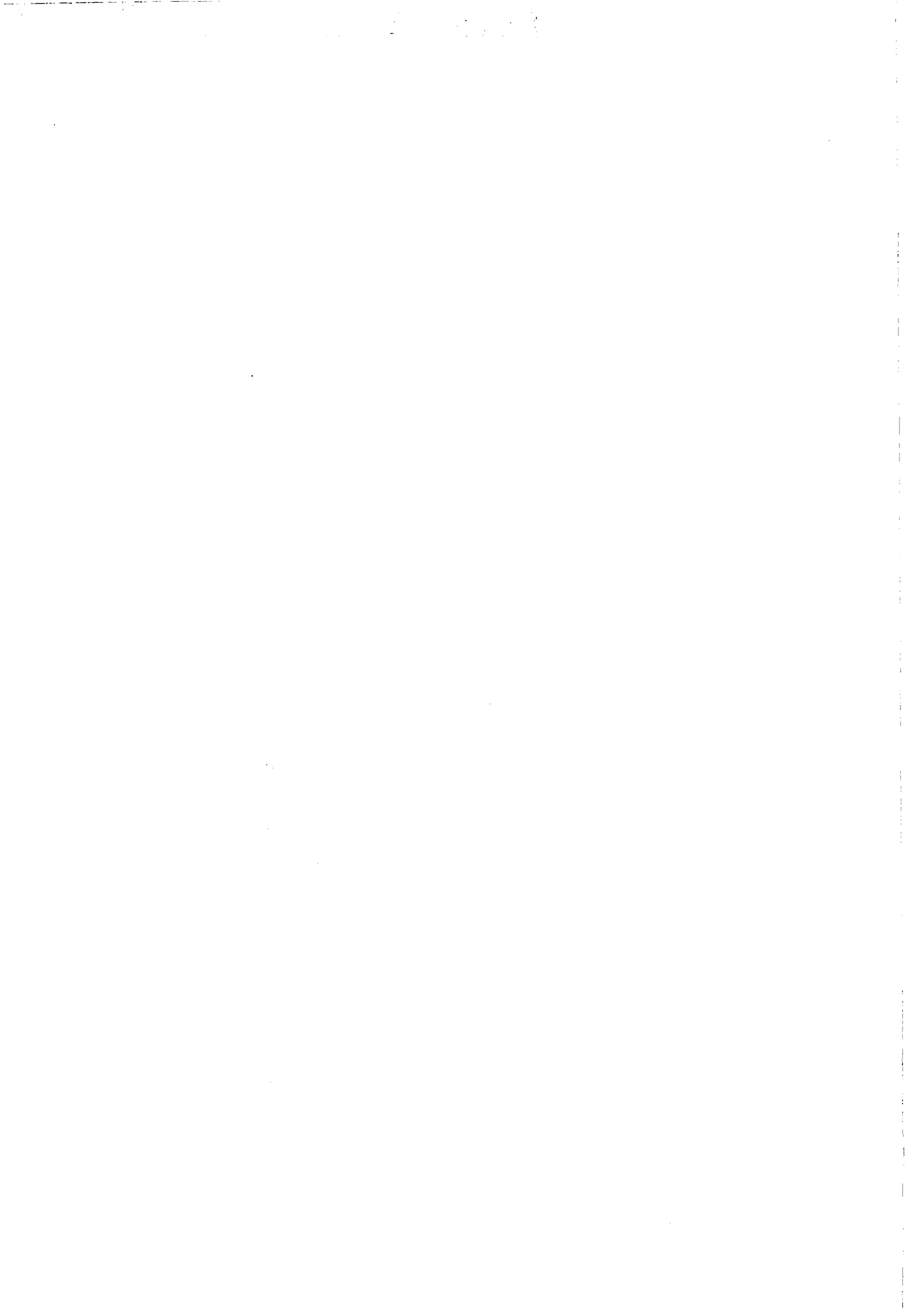
Our love for life should be the heart of every discussion on population.

Each person deserves all the love and hope we can give.

Any solution to the population issue must lead to

a personal happiness of the individual concerned.

*From the words of the late Takashi Sato,
former Chairman of
APDA and AFPPD*





A Twenty-Year History of APDA

(Asian Population and Development Association)



Tsuguo Hirose

Executive Director/Secretary General of APDA

Introduction

The latter half of the twentieth century was characterized by "population explosion". At its peak 90 million new lives were added to the teeming population of the world. The world population that stood at 1.65 billion at the beginning of the 20th century grew to 6.06 billion by its end, representing an increase of 3.67 fold.

According to the United Nations Population median estimates, the world population is expected to reach 9.322 billion by 2050, the mid 21st century. Our region of Asia will have 5.422 billion people accounting for 58.2 percent of the total. It is not an exaggeration to say, therefore, that the trend of Asia's population will dictate the future of humankind.

Under an unprecedented population pressure, the earth is plagued with serious environmental destruction, shortage of food and water, runaway unemployment, poverty and prevalence of infectious diseases such as HIV/AIDS.

Some say that the earth can only feed and support eight to eight and a half billion people. The population that threatens the survival of our planet is an issue that cannot be left to any single country to resolve. Co-existence with the mother earth urgently requires us human beings to bring together the best wisdom available.

APDA was born in 1982 against this backdrop as a small NGO with an ambitious mission to tackle the problem from a global perspective. While the population explosion is showing signs of slowing down, we are continuing to add 77 million people every year.

On the other hand, we observe here in Japan that the total fertility rate (TFR) is declining at an unprecedented rate, plummeting to 1.34 in 2001. Given this alarming scope of aging, caused greatly by the small number of births, the government is hard pressed to alleviate what it sees as a problem of national survival.

It is at this stage that APDA comes of age.

In compiling its twenty-year history, we begin by describing the situation leading to its establishment and the ensuing activities since using mainly the materials available.

I . The story of APDA's birth

The Asian Population and Development Association was established on 1 February 1982 as a licensed organization under the auspices of the Ministry of Health and Welfare. On 31 March 1983, the following year, it received an endorsement from the Ministry of Foreign Affairs and Ministry of Agriculture, Forestry and Fisheries. Today therefore, it carries out activities as a NGO under the auspices of the three ministries, Ministries of Health and Labour, Foreign Affairs and Agriculture, Forestry and Fisheries. It was given a wider mandate as a good-will public corporation when the Ministry of Finance (current Ministry of Treasury) granted it on 19 August 1983 a license to conduct research and testing programs on its behalf.

In order to contribute to the solution of population problems, APDA sets the following objectives for its activities:

1. To contribute to peace, to improve welfare and achieve social and economic development in Asia through research and survey of population and development issues in Japan and in other Asian countries,
2. To support population and development activities of parliamentarians, functioning as the Tokyo office of Japan Parliamentarians Federation of Population (JPFP) and Asian Forum of Parliamentarians on Population and Development that were set up to address population issues from legislators' perspective.
3. To address diverse population issues by supporting government contributions to international population agencies such as UNFPA and International Planned Parenthood Federation by maintaining alliances with NGOs around the world.

II . Beijing Conference urgently requested Japan to set up a parent body to support parliamentary activities

A strong appeal for organizing an Asian group of parliamentarians to resolve population problems in Asia was raised during the Asian Parliamentarians Conference on Population and Development held at the People's Great Hall in Beijing from 27 to 30 October 1981.

Asia's population then was 2.63 billion or, approximately 60% of the world's total. Of the world's top ten populated countries, six were in Asia, the largest country, China with a population of 1.08 billion (22.3%), second largest India with 750 million (15.6%), fifth largest, Indonesia with 154 million people (3.4%), seventh, Japan 118 million (2.6%) , eighth, Bangladesh with 91 million people (2%) and ninth, Pakistan with a population of 89 million (2%).

Population issue that threatens the peace and safety of humankind cannot be resolved without considering the trend in Asia that has 60 % of the world's population. Asia, therefore, must be responsible to lead the world in the fields of population and development.

This shared conviction converged into a strong momentum to establish APDA (Asian group of Parliamentarians) .

Elected representatives of the peoples were convinced that the organization should not just be a salon but an action-oriented effective group that formulated and implemented policies. For this to be a reality, they felt there was an urgent need to establish a parent organization.

The Beijing conference was attended by a delegation of twenty-two led by Takeo Fukuda, the former prime minister and chairman of Japan Federation of Parliamentarians for Population. The acting head of the delegation was Takashi Sato, a member of the House of Representatives (Liberal Democratic Party) and the deputy head, Eisaku Sumi, a LDP member of parliament and Mr. Hironori Inoue, a Social-Department party of parliament.

The conference elected Mr. Liao Chengzhi from China as chairman and Takashi Sato as deputy chair.

A total of some two hundred were present from nineteen countries of Asia, international organizations as well as from Latin America.

Participating countries were Bangladesh, China, Cyprus, Democratic Republic of Kampuchea, Fiji, India, Indonesia, Iran Iraq, Jordan, Malaysia, Maldives, Nepal, the Philippines, Singapore, Sri Lanka, Syria, Thailand and Japan with Brazil as an observer.

The Beijing conference became the driving force in creating the parliamentarian group dedicated to the world's population and development issues and a historic turning point for parliamentarians to contribute to the resolution of the population problems.

It was further suggested that the parent organization for the parliamentarian activities be created in Japan.

III. APDA was born after much difficulties

Dawn broke on APDA.

Representative Takashi Sato returned from Beijing conference with a firm resolution. He will be responsible for setting up a juridical foundation. And a gutsy battle began.

Under the government's agenda for administrative reform, it had become increasingly difficult to found any juridical foundations and private public-service corporations. Even noble causes of peace and security and human welfare were more often than not stalled.

Ministry of Health and Welfare was reluctant to authorize the association on three accounts: 1) we did not have sufficient assets for the establishment of a juridical foundation, 2) it did not approve of a foundation that will serve to support a legislators salon-type of group, and 3) the organization for the purpose of population and development issues in Asia should be better served by the Ministry of Foreign Affairs rather than the Ministry of Health and Welfare.

To clear the first obstacle of raising funds, each of the five men, Takeo Fukuda (former PM), Tatsuo Tanaka (former ministers of international trade and industry and education), Eisaku Sumi (former minister of justice), Takashi Sato (former minister of agriculture, forestry and fisheries) and Fukusaburo Maeda (former president of Japan Radio Tower Co. Ltd.) donated two million yen towards the minimum requirement of fifty million yen. But they were still forty million yen short.

Takashi Sato approached Ryoichi Sasakawa, chairman of Japan Shipbuilding Promotion Association, a foundation passionately involved in international peace activities. Mr. Sasakawa was moved by the passion of Takashi Sato and contributed the necessary forty million yen. The first hurdle was cleared, or so it was believed. What had not been anticipated was the opposition from the Ministry of Transport, the oversight ministry for the Shipbuilding Promotion Association. It disapproved of making donations towards the endowment of an yet-to-be-established foundation.

On the other hand, the Ministry of Health and Welfare whose authorization was sought was adamant that an endowment of fifty million yen was the minimum requirement for the establishment of the foundation.

Tsuguo Hirose (APDA Executive Director and Secretary General, the then advisor to Mr Sato) was meanwhile working on the article governing donations and contributions for the new foundation and negotiating with the authorities under instructions from Mr Sato. Having served as a journalist covering the ministry in the past, Mr. Hirose pulled different strings but to no avail. Negotiation stalled. It was Junji Funatsu, the first secretary of Mr. Sato, who lent his hand. Connections in the end helped to breakthrough the stalemate.

Chiaki Machida (formerly of Ministry of Home Affairs and a Director at Japan Shipbuilding Promotion Association), Kikuo Nishio (Manager, social welfare department at the same organization), Yoshimura (Director General, Ministries Secretariat at Health and Welfare Minister's Secretariat), Nobuaki Asamoto (Director, Policy Planning Division), Shoji Ishizuki (Deputy Vice Minister for Policy Coordination, Ministries Secretariat at the Ministry of Transport), Akira Hayakawa (Director-General, Administration Department, Civil Aviation Bureau) were committed to get things moving. As a result, both Ministries of Transport and Health and Welfare simultaneously gave the go sign to allow the Shipbuilding Promotion Foundation to make the contribution and the newly proposed organization to accept it. It was 9 February 1982.

Takashi Sato's passion and perseverance paid off. Asian Population and Development Association was finally established. All in one hundred days. It was a miraculously speedy development.

The Asian Population and Development Association was launched with the following express objectives: "To contribute to Japan's international cooperation to the social and

economic development of the region and enhance its welfare and establish peace in Asia through conducting surveys and research on population and development in Japan and in other Asian countries”.

The following year on 31 March, 1983, it received authorization from the ministry of Health and welfare and the Ministries of Foreign Affairs and Ministry of Agriculture, Forestry and Fisheries. Today it continues its activities as a non-profit organization under three government ministries Ministry of Health and Labour and Welfare, Ministry of Foreign Affairs and Ministry of Agriculture, Forestry and Fisheries. Subsequently, it was to serve the Ministry of Finance (today's Ministry of Treasury) as its testing and research corporation. As a Special Public Service Foundation it enjoys special tax exemption status today.

IV. Asian Forum of Parliamentarians on Population and Development is established with Takashi Sato serving as its Chairman.

AFPPD contributes to organizing regional forums worldwide

With the launch of APDA, Asian parliamentarians group now had a parent entity to support their long awaited activities concerning population and development. The base in Japan was the fruit of eight years of commitment and hard work of Takashi Sato and members of International Federation of Parliamentarians on Population and Development, all loyal to the vision of Nobusuke Kishi, the former Prime Minister and Takeo Fukuda, also the former Prime Minister.

On 8 and 9 March 1982, representatives of six nations (China, Japan, Malaysia, Sri Lanka, India and Australia) met in New Delhi, India where they held an Ad Hoc committee. Based on the Beijing Declaration, the Asian Forum of Parliamentarians on Population and Development, known as AFPPD, was officially launched.

The Forum elected Takashi Sato as its first chairman and Madame He Liliang, the wife of China's former foreign minister Huang Hua as its Vice Chairperson.

On subsequent occasions, the steering committee met a number of times and the First Convention of the Asian Forum of Parliamentarians on Population and Development took

place in New Delhi, India from 17 to 20 February 1984. It was very well attended, a total of 297 people from thirty-one countries and forty-seven organizations.

This provided a turning point. AFPPD activities grew in substance and scope every year. It contributed to the spawning of regional parliamentarians' federations with whom it continues to exchange information and work closely in great partnership.

The story of their birth suggests that APDA and AFPPD are as if identical twins or two sides of the coin.

V. A door opens and historical turning point is achieved

Beijing Conference was stalled by an international conflict

Takashi Sato saved the day

The Beijing Conference that was instrumental to the birth of both APDA and AFPPD was an important landmark and a historical turning point. It was not a smooth road by any means. An international conflict between China and India over their border proved a formidable obstacle jeopardizing the conference.

Both China and India were adamant in their stances, and things appeared bleak.

Japan took the needed leadership. Under instructions from Takeo Fukuda, the former Prime Minister, Takashi Sato moved at lightening speed. It was a fitting drama to the start of a mammoth endeavor. Asia's population problems that are linked to world peace to be solved through parliamentarians' efforts. Japan's passion and vision and prompt action led the group out of a stalemate.

Beijing as a location of the Conference had been officially proposed by IFPPD, based on the Colombo Declaration adopted at the International Parliamentary Meeting on Population and Development (IPOP) that met in Colombo, Sri Lanka in August 1979.

However, right before the conference was open to, the Chinese government refused to issue a visa to one of the twenty-men delegation from India.

The person refused visa was T. L. Rajikumar, the speaker of the state assembly of Arunachal Pradesh, a northeastern state on the border with China.

India could not accept this refusal. It objected the development as a blatant violation in domestic affairs mixing politics with the population issues and notified of its intention to boycott the Beijing Conference.

An absence of India, the world's second largest country, would render any population conferences in Asia meaningless. Newspapers echoed. "Beijing Conference rendered impossible". Under the circumstances, Takeo Fukuda, chairman of IFPPD instructed Takashi Sato, IFPPD's representative director, to try once more to resolve the stalemate.

The Diet was in session but Sato flew to Beijing in the evening of 14 October. Having arrived around nine o'clock p.m. Sato visited Honorable Huang, Deputy premier and foreign minister, and his wife Madame He Liliang at the Foreign Affairs Department talking the matter over face to face.

Sato spoke earnestly suggesting that Beijing Conference was not just a Chinese problem. It aims to resolve Asia's population and development problems and contribute to ensuring peace and stability of the world. He told his host that he understood the border problems with India but asked if China would set that aside and issue a visa so that the conference could take place. Sato's sincere appeal late into night paid off. China agreed to issue the visa on a separate piece of paper. It was a quick solution.

That Takashi Sato was an old friend to Mr. and Mrs. Huang helped.

Rajikumar received his visa on a different form, and he was not to use his title as the speaker of Arunachal Pradesh assembly while in China. India made concessions towards China as well. Takashi Sato was back in Japan by noon on the following day. He had negotiated successfully behind the stage during a tight schedule of twenty hours.

This is the story behind the successful Beijing Conference, a historical turning point that laid the foundation of the subsequent outstanding achievements of Asia's parliamentarians.

Both APDA and AFPPD were simultaneously established by the Beijing Conference.





APDA

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