Pursuit of the Way of Life as Humans

Yoshikatsu Kawashima

President of the Society of Human-Environment System
Yokohama National University, Japan

(received 22 October ; accepted 22 October 1997)

Abstract

This report describes the objectives of and the events leading up to the establishment of the Society of "Human-Environment System" and forthcoming topics related to human living.

Description and Status of Establishment

In April 1967, the workshop for the Research of Regulatory Functions of the human body was established by researchers in medical and engineering fields who found it necessary to exchange the knowledge of functions of living organisms from each point of view. I was in charge of the administration office from the beginning of establishment and have been studying the regulatory system of body temperature and analyzing the characteristics of its system. Not only is this regulatory system of interest simply because it is a regulatory information system of living organisms; awareness has been increasing that it is the basis of human-thermal environments in daily life such as residential environments, clothing, and heating and air conditioning systems.

Since the thermal environment has a fundamental relationship with every living thing including humans, it plays an important role of the Human-Environment System. In order to gain a proper understanding and explain various underlying problems of the thermal environment, it is necessary to engage in meaningful cooperative activities with researchers from a wide variety of fields. Given this situation, the first symposium of Man-Thermal Environment was held in August 1977 at the conference hall of the Air Conditioning and Sanitation Engineering Building. Since then, this symposium has been

held once a year in support of Science Council of Japan over time.

Basic physiological and psychological data related to human body temperature regulation have been collected for normal adults, the elderly persons, the handicapped persons and children, and studies have been conducted on housing, offices, factories, vehicles, and old-style houses. In addition, work related to fire fighting, cold storage, and hyper- and hypobaric environments, body temperature regulation during physical activity and sleeping environments have also been examined and discussed. The approach has also been expanded to include human physiology and psychology, clothing, immediate environment and buildings, and methods for taking physical measurements of these items have also become diverse.

Through the Man-Thermal Environment Symposium, scientists from the fields of medicine, physiology, social engineering, air conditioning and sanitation engineering, clothing and hygiene, architecture, climate-control engineering, thermal transfer engineering, as well as hands-on experts from architecture, fabric-related industries, medical treatment, air conditioning and climate-control equipment, fire departments and the automobile industry have greatly expanded their interactions and exchanges and have been conducting a large amount of joint research.

The main purpose of holding the

symposium was to promote research organization which emphasizes actual technologies and life-styles, yet due to the efforts of the wide diversity of participants, it is now becoming a truly scientific symposium.

In recent years, the content of the Man-Thermal Environment Symposium has been moving to include other topics besides thermal environments, such as indoor air quality. Consideration has been given many times to expand the scope to include Human-Environment System. In the panel discussion at the 16th symposium entitled "Linking Space, the Earth, Cities, Architecture, Clothing and Humanity", we realized that the demand of interdisciplinary studies became important. For this reason, Man-Thermal Environments System was changed its name to Human-Environment System. The name of the symposium was also changed to the symposium of Human-Environment System where more scientists can participate from a wider variety of fields. The preparatory committee was then reorganized to be called the Society of Human-Environment System.

In order for the society to become a truly scientific conference, we recognize that any participants must be given equal footing regardless of their field, and therefore the society is open to anyone as well as scientists and technical experts.

The Society of Human-Environment System is a significant melding of information and technology from a wide array of fields related to humans and the environments where they live. The main activities are promotion of systematization as Human-Living Environments, design and control of healthy and comfortable living environments, and contribution of better quality of human living. Its functions are as follows:

- 1) Holding symposiums on Human-Environment System
- 2) Studying actual human-environment system
- 3) Studying and proposing ways to make human living environments more comfortable
- 4) Holding training seminars related to

human living environments

5) Publishing the committee reports and other documents

6) Expanding interactions among scientists, technical experts and others, and promoting joint research activities

Future Topics and Problems

As coping with the severity of nature, living beings such as humans have continuously progressed by adopting themselves to such environments. In recent years, humans have attempted to control their living environments instead of adapting themselves to them. Living in artificial indoor environments that have been controlled by heating and air conditioning systems is now the norm, and will likely increase as time goes on. In one day, a typical individual in a city may move from their home to a bus and / or train which they take to their office building or underground shopping district; hence, they may spend most of their time in artificially-controlled environments. Such artificial environments are mutually exclusive and have their own specifications, which leads to the occurrence of various problems.

Therefore, we should discuss "What is comfort?," healthy living environments, the harmonization of natural and artificial environments, the long-term involvement of artificial environments in human physiological functions, and the harmonization of human activities and pollution of the global environment, then it is necessary to establish a perspective and formulate guidelines for creating artificial environments. This means that we must study, evaluate and have a clear understanding of the actual conditions.

The following is a sample of the issues and important matters that will be investigated and discussed in human-living environment systems.

1) Gaining a Clear Understanding of Actual Conditions

There are many places besides our homes where we spend our lives. We also spend time in office buildings, factories, stores, subways and underground shopping malls, hotels, theaters, gymnasiums, schools and day care centers, hospitals, buses, taxis, trains, airplanes, and boats, to name a few. In terms of function, these are used for home-based activities, sleeping, working, transit, medical treatment, health-related activities, education, sports, and entertainment. Frankly speaking, there are still many living environments that should be adjusted. Because most of these environments have not been evaluated, they have been left as they are despite their importance as living environments, or have been debated endlessly with no conclusion being reached. Therefore, we must vigorously undertake surveys of the state of various kinds of living environments.

2) Basic Conditions of Evaluations

I believe that living environments should be fundamentally evaluated from their ability to provide a "healthy, comfortable setting for human activities." No matter which aspect of human life we try to examine, we must give our complete attention to "The way of life as humans." The wholesomeness and health of residential environment standards, for example, should be assessed in terms of the following six principles: 1) prevention of accidents, fires, disasters, 2) fulfillment of physiological needs, 3) fulfillment of needs for daily living, 4) preventing the outbreak of disease and infection, 5) satisfaction in terms of economy, and 6) spiritual and emotional fulfillment. However, unlike the UK, which has set minimum standards for residential environments, there has been no effort in Japan to write such regulations into a housing code.

For each of the environments that have been mentioned, such as homes, office buildings, hospitals, automobiles and airplanes, it is necessary to consider "fundamental conditions," establish basic standards and evaluation methods, and press

government to formulate specific measures and policies.

3) Evaluations Based on Physiological and Psychological Considerations

It is important that we gain a clear understanding of the physiological and psychological characteristics of humans and to use them to evaluate and plan for human environments. For this purpose, it is not enough just to have a physiological view based on medicine; it is also important to have data on human physiology and psychology. Data must be collected on living environments and systematized as the Human-Clothing Environment System, and have a firm grasp of the most of the physical factors of the environment and the physiological and psychological characteristics of humans. It is also necessary for engineers to have a better physiological understanding and sufficient engineering data. To advance physiology beyond its medical foundation, it must be understood as the fundamental science of the system of humans and their living environments.

Recently we have been hearing a lot about policies emphasizing people in housing policy. Seen in terms of thermal environments in the field of environmental engineering, this means that the existence and characteristics of the human body temperature regulatory system must be put in the foundation and that evaluations should be based on surveys of actual conditions.

4) Evaluation from the Perspective of People who Move about

In the past, homes, office buildings, etc., had been considered separately, but now, given that people spend their days moving about from one environment to another, we must evaluate these various environments as part of a unit. Presently government considers homes, office buildings, vehicles, underground shopping areas, etc., on an

individual basis, but it would be better if they were now considered as components of the living environment.

5) Synthetic Evaluation as Human-Environment System

The living environment is dependent on physical features such as heat, sound, light, vibrations, ventilation, air quality, available space, and scenery, as well as psychological factors such as interpersonal relationships. While it is important to probe individual components, research must also take a holistic approach. For example, although houses, air conditioners and sleeping beds are incorporated into a residential system, they have been studied independently. In the case of the thermal environment, it has a structural relation to body temperature regulation, clothing, bedding for night, heating and air conditioning equipment, buildings, and external environments. For this reason, we must understand them as components of the Man-Thermal Environment System.

It is especially important to evaluate the Human-Environment comprehensively as a total system within a time-space framework. This requires not only an academic hierarchy but also lateral linkages with government bodies and industries that are concerned with the living environment.

6) Evaluation of Clothing Functions

In our living environment, clothing plays an especially important role. Clothing functions become especially clear in the case of special types such as fireproof clothing or protective clothing worn by workers who handle radioactive materials. Fireproof clothing must have three types of characteristics:

- 1) thermal insulation,
- 2) characteristics of "clothing microenvironment", i.e., temperature and humidity, which may provide comfortable environments for wearers, and

- 3) ability to allow wearers to move and work easily.

Although fireproof clothing is often used, its special characteristics have not been sufficiently evaluated. Like any other product, evaluation values of its properties should be shown when it is used.

Radiation-proof clothing may be the same as fireproof clothing. The evaluation methods must be standardized as national standards. Workers wearing such clothing may be exposed to much harder environments than we can imagine. Three properties, i.e., its ability to protect against harmful radiation, clothing microenvironment characteristics, and its ease of use must be properly evaluated. In addition, operation standards must be formulated for the special environmental conditions and severity of work. At the same time, workers and managers need to be fully informed of the results of these evaluations to promote safety in the workplace. As was stated before, a system for adequately evaluating such important types of protective clothing and the environments where they are used must be implemented as quickly as possible.

Such knowledge of specific environments would also be of use in normal environments, so it is important to use it within as wide a scope as possible. Normal clothing has the fourth characteristic, that is, ability to express the individuality, taste and aesthetic sense of the wearer.

7) The Elderly and the Disabled Persons

Normal, healthy people are not the only ones who are in the living environment. We keep it in mind that the elderly persons, the disabled persons, infants and the infirm also live together in the same environment. Co-workers and I conducted a nationwide survey on the thermal environments of housing for the elderly persons and evaluated the physiological and psychological characteristics of the elderly persons to formulate their "Method for Evaluating

Residential Thermal Environments, Especially for the Elderly and Disabled." In a nutshell, this new method can evaluate residential thermal environments composed of a variety of spaces used for different purposes, based on the daily activities of their residents, especially those such as the elderly persons and the disabled persons who are more vulnerable to such environments."

8) Nighttime Living Environment

People live their lives by repeating a cycle of activity and rest; active lives require a satisfactory amount of rest, which for most people means about one third of their lives should be spent sleeping. Like studies on environments and clothing used in people's waking hours, studies on nighttime sleeping environments and bedding are of the utmost importance.

We must undertake studies on the conditions of the environments, rooms and materials used for sleeping. Of special importance are the environments of hotels, hospitals and convalescent homes. So far, equipment has been developed for testing the properties of 'futon' mattresses such as capacity to retain heat, resilience, and durability, and 'futon' mattresses and other bedding materials have actually been evaluated. Better evaluation methods for bedding materials and bedrooms, which are so important to us at night, should be systematized into a "science of nighttime activities."

9) Destructive Elements in the Living Environment

Manufacturing various types of equipment and facilities for the living environment is very important as well as removing those elements which may deteriorate the living environment. While establishing the Human-Environment System, resources and energy must be used efficiently and sparingly, and everyone knows of the

importance of reducing solid and liquid waste originating from homes and factories. In addition, there are problems with the damaging aftereffects of machines and device that had actually been designed to make our lives more comfortable. Therefore, it is necessary to develop a method of technological assessment of the Human-Environment System. Wars are the and who can think well about the human aspect of their products.

The nurturing of such people is one of the main roles of this committee, which we must vigorously promote through seminars and other means. Perhaps this also requires taking measures such as establishing a licensing system.

In the near future, young people, through a well-rounded understanding of the theoretical and technical aspects of human physiology and psychology, clothing functions, and living environments, should be able to debate social issues concerning people's daily activities and their environment in a comprehensive manner. In short, we could see the birth of the interdisciplinary scientists / technical engineers.

Among the most pressing tasks we must accomplish in our attempt to resolve the various issues and problems surrounding the human-living environment system are 1) investigation of the living environment around us from the perspective of human character, and restructuring our viewpoint to become more people-oriented, 2) meaningful assimilation of the results of broad-ranging research on physiology, hygiene and sanitation, housing, clothing, etc., 3) gaining a firm understanding of the various climatic zones and regions of the world, and how the various peoples that inhabit them make their living, 4) gaining a systematic understanding of the living environment and global environment as a system, not as separate entities, since preservation of the living environment begins with resolving environmental problems at the global level,

and 5) using a systematic understanding of the human-living environment system as a means of restructuring academic thought, which has become far too specialized, into a more holistic mode.

By achieving these goals and by taking a more human-oriented view about housing, clothing, climate control equipment, vehicles, etc., it will become possible to plan and design products based on people's physiological and psychological traits. It is believed that engineering and industry must be viewed as mostly a kind of synthesis, just the opposite of what has been believed. However, this new approach would provide a new starting point for human-oriented academics and industry to approach the 21st century. Should this happen, the foundation would be laid for most types of production, such as housing, clothing, climate-control equipment, automobiles, home appliances, etc., to help improve people's quality of life. What's more, it could become one of the next-generation "soft" technologies which emphasizes human physiology and psychology.

Thus, a truly interdisciplinary approach is needed to resolve the issues associated with

the Human-Living Environment. The Society of Human-Environment System, I believe, will play a key role in bringing this about. The undertaking of various types of international cooperative research projects, such as comparative surveys of Human-Environment system throughout the world, and the progress of international cooperation in general, may enable this committee to develop into an international academic research organization that will be of significance for future generations. By sincerely approaching the issues such as those reported here, we may be able to open the way toward a truly "people-oriented society."

In celebration of publication of the first volume of *Journal of the Human-Environment System*, I spelled out how the Society of Human-Environment System (SHES) has been established and how I have been concerned about future scientific issues. I would expect that SHES becomes more active in research activities, makes a great contribution to enhancement of quality of the human life and development of the related industry. As a last statement, I should be grateful for all the members' cooperation in supporting SHES.