

## Our Stolen Sustainability: Unsafe Eden Contaminated by Environmental Hormones †

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### Abstract

When we speak of sustainable development in the context of modern society, what does it actually mean? Here we would like to address the issue of environmental contamination and explore the conditions required to move toward human coexistence and symbiosis with the natural environment. Studying the effect of 'environmental hormones' and endocrine disruptors on the ecosystem, Theo Colborn confirmed the risk of 'brain contamination' through the food chain and 'bio-accumulation'. The contamination of the ecosphere by environmental hormones - an issue which no modern human can avoid - is a 'negative legacy' contrasting with the economic wealth brought by modern rationality. In this article, we consider the role of the environmental ethics which societies and individuals will be required to practice in the near future and examine the role of 'environmental management' as a preventive policy carrying the morality of the modern organization.

Key words: sustainable decision-making, systems pathology, organizational disaster

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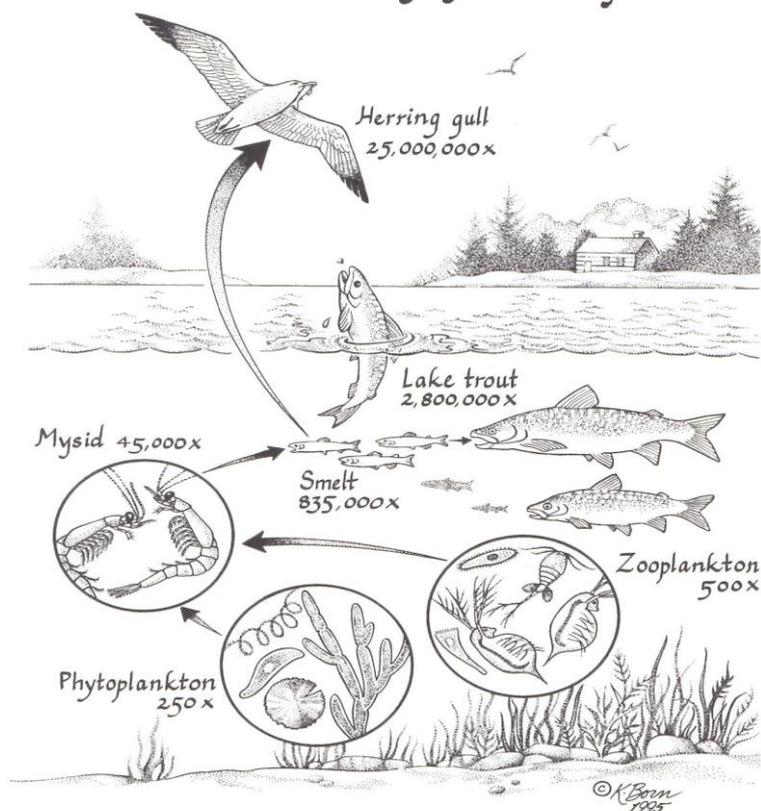
## **I. Brain contamination by environmental hormones**

### **(1) Bio-accumulation of environmental hormones**

The endocrine disruptors which are known collectively as environmental hormones are recognized to include around 600 substances, all of which are artificially compounded chemical substances. The best known are dioxins and polychlorinated biphenyls (PCBs). Even in extremely small amounts, these substances disturb the endocrine system that controls the body's internal regulatory functions. Environmental hormones are also contained in dichlorodiphenyltrichloroethane (DDT) and other agricultural chemicals, herbicides and plasticizers, and in the artificial preservatives, colorants, and flavorings used in processed foodstuffs. In recent years, atrazine and bisphenol, which are contained in plasticizers, have been found to affect sex determination in animal species and to alter the male-female birth ratio. Unbalanced sex determination threatens the preservation and the very survival of the species. Instead of being broken down, environmental hormones - chemical substances not originally present in the natural world - accumulate in the body. As a result, these artificial chemical compounds unleash a chain of contamination through the bio-environments which are formed through the interdependence of diverse life forms.

As environmental hormones cannot be detoxified or excreted by the organism itself, serial accumulation takes place over the long term in proportion to the amount ingested. Focusing specifically on the harmful substances of the organochlorine family, these were previously not considered a threat because, after diffusing through the soil in the form of agricultural chemicals and herbicides, they were thought to be rendered safe by a process of deposition in rivers and lakes via rainwater and groundwater drainage and soil permeation. The truth, however, is that these harmful substances, far from being removed, continue to circulate in the ecosystem through the food chain until they are served back up, in concentrated form, to the humans who stand at the top of the chain. In her work *Our Stolen Future*, Colborn explains this mechanism, which she calls 'bio-accumulation' <sup>(1)</sup>.

## Lake Ontario Biomagnification of PCBs



**Figure 1: Bio-accumulation in the food chain**

Source: Colborn, T., et al., *Our Stolen Future*, Spieler, 1996.

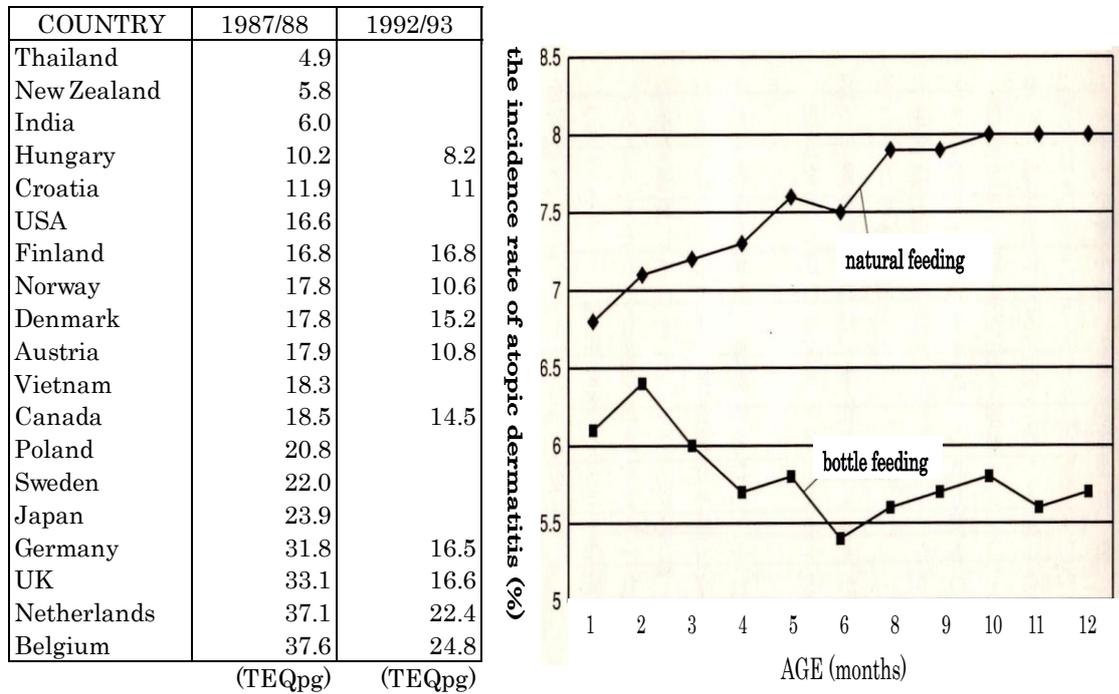
As illustrated in the above Figure, accumulative contamination with environmental hormones has already spread to many animal species through the food chain. The harmful chemical compounds mentioned above are raised from river and lake sediment to the surface layer by plankton photosynthesis and predation. Contaminants which were previously assumed to sink to the river or lake bed are in fact ingested by the interconnected food chain of living organisms stretching from phytoplankton through zooplankton, immature fish, and adult fish to birds, becoming successively concentrated in their bodies instead of being excreted. This startling fact was demonstrated by Colborn using data from a large number of researchers. Environmental hormones inflict serious damage on the reproductive cell DNA of all animal species in the global ecosystem and threaten their very survival. PCB, DDT, and other agricultural chemicals were thought to be deposited in the sedimentary layers of the hydrosphere and in the soil; in fact, through the food chain and bio-accumulation they come hurtling back to mankind like a boomerang.

### (2) 'Brain contamination' through environmental hormones

According to Colborn 'brain contamination' is the most significant effect of environmental hormones

(2). Dioxins and PCBs accumulate in the mother's body and cause damage to the formation of the cranial

nerves during the fetal growth stage. In a study of the Great Lakes, J. L. Jacobson demonstrated that PCB damages the formation of the fetal brain in the womb <sup>(3)</sup>.



**Figure 2: International comparison of dioxins in breast milk and incidence of atopic dermatitis**

Left: WHO research on breast milk contamination Right: WHO research on incidence of atopic dermatitis

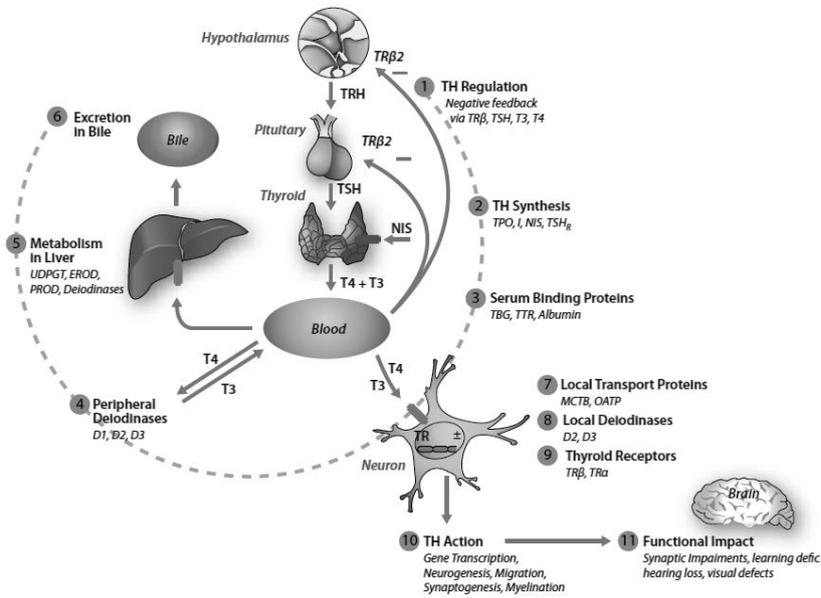
Source: H. Hongo, *Iwanami Booklet No.482, Bonyu to Dioxin*, Iwanami, 1999

In the study, children exposed to PCB at the fetal stage were observed to suffer damage to brain function, with intellectual impairments including reduced memory ability and decreased environmental adaptability. Brain contamination not only has a general disruptive effect on human physiological function, but also causes mental impairment and irreparable pathologies. Accordingly, Colborn posited an effect of environmental hormones and other contaminants on the children of the next generation. She asserted that the sharp increase in emotional disorders among children in the form of suicide, bipolar disorder, uncontrollable anger, and attention deficit hyperactivity disorder (ADHD) <sup>(4)</sup> was a symptom of this which had its origins not solely in the unhealthy social environment of today; damage to brain function by environmental hormones was also a factor. The correlation between brain damage through ingestion of chemical substances and abnormal behavior has already been proven through experiments in rats <sup>(5)</sup>.

It is indeed not possible to rule out a link between environmental hormones and the current sharp rise in the suicide rate, the increased incidence of depression, and the emergence of modern illnesses such as ADHD. As the mechanism of the brain damage which is thus able to paralyze the nervous system is gradually elucidated, there is concern that functional impairment during the developmental process due to

brain contamination may derange people’s judgment, and that the resulting abnormal behavior, played out on a larger scale, may inflict major damage at the level of the organization or the state. Colborn maintained that the biggest threat from environmental hormones lay in brain contamination, which could bring not only contamination of the bio-environment but also destruction of the social environment, and was concerned over the impact of organizational behavior on the environment. Going forward, she predicted that, if people affected by brain contamination became the majority, this would have a considerable impact on state policy and organizational decision-making and eventually have a direct and decisive influence on the survival of mankind. From this it can be appreciated that resolving the issue of environmental hormones is an urgent task not only for the natural bio-environment but also for the social environment.

It is 50 years since Rachel Carson sounded the alarm over the dangers of insecticides, agricultural chemicals, and also pharmaceuticals such as antibiotics in her book ‘Silent Spring’ (6). Carson’s predictions were accurate. Various chemical substances have been demonstrated to contaminate animal species and the ecosystem and to become accumulated in the human body. Created by artificial manipulation, insecticides and other synthetic chemical substances are not detoxified after release into the natural world but spread their contamination, causing a grave situation. Colborn’s work served almost as a systematic verification of Carson’s predictions and revealed the possibility of brain contamination that could cause modern humans to take deranged decisions and actions.



**Figure 3: Possible sites of action of environmental contamination on the HPT axis**

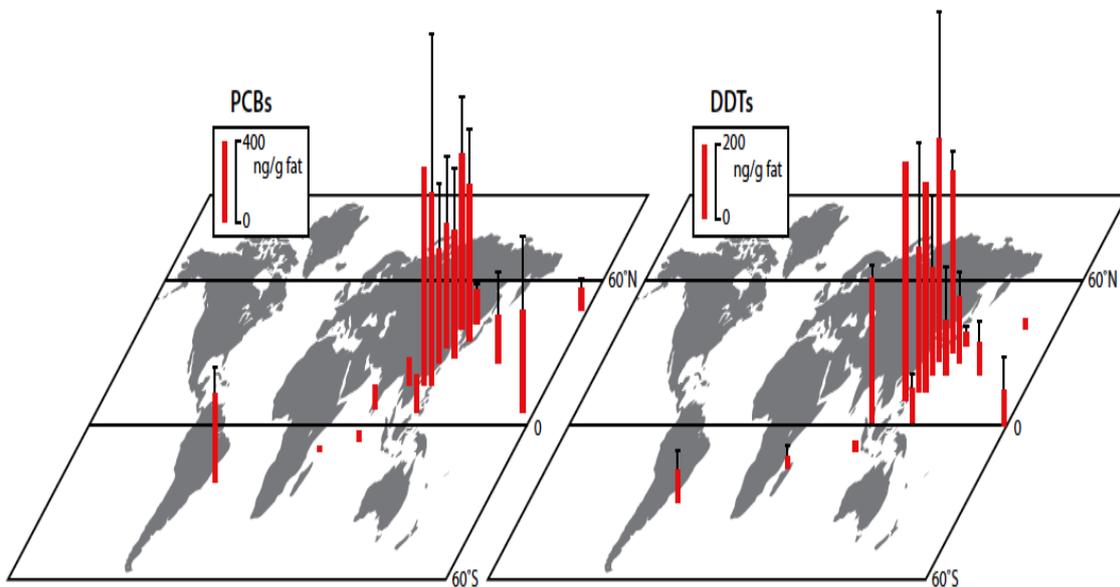
Source: WHO, State of the Science of Endocrine Disrupting Chemicals – 2012, p. 92

Figure 3 shows the mechanism whereby environmental hormones act on thyroid hormones and damage the regulatory functions of the human body and the ecosystem. There is particular concern over

possible fetal brain contamination. Colborn also confronts us with the terrible danger posed by the chemical byproducts of today's consumer society. Her fear was that the production volume of synthetic chemical substances was positively correlated to the prevalence of self-destructive mental states.

### (3) The globalization of environmental contamination

Environmental contamination started off as a problem of developed countries with highly advanced societies, but as contamination has spread, its range has come to extend over the whole of the global ecosystem. Even though its sources may be located in a specific area, contamination becomes dispersed through convection in the atmosphere and hydrosphere. Reinforced regulation has the effect of turning the industrial effluent, exhaust gases, and other emissions and industrial wastes of developed countries into pollution for overseas export to developing countries, while emission credits and other forms of atmospheric trading are creating a seamless distribution of environmental contamination throughout the ecosphere. Similarly with the use of chlorofluorocarbon gases, which rise to the stratosphere, where they create an ozone hole through which cosmic radiation reaches the earth's surface and impacts on animal species. This phenomenon is evident at many places throughout the world, and is spread worldwide through atmospheric and hydrospheric convection. Environmental contamination itself is thus being globalized <sup>(7)</sup>.



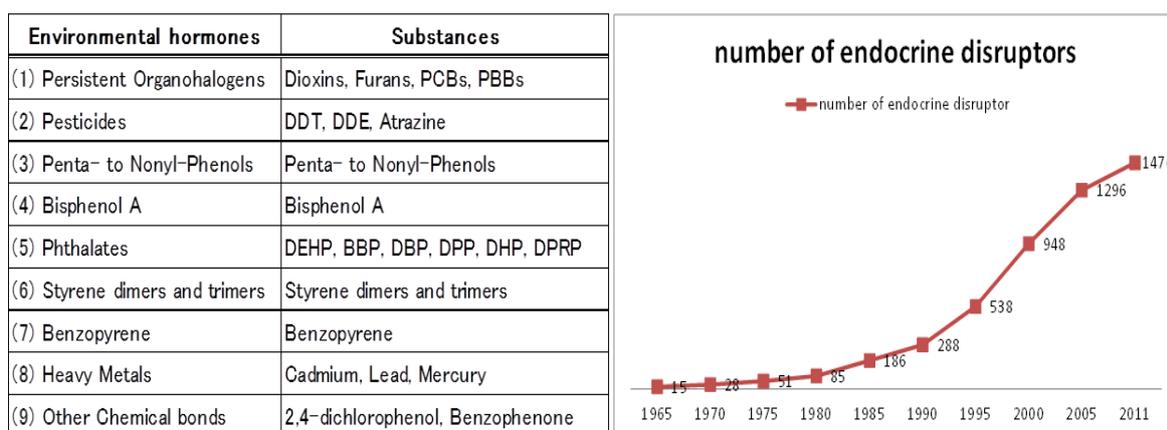
**Figure 4: PCB and DDT contamination in liver of skipjack tuna**

Source: WHO, State of the Science of Endocrine Disrupting Chemicals – 2012, p.212

Figure 4 shows levels of PCB and DDT in skipjack tuna liver. Measurements are from the Pacific, Indian, and Southwest Atlantic oceans and do not cover the North Atlantic. There can be no such thing as

locally limited environmental contamination. Convection through the water and air that make up the global ecosphere and interactions due to the movements of animal species such as migratory birds and fish that move with sea currents have the effect of disseminating contamination, so that environmental destruction spreads throughout the ecosphere. This may initially involve contamination at low concentration, but chemical compounding with other substances and reactions with various chemical elements lead to the secondary development of toxicity and bio-accumulation in a ‘domino effect’ of environmental destruction. Environmental contamination can no longer be a distant concern but is casting an unmistakable shadow on the lives of modern humans. Environmental hormones have a multiple presence in our lives, not only in synthetic preservatives, colorants, and flavorings, herbicides and agricultural chemicals, but also for instance in dioxins emitted through waste incineration, and these substances have left residues in the bodies of nearly every human being. The threat from environmental hormones highlighted by Colborn was that, mediated through the interaction between living organisms that takes place in the food chain, contaminants would undergo bio-accumulation and collect in high concentrations in the bodies of modern humans. This would mean damage to DNA, which is a ‘blueprint for preservation of the species.’ The contamination of animal wombs with environmental hormones amounts to the contamination of the global ecosphere, which is the amniotic fluid of all life on earth, in other words contamination of Gaia. This is because contamination of any one group of individuals, such as waterfowl, poses a danger to all living organisms, all intelligent life forms with a nervous system dependent on water and carbons. Waterfowl contamination leads ultimately to ‘Gaia contamination’, or contamination of the whole of the global ecosphere, which threatens human survival.

According to TEDX (founded by T. Colborn), the number of endocrine disruptor chemicals suspected of acting as environmental hormones (see classification in Figure 5) was in excess of 1,400 as of 2011.



**Figure 5: Classification of environmental hormones and number of endocrine disruptors**

Source: TEDX (<http://www.endocrinedisruption.org>) and WWF

## II. Management for environmental protection

### (1) Global-scale spread of contamination

It has already been reported that alligators in the US state of Florida have been found to display symptoms of 'sexual involution', with many males observed to have atrophied sperm glands. Physical analysis of the alligators showed a correlation between agricultural chemical concentration and sexual involution<sup>(8)</sup>. The concern here is the possible effect on humans. Since the alligator and human endocrine systems are similar, there will inevitably be a similar effect on humans. This appears to be backed up by survey reports in recent years indicating that the sperm count of adult males has been halved. The endocrine disruptors nonylphenol and bisphenol destroy the endocrine receptors of fish species in contaminated water. Especially since animals move around, the area of secondary contamination gradually expands. With nonylphenol, movement on the part of the contamination source has the effect not of reducing the level of toxicity, but of extending the contamination range through the interaction between living creatures in the food chain. Characteristic of environmental hormones is global spread through the movement of species to reach seamless distribution. For instance, many of the waterfowl that inhabit Lake Ontario undertake seasonal migration to countries across the globe, through which the contamination source itself spreads. As is already known, since almost none of the toxicity is removed, the bio-accumulation of environmental hormones intensifies progressively.

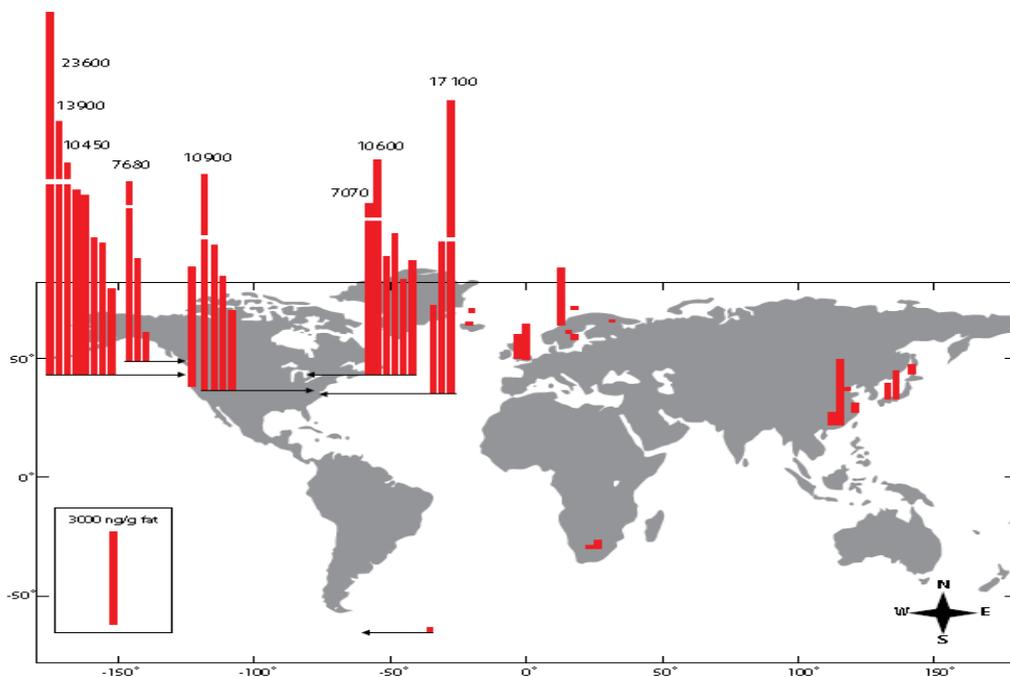


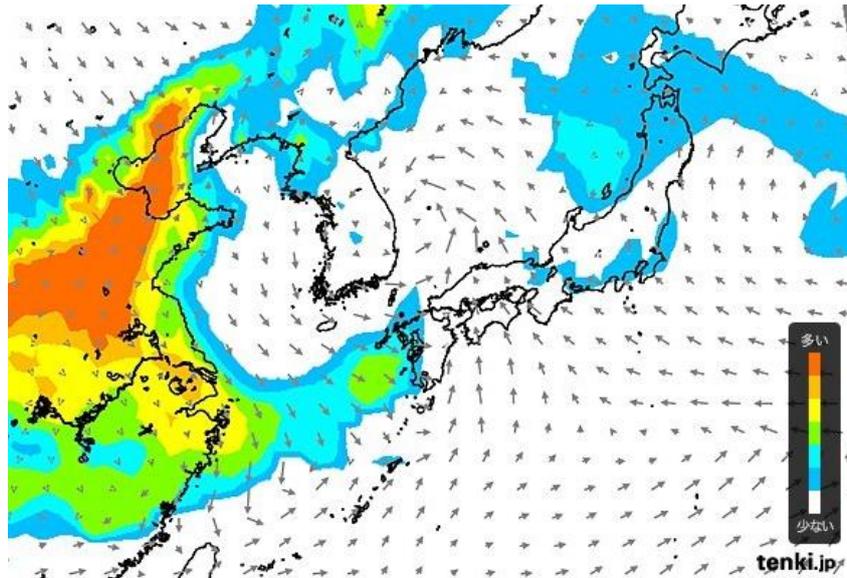
Figure 6: PBDE contamination in bird tissues and eggs

Source: WHO, State of the Science of Endocrine Disrupting Chemicals – 2012, p. 214

Figure 6 shows contamination with PBDE (polybrominated diphenyl ethers) among birds in various regions, which is correlated with PBDE production levels at chemical plants. As PBDE has a similar structure to PCBs and dioxins, it has a high degree of lipid solubility, has accumulative potential, and is subject to bioconcentration.

The survey finding that environmental hormones have already been detected in 80% of aquatic animals indicates that environmental contamination is not a transitory phenomenon restricted to single geographic areas. Today, moreover, there is concern over potential effects on unborn children due to the increased number of births to older women and contamination of breastmilk with PCBs. Do we have no choice but to carry on living with environmental hormones accumulating in our bodies?

The accompanying destruction of the global environment is also a serious concern. Most of the oxygen in the atmosphere (75% according to surveys) is said to be dependent on the tropical rain forest of the Amazon basin. The felling of this forest coupled with slash and burn farming are destroying its ecosystems, from the trees which have taken tens of thousands of years to grow to the fungi and bacteria in the soil, and is causing the loss of the forest. Similar deforestation is apparent everywhere around the world, and it is well known that acid rain caused by CO<sub>2</sub> emissions is stripping away the forest of Germany and other areas in Europe and the northern hemisphere <sup>(9)</sup>. Specifically, there is an area of eastern Europe known as the Black Triangle <sup>(10)</sup>, which remained hidden from the western media, where the environmental destruction was at its gravest, but it has recently become clear that serious atmospheric contamination and forest destruction is in progress here. Deforestation not only causes oxygen deficiency. When tree dieback has spread over wide areas the water-retaining properties of mountainsides are weakened and they become unable to store rainwater, which is washed into rivers and lakes and carried directly to the sea. The bleeding of water resources from the land leads to progressive global desertification and the loss of the equilibrium between atmosphere, soil, and hydrosphere. Environmental contamination and the destruction of the ecosphere thus aggravate each other in a synergistic fashion <sup>(11)</sup>.



**Figure 7: Predictive map for distribution of PM2.5 (19<sup>th</sup> May 2013)**

Source: Japan Weather Association (<http://tenki.jp/>)

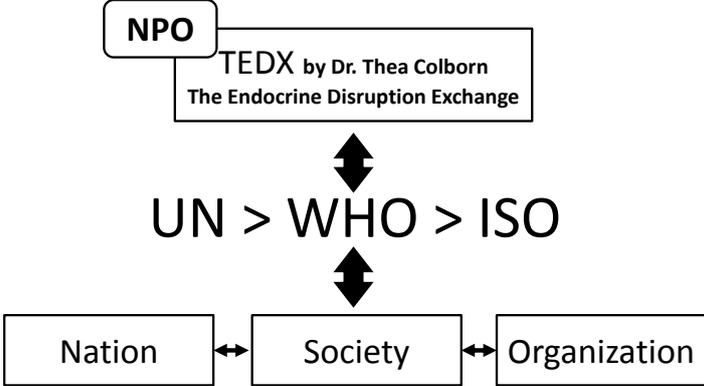
Figure 7 shows predicted distribution of atmospheric pollution with PM2.5 according to the Japan Weather Association. PM2.5 refers to the size ( $2.5 \mu\text{m}$  or below) of microparticulate pollutant substances; the finer the particles, the more easily bio-accumulation takes place, leading to concern among experts over health damage.

Add to this situation the population explosion in China and India, and we face not merely a food crisis, but an era in which even the supply of air and water cannot be guaranteed. The activities of modern humans have ended up unwittingly creating for the children of the next generation a savagely hostile bio-environment and social environment.

## **(2) Policy for environmental protection – learning lessons from ‘failure’**

When Colborn sounded the alarm on environmental hormones, she was referring to contamination not only of the bio-environment but extending to the social environment, including human psychology, and linked it further to the spiritual destruction of the individual. The physical, biological, and social impact of environmental contamination is connected with the survival and prosperity of mankind. The contamination of the bio-environment and destruction of the social environment shows heavy involvement of actions at the organizational and social rather than the individual level. Implicit in the consumer society of mass production and mass distribution operated by modern corporations are constituent factors that carry the seeds of effective environmental destruction. The direction to be taken by environmental protection going forward is shifting, in both corporate decision-making and government policy formulation, from a decision made at individual level to one at organizational and in turn societal level. As a result, Colborn underlines the need for leaders with environmental awareness to conduct the organizational

behavior of the near future, and explains that the most important theme is human resources cultivation and organizational design for the next generation that will facilitate decision-making and action in the interests of the global environment.



**Figure 8: Environmental hormone regulatory structure**

The qualities required of the leaders of the near future will include decision-making ability that can prevent action with a negative impact on the environment and can learn lessons from past failures such as corporate pollution and organizational disasters. The global ecosystem is a single integrated biosystem and forms the amniotic fluid for all life. This makes it essential to nurture human resources in the form of sound decision-makers who will have a comprehensive understanding of the global environment. The negative legacy of human cooperation seen in the example of environmental hormones has destabilized the global ecosystem. Remedying this situation will require action not only by the International Organization for Standardization and national governments, but is also likely to require regulation at the global level by the United Nations and similar organizations. Preventing the spread of environmental hormones is thus a global issue and belongs to the mission of the United Nations and other global organizations. Societies which have fallen victim to environmental contamination have a safety deficit, because of which the cultivation of sound leaders and decision-makers is an urgent task for the prevention of ecosphere contamination.

The large-scale mass production, mass distribution and mass consumption based on industrial manufacturing which has emerged in modern organized society and the environmental hormones released by incineration now stand in the way of mankind’s survival. To regulate the design of the near future, we need a social code of conduct on global environmental problems. Commenting on the moral hazard created by a society that gives priority to the economy <sup>(12)</sup>, L. Thurow argued the need for a new code of conduct in step with contemporary trends.

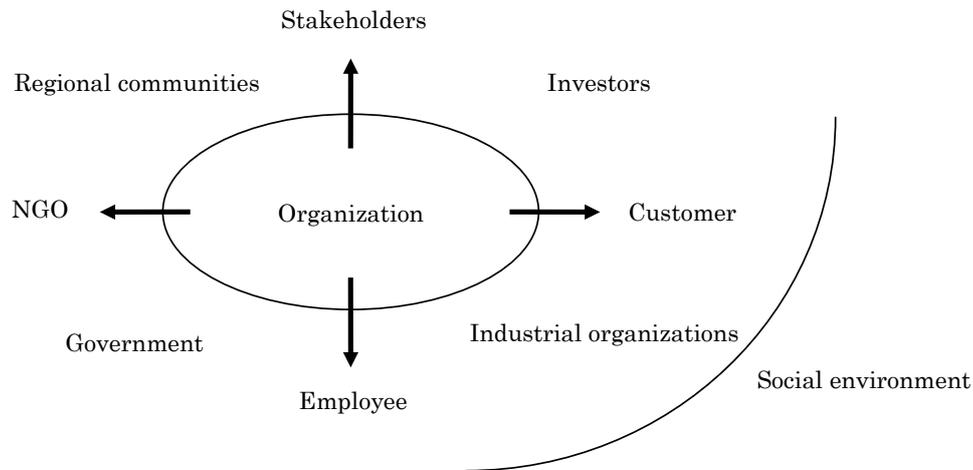
Dioxins, which are one member of the group of environmental hormones, are powerful chemicals. Just one drop in the vast space of the Tokyo Dome would apparently be enough to paralyze the nervous system

of everyone in it <sup>(13)</sup>. The formaldehyde contained in adhesives which is the cause of ‘sick house syndrome’ is just one of the many harmful chemical substances which surround modern humans, which, if used wrongly just once, could have irreversible consequences. However, if their harmful nature is not scientifically proved case by case, it is not possible to stop their manufacture. Even though many people may have found them empirically to be dangerous, if this has not been demonstrated scientifically with numerical data, regulation is not possible under current law. If we compare the present social system to a living organism, we might conclude that the parasympathetic nerves are not responding to the sympathetic nerves.

In recent years, the environment-conscious international standards established by the International Organization for Standardization: ISO, which are applied to the production process of actual manufactured products through environmental management and environmental management audit <sup>(14)</sup>, have spread from the European Union to become a worldwide standard to which the United States has also subscribed. Going forward, an environment is developing in which it will be impossible for corporations not certified under this international standard to distribute overseas their manufactured products, intermediate products, or services. In the modern world, single state policy and law has become powerless against environmental problems at global level and this will no doubt ensure that the ISO is accepted as a global standard. Environmental management can be seen as fulfilling the role of an international ‘business ethic’ which transcends the bounds of the state and other systems.

### **(3) Environmental management under the ISO 14000 series**

Environmental management is a system aimed at the prevention of global environmental destruction and contamination which clearly delineates the social responsibility of manufacturing enterprises that supply goods and services for the byproducts and waste materials they emit by requiring disclosure of information on production systems and organizational control. Its regulation establishes an environment in which the products of enterprises not certified under the system cannot be sold on the international market. And indeed, Japanese industry and especially manufacturing industry is currently making haste to obtain certification under the ISO14001 environmental management series. Although environmental management is insufficiently effective as a tool to prevent contamination and destruction, it will probably function as a set of basic preventive rules for the international market. In connection, cultivation of human resources to facilitate sustainable decision-making and action in respect of environmental responsibility is required. At last, the industrial world has begun to recognize the environmental connection and view it as a problem. Figure 9 Environmental Management – Organizations and the Environment presents the ISO vision of the interrelationship between organizations and the environment.



**Figure 9: Environmental management — organizations and the environment (by S. Atsuji)**

Under the current legal system, regulation is not possible unless there is scientific proof in the form of figures and other data on the effect in terms of environmental destruction and contamination. In the case of the industrial waste incident at Teshima in Kagawa Prefecture and the dioxin problem at the waste incineration facilities of the municipalities of Hashimoto and Nose, even though the danger was known, it was not recognized publicly in central government policy or local government action. Even where actual damage has been reported locally and there is empirical and statistical indication of risk, the government requires data from experiments on guinea pigs. This is the same situation as with the cat experiments in the 'Minamata disease' mercury poisoning scandal involving the Chisso Corporation. In conspicuous contrast to the government attitude is the shared awareness and sympathy expressed at the level of the individual resident or citizen in cases of environmental contamination. Today, there is increasing activism in support of environmental protection by local residents, including through non-governmental and non-profit organizations, and a network for 'environmental ethics' is beginning to form at world citizen level <sup>(15)</sup>. One expert emphasizes that there is a shared sensitivity toward environmental protection and that this network of common sympathies embraces an ethical view of the environment. He attaches importance not to the state or to organizations, but to social awareness based on links between individuals.

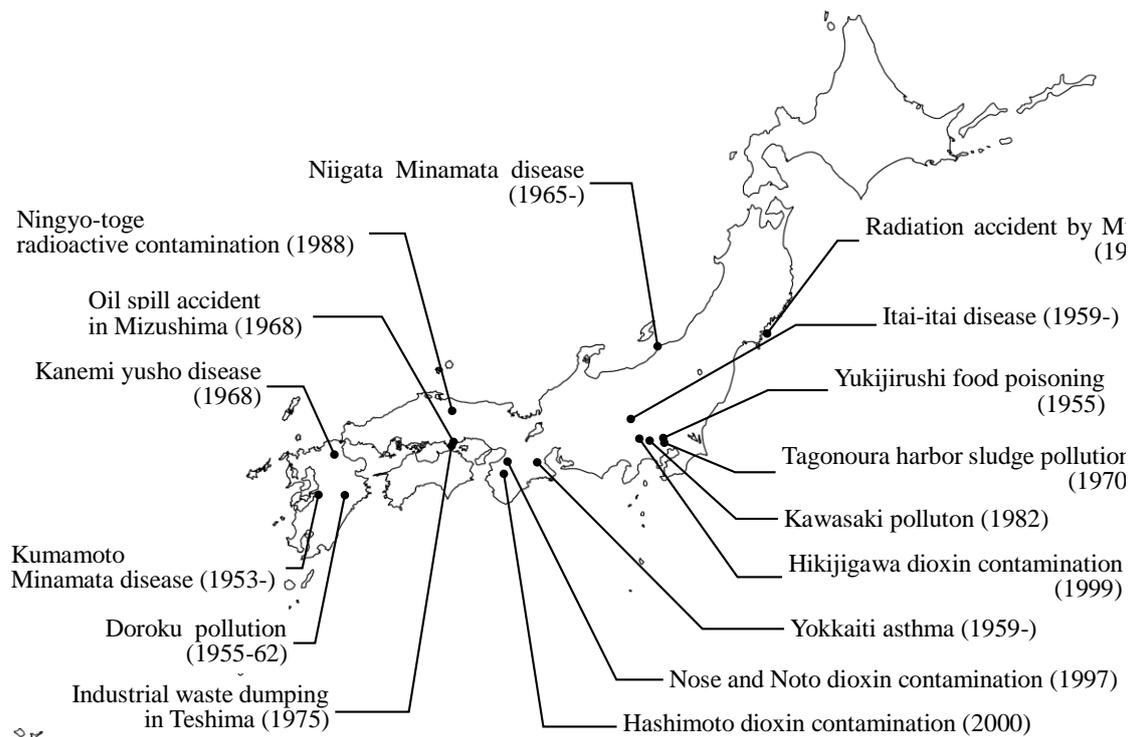
This expert is H.R. Maturana, one of the originators of the theory of 'autopoiesis' <sup>(16)</sup>, who gave a lecture entitled 'Ethics as a Human Action' at the 2000 World Congress of Systems Sciences <sup>(17)</sup>. Maturana states that the formation of ethical views in society arises from human emotion. In other words, humans and animals form groups, and as part of the rules of the 'herd society' a code of conduct around acts which are bad and acts which are good becomes implicitly shared among group members. All life forms that live communally share a common code of conduct for the species with implicit provisions. These implicit rules

are important in the survival of the species and constitute what might be called a 'program for the preservation of the species' according to which it is emotion-based behavior that is used to detect and avert danger to ensure self-preservation. It is thus emotion that constitutes the operating system for the survival of mankind, and this cultural network held in common within the social group can be called 'ethics'.

### **III. Organizational disasters and environmental ethics**

#### **(1) Organizational disasters, accidents, and pollution**

In recent years, with the shift from iron to plastics, synthetic chemical substances which are lightweight, durable, and easily processable have come to occupy an ever more prominent place in everyday life. However, the chemical substances known as plastics, which are mass-produced and mass-distributed for the purpose of mass consumption, not only produce chemical byproducts following disposal and mass incineration, but have also been shown to cause contamination to the human body through 'leaching' of harmful substances during their utilization. Already, dioxins and a range of other environmental hormones, either contained in synthetic preservatives, colorants, flavorings, herbicides, PCBs, and agricultural chemicals such as DDT, or released through the incineration of garbage and industrial waste, have spread their presence through many areas of our daily life. The accumulation in the human body of DDT, benzene hexachloride (BHC), and other agricultural chemicals and the finding that PCB contained in breastmilk accumulates in the hair of newborn infants are indicators of the dangers that environmental contamination presents to the next generation.



**Figure 10: Map of Japanese environmental contamination (mapping by R. Fujimoto and M. Fujii)**

Figure 10 is a map showing historic pollution incidents in Japan. In the past, corporate pollution incidents have included the outbreak of the so-called *itai-itai* disease, caused by cadmium poisoning, and the Chisso-Minamata disease, caused by organic mercury. Among cases of pharmaceutical damage, the outbreak of HIV infection caused by tainted blood products, in which hemophilia patients were infected with HIV after receiving non-heat-treated preparations, is still fresh in our memories. The infection was not restricted to the hemophiliacs, but spread tragically to their spouses and partners and even their children. There had been earlier cases of pharmaceutical damage, as when thalidomide and other anti-morning sickness agents caused birth defects, miscarriages, and still births. Why do we continue to repeat the same mistakes when we have already experienced many instances of pharmaceutical damage?

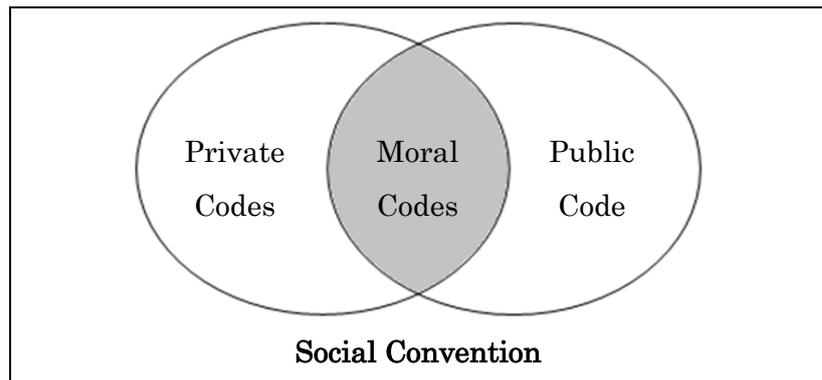
Are these organizational disasters and manmade accidents, of which these pharmaceutical damage incidents are typical, the inevitable fate of mankind? Among the organizational accidents and disasters which have come to light in Japan in the last few years are a food poisoning outbreak in the milk beverage industry and issues with recycled cow's milk and processed milk, BSE (mad cow disease) and a 'fake beef' scandal, in which the responsibility of the regulatory authority was questioned, the cover-up of medical accidents and mistakes, and a host of other cases too numerous to mention of antisocial activity by organizations. The reason why these organizational disasters attract attention is that activity at the

organizational level has a huge effect on the social environment and the bio-environment, sometimes with irreversible consequences. Since organizational disasters are instances of manmade disaster and human error arising from cooperative activity, there is an issue of social responsibility and historical responsibility. Organizational disasters of this kind present an opportunity to question the morals and ethics not only of central and local government and other public-sector institutions, but also of private-sector enterprises, universities, hospitals, and all organizational entities.

The morality of an organization is an element of the social infrastructure which lies at the foundation of corporations, universities, hospitals, and all other communities irrespective of whether in the private or public sector. The conventional social organization maintains itself through pursuit of profit based on economic value and efficiency, and 'organizational rationality' is established as the structural principle. However, maximum profit cannot be realized without survival over time. All organizations living in close contact with society can achieve long-term survival by studying the internal and external environment and contemporary trends and adapting accordingly <sup>(18)</sup>. Barnard anticipated this point in his major work, while Haruki Iino also indicated the importance of organizational morality through Barnard's theoretical research <sup>(19)</sup>.

## **(2) Creation of morality by executive function**

What in concrete terms is the morality of an organization? In his statements on executive function in Part IV of his major work, Barnard clarifies the role of organizational morality <sup>(20)</sup>. Here, he states that the essential nature of business activity is to create new business opportunities by destroying old practices. Taking the example of modern society, mobile telephones, the Internet, e-mail, portable audio and video players, vehicle navigation systems, and other new goods and services not previously available have been created. By changing our lifestyles, these have changed conventional manners and daily practices. As the goods created by the new businesses alter daily practices, new social conventions that match the times become necessary. Regarding the use of mobile telephones in public buildings and on trains, the gap in attitudes between the generations is one such area. One important aspect here is that, while businesses with the ability to revolutionize conventional lifestyles create huge markets, they have an inherent potential to develop into social problems. Although the creation of new businesses creates new lifestyles, if matching codes of conduct are not laid down, the innovations will not be accepted permanently. Because business creation destroys conventional customs and practices, the role of creating new moral codes is part of the function of executives. That is why Barnard considered that the creation of morality was a vital part of executive responsibility. In modern society, which is in a state of constant innovation, the morality of the organization, which is intimately connected with social codes of conduct, is today an important management responsibility.



**Figure 11: Moral codes bounded by private and public codes (by S. Atsuji and K. Ueda)**

Figure 11 illustrates the concept of moral codes composed of private codes and a public code as in Barnard's theory. Organizations that do not fulfill social needs, corporations that do not learn, and other cases where business management disregards the changing times make the organization no longer fit for the modern world and endanger its very survival. Just as life forms which do not learn are unable to adapt to environmental change and become extinct, so the social organism represented by the organization cannot survive if it does not learn from the internal and external environment. Barnard states that 'survival is the ultimate measure of the organization'. The morality of the organization, which is a form of social adaptation, is under scrutiny today as an expression of its learning from the internal and external environment.

#### **IV. Knowledge for social survival – significance of policy**

The modern organized societies of the developed world have in the past extracted fossil fuels, mineral resources, and other raw materials from the earth and processed them for use as thermal and electrical energy in production processes that emit large amounts of waste material and byproducts. But now, as part of their environmental strategies, developed countries are actually exporting pollution and industrial waste to developing countries, factory by factory. Manufactured products mass-produced by huge factories for mass distribution and mass consumption are admittedly items which fulfil the everyday needs of clothing, food, and shelter. But when they are disposed of through mass incineration as waste, they cause environmental contamination in the form of dioxins. In modern consumer society, at all stages from pre-production through the production process to post-production, and from pre-consumption through the consumption process to post-consumption, chemical substances not present in the natural world are created, spread through the soil, rivers, lakes, and atmospheric convection, and cause environmental contamination. As mentioned above, these inflict fateful damage on the global ecosphere.

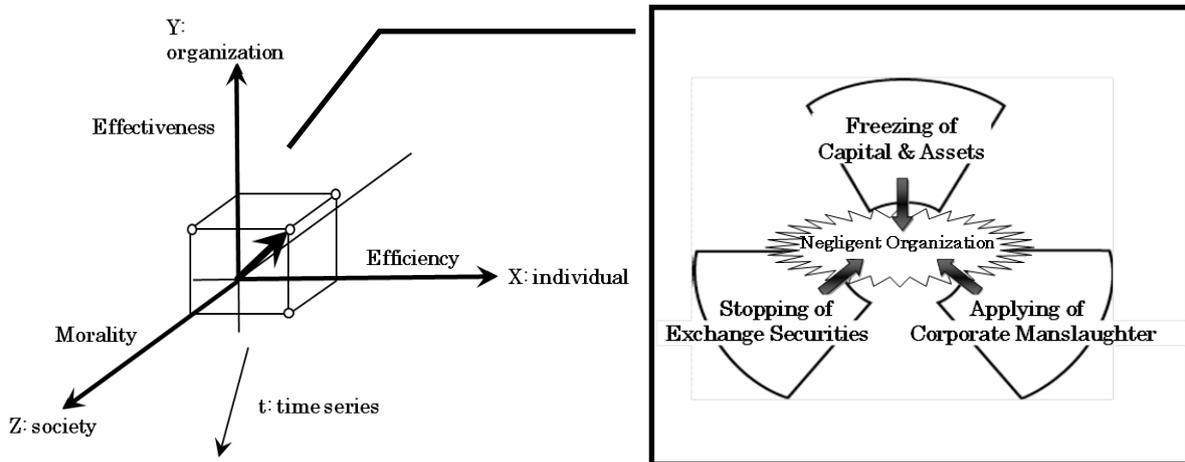
As part of the mixed blessings of the consumer society, chemical compounds which did not exist in the natural ecosystem have been created successively, causing not only contamination of the bio-environment, but also destruction of the social environment. The spread of environmental destruction is brought about by human cooperation centered on organizations. The result of this negative cooperation is not only to impact on the natural ecosystem but also on the social environment, which has begun to endanger the very survival of mankind. Once a substance which the individual cannot create alone has been mass-produced at a corporate factory and mass-distributed, it is quickly incorporated into family life through mass consumption followed by incineration. The harvest reaped by our consumer society is environmental destruction and contamination. Human knowledge originally used 'organizational cooperation' to reshape the global environment to man's convenience. In recent years, however, the water retention system of mountainsides, lakes, and rivers has been destroyed and the ecosystem thrown out of balance as evidenced by dried-up rivers and landslides. The 'visible hand' of human cooperation has artificially refashioned the natural ecosystem and this artificial manipulation has altered the global ecosystem. The upshot has been the seemingly irresolvable issue of environmental hormones, which is nothing other than the 'negative dividend' of modern rationality, which prioritizes economic value.

It is intelligence for the sake of survival that defines morality. Living organisms have learned from the environment and adapted. Similarly with the social organism known as the organization, which has survived by learning from its environment and adapting to the circumstances. The survival of the organization demands a code of conduct for coexistence with the bio-environment and the social environment. In other words, at both individual and overall level, the mission of the organism is to learn from the environment and live symbiotically. Both for humans, who are a living organism, and organizations, which are a social organism, there is an essential need for intelligence to control will and action so as to adapt to the environment and survive. In this way, the intelligence of an organism can be seen as a universal principle for the purpose of survival. It is therefore morality, a homeostatic system for the sake of coexistence with the environment, which is the source of knowledge for survival. Just as the senses are important for the survival of the biosystem, so morality is none other than an algorithm for the survival of the social system.

Conventionally, the approach to organizational behavior which infringed against social convention, such as corporate pollution, was to regulate it retrospectively by law. However, in areas such as global environmental problems and bio-engineering, the private sector takes the lead and legislation and regulation by the public sector has become unable to keep pace with developments. This has created the need for the organization itself to install a mechanism for ethical decision-making. In other words, a structure is needed whereby a moral program can be installed in the organization itself to control decision-making and action. Going forward, the design of the organizations of the near future should include the cultivation of a moral code that can learn from contemporary trends and cause changes to be

reflected in the behaviour of its members as part of an executive function fulfilling its social responsibility.

Barnard presents the three-dimensional model of organizational morality shown in Figure 12, in which the two dimensions of ‘organizational effectiveness’ and ‘individual efficiency’ are supplemented by a measurement criterion in the third dimension: social morality.



**Figure 12: Three-dimensional model of organizational morality (by S. Atsuji)**

Morality is a concept in opposition to rationality. Modern rationality grew by emphasizing economic efficiency and rejecting human emotion. A society which gave central focus to economic rationality undermined human interrelationships of trust and caused the destruction of morals and ethics and emotional sensitivity, negated the individual, and gave priority to the ‘logic of the organization’. Unfeeling modern society, which excludes the weak and prioritizes material goods, has brought a wealth of mixed blessings. In the interests of an environment-friendly ‘sustainable society’, the time has come to consider a new model of humanity which will admit a diverse range of value perspectives accessible to all regardless of age or gender <sup>(21)</sup>. Underpinning the code of conduct which we hold in common is a value system through which we share the emotionality inherent in humanity, in other words a system of ethics. The ‘substance of humanity’ spoken of by Haruo Murata <sup>(22)</sup> surely refers to the realization of this ethic which is the foundation common to all humanity. The philosopher Tetsuro Watsuji says that ‘the embodiment of ethics is policy’ <sup>(23)</sup>. Today, the loss of the ethical view in modern society in all communities, whether industrial, governmental, or academic, calls into question the meaning of ‘policy’, which is supposed to realize and embody ethics.

Environmental hormones could perhaps be described as a kind of test for mankind. The alarm which they sound tells us that consumer behaviour prioritizing economic value and focused on material goods has reached its limit and that mankind must shape a new criterion of social welfare. The phenomenon of

'endocrine disruption' caused at the micro level by environmental hormones in the inner body space of living organisms including humans is simultaneously mirrored at the macro level of the global ecosystem. Herein lies the reason why questions are being asked about the social responsibility of the decision makers responsible for mass production and mass distribution and the policy formulators responsible for issuing the relevant manufacturing permits, and why 'environmental ethics' deserves examination as an issue for modern society. To prevent environmental destruction and contamination, there is a growing aspiration for social well-being to be realized in policy formulation and organizational decision-making not only in the industrial world, but also in the worlds of business, politics, and academia. In this context, we look forward to a reconsideration of the meaning of 'policy', which will hopefully develop as a scientific discipline. Western thought is informed by a basic competitive principle which pits nature against mankind, but in Buddhism the idea of harmony between nature and mankind is the foundation. With today's urgent focus on global environmental problems, a need has perhaps arisen to move toward an oriental philosophical approach.

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