

## **Solar energy incorporation maxim (SEIM) concept as a foundation for sustainable human—natural resources inventory relationship**

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### **ABSTRACT**

Since industrial revolution, we have been consuming energy resources which are of the origin derived from paleo solar energy. Those resources are all limited in quantity, in a long run, would be used up. In 1972 a well known “The Limits to Growth” was published and the warning was accepted widely in the world. But for some decades, human activity was as if it were no limit in the resources, though oil price rise and occasional economic depressions remind us of the limit of resources. An optimistic myth of growth appears alternate with a myth of scarcity of natural resources in economics. De-growth (decroissance) trend has been prevailing for the last 1990’s to 2010’s. This was commonly a topic in Europe and particularly in France and Italy, leading to the recent topics among Canadian or Anglo-Saxon group. Ozeki and others (2011) proposed an unprecedented “ ‘Agro’ and Kyosei Thought”, and Giampeitro, Mayumi and Sorman (2011) also made a unique approach in “The Metabolic Pattern of Society”. Ivan Illich (1990) known for criticizing modern industrial society published "Declaration on soils". There, “We stand on soil, not on earth..., And soil - its cultivation and our bondage to it - is remarkably absent from those things clarified by philosophy in our western tradition.” The United States Senate adopted Senate Resolution No. 440 in 2008, “Recognizing soil as an essential natural resource, and soils professionals as playing a critical role in managing our Nation’s soil resources.” Thus, it might be, no awareness of soils for the suspect to be present, for many urban dwellers will have to reconfirm with the community's awareness. In Japan, the Ministry of Agriculture, Forestry and Fisheries initiated a soil amendment movement since 1960’s; however, most of the consumers have little knowledge about soils where, of what kind their foods were produced. It is because that only a few topics about soils are adopted in the text book in any grades of science education. Since intuitive reasoning doesn’t work without information prior to the action, we could not fully recognize the significance of natural resources. This is because we have proposed that we could rethink the significance of abiotic natural resources such as soil, water, air and so on for developing a

philosophy of natural resources inventory as human action. The consequence of this activity, we believe, germinates into a Solar Energy Incorporation Maxim (SEIM). Contemporary aporia in the global economy could be a result from an ignorance of multifunctional nature of natural resources, which have various kinds of value. We propose a maxim that promotes alternative way of sustainable future. Based on the enriched knowledge of inventory of world soils, we could recognize the significant diversity of soils and its function in regions. One recent example of utilization of soil inventory is obtaining a statistical transfer factor of radioactive Cesium of paddy rice after the accident of Fukushima Nuclear Power Plant in Japan. The inventory has been maintained since 1950's, although continuation monitoring was sometimes threatened by the government restructuring. Combating desertification, enhancing carbon sequestration, minimizing heat island in urban area, etc.: these environmental problems could be solved soundly, if we could identify the uniqueness of the quality of soil, water and air in certain place. In other words, it is utilization of natural resources inventory. SEIM is a mirror of human action, which we could convert and fix the unlimited solar energy into organic matter, electricity, heat and so on through promoting a sustainable agriculture. It doesn't mean agriculture could produce anything of course. However, from the view point of sustainability and renewability, we could agree in principle to have a concept of natural resources inventory. Site specific assessment of carrying capacity of natural resources is also a key to maximize solar energy incorporation everywhere. SEIM could be conceptualized in the various scale of the community such as local, regional, national and global.

## **1. Introduction**

Human beings are living with limited resources (Meadows et al., 1972). Global community, in tem of human activity, has so far still going on without consideration of limited natural resources. However we are brought into the situation inevitably being forced to recognize the limits of natural resources. As early as the 1970's, this was pointed out in the report by Club of Rome (Meadous et al. 1972). Since industrial revolution, we are consuming energy resources which are of the origin from fossil solar energy in the form of coal, oil and gas. Other materials in iron and other mineral ores excavated for use on which our daily life are heavily dependent, are all limited natural resources. Forest and grass vegetation, wild animals and other living things are included in natural resources. Soil, air and water are also natural resources which are quite often disregarded or overlooked, since we have more concern on energy resources and immediately useful materials. In this article we are intending to focus on the meaning and values of soil resource which has been forgotten quite often in the

discussion of environmental problem except for soil pollution. Another natural resource is a solar radiation by which we obtain energy of not fossil but present time as well as additional values in the products such as in the area of agriculture, forestry and fishery.

The relationship between the state of the earth and human life has been changing since industrial revolution to a great extent. Major change was the increase in fossil energy consumption and decline as to the portion of dependence on present day solar energy incorporation as well as degradation of ecosystem supported by natural resources such as vegetation and soil environment. From sociological or philosophical viewpoint, this was considered as uprooting (Toho, 2012) or entwurzeln (Sekiguchi, 2012) leading to unsound human life of the people living on the earth. Mayumi(1991) called this as temporary emancipation from land, based on entropy concept. From those, we will try to develop the thoughts on the state of the earth and human life and on what shall we take for action to the next step in the future. So far, we attempted to attract the attention of the people to the utilization and the values of almost unlimited solar energy in contrast to the limited fossil energy (Ohkura and Hamada, 2006). The same attitude to the present state of the earth and human life was also found in the statement of Duerr and Hayashi (2007) and Duerr( 2012) . This subject will be discussed in the last section of this manuscript.

Key to sustainability, that is what we are looking for after recognition of present state of the earth and human life of contemporary era. Prerequisite for finding out the key to sustainability is to identify some necessary concept to support the way to sustainable human life together with natural resources inventory. Some of thoughts we have to keep in our minds before considering wise use of natural resources are concept of commons, one of the case dealing this subject is WECD report (1987) and can be traced back to Leopold (1947) and to Leviticus (25:23). Recently relevant subject was discussed by Yamazaki (2012). Others additionally to be kept in mind are concept of de-growth, ecological foot print as well as land ethics. We discussed this natural resources inventory concept as a bridge between human society and environment (Ohkura and Hamada, 2006). In the present article we want to focus on soil inventory. Examples of soil inventory are soil map, soil profile description, biological, chemical and physical data records. Soil distributed all over the world is soil inventory itself. Based on soil inventory we will rethink present relationship between the state of the earth and human life to avoid eradication (Toho, 2012) or entwurzelen (Sekiguchi 2012). Not just, soil inventory we have to consider several other concepts. As was mentioned previously, among those are limits to growth, de-growth, commons, and land ethic that will lead us to solar energy incorporation maxim (SEIM).

## **2. What is the State of Life on the Earth in Term of Human---Nature Relationship**

The relationship between the state of the earth and human life has been changing since industrial revolution to a great extent. What are those changes? How have we been accepting those changes? What do we understand those changes? Probably we cannot find common answer with which all of us agree, to those questions. But a key answer in a holistic sense will be degradation of environment not only on the surface of the earth but also underground deep into the earth. The rate of decrease in the amount of coal, oil and mineral resources has been tremendous. In other word, we are heavily dependent on solar energy captured long time ago by destroying all those stocks. It can be summarized that major change was the increased fossil energy consumption and decline as to a portion of dependence on present day solar energy incorporation as well as degradation of ecosystem supported by natural resources such as vegetation and soil environment. As for the soil, Mayumi (1991) called the degradation of soil is, according to his conceptual structure, continuous entropization of soil condition in which we may consider the entropy to be a waste for a simplicity sake. Generally speaking, modern industrial society overlook soil itself and disregard the state where we are not making wise use of soil.

By Toho(2012 ), it was identified that human being is a presence that wants to have a root. By having the roots into various forms such as into land, culture, history, one is able to claim the establishment of an identity.

In our understanding, she said that people were emancipated from closed society, by capitalistic modernization, unprecedented development eradicated people from his/her mother land. This was the cause of change not only ordinary life style but a pattern of presence of people, finally leading to the state where people had no foundation that was nurtured through long history. This can be understood as the state of uproot from her viewpoint.

Sekiguchi(2012) discussed the change in a status of human being through industrial revolution or mechanization of the human society. He understood a technology is not just a technology situated outside of human being but is incorporated deeply into the human being itself, by citing the statement of Peter Trawny. Sekiguchi agrees with the statement that technology itself is not just a mechanical presence as we aware when we saw automobile and computer. Our understanding from Sekiguchi's statement is that human being and society itself are already strongly influenced by technology or technological thoughts. He also cited Heidegger's reaction when he saw a picture of the

earth from the moon. Heidegger was surprised by looking at the picture and said that everything including human being was eradicated from the great land and brought us to the condition of without root or of uproot (entwurzeln). He further mentioned, we did not need atomic bomb, since we are all eradicated. Scarcely, we were keeping our relationship with technology itself. This is exactly the same as Toho's (2012) in essence. Those uprooting concepts are more or less sociological and philosophical origin, and a reflection of instinct of the people.

Mayumi(1991) has claimed, something other way around on uproot concept but basically the same in term of the fact that human life lost its base or foundation on which he stand. He used an expression 'temporary emancipation from land' for our present status on the earth. In his discussion, we consider, by using a term 'temporary', it contains a thought that we are supposed to be tied up with the land or to have a close relationship with the land but unwontedly released from the tie to the land. In fact, we are tied up with the land actually as far as we are dependent on food mainly derived from the land and this is the result of solar energy incorporation by photosynthesis. In this sense, we have, as a biological presence, never been emancipated from the land. When we go back to the statements of uproot by Toho (2012) and entwurzeln by Heidegger cited by Sekiguchi (2012), we interpret those term to be an illustration of the state of people living in a city away from countryside. In developed country, percentage of people living in a city is quite high, and those people are completely uprooted. This is also true for the percentage of agricultural production in total production being substantially low in developed country (Giampietro et al. 2011).

Mayumi (1991) made a keen observation on the characteristics of manufacture and agriculture. His explanation will be interpreted that manufacture with high entropy and agriculture with low entropy, in which manufacture consume so much of fossil energy but not so much for agriculture. Further we would like to emphasize our view that agriculture has a process of incorporating contemporary solar energy. A produced materials are mainly food which is never be replaced by any other things, in that sense, agricultural product has values other than energy used by human and animals and microorganisms. Those values can be identified to be a growth factor such as vitamin which again cannot be replaced by any other materials.

In summary, Toho (2012), Heidegger cited by Sekiguchi (2012) explained the state of life on the earth in term of human--nature relationship from the view point of sociology or philosophy. The term 'uproot' is a metaphorical expression of the situation of city dwellers of the present day in developed countries. They are far away from agricultural field and forest. Entropy concept of Mayumi(1991) explained essentially the same

situation in other way in which most of us were going to be unconsciously brought into rootless state. Increase in entropy was, according to his analysis, results of or reflection of the fact that we were consuming fossil energy endlessly but there will be sure to have an end somewhere because the earth resources is limited.

Another view point from which we will understand the state of the earth together with human being is an Ecological Footprint. The Ecological Footprint is a measure of human demand for the earth's resources, in term of the number of the earth. It is said at present that we exceeded more than one earth. The Ecological Footprint is also urging us to reserved attitude in using our earth's resources.

We will try to develop a meaningful thought on the state of the earth and human life and on what shall we take for action to the next step in the future. So far, we attempted to attract the attention of people to the utilization and the values of almost unlimited solar energy in contrast to the limited fossil energy (Ohkura and Hamada, 2006). The same attitude to the present state of the earth and human life was also found in the statement of Duerr and Hayashi (2007) and Duerr( 2012) . This subject will be discussed in the last section of this manuscript.

### **3. Key Concepts to Sustainability**

In considering our future, to aim at a sustainable state of human-nature relationship, there are several necessary subjects to be discussed in advance. Firstly we are living on earth where resources are limited (Meadows, 1972). Climate change basically derived from the limit of the capacity of the earth to sustain human activity to deal with the natural resources. In other word, attempts to reduce an emission of carbon dioxide are for the purpose of reducing the consumption of fossil energy source such as oil and coal with the limited amount. In utilizing atomic energy we may reduce carbon dioxide emission, but the source of energy is also limited length of period which is shorter than oil and coal. Manufacture uses mainly or solely limited fossil energy. On the contrary, agriculture uses smaller amount of limited fossil energy and incorporate solar energy to our earth. Solar energy is considered to be almost limitless. Takashima (1993) interpreted Adam Smith's writing that agriculture has more productive power than manufacture has. This interpretation is quite reasonable when we realize the incorporation of solar energy in agricultural production leading us to have a wealth as crops or vegetables. On the other hand in manufacture, we are, for example, produce machinery with an expense of fossil energy without gaining any wealth and there is only a process of modification of raw material. With this, we can make sure that by

using solar energy through agricultural production, we have a prospect of more sustainable future.

From the other viewpoint, we are said to be in a stage of de-growth. Just recently, in Japan, there was a book published with a title 'Thoughts on Descending a Mountain' by well known writer Itsugi (2011). According to his view, the growth is not a main subject to be concerned anymore. His concept of descending a mountain is almost the same concept of de-growth which is prevailing in developed countries where people are facing a big wall of no room to grow and eventually looking for a new state of equilibrium. This state of equilibrium is achieved by cycle of production and consumption that take the surrounding ecosystem into account (Daly, 1991). Growth is a quantitative concept. On the other hand, development is a qualitative concept. Though we are facing with the limit to growth, we may look for a further development. In this manner, we have a great opportunity to rethink the future system with a prospect of qualitative approach. Based on this principle, even we are in the process of descending a mountain, through reducing the consumption of limited fossil energy resource, we still have a choice to change our system by increasing our dependence on almost limitless solar energy. Haddad (2012) claimed that there was sometimes good growth. This is true for developing countries, as there is still a room for land resource with a quantitative sense. However he included ecological footprint aspect in his discussion.

World Commission of Environment and Development(1978) report titled 'Our Common Future' suggested us a Common world. Our earth is a common world. More specifically the report has a chapter 'Managing the Commons'. It says the oceans, outer space, and Antarctica are commons. Though we have a border line between the nation, from outer space there is no boundary of nation is identified. At this stage of our human history with a different level of management practice for ocean, outer space, and Antarctica, we are pursuing the way to treat natural resources of the earth as commons. 'Satoyama' in Japanese, is a common forest for villagers, will be considered as a type of commons. Not global size but in a small village size community has such a property as commons. Leviticus 25:23 can be interpreted as a reflection of commons concept. The year of jubilee is considered to be stemmed from the idea of commons. Land tenure system in Ghana is also considered as a commons. The rule that land should not be sold and bought even by the chief of village is rather strictly observed. Yamazaki (2012) pointed out, in the discussion of land ownership between Niger river- and Mekong river-basin that Niger River basin area had no agricultural land market and land ownership was based on the commons concept.

#### 4. Soil Inventory and Solar Energy Incorporation Maxim (SEIM)

Soil inventory is one of our major concerns. However, our society has little concern to soil itself, as metaphoric expression mentioned before, we are 'uprooted' (Toho, 20012) or we are in a state of 'emancipation from land' (Mayumi, 1991). Though in our society, in general, has little concern to soil, there are those who have keen eyes on the meaning of soil or try to understand nature of soil. In old days, Leopold (1949) is one of those who emphasized the land ethics within philosophical framework, by facing to nature. Ivan Illich (1990) known for criticizing modern industrial society published "Declaration on soils". There, "We stand on soil, not on earth. And soil - its cultivation and our bondage to it - is remarkably absent from those things clarified by philosophy in our western tradition." He made a strong comment on society's unconcern to soil in our society, where more attention has been played to wild life including plants and animals in wild life arena. Soil is one of abiotic environments such as air and water, and only opportunity to attract attention from any society is when they are polluted by toxic or hazardous materials. From our viewpoint, in human history, it is just the right era to ask people of society to pay more attention to soil, and aim to go back to mother land from the 'uprooted' state.

As a legislative body, an attempt has been made to emphasize the importance of the meaning of soil not only to wild life but also to human community. The United States Senate adopted Senate Resolution No. 440 in 2008, "Recognizing soil as an essential natural resource, and soils professionals as playing a critical role in managing our Nation's soil resources." In Japan, the Ministry of Agriculture, Forestry and Fisheries initiated a soil amendment movement since the 1960's; however, most of the consumers have little knowledge about soils where, of what kind their foods were produced. It is because that only a few topics about soils are adopted in the text book in any grades of science education. Since intuitive reasoning doesn't work without information prior to the action, we could not fully recognize the significance of natural resources.

In the process of production of any materials by the process of manufacture or agriculture, land of which component is soil plays quite a different role. In both of manufacture and agriculture, same role is to offer a space as land. But making use of land, manufacture consume fossil solar energy and modify raw materials, which we consider there is no production is taking place as was mentioned Adam Smith and cited by Takashima (1993). Since A. Smith's old days it is rather common concept as a proportion of agriculture in society was higher than that of the present days. But Takashima's citation has more meaningful as a present day circumstances where a



proportion of agricultural production has become lower. In case of agriculture, there is a production taking place. In essence, agriculture as well as forestry, has a process of incorporating solar energy of present time not of fossil and leading to a plant material as a product of photosynthesis. This process is usually carried out with a presence of and by making use of soil.

This is because we have proposed that we could rethink the significance of abiotic natural resources such as soil, water, and air for developing a philosophy of natural resources inventory within a framework of human and nature relationship. It includes chemical, biological and physical characteristics of soil and soil map of the interested region as well. In addition, we need a total picture of soil in connection to human activities. Eventually, a society will be led to understand the real picture of the relationship between soil and human being, or further through which, we can visualize an approach to establish a human and nature relationship to attain sustainable world.

The consequence of this activity, we believe, germinates into a Solar Energy Incorporation Maxim (SEIM). Contemporary aporia in the global economy could be a result from an ignorance of multifunctional nature of natural resources, which have various kinds of value. We propose a maxim that promotes alternative way of sustainable future. Based on the enriched knowledge of inventory of world soils, we could recognize the significant diversity of soils and its function in regions. One recent example of utilization of soil inventory is obtaining a statistical transfer factor of radioactive Cesium of paddy rice after the accident of Fukushima Nuclear Power Plant in Japan. The soil inventory has been maintained since the 1950's, although continuation monitoring was sometimes threatened by the government restructuring. Combating desertification, enhancing carbon sequestration, minimizing heat island in urban area, etc.: these environmental problems could be solved soundly, if we could identify the uniqueness of the quality of soil, water and air in certain place. In other words, it is an optimum utilization of soil and natural resources inventory.

We understand that present status of human being is living on the limited resources of the earth with almost unlimited supply of solar energy, as it was already discussed by Ohkura and Hamada(2006) as well as by Duerr and Hayashi (2007) and Duerr (2012). This above understanding is a foundation for proposing a solar energy incorporation maxim (SEIM).

SEIM is a mirror of human action, which we could convert and fix the unlimited solar energy into organic matter, electricity, heat and so on through promoting a sustainable agriculture. It doesn't mean agriculture could produce anything of course. However, from the view point of sustainability and renewability, we could agree in

principle to have a concept of natural resources inventory. Site specific assessment of carrying capacity of natural resources is also a key to maximize solar energy incorporation everywhere. SEIM could be conceptualized in the various scale of the community such as local, regional, national and global.

## 5. CONCLUSION

We are living on the earth with limited resources. We are facing so many problems such as poverty, sickness and hunger together with environmental degradation. All of these are stemmed from the limited resources. Here, we have solar energy which is quite abundant. One of solutions for the problems, we may attain it with wise use of natural resources, one of which is a wise use of soil inventory. To carry out action we need and propose a principle or a rule for sensible behavior: that is maxim. We call it Solar Energy Incorporation Maxim (SEIM). This is just a starting point. We need more discussion to take action based on the SEIM.

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