No. 19　What If Japan Is Reduced To A Hundred-Thousandth? －1

The number of quantity people can easily imagine is generally 10,000 at biggest and 0.01 at smallest, so the big number is better to be reduced to make us easier to understand. Thus, the size of Japan is radically reduced to a hundred-thousandth in this article for better understanding. All data are “approximate” number. Please understand the slight difference in small numerical values.
Now, if Japan is reduced to a hundred-thousandth, such as the land area, population, and the amount of substances, the land area is 3.8 km^2 (or 1,140,000 tsubo: Hokkaido 250,000 tsubo, Honshu 700,000 tsubo, Shikoku 60,000 tsubo, Kyushu 130,000 tsubo, and Okinawa 7,000 tsubo). If we put all lands together for better understanding, the shape will be 760 meters wide and 5,000 meters long, a long and narrow belt-like shape.

The details of the land area as follows (partially revised from Statistics of Ministry of Internal Affairs and Communications);

Forests	66 % (2.5 km^2, 750,000 tsubo)
Farmlands	13 % (0.5 km^2, 150,000 tsubo)
Residential areas	4.6 % (0.17 km^2, 50,000 tsubo) e.g., private housing and industrial parks
Roads	3.3 % (0.13 km^2, 40,000 tsubo) e.g., public roads
Areas of the water	3.5 % (0.13 km^2, 40,000 tsubo) e.g., rivers, lakes and marshes
Others	8.2 % (0.3 km^2, 90,000 tsubo) e.g., sandy soils and others

Of the belt-shaped land mentioned above, the center area with 500 meters wide and 5,000 meters long corresponds to forests and plains (2.5 km^2, 760,000 tsubo), or woodlands. And the surrounding area with 150 meters wide and 5,000 meters long corresponds to farmlands, residential areas, industrial parks, and other residential areas.

First, Japan is the country affluent in nature but poor in residential areas. Suppose there live 620 men, 650 women, and 1,270 in total in the reduced Japan (the number households: 397, and average 3.2 person/household). The composition of population is 1,010 people twenty or older, 780 people between 15 and 59, the working population, and 300 people sixty or older, the old-age population. This shows that

780 people support 490 children and elderly people. In other words, 1.6 worker supports 1 child or elderly person. Since in recent years, there are fewer people of fifteen who get jobs, the actual ratio becomes higher and 750 workers support 520 children and elderly people (1.4 person supports 1 person). Population density is 334 people/km^2 (the world average is 45 people/km^2 and Japan is forth the most congested country of the world). If the whole national land, including forest areas, is equally divided, each person will possess 3,000 m^2 (900 tsubo) and 130 m^2 (40 tsubo) for residential area only (Note: the data of the residential areas include the industrial parks. Therefore, the actual area is estimated as 100 m^2 or 30 tsubo, which is 20 to 30 % smaller). Moreover, there are 397 households (3.2 people/household) in the reduced Japan. Of the total households, the number of households that possess their own houses is 242 (61%) and the residential area per person is 120 m^2 (36 tsubo).

Second, Japan has a considerably big area for roads.
The numerical value in the previous page includes only the public roads, so if other private roads are included, the total road area will be the same as, or bigger than, that of the water area. The area of roads per person is 102 m^2 (31 tsubo), which is almost the same as that of the residential area. If the area of roads is reduced to a half, the residential area per person will increase 40 % and become 55 tsubo.
There are 880 cars, such as trucks and automobiles (1.4 person/car), in the reduced Japan. Cars need parking spaces in houses, places of work, supermarkets, and others, so the residential area will be reduced. If a car needs 5 m^2 for a parking space, 4,400 m^2 (1,300 tsubo) of residential area will be used for parking spaces for total. This corresponds to 44 people's residential area out of 1270 people (2 %).

Now, the annual amount of substance demands (substance flow) that 1270 people use is 30,000 tons, while ignoring the amount of stocks. Each person moves 24 tons of substances annually. These substances include irons, things with a big specific gravity, and papers, things with a small specific gravity. If we define a specific gravity of all substances as 1, 8 kg/m^2 of substances are annually piled up and 3.2 people/household move 77 m^2 of substances (more than 3 eight-mat rooms) per year. This shows that Japanese live in the flow of mass substances. Can we manage such a big quantity of substances within a family? (Revised from *Limit of the Earth*, by Hiroshi Mizutani)

	Annual Amount (tons)	Per Person (tons)
Agriculture, forest, and stockbreeding	1,243	1.0
Minerals, soils, and stones	10,500	8.3
Fuel materials	4,000	3.1
Foods	406	0.3
Feeds	287	0.2
Fibers and papers	264	0.2
Chemicals and plastics	560	0.4
Petrochemicals and coals	2,260	1.8
Cement and ceramics	6,080	4.8
Irons, steels, and nonferrous metals	3,420	2.7
Industrial wastes	5,000	3.9
General wastes	500	0. 4
	(200 from foods)	(0.2)

Of the above table, the architectural materials, such as soils, stones, and cements, and irons are widely used. This implies that Japan is indeed a construction kingdom and also symbolizes the nature of Japanese general contractors, such as "So-And-So House," that construct buildings and roads without much thought. Then, fuel consumptions come next, such as electricity, gas, gasoline, and oils. The amount of fuel consumption including a product use is more than 3 tons (8 kg/day) per person. If only fuel (heavy) oils are used for combustion, 350,000 liters/person of carbon acid gas is emitted annually.

500 kg/person, or 1.4 kg/person/day, of food and feed are consumed annually, reflecting the satiation era. Of them, 406 kg of food, or 1.1 kg/day, is consumed and, if we convert the amount of food into calories using 4 kcal/g, every person (from babies to elderly people) consumes 4,400 kcal/day on average. Since 600 kcal is disused as food wastes, 3,800 kcal is actually used. However, this amount is 1.4 times more than the adult's standard intake of foods, 2,700 kcal/day.

Mainly because of the satiation, 230 out of 1,080 people over 15 are overweight. In addition, 72 people have hypertension, 21 people have diabetics, 13 people have

cancer, 11 people have cardiac diseases, 15 people have cerebrovascular disorders, and 8 people are senile dementia. Especially, lifestyle diseases, resulting from daily eating habits, are increasing regardless children or adults. However, those data are obtained from the people who went to the hospital for consultation and who reported their symptoms. So there will be more people with lifestyle diseases in an actual case (Hiroshi Yoshida, *Japan Village: 100 Companions*).

Although it is different from the amount of substance demands, there is also the big amount of wastes. 4.3 tons/person/year (1.4 kg/ m^2), or 12 kg/person/day, of wastes are thrown away. In other words, we both consume and throw away in large quantities, which is a big waste of resources.

Of all substance flows, the flows from the recyclable biosphere are farm and stock farm products, feeds, and water. The important thing is that the total amount of these flows is only 10 % of all substance flows and the rests are taken from the lithosphere, impossible to recycle, and bring them into the anthroposphere. This means that 90 % of the mount of substance demands cannot be recycled. It is obvious that the society of mass consuming and dumping cannot last for a long time.

To solve those problems, it is important to recycle resources and transfer to the vein industries from the “product-centered” science technology. It is also important to promote the environmental revolution throughout the economic and social structures. The long-term goal of structural reforms is the environmental reforms and its ultimate goal is the humanity society that is kind to the global circulation system – the sustainable recycling-based society.

In other words, the recycling-based society is the society that harmonizes the global mechanisms and mankind’s activity system.

To construct this society, the first thing that we must do is to break away from the society on the basis of “consuming-first value” (market economy system) and to transfer to the society on the basis of “sustaining-first value” (environment economy system).

“If the current growth rate of world population, industrialization, pollution, food productions, and the use of resources is constantly kept, a growth of the earth will reach a ceiling point within the next 100 years. The most possible ending will be the sudden, incontrollable decrease of population and industrial productivity (A Report for the Club of Rome's Project on the Predicament of Mankind, 1972, translated by

Takero Okisa).

– Statistical Data –

Annual amount of substance demands (tons) (Hiroshi Mizutani, *Limit of the Earth*)

Farm products	39.2 millions
Stock farm products	8.35 millions
Forest products	76.7 millions
Minerals, soils, and rocks	1,050 millions
Fuel materials	439 millions
Foods	40.6 millions
Feeds	28.7 millions
Fibers	0.21 millions
Papers and pulps	26.2 millions
Chemicals	44.1 millions
Petrochemicals and coals	206 millions
Plastic products	11.9 millions
Cements and ceramics	608 millions
Irons and steels	333 millions
Nonferrous metals	9.03 millions

When 1 liter of fuel (heavy) oil is burned:

Air	11,800 liters are consumed
Carbon acid gas	1,500 liters are emitted
Water vapor	1,200 liters are emitted
Sulfur oxides	6.3 liters are emitted
Nitrogen oxides	1.9 liters are emitted