

# Study on Sustainable Water Resource Conservation

## —Toward Deepening of Homo Environmentics

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### Abstract

To unlearn the meaning of a sustainable water resource conservation is now an essential issue in using of sustained, sound, and high-quality water in the world. In this paper, a water quality purification by the Schumann frequencies was first considered through the murmuring sound of upper reach at the mountain stream (Kyoto Pref., Japan) regarding the conservation of water resources. Second, water is changing freely and easily accepting the wavelength of all the sounds. We therefore referred to a flow and dynamic equilibrium to realize and understand the water quality purification process. Finally, a “consciousness only Buddhist philosophy” of water quality as an analogical approach was introduced to realize and understand the water purification process. As a result, we have confirmed the water purification capability by Schumann frequencies in an experiment on water quality. And through the experiment, we have realized the importance/significance to find the meaning for a person’s primary meaningless such as 1) meaning connection among life, environment, and economics as a condition of human life, 2) energy, entropy and fluctuation under law of thermodynamics, 3) a metaphor between water quality and mutual possession of the ten worlds based on conscious-only theory, and 4) sense of wonder through the water purification process.

### Keywords

Schumann Frequency, Water Purification Process, Memory (Hysteresis) of Water Sound and Rhythm, Homo Environmentics, Analogical Approach (Conscious-Only Theory etc.)

## 1. Introduction

Authors have recently realized from the experience that if local residents themselves living in the regional area (catchment area) could become centered persons to conserve the water resource persistently, the residents in the catchment area can drink the drinking water with safety, abundantly and free of charge sustainably.

However, a “change in the consciousness” of local residents is a key point in satisfying the three conditions as stated above. Because a change of the value (change in the consciousness) is required to purchase PET bottle water for 100 yen under the current market economy system or to acquire a “right of drinking” a high quality & a delicious water without charge (we actually utilize eco-money worth 100 yen in the community currency system) for the water. An introduction of environmental social system (e.g. conservation of water environment by using a community currency) will be necessary in order to achieve an objective (the latter). Regarding this, we have already conducted a consideration in a previous paper [1]. If we succeed in the introduction of the system, it is considered that the acquisition of a sound (safe, abundant and free of charge) drinking water is sustainably possible in the catchment area. Authors have proposed an approach to conserve the water quality by a water quality visualization regarding the introduction promotion of the system [1]. And there we first measure the murmuring sounds (vibration/sound waves/frequency) of the stream and then show the improvement dependence of the water quality by the murmuring sounds on a map. Authors have investigated the improvement dependence of the water quality when irradiating the sounds to various kinds of water using several frequencies including ultrasonic wave [2] [3] so far. Water is changing freely and easily accepting the wavelength of all the sounds [4] [5]. Therefore, it is thought that if we would understand the relationship between murmuring sound of the stream and water purification better, we could have a feeling of profound respect for Mother Nature more than before. We consider that the change in the consciousness is related to the conservation of sustainable water resource.

By the way, the condition (seven items) of delicious water in Japan is as follows [6]. 1) Total residue: 30 - 200 mg/, 2) Hardness: 10 - 100 mg/L, 3) Free carbon dioxide: 3 - 30 mg/L, 4) Potassium permanganate consumed:  $\geq 3$  mg/L, 5) Odor:  $\geq 3$ , 6) Residual chlorine:  $\geq 0.4$  mg/L, 7) Water temperature: Maximum  $\geq 20^{\circ}\text{C}$  (suitable temperature:  $10^{\circ}\text{C}$  -  $15^{\circ}\text{C}$ ). One of the waters that satisfy the water quality conditions in the natural world would be a murmuring of a stream. The feature of these seven conditions is to visualize the human feelings by a numerical value through the three senses such as a gustatory sense, an olfactory sense, and a tactile sense. That is, it is a viewpoint of “visual-intensive.” This just grasps the nature by using one’s own four senses, and then we are lacking in the viewpoint of an auditory sense that is the most important to know the nature.

And now, more than 100 years have passed since the times had changed from the medieval dark ages to the modern era in civilization, and then, half a century has passed since the environmental problems had occurred [7]. Incidentally, past years were the age of auditory consciousness advantage (invisibilization). However, at present it is thought that it gradually transpired into the age of auditory consciousness advantage that we believe the thing just only to confirm under one's very nose. Under that kind of background, a great deal of efforts have been put for studying the nature, and then invested the enormous research expenses such as a scientific research fund to solve the environmental problems. In spite of the effort, however, the environmental issues have spread out into a global scale without one's knowledge [8]-[13]. "The environmental issues are the aftereffects into the three weak things (people in developing countries, all living things except people, future generation), that is, we should mean the aftereffects from the current generation's power in developed countries into the dumb weak one in developing ones(purport)" says Dr. M. Naito (Environmentalist, Professor Emeritus, Kyoto University). [14]. And Dr. T. Umesao (Anthropologist) looked back on humankind history as civilization, and said that the human beings have a destiny digging one's own grave by the civilization made by one's self. And then, he silenced at a word that science is a "karma" that means an energy created by willful action, through thoughts, words and deeds. And then, M. Heidegger (Philosopher) called the science/technology Ge-stell (grotesque structure), and he described that the Ge-stell involves human beings, but at the same time, human beings are the entity that want to be involved it without choice. Furthermore, Mr. G. Kida (Philosopher, Professor Emeritus, Chuo University) describe that the Ge-stell is something like a "karma" referring to the Ge-stell. Dr. T. Umesao concluded that a prescription for the "karma" was a way of "realization" [15]-[20]. At present, the environmental issues are the common ones of humankind on a global scale (spatial axis), and a recognition which the long-run time setting (time axis) is necessary has shared regarding the direction of the solution, and now we have finally been able to argue the "Sustainability." We think that a time theory (Eternal Now) of Mr. K. Nishida (the one and only Philosopher from Japan) could be a good reference for examining the "Sustainability." The first author has written a paper entitled "On the comparative study of the concept 'environment' in the east and the west—In case of K. Nishida and M. Scheler (1994)" [21] [22]. We think that to consider the "Sustainability" from his point of view is at present very important to get to the bottom of a problem (life condition). K. Nishida has determined that to continue the logic of zettai-mujun no jikodoitsu (absolutely contradictory self-identity) for the inquiry "How to live this moment of life?" is an objective structure, and then, has presented a point to establish one's independence for dealing with environmental problems. An inquiry "Mono ninattekangaeru (Put oneself in an individual)" is an attitude (methodology) to recognize a phenomenon more objectively through are lativization of the object and a denial of scientist's subjectivity, and there is a

Buddhism's thought of Ku (emptiness) behind that. That is, a cognitive scientific viewpoint which presupposes the condition for interdependent and change as being exists [23] [24] [25].

At present, a crisis of water resources in a global scale has been taken up in the world [26] [27]. Water resource problem has the characteristics that its global overall perspective could not be described only in terms of both grasping the global situation as a background and making continual efforts of local issues. Therefore, it would be necessary to consider this problem from the viewpoint of "glocalization." For this purpose, we actualize one's sense of values "auditory consciousness advantage (invisibilization)" which has been invisibilized, and also launch a new inquiry of the prerequisite. We think that it is very important to propose a possibility of new discussion regarding an importance of the realization of a sense of wonder [Auditory-predominant] by doing this. We put the relationship between the murmuring sound of a mountain stream and the water purification process into focus as for the auditory consciousness in this paper. It is now at last thought that we are to be in the process of forcing to fall in the situation which we could not select just only a life style (pattern of existence) in an extremely controlled environment. The systematization will be promoted more and more in the future under a limited global environment. This, however, means breaking away from the natural environment [28]. Therefore, we consider that it is extremely important to put the question to a meaning of natural environment for human beings now [29].

In this paper, we examine how sustained, sound, and a bountiful supply of high-quality water as a drinking water is very important by asking deeply the meaning regarding the sustainable water resource conservation. First of all, a water quality improvement by sound waves is considered through the changes of natural environment at the mountain stream (Kyoto Pref., Japan) regarding the conservation of water resources after confirming a change of water quality by simulated murmuring sound generator. Second, a water purification ability by murmuring sounds of a stream (upper reach) in the forest is stated. Third, a consideration regarding an environmental management and a water resource purification has been described in the paper, and we here referred also to a flow and dynamic equilibrium to realize and understand the water purification process [30] [31]. Finally, a "consciousness only Buddhist philosophy" of water quality as an analogical approach (Metaphorical expression) was introduced to realize and understand the water purification process mentioning the state of the life style from the viewpoint of Buddhism [32].

## **2. Water Quality Purification by Simulated Murmuring Sound**

This time, we used a simulated murmuring sound generator as an experimental apparatus regarding a water quality purification by sound waves. And linear PCM recorder is used for measuring the frequency (Hz) of simulated murmuring sound.

## 2.1. Linear PCM Recorder

The specification of this Linear PCM recorder is as follows. Model: Linear PCM Recorder PCM-D10, Internal memory: 32 GB, Recording mode: Linear PCM (192 KHz/4 bit), Recording performance: 45 KHz (Max.), Internal microphone performance: 1 Hz - 20 KHz, Maximum recording time: 6 hr 35 min.

## 2.2. Relation between Water Quality and Simulated Murmuring Sound

We examined a relationship between sound waves and a change of water quality in a previous paper [33]. In this paper, we have confirmed that there is a relationship between the two. Through the experience, this time sixteen kinds of water qualities are selected as check items of the water quality, and the irradiation time of simulated murmuring sound was set at 0 min., 30 min., 60 min., and 90 min. And, after the experiment, the water samples used in this experiment were left as they are for 8 hrs to remove the impurities. And those ones were removed by the filtration. The material of the used filter cloth is as follows: 44% Hemp, 13% Polyester, 13% Cotton, 3% Rayon, Polyethylene coating. And the water quality analysis was conducted after the filtration using this filter. The testing methods for water quality analysis are as follows. ICP emission spectral analysis for Ca, Mg, Na, K, Fe, potassium peroxodisulphate decomposition method (JIS K 0102 46.3.1) for T-P, ion chromatography for S, I, ICP-Ms for Cu, Zn, Mn, glass electrode method (JIS K 0102 12.1) for pH, TOC meter (2003, MHLW Notification No. 261 (appended table 30) of the ministry of health, labour and welfare) for TOC, ultraviolet spectrophotometric method (JIS K-0102 45.2) for T-N, molybdenum blue-spectrophotometry (JIS K 0101 44.1.2) for ionic Silica, the testing methods for industrial water (JIS K 0102 32.3) for DO, respectively. And each Increase-decrease rate at 0 to 90 minutes was obtained by a least-square method (Linearization).

## 3. Conservation/Resilience Enshrined in Nature Itself

In a previous paper, we confirmed the change of water quality by a simulated murmuring sound [33]. In general, it is said that the world of nature is full of “fluctuation” and the murmuring sound of the stream affects human’s mind and the body greatly [34]. Therefore, in this Section 3, the murmuring sound of the stream was actually measured as one way to recognize a part (change of water quality) of conservation/resilience enshrined in nature itself. And the effect of the murmuring sound affecting the water quality purification was investigated.

### 3.1. Relation between Frequency (Hz) and Loudness (dB) of Actual Murmuring Sound

It is said that the frequency spectrum of the murmuring sound in a stream is a wide range from 110 Hz to 24 KHz, and that the loudness is ranging in decibel value from -38 dB to -75 dB, respectively in a previous research [33].

## 3.2. Measuring of Actual Murmuring Sound in the Stream in Kyoto Prefecture, Japan

### 3.2.1. Measurement Location

This time, the stream in Kyoto Prefecture was selected as a place to measure the murmuring sound [See **Figure 1**]. The study area is called a SATOYAMA (Secondary Nature). And there the efforts towards the realization of sustainable use of natural resource (management of the common pool) have been made by the local residents. As is seen in SATOYAMA Initiative (United Nations University) [35], the realization of sustainable use of natural resource in SATOYAMA is at present highly required. Authors have carried out the investigation for the water quality improvement by sound waves to inform the importance of water resource in the SATOYAMA to the local residents so far. Specifically, hands-on learning on a natural environment paying attention to the SATOYAMA water resource for elementary school children was conducted in reference to the three key words, that is, “visualization”, “awareness (realization)” and “circulation of connection” [36]. The measuring points for recording the murmuring sound are the upper reach (U1), the middle reach (M1) and the lower reach (L1) in the stream, respectively. The difference in altitude elevation height between the upper reach (U1) and the lower reach (L1) is about 150 m. In addition, numbers 1) - 5) show the monitoring points by administration.

### 3.2.2. Measurement Method

The linear PCM recorder as mentioned above was used to record the murmuring sound. Authors think it is important that the murmuring sound recorded by the recorder is directly irradiated to the sample water as a sound energy. Therefore a vibration speaker was used. The specification is as follows. Testing Content: RMS 26 W, S/N:  $\geq 65$  dB, Frequency range: 30 Hz - 18 KHz, Speaker

## Measuring of the murmuring sound in the stream in Kyoto pref., Japan



**Figure 1.** Measurement place and recording point of murmuring sound.

Impedance: 4  $\Omega$ , 26 W, Power Supply: Built-in 1400 mA·h Lithium battery, Audio Socket: 3.5 mm Audio jack, Audio Source: Phone, Tablet PC, PC, Computer, MP 3/4, etc., Function list: NFC, Bluetooth 4.0, Line in/out, Hands-free MIC, Touch Panel. The apparatus for measuring the murmuring sound consists of the three parts, that is, 1) linear PC recorder outputting the murmuring sound, 2) vibration speaker accepting the output from the recorder, and outputting that as a sound energy and 3) specimen container (cup: stainless steel, volume: 620 mL, length: 15 cm, width: 11 cm, height: 4.7 cm).

### 3.2.3. Measurement Condition

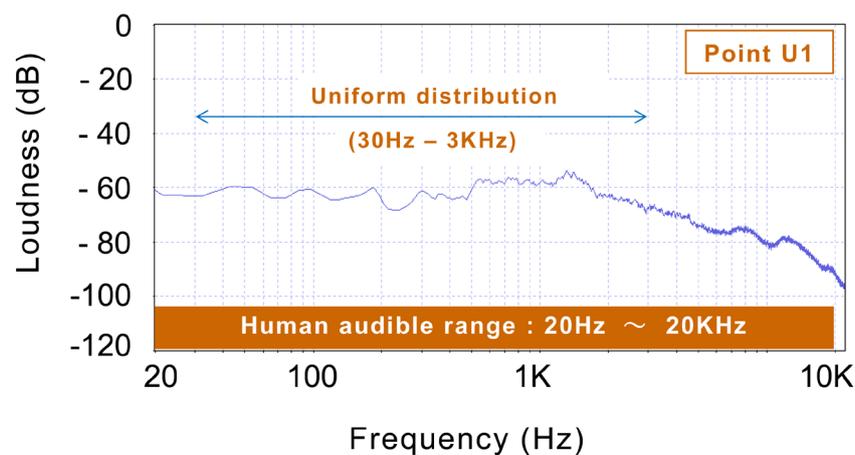
This time, the items relating to the major/minor elements (mineral) etc. of water quality (inorganic matter) centering on Ca, Mg, Na and K and the items relating to the major element etc. of water quality (organic contamination & eutrophication) centering on TOC, T-N and Si which are the fundamental water quality ingredients of drinking water and were selected as the measured items of the water quality based on the experiences [2] [3] so far.

## 3.3. Measurement Result and Consideration

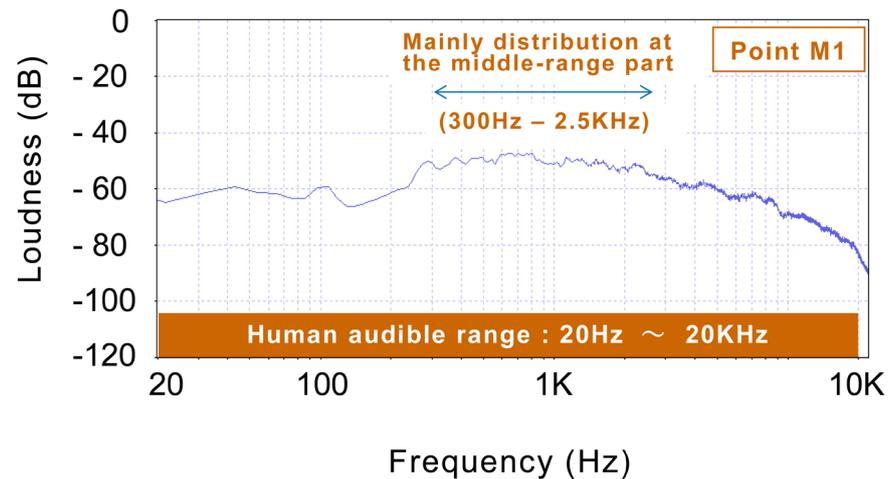
### Relation between the Sound Waves and the Water Quality Purification Ability

#### 1) Relation between the Frequency (Hz) and the Loudness (dB)

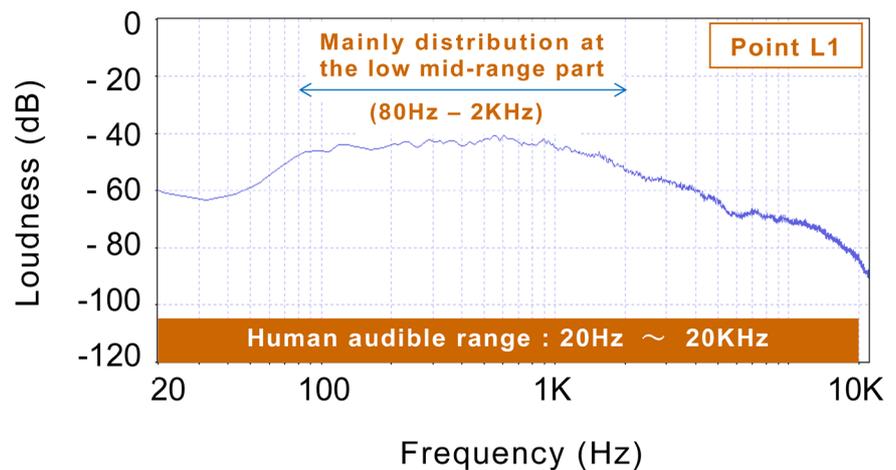
Here, the three points (U1, M1 and L1) in the stream having a normal murmuring sound were selected as an object area. The relation between the frequency (Hz) of the murmuring sound (sound waves) recorded in the three points as stated above and the loudness (dB) is shown in **Figures 2-4**. It is understood from **Figure 2** that the frequency spectrum of the murmuring sound at the point U1 in the stream covers a wide range of 20 Hz - 11 KHz, and that its loudness is in a range of -55 dB - -95 dB. The feature of the spectrum at this point U1 is that the spectrum from a low frequency range (20 Hz) to a high frequency one (2 KHz) exists on the average. However the spectrum at the high frequency range is slightly small. This tendency of the frequency is almost the



**Figure 2.** Relation between the frequency (Hz) and the loudness (dB) at the point U1.



**Figure 3.** Relation between the frequency (Hz) and the loudness (dB) at the point M1.



**Figure 4.** Relation between the frequency (Hz) and the loudness (dB) at the point L1.

same as that of the simulated murmuring sound as stated above. It is also understood from **Figure 3** that the frequency spectrum of the murmuring sound at the point M1 in the stream also covers a wide range of 20 Hz - 11 KHz as with U1, and that its loudness is in a range of -45 dB - -90 dB. Incidentally, the frequency at the point M1 is that the spectrum from a low frequency range to a high frequency one exists on the average. However, the spectrum at the low frequency range is slightly small contrary to the point U1. It is further understood from **Figure 4** that the frequency spectrum of the murmuring sound at the point L1 in the stream further covers a wide range of 20 Hz - 11 KHz as with U1 and M1, and that its loudness is in a range of -40 dB - -90 dB. And, the feature of the spectrum at this point L1 is that the spectrum from a low frequency range (100 Hz) to a high frequency one (1 KHz) exists on the average. It is further pointed out that the frequency component in the low frequency range (less than 100 Hz) is smaller than that compared to the points U1 and M1. It can be seen from the viewpoint as stated above that although the features of the frequency

spectrum are recognized at the points U1, M1 and L1, respectively, the general tendency of each spectrum is almost the same.

The comparative experiments between the water with irradiation of the murmuring sound and the water without one were conducted to confirm the dependence of the murmuring sound recorded at the object points (upper reach [U1], middle reach [M1], and lower reach [L1]) in the stream to the water quality. The frequency spectrum of the murmuring sound at the point U1 in the stream covers a wide range of 30 Hz - 3 KHz, and that its loudness is in a range of -55 dB - -95 dB. Therefore, the frequency at the point U1 is that the spectrum exists as the uniform distribution. This tendency of the frequency is almost the same as that of the simulated murmuring sound as stated above. The frequency spectrum of the murmuring sound at the point M1 in the stream covers mainly a narrow range of 300 Hz - 2.5 KHz, and that its loudness is in a range of -45 dB - -90 dB. Therefore, the frequency at the point M1 is that the spectrum exists mainly on the distribution at the middle-range part. The frequency spectrum of the murmuring sound at the point L1 in the stream covers mainly a little wide range of 80 Hz - 2 KHz, and that its loudness is in a range of -40 dB - -90 dB. Therefore, the frequency at the point L1 is that the spectrum exists mainly on the distribution at the low mid-range part.

Based on the result of Chapter 2, the comparative experiments between the water with irradiation of the murmuring sound and the water without one were conducted to confirm the dependence of the murmuring sound recorded at the object points (upper reach, middle reach and lower reach) in the stream to the water quality. As a result, the dependence of the actual murmuring sound to the changing of water quality was confirmed. There appears to be considerable difference among each reach (U1, M1, and L1). It is therefore thought that each reach has its own characteristics regarding the relationship between the sound waves and water quality change. This time, the dependence of the sound having the frequency inside of an audible region of a human (20 Hz - 11 KHz) was examined. As a result, it was understood that the spectrum exists on the average from the low frequency to the high frequency at the upper reach, the middle reach, and the lower reach, respectively. Although the features of the frequency are recognized at each reach, respectively, the general tendency of each spectrum is almost the same. It is thought from this viewpoint that the water quality change by the actual murmuring sound at the irradiation in audible region such as a relatively low frequency (20 Hz - 2 KHz) could be expected.

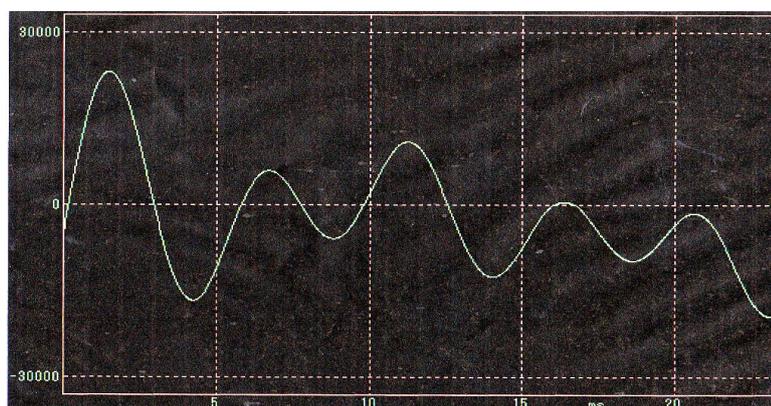
## **2) Relation between irradiation time of actual murmuring sound and measured water quality**

The feature of the frequency at the upper reach, the middle reach and the lower reach is stated above. We realize that the upper reach among these has frequencies representing the most uniform distribution, and that at this point the low and high frequency are distinguished compared with other two points. In general, the high-energy characteristic is not good for living thing (creature).

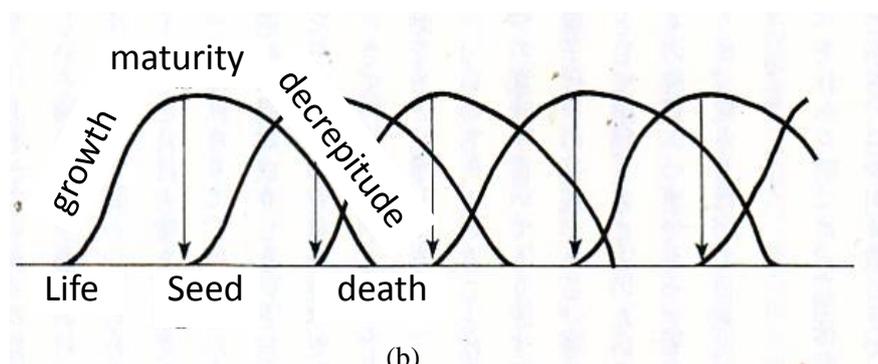
Therefore, it is thought that if the dependence of the sound wave for water quality purification at audible region (a low-energy characteristic) is applicable to a biological treatment, there is a possibility that we might be able to get a better result [33]. Therefore, we selected Schumann waves (brain waves of the earth) which are harmonic tones of 7.83 Hz (primary), and then used eight kinds of sound waves such as 1) the wavelengths at low frequency region (33 Hz [=4 times, 39 Hz [=4 times], 45 Hz [=5 times]) and 2) the wavelengths at high frequency region (136 Hz [=17 times], 144 Hz [=18 times], 152 Hz [=19 times], 160 Hz [=20 times], 200 Hz [=25 times]) as irradiated frequencies in this research [37] [38] [39] [40] [41]. And the murmuring sound (sound energy) recorded at the point (U1) in the stream was irradiated to the sample water using the linear PC recorder, and the relation between the irradiation time of the murmuring sound and measured water quality was investigated. **Table 1** shows the experimental condition and the results, and the related diagrams are shown in **Figures 5-24**, respectively. And, The above diagram of **Figure 5** shows the sound waves which were converted eight kinds of waves (sin waves) into the sum; Fourier transform used in this experiment, and then the below one illustrates a conceptual diagram of “waves of life” presented by Dr. S. Miki as a metaphorical expression. According to him, it is said that all the organic phenomena do have waves, and the waves repeat them with a slightly different rhythm

**Table 1.** Experimental results.

| Sample water   | Items of water quality   | Irradiation time (min.) |      |      |      | Remarks |  |
|--|--|-------------------------|------|------|------|---------|--|
|  |  | 0                       | 30   | 60   | 90   |         |  |
| <b>Mixed water</b><br>(540 ml)<br>1) Ocean deep water<br>2) Silica water<br>3) Vanadium water<br>4) Hydrogen water<br>5) Natural mineral water (A)<br>6) Natural mineral water (B)<br>7) Natural mineral water (C) | Major/minor elements (mineral) etc. of water quality centering on Ca, Mg, Na and K affecting inorganic matter<br><br><br><br><br><br><br><br><br><br><br><br>Major element etc. of water quality centering on TOC, T-N and Si affecting organic contamination & eutrophication | Ca (mg/L)               | 120  | 140  | 130  | 140     | <b>Vibration Schumann resonances</b> ※<br>※Overtone of brain wave of the earth: 7.83 Hz (primary)<br><br><b>Low frequency</b><br>1) 33 Hz (=4 times)<br>2) 39 Hz (=5 times)<br>3) 45 Hz (=6 times)<br><br><b>High frequency</b><br>4) 136 Hz (=17 times)<br>5) 144 Hz (=18 times)<br>6) 152 Hz (=19 times)<br>7) 160 Hz (=20 times)<br>8) 200 Hz (=25 times) |
|  |  | Mg (mg/L)               | 79   | 82   | 81   | 86      |  |
|  |  | Na (mg/L)               | 23   | 25   | 24   | 25      |  |
|  |  | K (mg/L)                | 18   | 18   | 18   | 19      |  |
|  |  | P (mg/L)                | 0.2  | 0.2  | 0.2  | 0.1     |  |
|  |  | S (mg/L)                | 160  | 160  | 150  | 160     |  |
|  |  | Fe (ng/L)               | 4300 | 3600 | 3700 | 3300    |  |
|  |  | Cu (µg/L)               | 11   | 26   | 22   | 33      |  |
|  |  | Zn (µg/L)               | 93   | 150  | 150  | 160     |  |
|  |  | Mn (mg/L)               | 84   | 110  | 110  | 120     |  |
|  |  | I (mg/L)                | <    | < 1  | <    | <       |  |
|  |  | pH                      | 2.7  | 2.7  | 2.7  | 2.7     |  |
|  |  | DO (mg/L)               | 9.8  | 9.7  | 9.6  | 9.4     |  |
|  |  | TOC (mg/L)              | 0.7  | 7.8  | 8.6  | 5.0     |  |
| T-N (mg/L)   | 0.6  | 1.3                     | 1.1  | 1.2  |      |         |  |
| Si (mg/L)  | 17   | 18                      | 17   | 18   |      |         |  |
| -----  | ----   | ----                    | ---- | ---- |      |         |  |

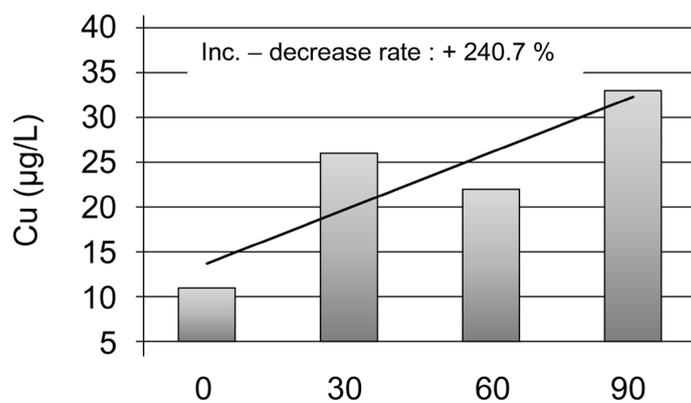


(a)



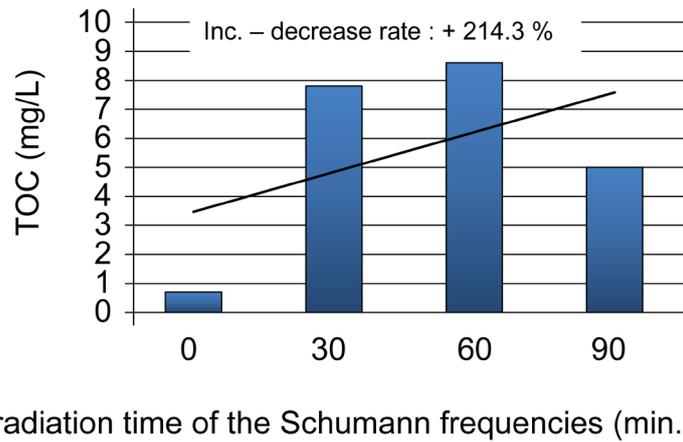
(b)

**Figure 5.** Metaphorical expression for Irradiated frequencies and waves of life [43] [44].  
(a) Irradiated frequencies; (b) Waves of life.

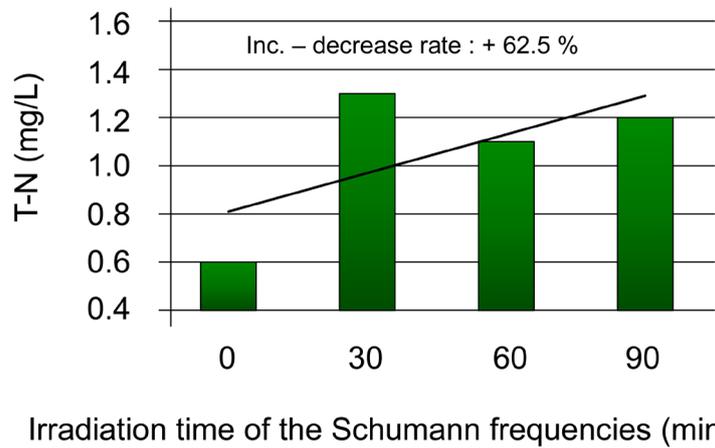


**Figure 6.** Change of Cu after the irradiation times.

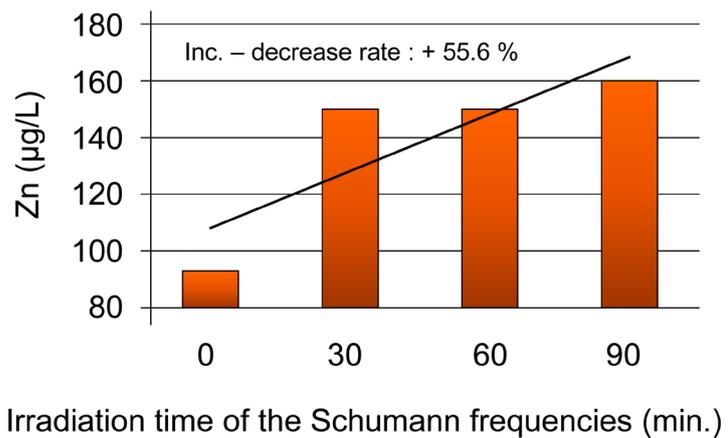
such as a water ripple on the ocean. The water including chlorine gets into the news regarding the high-quality water in the public mind. Therefore, a comparative examination of a tap water with and without vibration was carried out this time. The experiment was conducted based on easy-to-use water quality test kit, pack checker 1 (CIO), testing method: DPD visual colorimetric method (See



**Figure 7.** Change of TOC after the irradiation times.

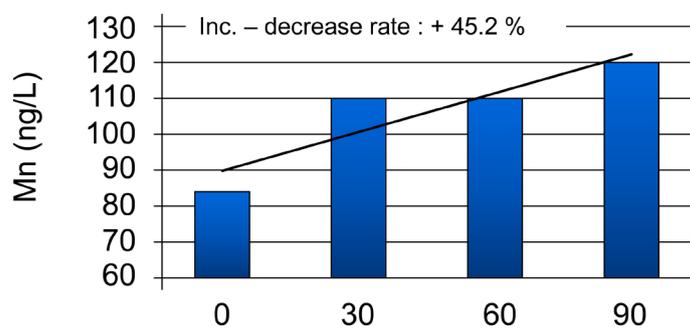


**Figure 8.** Change of T-N after the irradiation times.



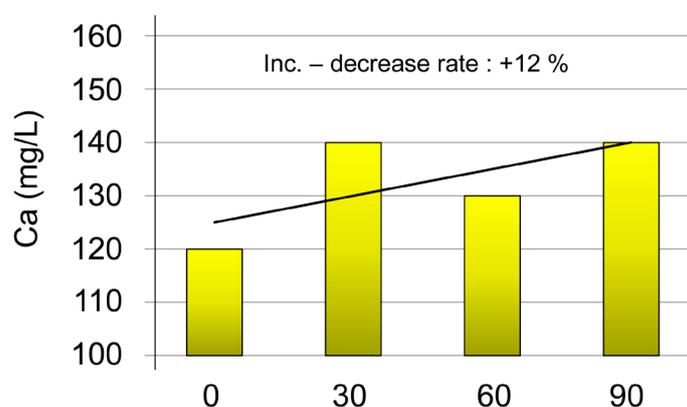
**Figure 9.** Change of Zn after the irradiation times.

**Figure 23).** In addition, a comparative examination on COD (organic contamination index; an environmental water quality standard concerning the conservation of the living environment) was also examined, and easy-to-use water



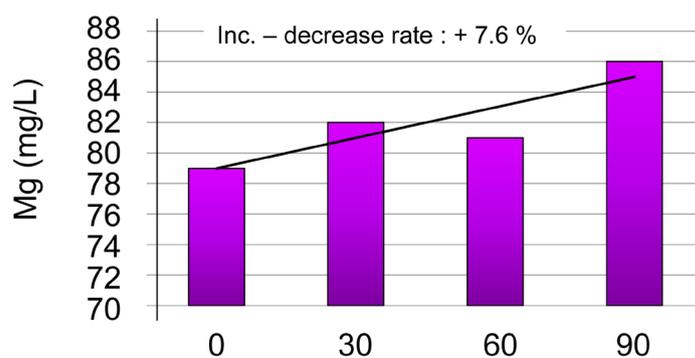
Irradiation time of the Schumann frequencies (min.)

**Figure 10.** Change of Mn after the irradiation times.



Irradiation time of the Schumann frequencies (min.)

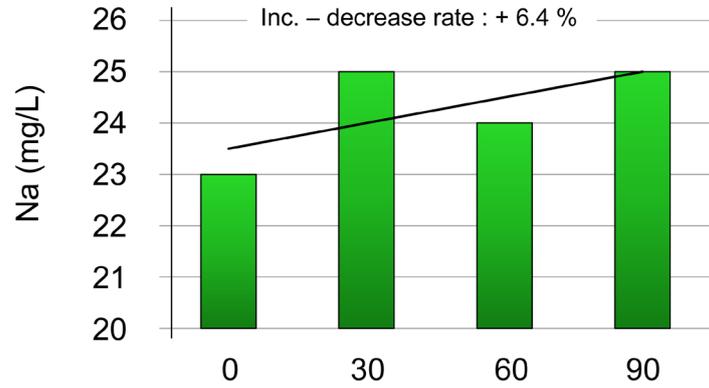
**Figure 11.** Change of Ca after the irradiation times.



Irradiation time of the Schumann frequencies (min.)

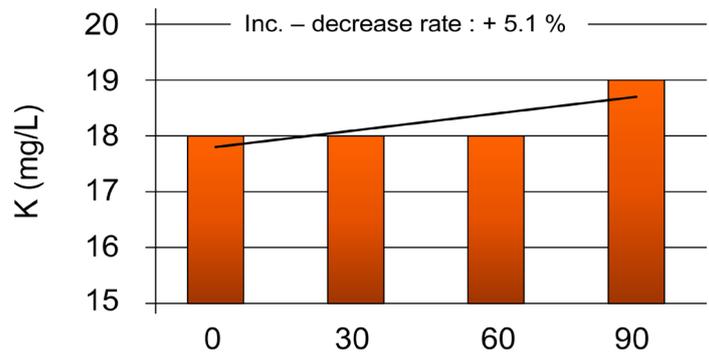
**Figure 12.** Change of Mg after the irradiation times.

quality test kit, pack checker 2 (COD), testing method: oxidation with potassium permanganate in alkalinity and color visual colorimetric method was used as a testing method (See [Figure 24](#)).



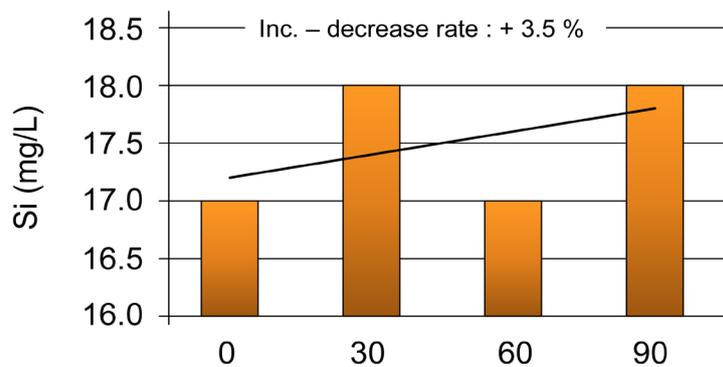
Irradiation time of the Schumann frequencies (min.)

Figure 13. Change of Na after the irradiation times.



Irradiation time of the Schumann frequencies (min.)

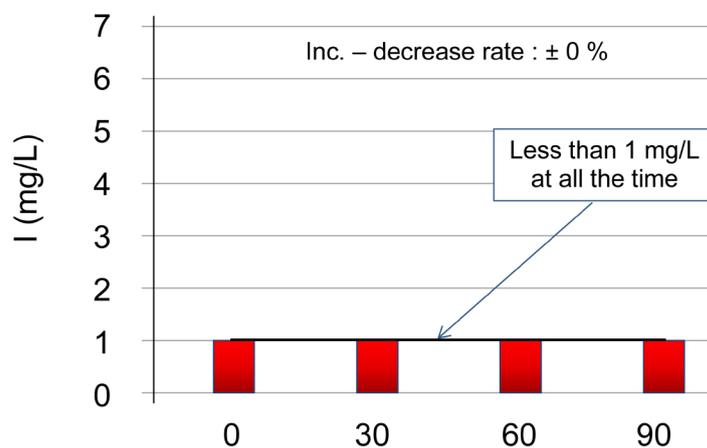
Figure 14. Change of K after the irradiation times.



Irradiation time of the Schumann frequencies (min.)

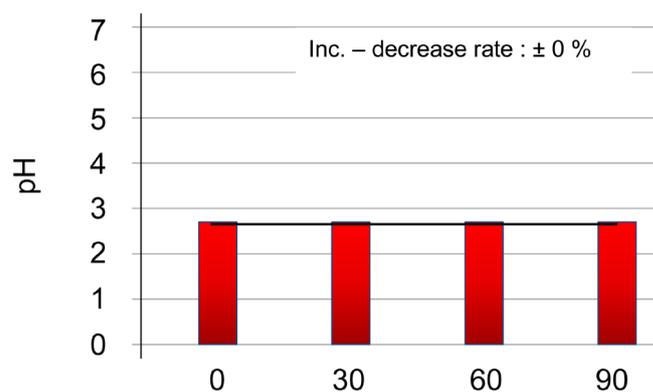
Figure 15. Change of Si after the irradiation times.

Figure 5 shows a metaphorical expression for irradiated frequencies and waves of life [42]. Figure 5(a) is an expression that transformed the Schumann frequencies into the sum (Fourier transformation). And Figure 5(b) is a conceptual diagram of “waves of life” drawn by Shigeo MIKI [43] [44]. MIKI says



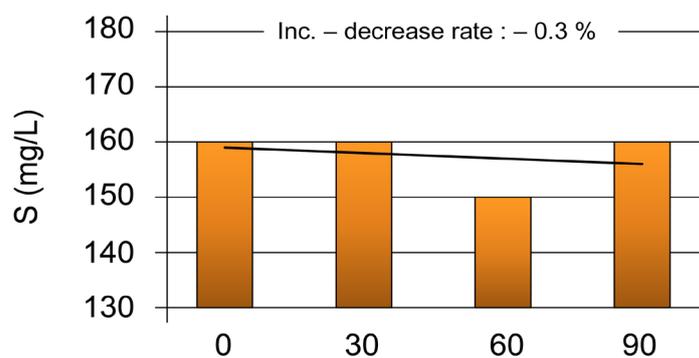
Irradiation time of the Schumann frequencies (min.)

**Figure 16.** Change of I after the irradiation times.



Irradiation time of the Schumann frequencies (min.)

**Figure 17.** Change of pH after the irradiation times.



Irradiation time of the Schumann frequencies (min.)

**Figure 18.** Change of S after the irradiation times.

that there are waves in all biological phenomena, and these phenomena are repeated with slightly different periodicity like ripples on a surface of water.

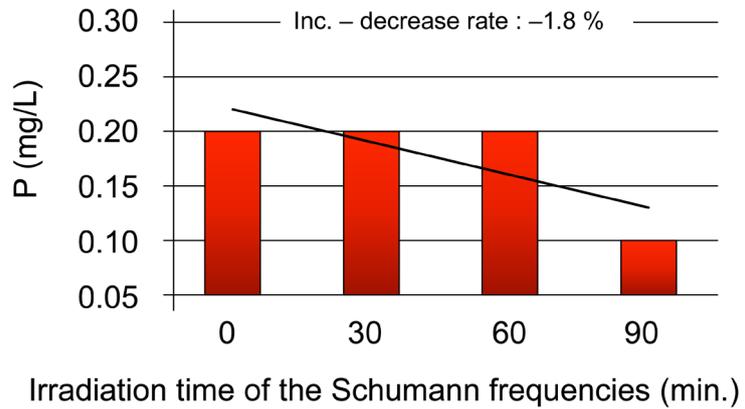


Figure 19. Change of P after the irradiation times.

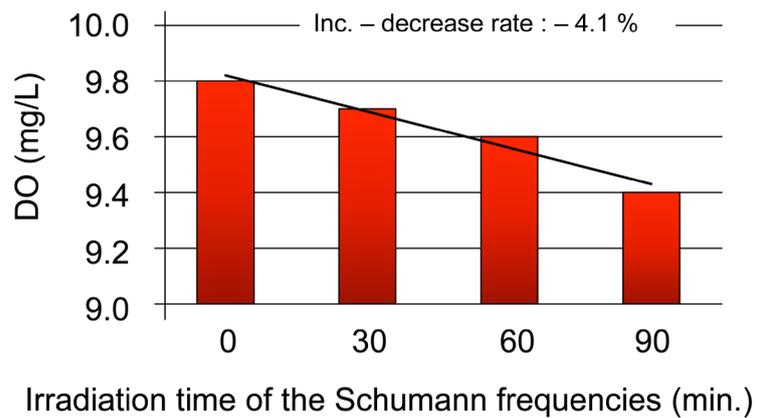


Figure 20. Change of DO after the irradiation times.

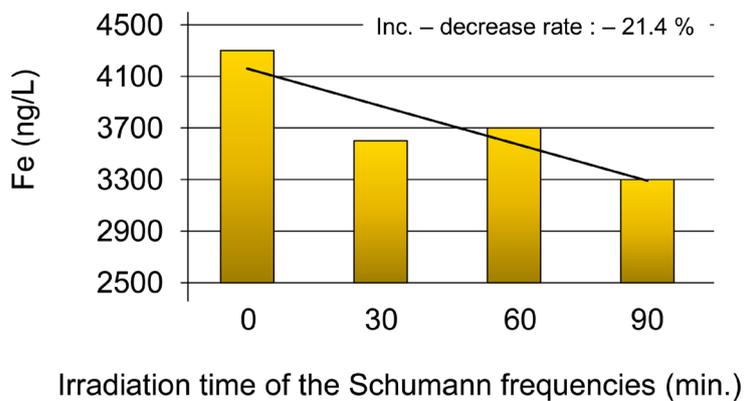


Figure 21. Change of Fe after the irradiation times.

Figures 6-21 are a result we irradiated the Schumann frequencies into the sample water. It is understood from this figures that water quality changes have been seen at all the water quality items except pH and I (<1 mg/L). And each increase-decrease rate at 0 to 90 min. was obtained by a least-square method (Linearization) for all the water quality items. The Inc.-decrease rate was ranked

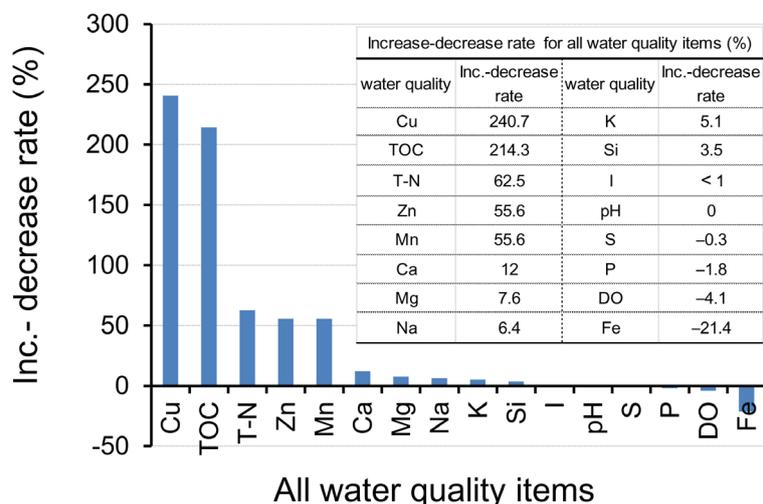


Figure 22. Inc-decrease rate for all water quality items.

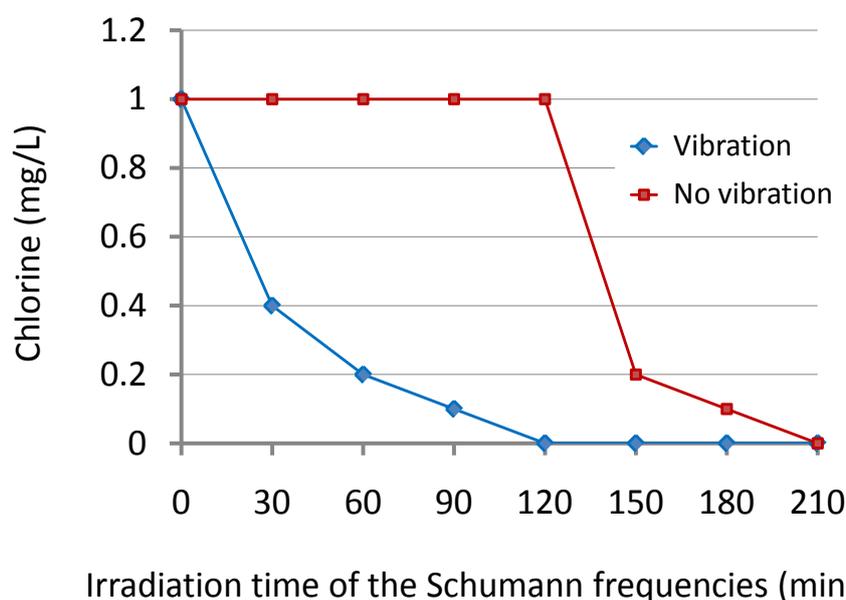
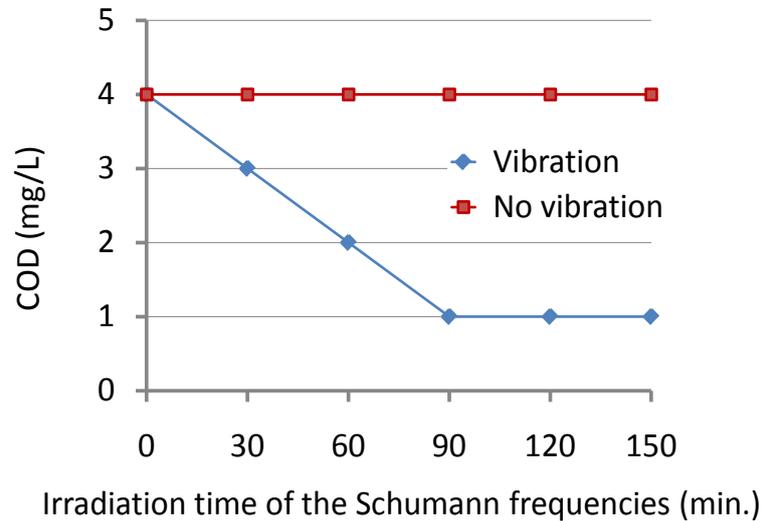


Figure 23. Relationship between Chlorine of tap water and irradiation time (min.).

based on the rates. Figure 22 shows the inc.-decrease rate for all water quality items. The ranking is as follows: Cu → TOC → Zn → Mn → Ca → Mg → Na → K → Si → pH → S → P → DO → Fe. It is understood from the figure that there is a big variation in the rates according to the water quality items. They are classified broadly into five groups. One is the first group. It contains Cu & TOC; the second one, T-N, Zn & Mn; the third one, Ca, Mg, Na & K; the fourth one, Si, I, pH & S; and fifth one, P, DO & Fe. Only the third group consists of the elements (minerals) affecting the inorganic matter out of these, and the other four groups are all part of the elements affecting the inorganic matter and organic contamination/eutrophication. In addition, we conducted a comparative experiment with and without a vibration regarding a chlorine of a tap water. As a result, an



**Figure 24.** Relationship between COD of alkaline ionized water and irradiation time (min.).

obvious difference between them was confirmed (See **Figure 23**). That is, the value decreases with the irradiated time in case of the situation with a vibration, and the value of chlorine becomes zero at the irradiated times of two hours. On the other hand, the value without one was unchanged during the time of two hours. And, after the time of two hours, a natural lowering of the value occurred gradually, and the value became zero at the time of three hours and a half (after the ninety minutes at that time.). In addition, we also conducted a comparative experiment on COD just for reference. As a result, a decrease of the concentration due to the vibration was confirmed in a similar manner as chlorine (See **Figure 24**). The value of the residual chlorine in tap water is defined by the water supply law in Japan; the chlorine more than 0.1 mg/L is required at the level of a faucet. (Minimum residual value; the upper limit is not decided.). This means a complete prevention against bacteria (Complete disinfection). Main countries in the world have the value as an upper limit. For example, 0.05 mg/L in Germany, 0.1 mg/L in France, and 0.5 mg/L in USA. Therefore, it is in general thought that a tap water in Japan might be contained an extremely high chlorine (probably 0.5 - 1.0 mg/L level). The chlorine is a poison, of course. The bacteria are instantly killed by the oxidizing power. And, the chlorine is also well-known as forming a poisonous substance; the chlorine forms trihalomethanes with other chemical substances [45]. The water like this would not be good for the persons who select the life style of health and sustainability (LOHAS).

Then we fundamentally have two choices; 1) To remove the chlorine from a tap water, and 2) To stop using the tap water as a drinking water. Regarding the choices, we could surely have a household water purifier with an activated carbon and a hollow fiber membrane. However, if people involved do not properly maintain it over a long period of time, it would be undesirable. And then, we could buy a commercially available water instead of the tap water as a third

choice. A natural mineral water is one of the mineral waters which is a water without an artificial operation extremely of all four kinds of mineral waters. We are convinced that this is just the mineral water that the people for choosing LOHAS have been searching so far. Anyway, one of the big points for holding the sound life sustainably is to drink a high-quality water. However, it is very difficult for us to secure the high-quality water because of a severe river water pollution due to chemical substances.

At present, the removal of the most dangerous chemicals (invisible) is very hard once contaminated. The electrically polluted chemical substances (Electrical energy) could not be removed by the ordinary methods. If the waterworks bureau could physically get the non-contaminated water using the various kinds of artificial treatments with chemicals, the treated water has become “dead water” which is already far from “living water” like a life of springing fresh.

It is said that even though we could dilute the wastewater ten thousand times with water, the electrical pollutions remain definitely from the viewpoint of the principle of homeopathy too. There is also a view that if we continue to drink the water such as a dead water, an immunity is extremely lowered [46].

Actually, there are a lot of constant users of using a household water purifier and a mineral water in Japan. This situation will directly indicate that mentioned above. Dr. Masukawa I. (fluid mechanist) says as follows regarding the polluted water one time. “It is impossible to remove an electrical pollution which was once memorized (historicized) by the water unless we give a special treatment process.” And then, to give the resuscitation force full of vitality like a water of newborn as well as to remove pollution will be a subject in the future [46].

Under such background, we examined the relationship between sound waves as a resuscitation force (energy) and the water quality change (See **Table 1**). As a result, we got the correlation diagrams shown in **Figures 9-24**. And, the increase-decrease rates at 0 to 90 min. were obtained from the figures (See **Figure 22**). By the way, we throw away an entropy (polluted water) placing on a flow of water in our daily life. Therefore, it is very important to intake a high-quality water day after day. In general, there are four laws on heat energy. The first law of thermodynamics (Energy conservation law) and the second law of thermodynamics (Increasing entropy law) are relating to the experiment in this time. All natural phenomena advance in the direction to increase of entropy. One life only could organize the cell, produce the energy, and build the order among them. That is, one life only builds the order against the increasing entropy. The life throws away an entropy using the high-quality water. The water is incessantly following in the life. This means that just the flowing has supported the life. The life needs the high-quality water to not to stop the flowing. Human kidneys (finely and precisely filtration apparatus) discharge the entropy from the flow of the life. There was a world of difference in the functions between the household water purifier and the kidneys. The structure of the household water purifier has inevitable limitations for necessary of accumulation of wastes and periodic re-

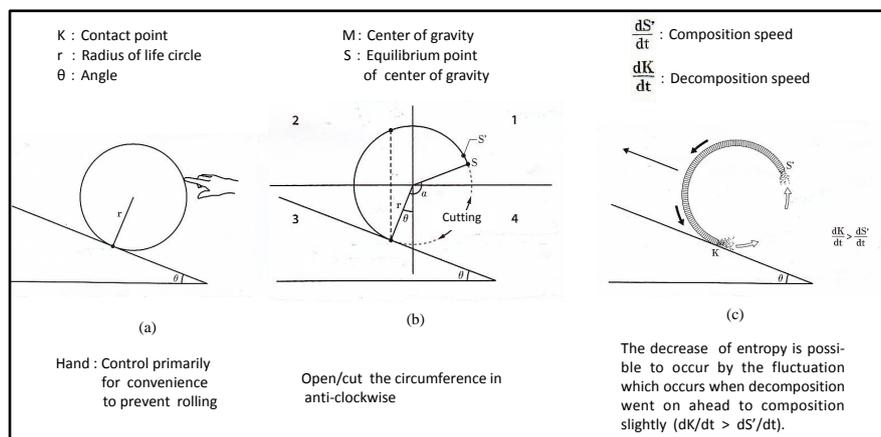
placements (Primitive way). There is no need to be anxious about the accumulation of the wastes (Entropy). Because the kidneys do not have that in the system internals.

The waste blood would first come into the kidneys, and then it is discarded from the kidneys.

After that, nutrients are selectively recollected through the renal tubules. And, the things which could not be recollected are here discharged as a urine. As stated above, we do not discard the water by the urine; we do excrete the entropy (waste matter) by the stream of the water. Therefore, it is extremely important for one's health to intake a high-quality water day after day [30]. In connection with this matter, Dr. K. Nagata says 'a person is a membrane, and the life maintains the homeostasis at the cell level through the "open with closing (Phenomena of two sides of the same coin)" [47]. As mentioned above, the water plays an important role in all the life. However, a large number of people do not realize that they are actually at the center of chronic dehydration (water shortage). Especially, it is said that one of the big causes of throbbing pain etc. is a shortage of high-quality water into human body's internal. In general, it is also said that soft drinks (coffee, tea etc.) and alcohol and so on are a kind of diuretics which brings about the chronic dehydration for the body, and such drinks hardly have an ability (transmission) of excreting the entropy (waste matter) from the body [46]. Therefore, we have to realize/understand the importance of supplying the high-quality water into the body. At the same time, a proper understanding of the entropy (originally, meaningless/insignificant) is essential for the people. That is, we think that the necessity to ask "the meaning" of life existence is very important for the people settling on the subject matter of "high-quality water."

Here, a figure (Bergson's Arc) is introduced regarding the entropy. **Figure 25** shows Bergson's Arc (A mechanism of dynamic equilibrium; a thought experiment). This one was introduced by Dr. S. Fukuoka (Life scientist) [48]. **Figure 25(a)** shows a ring of life written as a circle which indicates the situation placed on the slope. This figure shows a situation in which the circle is climbing the slope. It is considered not to roll down at this point. **Figure 25(b)** shows the circle in which a part of the circumference is cut out in a counter-clockwise to indicate the real state of the cell; the cell constantly repeats creation and annihilation through small tears. As the invisible hand still supports the circle even at this stage, it is considered not to roll down at this point too. **Figure 25(c)** shows a situation of the arc decomposed at one end constantly. When advancing toward a composition speed slightly, an equilibrium balance collapses in a moment, and fluctuations occur toward a direction of the decrease of entropy. As the circle is constantly composed at one end, it is considered that the circle itself has situations such as rotation, consumption, and new life climbing the incline slowly.

Bergson describes a sentence in his book that all our analyses show us, in life, an effort to remount the incline that mater descends [49]. And, although he expresses the word "effort", it would be a representation when viewed from the out



**Figure 25.** Bergson's Arc: a model to consider Dynamic equilibrium viewed from composition and decomposition presented by Dr. S. Fukuoka [48] (A part of original drawing was changed to simplify the explanation of the concept, and added a supplementary one.) (a) Incline with  $\theta^\circ$ ; (b) Cut figure of circumference (Cell opens with it closed.); (c) Life circle climbing back over the incline with composition and decomposition at once.

side (outer world). We might think that it would be "intuition acts" in an expression viewed it from the inside (inner world). That means a climbing act itself which begins to move a-head of consciousness seeking the next point of view constantly. That is, we have to sharpen one's intuition. This means an importance of realization based on the intuition acts. It is said today that it is extremely difficult; to solve the environment. We might be able to think that this could sufficiently not consider the viewpoint (logos of physis) in which the environmental issues exist precisely to "Inner world", not "outer world." If people could realize the view, the viewpoint must be consented to the word "Conversely limited concurrency" in which it is not good just only to objectify our living environment (objectification) so far, and at the same time, we have to make our living environment as is seen from the inside look (cognitive scientific viewpoint) as easy to understand as possible. The order itself (one's life style) to lead the life which opposes the law of increasing entropy is a "realization" in the life based on the Nishida's "intuition acts." "Realization" is an undivided understanding based on experience [21] [22] [23] [24] [25] [48]. At the introduction of this paper, we talked about Umeseo's Gou (Karma) based on the history of the past of environment (One's accumulated tab/something like Gou). There, we introduced Dr. Umeseo's opinion with respect to that, and his solution way for that was just "realization" only. It is thought that to realize something could be equivalent to just a Nishida's "intuition acts" itself. Therefore, as stated above, the logic as a cognitive scientific viewpoint, that is, conversely limited concurrency and absolutely contradictory self-identity are needed for the solution of environmental issues in the future. From this point of view, we realize an importance of having a sense of creating the story on "high-quality drinking water." We are convinced that now is the time to seek this story for humankind in the world. For example, Afghanistan's land has devastated by the aerial bombardment in addition to

large-scale natural disasters (flooding, droughts). However, a medical Dr. Nakamura (Japanese) has at present proceeded with a project which recovers the original rich nature together with the local people becoming central to it. He says “One could live in peace if there is a delicious meal and high quality water” (Intent). A folk story on “water of life” may be created in the near future in Afghanistan [5] [50]-[55]. Based on the permanent secretary of the Swedish Academy, Sara Danius’ argument [53], we think that the Dylan’s prize-winning work (A way of expression through the “SOUND” including voice) means that an event going back to the expression before literature, that is, it is also thought that the one (Evaluation of people’s song and their culture in the world.) which fundamentally lets us rethink the meaning of the literature has been shown through his Nobel Prize Award. From now on we consider that it is very important for humankind to clarify the negotiations of the sense of values concerning nature and environment by humans. We name those negotiations “Dialogue of Environmental Humanities” and will weave “The Story of Drinking Water” in keeping with the facts (both scientific and traditional indigenous knowledge on drinking water) centering on developing countries in the world.

**Figure 26** shows a photograph of the flow of a mountain stream. From a viewpoint, of Nishida’s intuition acts regarding this flow, we could see that a water purification has been made by the function of both the rhythm of water rotation and vibration (natural generation of Möbius loop/strip). By the way, Möbius strip has been used in various fields so far. For example, it has used for cassette for endless tapes and printer ink ribbons etc. in the application to industry [56]. (In this case, the ink ribbon can be thought of as a water filter as an analogical approach). Also, there are examples of the success on composition of organic and inorganic compounds as applications in the chemical field [57] [58]. Furthermore, it is used for a symbol mark of recycling regarding application to art and design [55]. In addition, it is also used for a metaphorical expression as a means of expressing the endless repetition in literary works [59]. It is said that Möbius Strip can be embedded in three-dimensional Euclidean space, and by using parameters such as  $r$ ,  $t$  ( $-1 \leq r \leq 1$ ,  $0 \leq t \leq \pi$ , where  $r$ : radius,  $t$ : time, and  $\pi$ : the ratio of the circumference of a circle to its diameter), it can be expressed as follows.  $x = \cos 2t(r \cos t + 2)$ ,  $y = \sin 2t(r \cos t + 2)$ , and  $z = r \sin t$  [60]. Therefore, it is thought that Möbius strip will act as a go-between for two ways in scientific knowledge: factual knowledge and narrative knowledge.

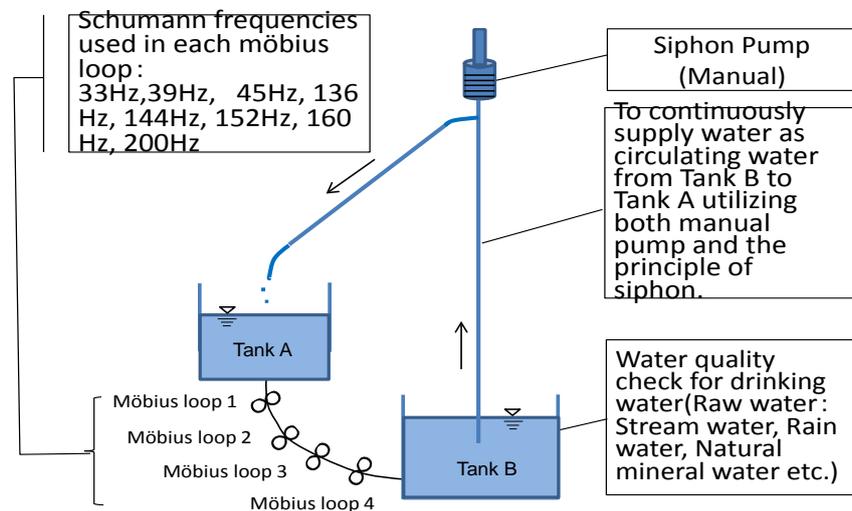
It could be possible that both the composition (Equivalent to decrease of entropy) and decomposition (Equivalent to increase of entropy) of the water molecule have always been occurred at the same time through the “fluctuations” in the stream. At the present stage, we could not clearly explain the mechanism mainly because of the situation of both an improvement of experimental procedure and an insufficient data. However, if people could consent the viewpoint, there would be a strong possibility to secure sustainably a high-quality water by making by a circulating-oriented water purification apparatus with several Möbius loops shown in **Figure 27**.



**Figure 26.** A photograph sample of a murmuring of a stream with Möbius loop.

#### 4. Unthinking Anthropocentrism and Economics

As mentioned above, we have three choices such as 1) a way to remove the chlorine from tap water, 2) a way to stop the use of tap water, and 3) a way to buy a natural mineral water on the market as taking the water into the body. The way 1) is impossible because of a waterworks law in Japan, while the cost is needed to put the way 2) and 3) into practice. Therefore, after all, we fall into the vicious circle as the flow of the current economy (Pursuit of short-sighted profit = ways of simultaneously both achieving economic growth and conserving the environment) as we have to buy the drinking water with money. Then, we think about an unthinking anthropocentrism and an economics in considering the sustainable water conservation in this chapter. First we describe the anthropocentrism vs. human beings = centricity (Humanicism) in considering this [61]. The former is a so-called Humanism as a preceding word. On the other hand, the latter is to lay “the human beings” at the origin of thought absolutely unlike the former. We think that to ask one just a question like this is decisively important in considering sound water environment. Here, we propose a Yuishiki (Consciousness only Buddhist philosophy) (See **Figure 28**) as an origin of thought to capture “the human beings”. Regarding human consciousness, an eminent scholar in anatomy, Prof. Emeritus (University of Tokyo), Dr. Yoro T. mentions that the fundamental causes of modern urban issues including environmental destruction lie in the divergence between “consciousness” (which human beings [creatures] have priority over) and “senses” (which animals [creatures] have priority over) and the divergence has progressed to the pathological stage in his book and sounds an alarm bell on the divergence. In addition, “Bullying” issue is one of the greatest problems worrying peoples in the



**Figure 27.** Schematic of simple circulation purification equipment set up at each home (indoor/outdoor).

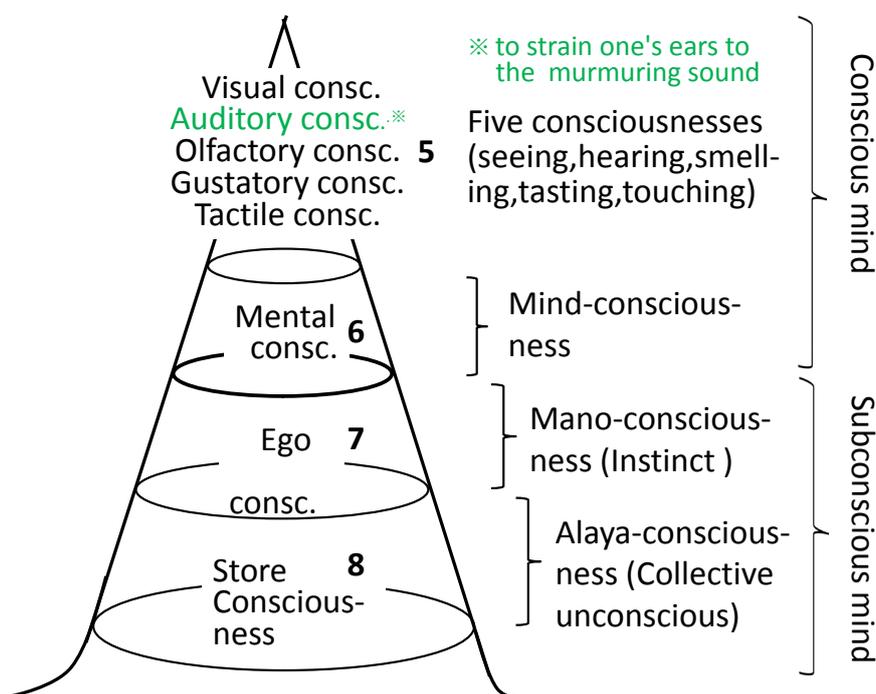
world today. It is thought that there is a close relation between “consciousness” and “senses” in this issue. Regarding this relation, a neuroscientist, Prof. Dr. Nakano N. (Higashi Nippon International University) states in her book that it is difficult to stop the bullying because of an act by “the function” originally provided with human beings, but it is possible to control the function or change the way to approach for the bullying [62] [63] [64].

#### 4.1. To Think “Life”, “Environment”, and “Economics” with a Clue of an Analogical Approach to Realize Water Purification Process [65]-[73]

Economics prioritizes “efficiency” which is involved/hidden value. We think that this efficiency priority society does not fit in with “Life condition”. And, one tends toward the eye to the contribution to economic growth only ignoring the basement as “Nature.” In other words, we could give the meaning to an ideal image of a human being who desires an infinite growth with a weapon as knowledge (six consciousnesses; Mental consc. in the Yuishiki) called economics and sense (five consciousnesses; seeing, hearing, smelling, tasting, touching) which is shared in an indefinite outline based on the competitive spirit (desire/selfish/ego; It is called “seven consciousnesses”, Ego consc. in the Yuishiki).

Therefore, we think we should pay more attention to the “Life condition” to solve the issues that arise in the society mentioned above. Concretely, unthinking the environment and the economy is required based on the “Life” (eight consciousnesses or more) [20] [61].

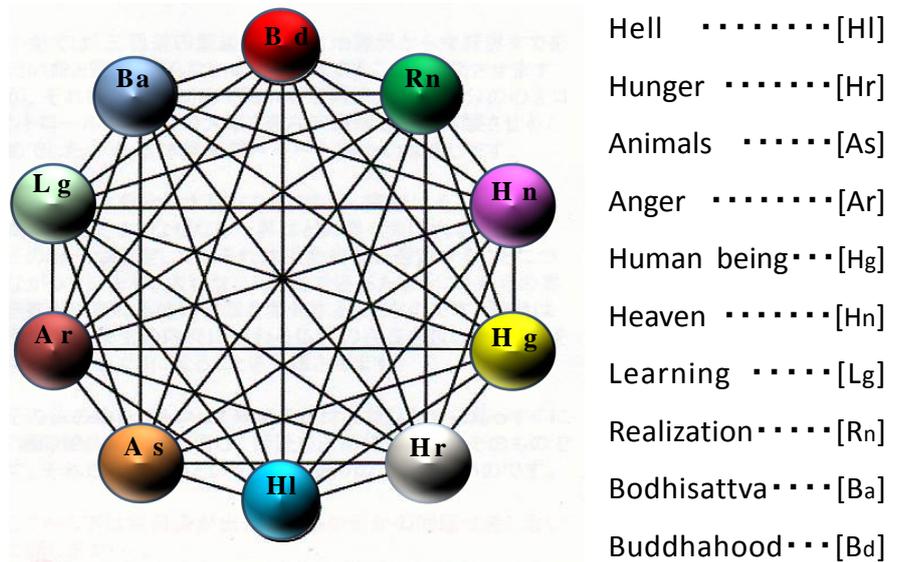
We here take up Yuishiki (Consciousness Only Buddhist Philosophy) as a bluey clue to consider the environment and the economy based on the “Life.” And, we also come into the contact with Jikkaigogu (Mutual Containment of the Ten Realms) and Junyoze (Buddhism Ten Factors of Life) in order to complement it. Here, an analogical approach (metaphorical expression) stated above is



**Figure 28.** Conceptual diagram of the Yuishiki (consciousness-only theory).

applied to realize/understand the water purification process.

Consciousness Only Buddhist Philosophy (Japanese: Yuishiki) is a theory that all existence is subjective and nothing exists outside of the mind). Layer of mind is called 'consciousness' in Buddhism. However, the concept 'consciousness' itself does not exist in the Yuishiki (Consciousness Only Buddhist Philosophy), and it considers everything as Mujo/Muga (uncertainty as something transient and empty). Therefore, it could be possible to say that this is a way of thinking to mediate between Yuibutsuron (Materialism) and Yuishinron (Spiritualism). As is seen in **Figure 28**, the theory consists of the eightfold consciousness. That is to say, first, five types of sensory consciousness (seeing, hearing, smelling, tasting, touching), second, mental consciousness, third, afflicted or ego consciousness (the mind of latent attachment that operates at a deeper level), and then finally, store consciousness; the "basic" or "source mind." And, the mutual possession of the Ten Worlds is a principle formulated by T "ie-t" ai (538-597) on the basis of the Lotus Sutra stating that each of the Ten Worlds possesses the potential for all ten within itself. Here, the life status is as follows from the lowest to the highest. That is, the realms of 1) hell, 2) hungry spirits, 3) animals, 4) asuras, 5) human beings, 6) heavenly beings, 7) voice-hearers, 8) cause-awakened ones, 9) bodhisattvas, and 10) Buddhas. The ten realms share the other nine realms (Jikkaigo-gu, Mutual Containment of the Ten Realms) (**Figure 29**). Furthermore, Junyoze (Buddhism Ten Factors of Life) is a principle of causality which is expounded in the chapter of expedient means of "the Lotus Sutra". Ju (ten factors) refers to a form, nature, embodiment, potency, function, a primary cause, a secondary cause, effect, recompense, and complete fundamental whole.



**Figure 29.** Conceptual diagram of the mutual possession of the Ten Worlds.

## 4.2. Consideration for Human Desires

In the previous Section (4.1), we show the outline of Yuishiki (Consciousness only Buddhist philosophy) etc., and consented that the desire (ego) is positioned as the “seven consciousnesses” in the philosophy. Then, we consider this one in this section.

### 4.2.1. Desire/Ego as an Important Thing Fundamentally for Human Beings

Mr. S. Takeda (Philosopher) has proposed a concept as a “desire correlation” in his book. And there, he describe that the desire is synonymous as the meaning, and that the world is mesh of a net of the desire (meaning). Therefore, he has mentioned that just the desire (meaning) is fundamentally important for human beings in order to live in the world [74]-[79]. That is, we live in the existential world which the desire of ourselves has braided. However, the mesh of a net is just only dissipated sometimes, and there may not have a central point. Then, where to place of the central point of the desire is to the point. Dr. Tomano I. (Philosopher) has been proposed regarding this. That is, it is neither “to decrease the desire” nor “to increase the desire”, it is “to change the desire” as the third choice [80]. As he pointed out, we think that “to change the desire” is extremely important in solving the environmental issues.

### 4.2.2. Giving a Significance of Desire/Ego Based on Consciousness-Only Theory

As mentioned above, we think that it is important how do we mean the desire (seven consciousnesses) which is fundamentally placed importance in considering the “unthinking anthropocentrism.” It means that we have to contribute the raise to the true level which means a formation of the mountain stacked with the sense of satisfaction regarding the desire level [81] [82] [83] [84]. In general, we

think that various kinds of environmental research have been conducted under a way of thinking simultaneously achieving both to achieve economic growth and to conserve the environment. However, we focus on the opposite stance, that is, incompatible one from the viewpoint of sustainable water resource conservation in this study. This is because we keep in mind for aiming for the realization of “cost = benefit” (changing the direction of desire) in our socio-economic systems obeying the rule of the framework as “economics = fundamental duties of governing a nation and providing relief to people”. That is, stance(1); the object as “environment” is a site which makes economy grow in this framework, and to create and maximize the economic value (market value of a corporation) is an important purpose in this site. Here, we aim at maximizing the returns by utilizing the environment on the pretext of conserving the environment with cost for getting a profit at the short time in the firm. On the other hands, stance (2); “the environment” will change the boundary line according to an eye on the economy in the concept in which the environment = boundary line will change depending on the purpose.

Therefore, we do not have a way of thinking in which the environment is a site of growing the economy. It is a site of projecting the economic activities (including desire itself) involving human regardless of the economic growth. There, we do not use the concept of costing something at the short time. Instead of such a viewpoint, we should place importance on the way of thinking that we put continuously a constant cost for the social benefit in the long, long time. Therefore, if we grasp the object as “environment” the concept as “site”, the way of thinking such as a simultaneously both achieving economic growth and conserving the environment aims at maximizing the returns by utilizing the environment. And then, a possibility of staying the short-sighted pursuit of profit increases. In this way, the way of thinking as environmental conservation is going to disappear naturally. However, in the environmental site, the way of thinking of putting continuously a constant cost for the social benefit in the long, long time prioritizes the understanding of the chance of value creation in the medium-to-long term. We here obtain the profit (true socio-economic value, satisfaction of the people) for the first time. Therefore, a way of thinking that we do not simultaneously both achieve economic growth and conserve the environment can instead realize the “cost = benefit” in our socio-economic society (stance (2)) obeying the rule of the framework as “economics = fundamental duties of governing a nation and providing relief to people” (stance (1)). Accordingly, when viewing from the stance (2) regarding the flow mentioned above, it is very important that how we do sustainably secure a “high-quality water” as a drinking water comparable to the natural mineral water in a current natural environment. Then, we think that the way of thinking as put continuously a constant cost for the social benefit in the long, long time is here utilized in the environmental site proposed. That is, we think that the benefit (true socio-economic value, satisfaction of the people) is obtained by capturing preferentially the site

as environment the chance in which we could create the value in the medium-to long-term. We think that to secure the “high-quality water” becomes a proof of creation of the benefit in which we could realize by just putting continuously a constant cost for the social benefit in the long, long time in the environmental site. And, hereby, we could have spurred a proposal of a right in which we could drink a “high-quality water” almost free of charge by managing the water quality in the reservoir and an embodiment of creating mechanisms (keywords: visualization, realization and circulation of connection) on the involvement to community for managing the water area to obtain the right [1]. In addition, what is needed here is not interests (seven consciousness). The altruism which obtains in one’s relations to others (eight consciousnesses or more) is needed as a basis of value. So this is familiar with Yuishiki (Consciousness only Buddhist philosophy).

#### **4.2.3. View of Nature and Economic Thought in the East (India, China and Japan)**

Global environmental issues that our world is facing today have mainly resulted from economic activities. Needless to say, they are very involved with the culture behind the act, especially the economic thought. It is necessary to go back to the economic thought for the fundamental solution in regards to the serious situations such as global warming and environmental pollution. The solution way based on the technological approach is the so-called measures with patches over each problem temporarily when it arose. No matter what, if we could not find the direction of constitutional improvement, it is not too much to say that there is nothing about the following century for humankind.

In this article, therefore, first we outline the view of nature and the thought for economic activities preached in the Lotus Sutra that is one of the most representative thoughts of India where Shakamuni Buddha was born and spread his holy teachings. And this thought has been conveyed to China. Then second we take up a great Chinese book “Guanzi” written by Guan Zhong (First Chinese Legalist and State Philosopher, 6<sup>th</sup>-7<sup>th</sup> centuries B.C.), and approach a word “倉廩實則知禮節、衣食足則知榮辱 (Meat and cloth make the man. Well fed, well bred.)” to understand the Chinese cultural background against which the Lotus Sutra has been developed in their lives. And finally we look to economic philosophy of Nichiren (1222-82) who lived in the 13th century in Japan as a typical Japanese thought. (This century can be also regarded as the turning point not only in the East Asia, but also in the whole world in the human history. And we show that it is possible to find important hints to a solution of the environmental issue from what we stated here.

##### **1) View of Nature and Economic Thought in the Lotus Sutra**

It is said that Shakamuni Buddha preached huge quantities of Buddhist scriptures, but summarized points that he wants to say have been preached in the Lotus Sutra. The view of nature with the spectacular view of the universe for a background contains highly suggestive content, and Shakamuni Buddha

preached that all living things are great existences with dignity and equality because of underlying “Buddha-nature.” Therefore, Sanso-nimoku no-tatōe (a parable of the three kinds of medical herbs and two kinds of trees) is described in Yakusoyu-hon (Chapter 5; the parable of the Medical Herbs). In this parable, the principle that all countries and societies have been developing with keeping harmony is symbolically preached. The parable is as follows [85].

“It is like the plants and trees, thickets and groves, and the medicinal herbs, widely ranging in variety, each with its own name and hue, that grow in the hills and streams, the valleys and different soils of major world system. Dense clouds spread over them, covering the entire major world system and in one moment saturating it all. (omitted below) This is not just a parable. That is to say, the view of life with a deep and penetrating mind is expressed here. It suggests that although all plants seem to be independent, they enjoy the blessings of rains from the sky, keep a consistency and have a good relationship with one another. It is thought that this also expresses a Buddhist view of nature that there is a power creating the harmony with nature in the ground potentially. No matter what happens, the resilience (power which produces harmony with nature) is involved in the ground. The appearance of the revitalization after Hiroshima and Nagasaki in Japan took a huge and terrible disaster would be providing this power of resilience.

Next, similarly there is a following passage in Hosshi-kudoku-hon (Chapter 19; Benefits of the Teacher of the Law). The word “資生業等 皆順正法 (Shi Shou no Gou tou wo token mo Mina Shouhou ni Jyunzen) (No worldly affairs of life or work are ever contrary to the true reality)” is in this passage as described below [86].

“Although they have not yet acquired the wisdom of no outflows, the purity of their minds will be such that the thoughts they speak, will in all cases represent the Law of the Buddha, Never departing from the truth, and will also conform with what was preached in the sutras of former buddhas.”

It preaches that 資生業 (Shi Shou Gou) indicates economic activities to make a living, and the ways of the true reality including all things making a living are the teachings of Buddhism. And the Buddhism was introduced to China around the second century A.D., and it has progressed and developed more and more in Chinese culture. In China, a person who most deeply, precisely and systematically grasped the Buddhism centering Lotus Sutra and developed it in the Chinese style is Tien-tai (537-597). He comments on the word as “資生業等 皆順正法” in this chapter, and he describes it “世間資生產業 皆順正法” [87].

That is to say, he mentions that the production activities themselves made by people who are involved with various kinds of industries in the real society are all none other than the practice of the true reality.

## 2) Economic Thought in Guanzi

“Guanzi (管子)” written by Guan Zhong (管仲) (Spring and Autumn period of Chinese history, ?-645 B.C.) is considered valuable historical material to con-

vey his thought and economic view. It contains valuable historical records here. Particularly famous and well-known passage in this regard is “倉廩實則知禮節，衣食足則知榮辱 (Sourin Michite Reisetsu wo Shiri, Ishoku Tarite Eijyoku wo Shiru) (Meat and cloth makes the man. Well fed, well bred)”. This article could also be interpreted as follows: If people have enough food supply stored in granaries, they will pay attention to etiquettes. If people are not short of food and cloth, they will lay stress on the sense of honor and shame [88]. He encourages people’s economic activities produced to make their own profit while underlying the agriculture as a base of the economy.

However, it has been said from the Confucianism which emphasizes a feudalistic order that the contents preached in the “Guanzi (管子)” are second-rate ideas which accept human desire, and also that is an apocryphal book which was established in the Warring States Period (475BC-221BC).

Nevertheless, it has been found that the very important information which is to be known only by people who lived in Spring and Autumn period had been included in this book because a lot of mokkan (long and narrow wood plates written with a brush) at a period of Qin Shi Huang (259-210 BCE) were excavated in the second half of the 20th century [89]. As the Confucianism pays little attention to the money-making economic activities, that though was thoroughly denounced since the founding of New China in mid-19th century. And the development of Capitalism in China has been resulted in the serious situation such as PM2.5 today. Everyone recognizes such a situation these days.

Then, it is generally believed that the “Guanzi (管子)” in which the positive attitude toward the economic activities including the trade with other nations was recommended had a problem and the Confucianism was correct, but that belief is not always correct. It could be regarded and positioned that a moderate capitalism centering on the agriculture was recommended in the “Guanzi (管子)”, while a teaching placing too much emphasis on “the place” of the class system was the Confucianism. Apart from the teachings of Confucius (孔子) who is looked up to as the father of Confucianism, this principle adopted as the ideology of the nation in the age of the Han dynasty in China was a top-down manner, so to speak, a manner with the importance on the order from the top. Accordingly, it would be certain from the side of ordinary people that they will be forced to bear patience and sacrifice. In a sense, the order of a vertically-structured society was emphasized.

The basis of Chinese culture on which “Guanzi (管子)” has ever been written is rich in diversity. Especially the region to the south of the Huai River (淮河) has produced a flexible mindset like the philosophy of Laozi and Zhuangzi too. It can be said that such a cultural basis aspires to an equal society which focuses on the horizontal relation satisfied with freedom and flexibility. It is certain that Buddhist thought symbolized in Sanso-nimoku-no-tatōe (parable of the three kinds of medical herbs and two kinds of trees) has had a strong affinity for such a cultural basis. It is also not a coincidence that Buddhist thought has been

widely spread through this region first of all at around the second century B.C. Tien-tai (537-597) mentioned above was also a king's family of Southern Dynasty Chen (南朝陳王朝) during the period of the Northern and Southern Dynasties (439-589) in China. This is how philosophically systematized Buddhist thought was conveyed to Japan around the sixth century and has eventually developed into the people's Buddhism in the Kamakura period.

### 3) Nichiren's Economic Philosophy

Nichiren (Japanese) was born in the Kamakura period (1185-1333 CE) in Japan. 700 years have passed since Chinese T "ien-t" ai (537-597). In mainland China, Mongolia established the Yüan dynasty in the period, and expanded with an extraordinary rate. It was just a time of turning point that under this situation, there were conflicts between the East and the West for the first time in human history.

Taking this opportunity, this occurrence helped the both camps have better communication with each other. The conflicts between Japan which is located in the eastern end of Asia and Yuan (元) were unavoidable trends of the history too. Nichiren examined the Buddhist literature closely with staring into the flow of the time. He gave a notice through "Rissho Ankoku Ron (On establishing the correct teaching for the peace of the land)" in which "Takoku Shinpitsu (Invasion from foreign lands)" that is preached in his teachings will be occurred as an actual calamity in the near future, and handed in it to Kamakura shogunate in the Kamakura period (1185-1333 CE). Buddhism at that time became a matter of formality as a religion for the protection of the nation. Buddhists set apart from people's heart, and lapsed into corruption such as a magico-ceremonial one which was quite different from Shakamuni Buddha (Founder of Buddhism) self-centered teachings. Then, he has developed the people's Buddhism which went back to the starting point of the founder while being persecuted by the former Buddhism power which supported the Shogunate from behind. He was definitely not obsequious to power, and his activities were supported his activities by the people's memorial services. He sincerely praised believers who donated rice by saying "Hakumai wa Hakumai ni arazu Inochi nari (Rice is not just rice, it is life)." And, he also cheered believers on by saying, "Onmiyazukai wo Hokekyo to Oboshimese (Regard your service to your lord as the practice of the Lotus Sutra)" for bushi, Japanese samurai who protected his lord at the risk of his own life. In addition, he preached that interacting with all of one's daily productions mixing up with people and the society was a practice of the faith in itself. He furthermore preached the passage "Kura no Zai yori mo Mi no Zai, Mi no Zai yori mo Kokoro no Zai Dai ichi nari (More valuable than treasures in a storehouse are the treasures of the body, and the treasures of the heart are the most valuable of all)" [90]. Therefore, he demonstrated that all the productions and socialactivities must be the target to keep trying many treasures of the body.

Such Nichiren's behaviors were backed by Buddhist enlightenment. In 1272,

he wrote “Kaimoku sho (The Opening of the Eyes)” at Sado Island (Japan) where he was sent into exile because of the persecution of the power authority side. In this book, he describes as below: “Ware Nihon no Hashira to naran, Ware Nihon no Ganmoku to naran, Ware Nihon no Taisen to naran to Chikashi Negai Yaburu bekarazu (I will be the pillar of Japan. I will be the eyes of Japan. I will be the great ship of Japan. This is my vow, and I will never forsake it!” [91] In addition to that, he took over T “ien-t” ai’s philosophy, and preached the passage “一身一念遍於法界 (Miao-lo; Chinese, 711-782); Isshin Ichinen Houkai ni amaneshi (Power of human mind <一念: faith> reaches to the entire universe <法界: universe>”, which means that the workings of one person’s mind and behaviors have a great effect up to the universe. The Great Teacher Miao-lo says in the book: “You should understand that one’s life and its environment at a single moment encompass the three thousand realms. Therefore, when one attains the Buddha way, one puts oneself in accord with this fundamental principle, and one’s body and mind at a single moment pervade the entire realm of phenomena [92]. Such his mind is not just a spiritualism. It must have been a thought backed with deep philosophical beliefs or a spiritual enlightenment. If so, we think that a numerical verification is possible in some form or other. Although the experiment is a “modest first step”, we (first author-led) will conduct the experiment this time under the background mentioned above.

It is therefore thought from the experiment that we could at least show a part of existence of possibility on water purification (resilience) in the water itself. That means that the resilience (recovery power) is a function itself of “妙 (Myo) (This term means wonderful and beyond ordinary understanding ; Openness, Completeness & Harmony, Resuscitation)” as he says [93]. It would be proving the hypothesis that the resilience (recovery power) is working as a function (power) to change the situation of water qualities including the pollution to the true reality in phenomenal worlds. If it is true, that would be connected to the following fact that the intelligence which is restored the distortion of the present society developing under the law to its original state is also immanent in human nature with Buddha nature.

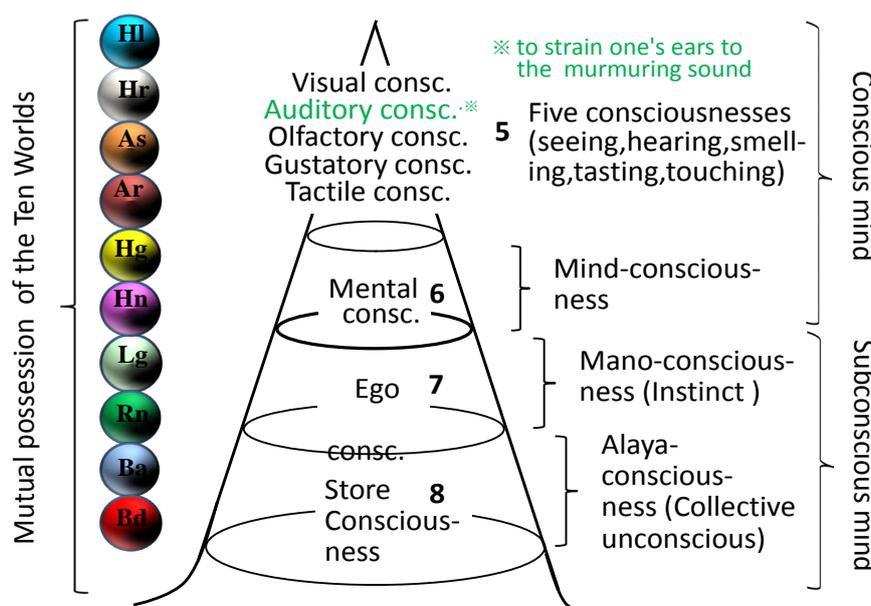
We think that the keywords are life, environment, and economics to sustain the sound water environment, i.e. sustainable water resource conservation. In doing so, it is thought that we will practically be able to approach to the sustained conservation of water resource area through a better understanding of the relationship between sound waves and water quality change. In this chapter, a water purification process using the murmuring sound is considered by an analogical approach (metaphorical expression) based on the Yuishiki (Consciousness Only Buddhist Philosophy) and Jikkaigogu (Mutual cotainment of the ten realms).

**Figure 29** shows an example of existence in nine life-tendencies centering a life-tendency. It is important which life-tendency we set up as a fundamental one. Each status (1) Hell-10) Buddhahood) is shown like a chemical symbol for

an element, being the acronym of the status of the ten worlds. It is ideally said that the highest life status is 10) Buddhas as a fundamental one in the theory. Here, all the water qualities in array as a metaphorical expression. **Figure 30** shows a conceptual diagram of Yuishiki (consciousness-only theory) with mutual possession of the Ten Worlds in array. We here set up that the highest status in water quality is Bd (Cu/TOC), and the lowest one, Hl (Fe) in array, respectively. Through the figure, we could see the water purification process as a flow with the name Eight consciousnesses (Store consc., Altruistic heart/Wisdom) or more (Conscience/Jocho (not “emotion” in English but something else that is difficult or impossible to translate into English. Therefore, we have no choice but to be aware of jocho during one’s stay in Japan)) → Seven consciousness (Ego consc.) → Six consciousness (Mental consc.) → Five consciousness (seeing, hearing, smelling, tasting, touching) [71]. It could be consented from the consideration mentioned above that a realization to the change of water quality by the murmuring sound and an importance to have a look to a sense of wonder for the nature to sustain the sound water environment, *i.e.*, sustainable water resource conservation [94] [95] [96] [97].

### 5. Ten Worlds Layout with Inc.—Decrease Rate for All Water Quality Items and Conceptual Diagram on Sea Wave through Junyoze (Buddhism Ten Factors of Life) [62] [65] [98] [99]

In the previous chapter 4, we described the need of way of unthinking the environment and economics based on the “life” focusing more on the “life condition” to see it and Yuishiki (consciousness-only theory) with Jikkaigogu (mutual



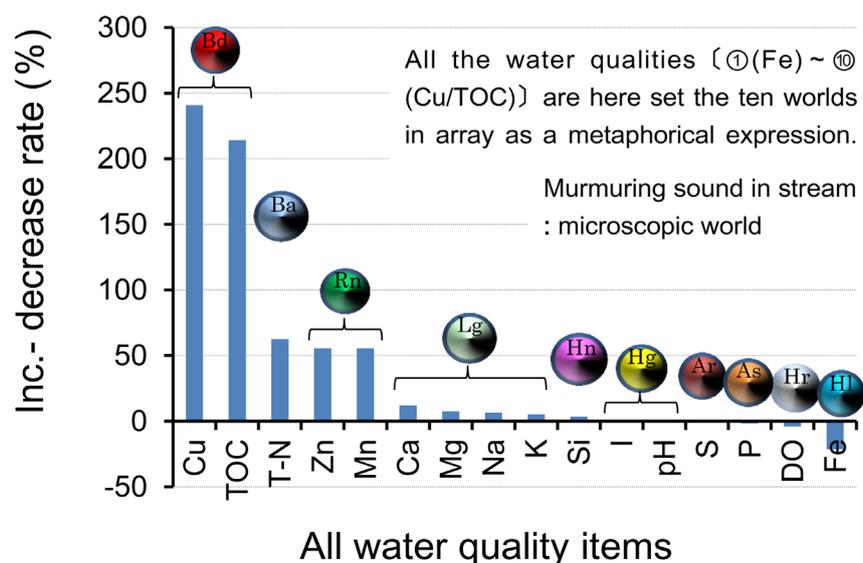
**Figure 30.** Conceptual diagram of the Yuishiki (consciousness-only theory) and the mutual possession of the ten worlds.

containment of the ten realms) as a proper way to obtain a clue. In this chapter 5, we first see a relation between increase decrease rate for all water quality items and the ten worlds layout, and next we describe a conceptual diagram among energy, ocean and sea wave through Junyoze (Buddhism Ten Factors of Life) based on the theory mentioned above. **Figure 31** shows increase-decrease rate for all water quality items and the ten worlds layout. It is understood from the figure that increase-decrease rate for all water quality items and all the water qualities (1) Fe-10) Cu/TOC) are well set the ten worlds in array as a metaphorical expression. **Figure 32** shows a conceptual diagram regarding a relation between water and sea wave in nature through Junyoze (Buddhism Ten Factors of Life). It is understood from the figure that we first realize the existence of “en” (condition; indirect cause) as an energy(vibration), and the “en” affects the “in” (cause; direct cause), and finally the “in” results in “ka” (effect; causal situation) as an unification of “en” and “in”. That is, we realize an occurrence of each one of wave (life) as a result through “en” and “in”.

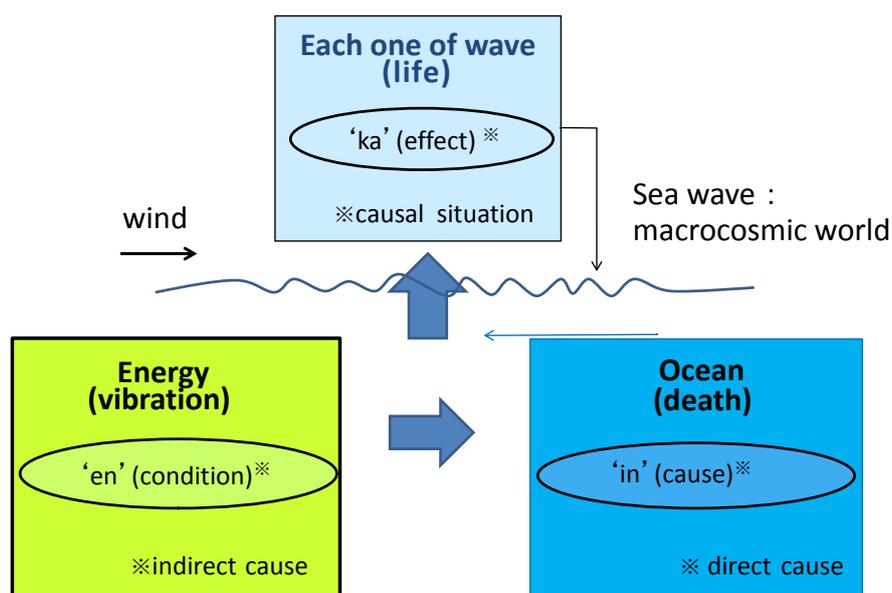
## 6. Conclusions

In this paper, we have conducted a consideration on how the ensure system of high quality water sustainably and soundly is essential for a sustainable water resource conservation by asking the meaning deeply. The results obtained are as follows:

1) All the water qualities affecting the inorganic matter, organic contamination and eutrophication except pH and Iodine have changed by irradiating the Schumann frequencies which have low wave energy as is seen the murmuring sounds at the upper reach of the mountain stream. And, a classification of the water quality items was tried based on the increase-decrease rate of the water qualities.



**Figure 31.** Increase-decrease rate for all water quality items and the ten worlds layout.



**Figure 32.** A relation between water and sea wave in nature (conceptual diagram) and the principle of causality in Buddhism as a metaphorical expression.

2) It was understood that it was important to ask the meaning of 1) First law of thermodynamics (law of the conservation of energy), 2) Second law of thermodynamics (law of entropy increase) and 3) Fluctuation through the experiment to ensure the high quality water. That is, as for 1), a metaphorical comparison (“en” [Vibration energy  $\leftrightarrow$  Karma energy], “in” [Ten Water qualities  $\leftrightarrow$  Ten Factors of Life], “ka” [Water purification  $\leftrightarrow$  Life purification]) between the water quality change and Junyozu (Buddhism ten factors of life) was conducted from the water quality change by irradiating the energy (vibration including the fluctuation). And, it is realized through the metaphoric comparison that “en” is the most important one of the three factors. That is, the first priority is “en” followed in order by “in” and “ka”. As for 2) in thinking about drinking water, a positive entropy means to remove the dirt in water, while a negative one, to supply the high quality water, respectively. In terms of the metaphoric comparison between the water quality changes and the entropies, the positive entropy (some kind of water quality change), meanwhile, was just a negative entropy (one new water quality change). We consider that a prehension by the concept as Jikkaigogu (mutual containment of the ten realms) and Nishida Kitaro’s logic of zettai mujun no jiko doitsu (absolutely contradictory self-identity) is useful to understand this. As for 3) the fluctuation, the supply of the energy and discarding the entropy continuously is the essential requisites to ensure a sound life at the same time. A supply of the high quality water is essential for that. Therefore, irradiating the appropriate wave energy (vibration including the fluctuation) into the water is a key point to get the high quality water. It is thought that the water flow itself at the upper reach in the mountain stream may have played two important roles such as entropy disposal (rhythm of water rotation) and supply

of the fluctuation of energy (vibration) at the same time.

3) It is difficult to stop the desire because of an act by “the function” originally provided with human beings, but it is possible to control the function or change the way to approach for the desire. In regards to this point, we support a positive view on the human desire. Looking at the flow mentioned above from the standpoint of the stance as simultaneously not achieving both economic growth and conserving the environment, the ensure system of high quality water could be realized by just putting continuously a constant cost to the environmental site for the social benefit in the long-long time. We think that this would just become a proof of creation of benefit (changing the direction of desire). And by this, implementing the management for watershed and water quality will spur both an advocacy of the right in which we can drink the high quality water mostly free of charge and a promotion to develop a concrete mechanism for connecting to a watershed community to obtain the right. At that time, what is needed here is not an interest (seven consciousnesses [ego consc.]), an altruism (eight consciousnesses [altruistic heart/wisdom]) which are produced in one’s relations to others is needed as the basis of value. Then, this is easy to be familiar with Yui-shiki (Consciousness only Buddhist philosophy) we proposed.

4) It is thought from the experiment that we could at least show a part of existence of possibility on water purification (resilience) in the water itself. That means that the resilience (recovery power) is a function itself of “妙 (Myo) (Openness, Completeness & Harmony, Resuscitation).” It would be proving the hypothesis that the resilience (recovery power) is working as a function (power) to change the situation of water qualities including the pollution to the true reality in phenomenal worlds. If it is true, that would be connected to the following fact that the intelligence which is restored the distortion of the present society developing under the law to its original state is also immanent in human nature with Buddha nature.

5) It is absolutely necessary to continue taking a high quality water as a drinking water to maintain soundly human life. The drinking water is just a life of human beings. The flow at the upper reach in the mountain stream in nature is full of the fluctuation. We could realize the importance to realize the meaning for meaningless things such as the fluctuation and the entropy in ordinary situation through the experiment. Therefore, it is fundamentally essential to deepen realization (Sense of wonder) for nature to solve environmental problems.

## 7. Further Perspective

This time a clarification on the mechanism of the change of water quality (an interpretation of the phenomenon due to chemical reaction) is a big issue for future consideration for the reasons; 1) there is still great room for improvement in this experimental method and 2) the data including a possibility of element transmutation are still insufficient and so on. In addition, the research on the relationship between sound and water quality purification using Möbius wave

producing device will be an important subject in the near future.

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