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**Prof Dr Timi Ecimovic and Prof Emeritus DDr Matjaz
Mulej**

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In 2002 major event was the UN World Conference “10 years after Rio” which took place in Johannesburg, South Africa. During the UN conference we have lost close friend and colleague late Prof Dr Rashmi Mayur who suffered brain attack and later on we have lost him. He was co-author with us on the Noble price nomination book “System Thinking and Climate Change System (Against a big “Tragedy of Commons” of all of us”), Ecimovic, Mayur, Mulej and others, soft cover, paper and CD, 303 pages book, ISBN 961-236-380-3, 2002. The nomination was for 2003 – Climate Change System – Ecimovic.

Climate Change System

By

Dr. Timi Ecimovic

The Climate Change System is presentation prepared for ANSTED University Convocation Ceremony, Kuala Lumpur, Malaysia, 31. October 2002.

The author Dr Timi Ecimovic is Head of SEM Institute for Climate Change, an independent, non-profit, non-governmental, scientific, research and applied research institute, Korte 124., SI - 6310 Izola – Isola, Slovenia, e – mail: timi.ecimovic@bocosoft.com and home page: www.institut-climatechange.si

Statement:

The climate change system as an integral part of the biosphere and nature of the planet Earth and at present level is causing more damage in property and lives of our civilization achievements within 12 months, as is budget of large country amongst G 7 countries. In future we may expect upward trend of damages.

From the natural sciences viewpoint the climate change system alias the climate, the climate change – is set, system, or complex entity of conditions within the living space of the biosphere. Actually the living space is the biosphere itself, which is a tiny part of the Earth planetary system. Watching the climate and taking it into consideration when humans have been making their decisions – these have been two separated issues, especially in the recent centuries in which industrial life has been taking the lead and has caused a narrow professional specialization to reign and prevail.

There are two main sources of the climate change: the natural ones and the ones caused by humans. We humans should understand both of them in order to accept the natural ones and to possibly prevent their tough impact over ourselves, such as floods, droughts, and atmosphere and water pollution etc. But we should better understand and cope with our own tough impacts and prevent them, too.

The systems (as complex entities rather than mental pictures of them) could be formally set according to their size as follows:

MACRO, MEGA, SUPERIOR, SENIOR, VERY BIG etc., SYSTEMS like The Universe the biggest system known to humans, The Milky Way, The Solar System, the planet Earth System etc., and



MICRO, INFERIOR, JUNIOR, Sub etc., SYSTEMS that are smaller and are either natural such as Homo sapiens, plant, animal, living creature system, and or artificial or human made systems such as township, car, aircraft, rocket etc.

Of course, the above artificial and natural systems make a needed differentiation due to natural sciences and social sciences, which do not include all human activities as an integral part of the nature. We think there are not artificial and natural systems, but all are natural as long as they are results of living creature's activity. But we know it has to take a long time for many to understand such a philosophy. For the time being let us use the terms artificial and natural systems.

The system theory, thinking, analysis, and synthesis are best available assistants today for humans to understand complex problems, which both the macro and micro systems are. There is not a simple system, and there is not a system we may say that humans know everything about. This could be stated only when using system theory thinking, and this could make difference between today scientific thinking and tomorrow's.

The challenges to us humans today are much more complex as ever before, because we have reached a sort of a peak of our ability to understand the present time. The proof for this is our relationship with nature, space and environment, which is going to become unfriendly to humans, and not a good friend, as it should be. Our civilization's anthropocentric philosophy, its present social order, its religious approaches, and governances, money-based democracies, local, national, international, and United Nations bureaucracies, totalitarian rulers, lack of tolerance amongst different peoples of the Earth, from antique till today times policies: divided and rule, bread and games, ruling by information, are organizational techniques, which need restructuring/transition, and new approach for a better tomorrow. Whether our civilization will have a better tomorrow or not is a question, which we better answer before it will happen. We think optimistically, and tomorrow will bring to our civilization understanding of nature, space and environment, climate change system, cosmos and other systems; as a result this will open large doors to sustainable future for all of humans living on the planet Earth.

The current understanding of the climate change is limited by anthropocentric and other issues, which is not a case, when using system theory, thinking, analysis and synthesis, which could make us better understand the interdependences, interactions, co-operation, and mono, multi, interdisciplinary and supradisciplinary issues, all of them as an integral part of the inferior and superior systems, within the system of the planet Earth, and further the solar system, the Milky Way and the Universe.

The Nature does not repeat itself it always goes in only one direction - dynamic forward.

We humans with all our beliefs, religions, natural, social and technical achievements, technologies, techniques, governances, local communities, families and relationships, sooner or later think we are Gods, which have to rule nature, space and environment of the biosphere. When it comes to the point of joint action, "mutual interest" and our civilization survival, many excuses are handy such as national interest/national security/national citizen's well-being etc., but all of them are usual phrases for defending/protecting individual/collective rulers, and national elites. We believe into the role of leadership, but we believe also into the moderate life style, which allows long life, peace, and stability.

How the today understands of the climate changes result from the anthropogenic influences, we may explain only with rule of international bureaucracies, who have sufficient financial resources to pay scientists to speak and write as they wish. Redirection of scientific, research, applied research, and theoretical work is not possible, due to handling of resources by politicians and bureaucracies, who learned how to rule, and not how to make progress in sciences and technologies of the planet Earth systems. How to explain fantastic development of armaments, chemical synthetic products, and 800 million motor vehicles and many more combustion engines, such as aircraft, ship, boats and agriculture machines, marketing money and profit making oriented products, transport system, promotion of "globalization" as a tool for making money, without paying scientist to do the basic



research work, and neglecting the research needed for understanding issues of the biosphere system, which is threatening our civilization with responses of the climate change system and the whole Biosphere?

The climate change system is a macro system of the nature with interdependence, interaction, co-operation of superior, and inferior natural systems, and the climate change system is responding not only because of our civilization activities, but is responding according to rules of the systems and nature. If we do not understand the climate change system, it is due to the improperly directed research, and has nothing to do with the common human being, but with the present social order, monetary democracies, nations of the G 7 countries leading our civilization, and international bureaucracies.

If we take the case of CFC the ozone depleting synthetic chemical products, which were produced because of the market oriented research and production aimed at making money, which caused the response of the climate change system, and ultimately may respond with a total destruction of our civilization, **we have to learn** how to manage ourselves. It is true that humans did not know of the side effects of CFC's, but there is no reason to continue with such a practice, like genetically modified organism's techniques, war technologies, uncontrolled research of new synthetic chemical products, and combustion engines, which are at present the most dangerous activities of our civilization, not to mention information techniques and energy transmissions influencing magnetic fields and basics of the planet equilibrium.

Commencing from energy and gases and moving to planetary explorations.

The climate change system, the climate, the climate change is a system of the biosphere, which is responsible for the maintenance of living conditions. As a system it is inferior to biosphere, the planet Earth, the Sun and solar system, the Milky Way system and the Universe. Later we shall look into separate systems. The climate change system has many inferior systems like: atmosphere, seas, oceans, lands that are interrelated to biosphere, and each of mentioned systems has inferior systems, which all together are making a holistic the biosphere system. All mentioned should be understood as moving, interdependent, interacting, and co-operating dialectic or dynamic system always evolving. The moving direction is **only dynamic** forward. To an uninterested walking person the nature may look like chaos, but as the late Prof. Dr. Helmut Metzner wrote in the book from "Chaos to Bios", that nature may look like chaos to us humans, but also our achievements may look to nature like chaos, and not like order, as we believe. It has to be knowledge, which has to decide on right or wrong.

The climate change system is a very complex system, which is interrelated with a number of superior and inferior systems, and the main purpose of the climate change system is to maintain the energy equilibrium, mean temperature, moisture and water cycle system, composition of troposphere, atmosphere and ocean currents, as the second main transport system within the biosphere, being second to the water. Many more subsystems will be explained later on.

Definitely the climate change system cannot be explained, understood, and researched with the knowledge of one or two of the presently known scientific disciplines, but the scientific research approach should be holistic, interdisciplinary, multidisciplinary and done by a team of scientist working for a common goal. It is obvious that scientists need techniques of the system theory, thinking, analysis and synthesis, and complex problem solving for work on the nature explorations.

Interdisciplinary in terms of our research from the nature sciences point of view is a precondition for individual ability to understand the complex problems of the complex systems. Interdisciplinary work and research is above the classical scientific disciplines, from the viewpoint of understanding the needs of research, work, and action aimed at system functioning in regular conditions and otherwise, interrelated with system itself, inferior and superior systems.



The main purpose of the climate change system is the maintenance of the living conditions within the biosphere, and is calling for explanation of life. From our research and nature sciences thinking we think that the life could be explained by hypothesis in the following equation:

$$\text{Energy (E) x Matter (M) + Time (T) = Life (L)}$$

$$E \times M + T = L$$

The life should be understood here as life appearance on the planet Earth, which has a unique composition, place, physics, geography, biology and is permanently evolving its own nature, space, and environment quality, reflecting the present status of the system and its superior and inferior systems qualities. An integral part of the evolvement in the biosphere is information, which is an integral part of the evolvement. Basic information connected with life itself is in gene structures, which are composed by four amino acids in different combinations and systems, according to a species for which has been simultaneously (by evolution) composed. First life information has been evolved simultaneously by evolvement of first live structure and later evolvement was reflection of the evolution.

The living conditions are a set, system, or entity of the biosphere environment qualities, and are preconditions for appearance of the life. The theory of evolution, the Gaia theory, the system theory, known past and present, and status of the biosphere are proving the above hypothesis to be correct.

The origin of the climate change system, the climate, and the climate system are dynamics of the planet Earth, its appearance and existence, also as a part of solar system and its appearance and existence, and as result of the Universe dynamics.

The climate change system is ruler of the life status on the planet Earth, not by command, but by interrelations, interdependence, interactions, co-operation and consequences of the system dynamics. Here we may comment on the role of humankind present civilization and the climate change system, which may be described as triggering of the system dynamics by our activities. We shall comment on this later on.

The planet Earth appeared around 4, 5 billion years ago. At that time the planet was something like energy and gases with temperature around 7.000 degrees Celsius. Within millions of years planet was cooling down, and the firm matter was formed within a couple of hundred million years. The oldest rocks on the Earth have been dated at 4.3 billion year ago.

The planet Earth is an inferior system to the Solar system, the Milky Way and the Universe.

Universe is the macro, largest, most complex whatsoever system humankind may research and explore, and consists of all matter, all light and other forms of radiation and energy. It consists of everything that exists anywhere in space and time. The universe includes the Earth, everything on the Earth and within it, and everything in the solar system. Our solar system contains nine major planets along with thousands of comets and minor planets called asteroids. It also contains the sun, the star around which the planets revolve.

We think that if we estimate total existing knowledge of the universe as 100 units at present, our civilization's knowledge may stay between one and two units. We have to explore and research much more as we did until the present time. Of course, we should not forget the system dynamics and evolvements, which both reach beyond the present knowledge of the universe. Understanding the holistic nature of the universe, we have to understand that the universe dynamics are present in



countless forms, transitions, expansions, big and small bangs, appearances and disappearances and all countless happenings, and evolvments.

Second to the universe is the Milky Way Galaxy system, which is a limited part of the universe within which we humans exist. It is our first exploring target and a system about which we have to learn as much as possible. The Milky Way Galaxy have 100.000 billion and more stars as systems of whatsoever form, and countless number of planets, micro planets or asteroids, and all other forms of energy, light, matter and particles of any kind.

Within the system of the Milky Way there is our solar system with our star the Sun. The composition of the Earth is “unique” because of the matter and energy at its birth. All forms existing at the moment of appearance are included within our Earth system, and plus more as how many other the universe forms like energy, lights, particles, rays and matter from the appearance until present collided with the Earth. Major influences on the Earth dynamics come from the permanent energy flux from the Sun, and collisions with asteroids, which arrive from the outer space. It is important to have this knowledge, which may assist when researching and exploring the climate change system, because first outside effect on the climate change system is coming from the outer space as asteroids and other dangerous collisions, which were changing and may change the equilibrium of earth system as well as the climate change system.

From the past we may learn about a number of occasions on which the planet Earth climate change system has been reacting with dramatic change of the living conditions. It was recorded as Glacial or Ice periods, which were result of downward direction of changes of mean land and ocean temperatures. Of course we should not forget that land mass and salt water mass react to the change of mean temperature according to their abilities, which are different. The land mass reacts faster as salt water mass do. Consequently, the life on terrestrial part of the earth (totalling to 30 % of earth surface), during ice periods have been affected more, as marine life.

Interdependences of the life, climate change system, and biosphere are dynamic factor for evolution of the life forms, and consequent environmental conditions. The primordial Earth, some 4.5 billion years ago was lifeless and unrecognizable by our civilization standards. The air was oxygen free and many today known sub-systems of the climate change system did not exist. The climate change system itself was evolving according to the components of the system as well as even today.

The rise of the life on the Earth mirrored conditions of the primordial surface, and physical contents. It took Earth to evolve the life something like 0.7 billion years. The first evidence of the life is dated 3.8 billion years ago. From microbial life of primordial time to final evolving of complex biosphere around 1.2 billion year ago was time, within which the biosphere evolved. First biosphere energy transition from anaerobic to aerobic energy production of microbial life was responsible for change of the atmosphere from oxygen free to oxygen reach. The oxygen content was around 40 % and with time was coming down to 21 % as was by end of XIX century.

The oxygen content was the major improvement of life conditions, which made the difference from the primordial time to the time of biosphere, from 1.2 billion year ago till present time. The concentration of the oxygen in the breathing air of life creatures should not come down below 8 %, what is somehow needed for survival. At present in some heavily human populated areas of big cities, the concentration of the oxygen could come down as much as just above 10 %, and we are recommending monitoring of oxygen concentration as a precondition for survival of humans in fragile and heavy polluted environments (big cities).

Our civilization's first settlements were built some 12.000 years ago, as a result of social life improvement of pre-antique humans. First settlements in Europe were built on swampy areas, because of security reasons, and population was up to 10.000 people. It was a result of the changed conditions within biosphere that evolved after the last ice period, which was ending some 60.000 – 16.000 years



ago. Since then the climate change system conditions on the earth were almost at the quality of present. Of course the changes existed but not as extreme ones, as are coming now days. The difference between today and 200 years ago is due to extreme input of our civilization's output into biosphere such as: waste and side effects of nuclear technologies, synthetic chemicals, human population explosion and consequences, and destruction of biosphere due to the needs of human population. In short, and we shall work out the above-mentioned in separate sub-chapters, those are reasons, impacts, and consequences, which are a cause of triggering effect of our civilization on the climate change system.

The climate change system as an integral part of the Earth biosphere is somehow between the inferior and superior systems, and all together with climate change system itself it has got a number of mutual interdependences, interactions and co-operations.

As we mentioned before, the Universe does contains all matter and energy, particles, rays, information and everything. To the Earth's the climate change system the Universe may have dramatic influence, in a case of catastrophic changes affecting solar system, and in a case of collision with space body, and bodies influencing the Earth existence. It happened and may, or can happen again. There is the hypothesis of collision with cosmic meteorite some 65 million years ago, when Dinosaurs got extinct.

The most superior system is the Universe, which is the largest system known to us humans. Probability for a destructive interaction of the Earth with the Universe system is very small. Because of countless number of star systems and other forms within the Universe, the Earth has a little chance to experience major destruction, due to the Universe system activities. Of course the planet Earth system is just a very small part of it.

The Solar system is a very large system, from our civilisation point of view, but a very small one from the galactic point of view, and even much smaller from the Universe point of view. The sun and nine planets are one small sub-system of the Galaxy Milky Way. Actually the Milky Way Galaxy has got hundreds thousands of billions of star system, and our Solar system is just one of them.

The Sun is the central star of the solar system has got 99.8 % of the solar system mass. It is the centre of the system, and source of all energy and matter within it. Of course it is an inferior system to the Milky Way Galaxy, which is over 100.000 billion times bigger in mass as solar system. The solar system revolves around the centre of the Milky Way Galaxy at a speed of around 250 kilometres per second

For our Earth planetary system the Sun is the source of everything from birth of the planet onward, and we exist because the Sun is providing us with energy, warmth, light and all other important inputs/physical components and interdependent matters. Our planet system is completely dependent on the Sun. Our present is mirroring physical, geographical and biological statuses at which we are at this very moment of observation.

Of course the influence from the solar system is not only the Sun, but also a number of interdependent relations with neighbouring planets, planet like bodies of different size, Moon and other forms of energy and natural powers. The Sunward planet is Venus and the outer planet is Mars. Together with Mercury they are presenting terrestrial planets of solar system. Other four planets Jupiter, Saturn, Uranus and Neptune are gaseous gigantic planets of outer part of our Solar system. The last planet is Pluto, but not always last, because of its oval shaped orbit, which place it sometimes before Neptune, but most of time it is the last planet in the line from the Sun.

The solar system is stable, and changes as the system qualities are reflecting, and influencing the whole system. The most important part of the system is the energy flow from the Sun to the planets, and the quality of each planetary system. Not only composition of each planet, but also the distance from the Sun is the deciding factor for the quality of the system. The life stream of light and warmth



from the Sun is making possible the life on the planet Earth. Both the quality of the Sun system and unique composition, and distance from Sun of the Earth are interdependent parts of the life support system on the Earth.

Understanding of many known powers of nature, like magnetic, energy, matter transformations, rays and particles role etc., the movements (like a top, orbital, galactic and of the Universe), the solar system, the Sun and planets including our planet the Earth are important, and are putting together characteristics of the whole system.

The sun diameter is 109 times bigger than the one of the planet Earth, and 400 times larger than the one of our Moon. All nine planets and all other forms within the solar system are orbiting around the Sun. The Sun and all planets are moving like a top and all together are orbiting within the Milky Way Galaxy. All this movement should be more researched to allow us to understand the basic powers for interdependences among parts of the system. The solar system as well as all other systems functions according to their given set, systems, or entities of parameters, and our civilisation is given the chance of exploring, researching and understanding our existence.

The birth of the planet Earth could be placed sometime around 4.5 billion years ago. At that time the sun has provided the energy and matter for shaping its sub – systems, planetary systems and other bodies. The Earth appeared as gaseous mass, which by rotation like a top and orbiting around the Sun for a few hundreds millions year, commenced shaping the planet. The composition at its birth, distance from the Sun, and interdependences within the system have made this 4.5 billion years of the whole the Sun planetary system until today.

The Earth planetary system is very robust. At present we are having an inner core of 1.500 miles in diameter composed of iron and heavy metals, an outer core of 1.400 miles, a lower mantle of 1.400 miles, and an upper mantle of 400 miles and the crust of 2 – 45 miles in diameter.

On the top of the crust, there are permanent dynamic changes due to the nature powers, by which the Earth's surface was, and is shaped. The atmosphere is covering, protecting and completing the biosphere of the planet up to 1.000 kilometres, where the Exosphere is ending into the outer space. Main subsystems of the Earth are: planetary body, Moon and atmosphere. Planetary body has got 8.000 miles or 13.000 kilometres in diameter. The Earth is the fifth planet by diameter, the largest is Jupiter with an eleven times larger diameter, and the smallest is Pluto with around one fifth of the Earth's diameter.

The surface of the Earth together with its atmosphere is making its biosphere, where we live and where the life has been a part of the system for more than 3.8 billion years. At that time the first appearance of microbial life could be placed.

Among the life supporting components of the Earth, we think, oxygen is most important element. With its two inorganic oxides - water and carbon dioxide, which are life supporting molecules and atmosphere with oxygen molecules in the breathing air, and protection against UV rays as the ozone layer? After setting such support within the system of the biosphere the life appearance was just a matter of time.

The outer supporting part of the system is flow of light and warmth from the sun, which is due to adequate distance from the Sun actually, and is supporting part of the system and, not to life antagonistic, like it is a case with the Earth neighbour planets Venus and Mars.

The unique composition of the planet Earth and its distance from the Sun are two major qualities that evolved with evolvement of the solar system, which are making the basic possibility for the life appear on the Earth at present.



The Earth crust surface at present is made from a terrestrial part, which is covering around 30 % of the surface, and an ocean, and seas water cover taking the remaining 70 % of the surface. The ratio between oceans and lands was changing with dynamic changes of the Earth surface evolvments. First appearance of the water on the Earth was the deciding factor for the formation of the surface and atmosphere. After cooling down the atmosphere was thick and much lower than now. The primordial atmosphere was oxygen free. A big change was the appearance of the first life forms, which have been anaerobic microbial organisms, living without oxygen. They were gaining the necessary hydrogen for their synthesis of different organic carbon compounds from dissolved inorganic compounds of carbon. It took hundreds of millions of years for them to change the primordial Earth from anaerobic to aerobic stage. Their significant contribution was the sink of carbon dioxide, due to their dead cells sedimentation to the bottom of the oceans, where they have been transformed into numerous carbon compounds, what we see today as fossil fuels. It was the time of the first energy transformation, actually those organisms transformed sugar molecules gaining two units of energy.

The next generation of microbial life were able to split water molecules with assistance from the light from the Sun, and took released hydrogen to reduce the carbon dioxide molecules. By this photosynthesis a rich biomass was produced. The end product of this reaction was the molecular oxygen, but its appearance was poisonous for the existing life creatures. It changed the life entirely, and the new generation of microbial life was able to use oxygen as oxidation of biomass by respiration. It was the second energy transition on the Earth, because with such a transformation of the sugar molecule they gained 36 energy units or eighteen times more that the anaerobic microbes.

The carbon dioxide was a part of water due to solubility, and oxygen due to its insolubility in water, became an integral part of atmosphere. The concentration of the oxygen in the atmosphere was increasing and changing, and settled at 21 %, with 78 % of nitrogen, and remaining part was made of carbon dioxide, methane and some other gaseous elements. With appearance of oxygen in the atmosphere, with influence from the Sun radiation, the oxygen molecule was split down to the elementary oxygen, which in the upper layers of atmosphere made the three-valence oxygen molecule ozone. With time the ozone formed an UV impermeable screen or ozone protection layer for those rays from the Sun, which have been responsible for decomposition of the dioxide molecules – the UV rays. The biosphere on the Earth responded with evolution of life, intensification and transition from water to terrestrial parts. The bacterial life moved on the terrestrial part of the surface, formed on the crust top a carbon rich layer, which with time became, what we today call soil. The Earth system evolved to the stage when complex life forms could appear. It was some 700 hundred millions year ago, and land mammals appeared some 350 million year ago. The human predecessors are dated some 8 million years ago, and Homo sapiens our predecessor some 200.000 years ago.

So here we are - we have the Universe, the Milky Way Galaxy, the Solar system, the planet Earth system, and the life on the surface of terrestrial and aquatic part as well as within atmosphere. With the existing input and output effects from superior systems – the Solar System, with evolved parts of the Earth system the climate change system became **provider, maker, holder, and guardian** of living conditions within the Biosphere.

The described facts, though, do not mean that there is no impact of us humans over the climate change system. We do have an impact, and its content depend a lot on our own thinking and behaviour.

The climate change system is an integral part of the Earth biosphere. It has got no clear-cut borders with other systems of the nature, like we humans are used to think and see. Rather the climate change system as part and complex natural system actively takes, uses, puts, and gives inputs, influences, and impacts; it receives outputs, influences, and impacts from all inferior and superior systems and reflects the present ones – as living conditions at its very moment of observation. Observer can go back in the history of evolvments, but cannot go in the future, due to countless possibilities involved. Let us discuss the climate change system itself, and its inferior natural systems.



The difference between the human's traditional thinking and the system theory thinking could be described as follows, when discussing the climate change:

When observers look at our civilization's achievement from the viewpoint of building, and construction heritage the look is nice, everything is in order, the arcs are arcs, lines are in geometric order, and the whole construction follows a certain tradition, style, and architect's mind work. Of course not as a total rule, because e.g. the great architect from Catalonia, Gaudi has demonstrated his innovative approach to churches and other construction. Also our houses, exterior and interior arrangements, agricultural activities, communications, roads, and railways etc., are following a certain order, which are not like the virgin nature. To us humans from this civilization the virgin nature looks like chaos, and we are not in position to comment vice versa. It is also difficult to comment whether the distance between nature and the human life style is now big or small, but it is obvious that we humans have made many different approaches, and innovations, which are not a natural way of acting. So for conventional thinking chaos of nature is chaos, and our life style is all right. On other hand the system theory, and thinking may allow us humans to see the natural chaos as order and the human's order as sort of chaos. When not only scientists, but also common people in the local communities will have this ability, we shall have much more of a natural habitat as now.

When we apply the above findings to the climate change system, we may understand "chaos" of interdependences, interactions, and co-operation of many different systems of nature as a result being parts of the very complex climate change system. Of course we should not forget that this thinking is the thinking of human beings, and it has all good and bad attributes as we humans have.

The climate change system is a composition of a permanent evolution of the natural systems, which support the biosphere as the space for living creatures within nature. We have seen dependences of the climate change on its superior systems, and let us first list the influences, which may occur from them to the biosphere.

All changes and evolvments of the Sun system have an absolute impact to the biosphere. They have a strong impact on the Earth, and most probably grave consequences when changes at the Sun system evolve. More scientific research should be directed towards understanding of effects from the Sun on evolvments of our biosphere. As the major provider of warmth and light the Sun has got a strong position as influence on the biosphere.

The Moon/Earth equilibrium has got also a high ranking.

The meteorites from the Universe, the Milky Way Galaxy and the Solar system as well as other forms of matter, energy, particles, rays, and to dimensions, powers, and systems not yet known to us humans have influenced and will influence our biosphere. Fortunately, their impact is not so frequent.

The planet Earth's attributes studied by physics, geography, and biology have a most important position. Due to permanent evolvment, interactions, interdependences, co-operation and etc., the powers of nature have created our biosphere, and keep creating it. We humans can see its past and present. For some of the mentioned systems, and powers it is possible to understand dynamics, but for others it is not. Our knowledge at present is lacking system thinking, as a possibility to better understand the system's dependencies and dynamics.

The inner core of the Earth has some 1.500 miles in diameter and is moving like a top with a different speed as other parts of the planet do. Any change in the revolutions and directions of the movements could have a strong impact on the Earth system. More research is needed, to understand this subsystem.



The rest of the Earth – outer core, lower mantle, upper mantle and crust totaling some 3.200 - 3.250 miles in diameter have got a number of common interactions, which influence the biosphere. Earth's permanent changing under its surface is broken into numerous crust plates, which because of powerful internal forces, are in constant motion with respect to each other. Volcanic activities and earthquakes are products of large-scale crust plate collisions or separations. Both activities have complex impact on our biosphere, from the local direct disastrous impacts by lava, ashes and land movements, to even impacts in cases of strong eruptions and large inputs of ashes into our atmosphere. With consequent impacts they impact to the biosphere as whole.

The natural powers such as gravitation, magnetic force, electricity etc., movements like a top and joint movement within the space of the Solar system, the Milky Way Galaxy and the Universe are extremely important and not yet fully understood by our civilization.

The climate change system – maker, provider, holder, and guardian of living conditions within our biosphere is composed of a large number of systems, which all at same time are interdependent, interacting, co-operating and evolving into the present condition at the place of observation. Thinking globally, the climate change system could be observed as some of patterns or expressions or variations, which are varying in different values of the temperature, moisture, and currents.

The biosphere is composed of terrestrial, aquatic and atmospheric subsystems. The characteristics of those are basically the frames, within which the climate change system has got the role of living conditions maker, provider, holder, and guardian.

Very well-known geography knowledge of the Earth, as latitude, longitude, and altitude are decisive qualities for warmth and light, which reflects the quality of local environment.

On the other hand the distribution of quality is conditioned by basic characteristic of land or aquatic environment.

Of course when differences meet, at bordering environments, the quality is more complex.

It is not so simple, when taking into account complex interdependences, interaction, and co-operation of all different systems together, which has got something to do with the climate change system.

The Sun is energy – light and warmth provider. The planet Earth protection systems are ozone protection zone at Stratosphere (15 – 24 kilometers) and greenhouse effect (the natural parts of which are carbon dioxide, methane and nitrogen oxide). Both protection systems are filtering/transporting radian energy to the surface of the Earth and back to the outer space. The geography of the Earth at present has around 30 % of terrestrial and 70 % of water areas (oceans/seas). The energy equilibrium is a result of input and output of energy. Changes within input and output are interfering with energy balance, and consequences are cooling or warming. But due to complex system characteristics such as: changes in the atmosphere, changes at the terrestrial part, changes at the oceans, and seas waters, changes within the biology of the surface, and anthropogenic inputs, the reaction of warming or cooling has different patterns. To add to this complexity the air movements and oceans, and seas currents have an additional influence.

The energy balance is a most important life supporting system, and the changes within it are very destructive for the biology of our biosphere. Results of changes are extinctions of animals, plants and bacteria, and appearances of new types. Drastic changes are known as glacier or ice periods and in the past the Earth experienced a number of them.

The water cycle makes the difference between the planet Earth and the other terrestrial planets Mars, Venus and Mercury. It is a part of the biosphere and has been provided at the birth of the Earth. The water cycle is a sub-system of the biosphere, which is providing the basis of quantity, and quality of



the biosphere environment. After birth of the Earth, as soon as it has become cool enough, water appeared in liquid, ice and gas forms, the water cycle commenced its permanent action/evolvments. As an environment it has got excellent transport and inter-action abilities, which probably together with other sub-systems: cloud formation and movements, lightening and natural electricity, assisted the birth of life. Life appeared in aquatic environment, and it took almost two billions year for life to move out from aquatic environment into terrestrial lands. 97.3 % of the Earth water is at oceans, and seas, 2.1 % at glaciers, 0.6 % at aquifers and insignificant quantities are lakes, rivers, soil moisture and the biological life. Yet the water is a needed quality of biosphere, which has been a precondition for life. A majority of living creatures has between 85 and 95 % and more of water content within their bodies. The water is the main transport system within cells, tissues and body itself. The water is the main environment for chemical happenings in nature. The water is the main architect of nature, when carving mountains, lakes, rivers, and shaping the Earth surface.

Life and water,
Water and life,
Life,
Water.

From the book "Slovenia Yesterday, Today and Tomorrow, Water Management Challenge to Slovenians in the Third Millennium", Ecimovic, Jan, and Vrhovsek, Ljubljana, Slovenia, 1998 (in Slovene language).

Water movements and currents of oceans and seas are a result of the temperature and salinity difference and interdependences, interactions, and co-operation of other Earth systems – gravitation, Earth movement, air movement, energy balance, Moon and Sun gravitation, etc.

Air and water are permanently co-operating when the water change from liquid to water vapour, which is transported by air. When temperature changes and the processes assisted by the air particles (physical or biological), the water vapour changes into ice and liquid form and come down to the surface as precipitation.

The mountains are water towers of the terrestrial surface, and the forest is the primary filter of water and its transporter to the underground. The rivers are taking water to lower altitudes and with their biological system they are secondary filters, and conditioners of water. The river waters are the main transporter of mineral components from mountains and higher altitudes to lower altitudes and finally to the seas.

When waters from higher altitudes do not find the way to lower altitudes the lakes show up, and with their biological life they form the lake waters systems. Of course, lakes can have river water input and river water output, but the lake water body is placed under the level of water outtake. Lakes are the water storages at higher altitudes.

The swamps, swamp-forests and swampy areas are best filters for water by biological filtration and they usually are placed at lower altitude and as estuaries. At all locations when water (fresh or salty) and land meet there are the biologically richest regions. The planet Earth matter exchange is possible due to water active transporter role, and activity of environment with biological richness, which is health assistant for purification of terrestrial surface waters.

The underground waters transport water under the ground and are origin of water at water springs. There are large underground waters at dipper levels of terrestrial and ocean, and seas bottom levels, which are there because of the Earth crust movements. They are underground lakes of waters rich with minerals and usually sterile.



The terrestrial surface water movements are result of altitude and gravitation, and water has the golden ability to moves downward (gravitation), and it has a levelled surface when staying.

The terrestrial, biological and atmospheric waters are less as one per cent of total waters on the Earth, but due to water cycle they are important sub-system of biosphere.

Between the Earth body and outer space up to 1.000 kilometers there is a large environment of gasses, rays, particles and nature powers called atmosphere. Up to ten to fifteen kilometers there is the Troposphere, the lower part of the atmosphere. It is the weather impact region where the air movement is most frequent. Also it is clouds formation and movement area and area where it is possible to find living creatures, from birds to microbial life forms. Troposphere ends into stratosphere 15 – 50 kilometers where the ozone protection band is placed (15 – 24 kilometers). Mesosphere (50 – 85 kilometers) and Thermosphere (85 – 400 kilometers) ends into Exosphere, which ends into outer space at the altitude of around 1.000 kilometers.

Atmosphere is a gaseous cover of the Earth surface and it is an integral part of the biosphere and of the whole planet Earth system. It takes, transports, rebounds, transforms the band of the Earth for the Sun's rays of light and warmth, as well as for any rays, particles, outer space bodies, nature powers meeting the Earth as a whole.

Two main gases are making 99 % of the atmosphere: nitrogen 78 % and oxygen 21 %. As everything in the nature their distribution, movement, and content are changes within limited possibilities. The remaining one percent is made of the natural presence of carbon dioxide, methane, water vapor, nitrogen oxides, argon etc. The oxygen is present as dioxide, ozone, carbon dioxide and water vapor. As a contribution from our civilization additional contents of gases have been put into atmosphere as follows: additional carbon dioxide, additional methane, nitrous oxide, chlorofluorocarbons CFC's, hydro fluorocarbons HFC's, per fluorinated carbons PFC's as greenhouse gases. As photo chemically important gases there are carbon monoxide, oxides of nitrogen and no methane volatile organic compounds NMVOC's, which indirectly contribute to the greenhouse effect.

The atmosphere as the largest part of biosphere holds an important role of making life possible due to oxygen concentration, which is the life-supporting gas amongst the atmosphere gases. Secondly it is the area of water vapor transport, cloud formation, and the main transporter of the water cycle, important from the biology point of view.

The air movement in the multidimensional space has regular and irregular patterns, and at present during the climate change system movement the extreme air movements are recorded. To the biosphere air movement is of great importance as a transporter of life forms, moisture supplier, and local weather maker. On the other hand it is antagonistic to the human constructions, which if they are constructed at lower standards of the wind, tornado, and typhoon strength are usually demolished, when it occurs.

The carbon cycle was probably the most important cycle during the primordial Earth, due to crust formation and carbon cycle deposition at ocean, seas bottom and land surface. It is a direct in or output of biology, and partly of the biosphere chemistry.

Carbon is a constructing element of the biosphere. A very fast (less than 1 year) exchange of carbon is within plant life. Of course it is today second to our civilization carbon exchange, which takes the first place when thinking of the very fast carbon exchange. Fast (1 – 10 years) carbon exchange comes from soil, oceans, and seas surface. Slow (10 – 100 years) is exchange of carbon within the forest systems. Very slow (more than 100 years) carbon exchange is important in the biosphere as deposition of carbon by microbial life and Calcium carbonate sediments, and rocks.



Due to the relatively slow processes within the carbon cycle in nature, and the relatively fast input of carbon from our civilization into biosphere, we have situation, which the existing processes in biosphere are not able to compensate. It is one of the reasons for the global warming.

The sulfur cycle has been a less important cycle in the nature during the time of non-existence of our civilization. Of course it has its important role within nature, but with output of our civilization the damages in nature due to increased quantities of sulfur (acid rain) became fast damaging factor. Of course sulfur is an essential element for the life to exist on Earth.

Be it any inferior or a superior system of biosphere, planet Earth, Solar System or Universe, and our civilization is a small system, but an integral part of the whole. Today we are discussing our problems of nature, space and environment protection (protection against whom?), but even the great Greek philosopher Plato more than 2.000 years ago stated:

“When there was still forest growing in the mountains of Attica, the rich soil received the water and stored it, so that the absorbed mass slowly became distributed from the heights, feeding fountains. But now the fatty and rich soil has been washed away and just the meager framework of the landscape is still present – comparable to the skeleton of the body attacked by illness”.

There have not been properly named “important and unimportant system”, there are systems and systems, all of them, are interacting/interdependent and co-operating to produce the result as present in the Biosphere. But we humans did not follow the instructions that we should think of interdependence, interaction, and co/operation enough so far.

The climate change system as an integral part of the Earth biosphere, have bigger influence on our civilisation as we humans of our civilization think and believe. In absolute terms the climate change is making our life possible, and we humans are mostly trying our best (discussing from today prospect of mutual relation) not to appreciate this, but to harm the climate change system as much as we can, but fortunately not as much as we think, we may.

Due to theory of anthropocentric interference with the climate change system, which is trying to develop reason for the climate change as activity of our civilisation last 200 years 1800 – 2000, we would like to discuss it and to see a feasibility of such theory.

The philosophy of this issue was written many centuries ago when the story of David and Goliath appeared. Only by our standards we are not assessing our abilities and impacts as a general practice and we do not know what we are, what it is our system, which systems we are interrelating, we are interdependent, interacting, and co-operating with and where do we do to belong to. What we do understand is how to make money out of our civilisation and how to use the nature's richness for it. What are our impacts and what could be consequences, most of us humans do not care. Discussing from living of our civilization on the Earth, we have to recognize the biosphere's capacities for our species to be successful and not to harm ourselves. It is not competition but co-operation, which is making our species live. As long as we shall live on the present paradigm, which could be seen as “the ostrich head”, rather than take the long term responsibilities for our civilization's impact on the biosphere, so long we shall be increasing the difference, and distance between our civilization and the nature/the biosphere. It is not the planet Earth that is the home of our civilization, but the biosphere, which is the tiny part of the planet Earth. Vulnerability of the planet Earth and vulnerability of the biosphere are two not even comparable issues.

What is present status of our civilization, do we see our civilization as system, and what are interdependences, interactions, and co-operation needed for sustainable future of our civilization are the issues of “be or not to be” important only for our civilization well-being.



If we accept our civilization/Homo sapiens origin dated some 200.000 years ago and her first settlements some 12.000 years ago (Europe first settlements), and great cultures (China, India, Mesopotamia, Egypt, Persia) 7.000 – 3.000 years ago, we may discuss from where we are. But what we are, as from the natural sciences – biology of the biosphere and planet Earth point of view, is not included into any old script or our predecessor philosophy. Religions – the permanent supporters of our civilization are our predecessor innovations, but never discussed origin of the civilization. Focus was always on human being and how to get from people as much as possible. Either warriors, kings, rulers, democrats from the past (ancient Greeks some 2.500 years ago) and present, religious/spiritual leaders, politicians and many others, who have been self-appointed, elected, or appointed were product of their time and ruled as they ruled. The tribe stories – people, chief, and spiritual leader – describes what we are, but do not discuss what are we doing for our living, and what is our civilization's impact on the biosphere.

If we accept that we are an integral part of the planet Earth biosphere – nature, and the peak of life tree on the planet Earth, from the natural sciences point of view, and take system theory as tool for thinking, we may discuss that we belong to the planet Earth biosphere.

So our civilization is one of many life systems inside the planet Earth biosphere. So we may say that we are one of the planet Earth civilizations. And which are other civilizations? From our research we may point many live creatures' large civilizations, which by the number of individual creatures who are out-numbering Homo sapiens by many zeros. Among the largest populations are microbial species etc. It is known that survival is based upon food, water, air, and space or environment availability, but what has never been considered, was the impact of the species on the food, water, air, and environment availability. Because in the nature many species are known, which have a short lifetime, as individuals, or individual representative of the species, but as species they are within the biosphere for very long time. The classical case are microbial cultures – parasites, which destroy host and themselves, but not as species, but as present culture invading the host. This is a life story, one among many others. And the nature has taken care of matter transition within the kingdom of life. It is a permanent system of matter transition from “ashes to ashes”, not used for ruling the humans but symbolising cycling of matter and energy within the biology of the biosphere.

So let us see ourselves in this context. First scattered settlements were where the food, water, air, and environment were abundant, and settlements flourished. When settlements have come together, the cultures, and nations were established, and as long as the food, water, air, and environment were abundant the culture was in good shape, but when food, water, air or environment became restricted, the culture went down. So finally our civilization become our, global ruler of the planet and food was abundant (in 1960's), and water was abundant (in 1960's), and air is abundant (at the beginning of third millennium) and environment looks like being abundant. But by end of second millennium the food is no more abundant, the water is no more abundant, the air is no more abundant, and only environment looks like abundant, in fact it is also no more so. Is the end of our civilisation approaching us or not?

From nature sciences point of view yes, it is. However, any culture in the biology of the biosphere has its time of birth, childhood, adulthood, old ages and history, anyway.

The difference could be Homo sapiens ability to think, understand, and learn, how to manage civilization affairs, and ensure to all of humans food, water, air and space for living. This task can be done better, if the systems thinking are used. Several system theories can help us, and can be differently applicable in different problem situations.

The climate change system is an integral part of the Earth's biosphere and it has a multi-complex purpose to make, rule, provide, and guard basic conditions of the life: temperature, water cycle, air-sea-ocean movements, protection, management and regulation/control of the biology of the biosphere.



The climate change system is one of sub-systems of the biosphere. Which parts of the system could be affected by impact of our civilization is a question, which we shall try to indicate an answer to.

Biology of the biosphere has many successful systems, which are in different stages of life. The most successful and the best evolved for the purpose of the place is the rain forest. Of course there is important longitude, latitude and altitude of the environment and space, which reflects conditions and possibilities for evolution and management of the life. Second to conditions is availability of water, which in many cases is closely connected with evolution of the biological system, and neighbouring systems. In many cases the biology of bordering regions includes very successful systems (mangroves, corals, coastal sea and ocean waters etc.). But the bigger portion of the biosphere the oceans and seas (around 70 % of the earth surface are oceans and seas and 97.3 % of all water on the Earth is in the oceans and seas) are less researched and more difficult for discussion.

General biology knowledge may recommend the best land biological systems of the nature are the forests, the second are grasslands, and remaining are specialized biotopes according to local conditions – swamps, bush lands, makia or gariga (Mediterranean), mountains, sub-arctic and Antarctic regions, rivers and lakes, deserts etc.

In ocean and seas there are coral, mangroves and generally coastal waters as biological systems among successful stories.

All natural systems are composed of physical, geographical and biological characteristics, which make a basis while the climate change system provides the conditions (water, air, temperature) to make, rule, provide, and guard the evolutions. We may explore past of the systems, but may not see future evolutions, due to many possibilities and influences.

Water and food are very interdependent when we discuss the food production of our civilization. Water is a basic precondition for food production. Due to changes in the biosphere our civilization was replacing water available for food production by water from other sources – rivers, lakes, artificial accumulations, etc. Actually by doing so, the food producing environments become very much like artificial systems, and were moving fast out of the biosphere patterns.

Due to increased demand, for food, a new areas have been put into production, which were not been used before the artificial food producing systems were in long-term use (reactions in the biosphere are taking time as long as needed, or nature always has got enough time, or nature does not care for time or etc.). The reaction was by far limiting the production ability, and our civilization was forced to innovate technologies for food production and protection (not to forget money gaining reasons) of the food production systems. The pesticides were invented and then innovated. One-sidedness of the purpose and result of innovation was a reason for damages in the biosphere that have gone far beyond our ability to understand at the moment of commencement of our use of them.

At present we have large intoxication of the biosphere with pesticides.

Due to needs of civilisation and food production the water sources in the regions become insufficient. Many innovations were used for solving this problem, of which many had an impact on the biosphere systems. Let us mention here over use of fresh rivers, and lakes waters, destruction of underground deposits and lakes of water by over use with a lack of understanding the physics of the underground water deposits systems, etc.

Our civilisation's settlements of near past and present (over concentration of people and self-creation of the fragile environment – mega cities etc.) has caused the pollution of all waters in the region, and as far as such polluted waters travel.



Actually, the pollution has been a combined effect of pollution from city life (countless toxic substances – natural and synthetic chemical products) ending in the waters by individual kitchen outflow and sink, toilets and sewage system, and from the “natural” rivers flows.

Secondly, the conventional agriculture intoxicated lands and underground waters and further waters connected with intoxicated lands and underground waters. Finally all this is ending into coastal sea and ocean waters, which are in different stages of pollution or intoxication.

Our civilization has used rivers as sewage transport system. To achieve the combined effects of the protection of human settlements, citizen’s wealth and civilization achievements, against the natural river waters floods, huge hydro construction were introduced.

Actually, by our standards, we have straightened the natural river flows, and by doing this, we destroyed natural and biological river waters “filtering” system’s ability.

We achieved a fast take off of the river waters, and only this, because we did not protect civilisation settlements and achievements against flood, because on the long-term scale the floods are still here, but with a much more damaging effect.

A majority of the rivers need eco remediation of their natural abilities for hosting life and others by our civilization destroyed qualities.

And so we have come to estuaries and coastal waters, which in many cases were reconstructed into business, settlement, and tourist resorts with no natural, or biosphere characteristics, and opening new frontiers for pollution of coastal waters and consequently ocean, and sea waters.

Today larger share of human population of our civilization lives within coastal lands. The pollution of coastal waters is taking place, and soon we shall be able to reed results of our continuous action for damaging the quality of sea and ocean waters.

The data briefed here make us conclude that many individuals and organizations need to learn and apply system holistic thinking.

The climate change system operates under preconditions given by the dynamic evolvment of physics, geography, and biology of the Earth. Homo sapiens with his natural abilities are crossing the border between his longevity and his long-term influence on the planet Earth biosphere system.

Nuclear technologies, synthetic chemical production, social order and relationship towards the nature are issues of our brief examination.

The climate change system as an integral part of the Earth biosphere is not its creator but its maker, ruler, provider, and guardian.

Homo sapiens have to find new path towards sustainability or sustainable future, which will make mutual relationship of the Homo sapiens and the planet Earth in the newly evolved relationship.

Knowledge, sciences, research and applied research, society, and all governing, economic, national, international institutions, and subjects etc. need to accept evolvments in a broader view, and to respond adequately to their new challenges.

The present pollution on the global scale (nuclear technologies, CFC’s and a like substances, pesticides, genetic modifications, hormones-like substances from our civilisation synthetic chemical production, technologies impact – combustion engines and others, transport equipment, war



equipment's, PCB's with impact on gene structure, etc.) is example of our civilization's short-term action.

What we need for sustainable future is our long-term responsibility for our civilization's impact within the biosphere.

Here we have to distinguish impacts of the ruler of our civilisation – profit motives – from the understanding of it, and the actual damages done by by-products cause by the lack of knowledge and holism.

In many cases of global pollution the profit motives of our civilisation was the main reason for large pollution – PCB's, CFC's, pesticides etc. – which were produced, promoted and marketed as improvements and resulted as damages in our own environment.

Global warming, ozone band destruction are cases of a lack of responsibility of our civilisation. Cases include the population's explosive reproduction, and pollution of the atmosphere.

We need research and understanding towards long-term responsibility of our civilisation in order to stop the irresponsible behaviour of the present rulers, the humans and our civilisation product such as one-sided profit system, which causes a failure of understanding of the long-term responsibility, and hence are causes of irresponsibility.

References:

System Theory and Climate Change System¹, a book by: Ecimovic, Mulej, and Mayur, in print 2002

Similar presentations we had at different conferences and public gathering around the Globe. Novelty approach, system thinking, requisite holistic and understandable description have been attributes of our research work.

2.

IS WAR ON IRAQ JUSTIFIED

Prof. Dr. Jan W. Dobrowolski, Ir Dr Tee Choon Hwa, Prof. Dr Bartolome Ribas-Ozonas, Dr Timi Ecimovic, Sir. Prof. Dr. Roger Haw

Definitely War on IRAQ is not justified.

In this chaotic world of ours today, the word "war" strikes men with horror. It reminds us of the calamitous results of past wars in the "First and Second World war." It brings to our minds

¹ The book »System Thinking and Climate Change System (Against a Big »Tragedy of the Commons« of all of us), Ecimovic, Mayur, Mulej et al, ISBN 961-236-380-3, 2002, soft cover paper book with 303 pages, CD and is displayed at www.institut-climatechange.si



sad pictures of familiar fields once luxuriously green with crops, brought to desolation by the hand of war, trampled by the feet of ruthless men; studded with holes made by bombs, and stained with blood of unfortunate men, of fine houses and buildings once so proud and massive, razed to ground by fire and bombs. It brings to men's mind pictures of homeless people wandering aimlessly through deserted streets, and burdened with sorrows. Because of war, women are widowed children orphaned and the old and infirmed left without comfort or care. History tells us that most of the wars were result of man's greed for wealth and power.

USA government and wars are hands and gloves, since USA were established. In 110 years of recent history, from Wounded Knee to present Iraq, 135 wars were results of USA government human internal and external relationship (Delo, 22. March 2003.).

Talking of the USA government system and socio-economic characteristic at present called *democracy*, could be called money/finance democracy. Ones by humans introduced money have been great civilisation advancement, and today by USA government, and many other governments, corporations, individuals and socio-economic systems, it become monster of our civilisation. One's money a good slave of humans has been with time transformed to the master/monster of humans.

The only purpose of it today is to rule humans to their destruction. Once scientist has been people who researched because of their ability, and today they work because of money regardless their abilities. One's scientist researched what was by their thinking important, and today 99 % of scientist research what government and money masters direct them to research. War armaments today are principal targets of research (System Thinking and Climate Change System, December 2002). And results of by USA government introduced war operation some 15 million people were killed. After cold war was off, USA government introduced 23 wars, with use of all types of soldiers and armaments (Delo, 22. March 2003).

For many USA presidents and their advisers, war is best generation of popularity, money, wealth and power. Present president Gorge W. Bush did not put forward results of 11th September as they have been established, but have put forward Osama bin Laden and Sadam Husein for Americans to chow it instead. And result is better popularity of the president.

Financially, Iraq war is estimated to cost, if short war about 99 billion, and if long war up to 1.924 billion, in both cases only small portion of USA GDP (Delo, 22 March 2003). Actually it is estimated cost of war only.

Economy loses all around the Earth, would be in many zeroes more. Countless by money damages will be at nature, space and environment damages, human ethics, socio-economic system, international relationship, United Nations and many other aspects. For USA president it does not mean anything, because it has nothing to do with his popularity. By money/financial democracy system of present USA only money value is considered as important.

Human resources are at hand, nature, space and environment value has to wait in line for consideration, eco remediation of nature, space and environment is financially unimportant by now, Agenda 21 and Local Agenda 21 only path to our civilisation sustainability is under deep layer of fog, pesticides, gene manipulations, etc. are financially unimportant activities, and ultimate line of implementation of internal/external policy is physical strength of



armament industry, USA army/navy/air-force and special-force, USA internal and external security forces and police as final part of government power.

After Second World War - Nuremberg process against war crimes of fascist in Germany, Hag tribunal action against war crimes and violation of human rights in former Yugoslavia, Serbian Slobodan Milosevic and supporters, Croatian Franjo Tudjman and supporters and Bosnian Izetbegovic and supporters does not bring the bells in ears/minds of politicians around the Earth.

Damages of the Earth biosphere by humans in our history of 12.000 years are so grave that the civilisation survival is under question – The Climate Change System has got enough power to change biosphere so far, that entire civilisation will cease to exist (System Thinking and Climate Change System, December 2002), and yet most powerful country at present on the Earth USA, is considering more important to be “self-elected Earth policemen” as needed international leader for nature, space and environment protection as the only guarantee for survival of our civilisation.

There have been not any right of the USA government/president war against any people included USA citizens on the Earth. The only enemy of humans are humans. From ancient people of China, Persia, Mesopotamia, Egypt, Rome etc. to 20th century fascist Hitler, communist Stalin and others, internal and external enemies have been and are best tools to keep power.

Let us hope that third millennium will not follow its beginning with Osama bin Laden and Sadam Husein.

The only enemy of humans are humans! If and when other intelligent beings appear on the Earth, we shall have to find ability to deal with.

During 2002 we had much presentation worldwide. Also we participated at Baltic 7th International conference, Kaliningrad, Russia.

3.

SEM Institute for Climate Change
Head of Institute Office:
Dr. Timi Ecimovic, Head of Institute,
Korte 124
6310 Izola - Isola
Slovenia
Phone: ++ 386 5 64 21 360
E - mail: timi.ecimovic@bocosoft.com
Home page: www.institut-climatechange.si





THE ROLE OF GEOLOGY IN LOCAL AGENDA 21 PROCESSES – INTERDISCIPLINARY LINKING OF GEOLOGY AND THE SOCIAL SCIENCES IN ECO REMEDIATION

The presentation of the “The Role of Geology within Local Agenda 21 Processes – Interdisciplinary Linking of Geology, and Social Sciences in Eco Remediation” has been prepared for The 7th Conference of the Baltic Geologist, Baltic 7, Kaliningrad, Russia, 21 – 27 April 2002, by:

Dr. Timi Ecimovic, Head of SEM Institute for Climate Change, Korte 124, SI – 6310 Izola – Isola, Slovenia, timi.ecimovic@bocosoft.com www.institut-climatechange.si

Prof. Dr. Danijel Vrhovsek, Limnos, Podlimbarskega 31, SI – 1000 Ljubljana, Slovenia, info@limnos.si www.limnos.si

Dr. Elmar A. Stuhler, Chairman WACRA EUROPE, Hochackerstrasse 7, D - 85356 Freising, Germany, stuhler@wzw.tum.de www.wacra-europe.org

Prof. Dr. Marjan Vezjak, University of Ljubljana, Faculty of Electrical Engineering, Trzaska 25, SI – 1000 Ljubljana, Slovenia, marhan.vezjak@gov.si

Ms. Roshni Udyavar, International Institute for Sustainable Future, 73A Mittal Tower, Nariman Point, Mumbai 400 021, India, iisfb@giasbm01.vsnl.net.in

Dr. Rashmi Mayur, International Institute for Sustainable Future, 73A Mittal Tower, Nariman Point, Mumbai 400 021, India, iisfb@giasbm01.vsnl.net.in

Prof. Dr. Micheal O Suilleabhain, University Cork, Ireland, mosuilleabhain33@yahoo.com

Abstract

As a path towards a sustainable future for our civilization Local Agenda 21 Processes should play a significant role in linking nature with natural, technical, and social sciences in order to generate knowledge at local community level. The potential role of Geology at local community level is underestimated due to a lack of understanding by local people and also because geological science has isolated itself in the interest of specialist knowledge protection.

With the opening up of the neglected field of research on the impact of society on nature, space and environment, the interdisciplinary linking together of the social sciences and geology is long overdue. In our contemporary environmental context Local Agenda 21 Processes can take on the form of scientific technology, or technique in an effort to bring sustainability to local communities around the planet Earth. The life style of local communities is a major source of pollution and this process is aggravated by trans-boundary air, water and land pollution, part of which is due to visitors, tourist, armed forces etc. Polluted parts of local communities should be treated remedially, and this is possible in terms of what we call eco-remediation process and techniques.



THE ROLE OF GEOLOGY IN LOCAL AGENDA 21 PROCESSES – INTERDISCIPLINARY LINKING OF GEOLOGY AND THE SOCIAL SCIENCES IN ECO REMEDIATION

Introduction:

Local agenda 21 processes represent a holistic, modern environmental technology, and technique for the upgrading of local community environments on the way to sustainability. Its origin is coming from “Agenda for Change”, the nature, space and environment protection document from Rio Summit 1992. The goal of the Local Agenda 21 processes is the protection of nature, space and environment, and population sustainability of local communities around the globe. In the current year, ten years after the Rio Summit 1992, UN is organizing an international conference under the title “10 Years after Rio” to establish results of the latter summit and to evaluate progress towards sustainability. Our presentation here today is intended to open up possibilities of scientific applied research work at local community level in pursuit of local community sustainability as part of wider agenda aimed at achieving the sustainability of our civilization.

The role of geology within local agenda 21 processes is not yet fully established. The provision of a basis for the introduction of geology at all levels of Local Agenda 21 processes will depend on interdisciplinary co-operation between the social and natural sciences. If participation of geologist in Local Agenda 21 processes already existed, there would not be so many instances of polluted spots in our local community’s territories and it would be much easier to pursue eco remediation activities. In the majority of cases this malaise can be traced back to the lack of geologist.

Technologies and techniques for nature, space and environment protection as well as for the population sustainability of local communities embrace those of communications, teaching, learning, environmental information, energy, water and waste management, transport, agriculture, forestry, spatial science, ethical, sports, tourism, and, finally, cultural and historical heritage management in the context to local specific complex problem solving. In this way they comprise elements of ECO REMEDIATION, seen here as prophylactic and therapeutic measures to overcome local environmental problems. They include alleviation and adaptation of local communities at a time when climate change system and global changes affect common life in local communities.

Eco remediation represents a new approach towards nature, space and environment protection based upon system thinking or, in other words, a holistic approach involving technologies, and techniques aimed at damage of local cases remediation at regional and local community levels. Macro remediation includes region-specific complex problem solving as exemplified by integrated river basin management, coastal region management but encompassing also techniques for specific remediation of damage of local habitation, environmental hot spots such as landfill sites, polluted waters and soils, etc., which strictly speaking, should be regarded as micro remediation measures or local problem solving techniques.

From a spatial perspective one can distinguish between *macro* and *micro* remediation, while, in the context of complex problem solving, one can also distinguish between social, natural and technical measures differentiating downward differentiation from integrated management to single techniques aimed, for instance, at wasted, and polluted water treatment by means of constructed wetland or co-natural reclamation of landfills etc.

The Case No. 1

In the course of our work on Local Agenda 21 processes on the island of Hvar, in the Central Dalmatian Islands Region of the Adriatic Sea, Croatia, Europe in 1990, we recorded environmental hot



spots. Municipal landfill was source of pollution, there were numerous cases of waste deposition in the nature (forest and rocky areas on the edge of roads), agriculture production was supported by synthetic chemical products and chemical fertilisers, local wine production was produced by grapes from vineyards treated by synthetic chemical products, and for vine production synthetic chemical preparations for sedimentation and other phases of production were in use. Olive trees were protected with synthetic chemical products, and olive oil was produced by thermal intensive process.

Many other problems were recorded. Due to complex nature of environmental pollution problems, which are always linked to the activities of the local population, all of them needed to be tackled by a combination of actions aimed at the local population (education, environmental information, demonstrations etc.) and emphasising especially the initiation of bottom – up measures for eco remediation. Secondly environmental hot spots were analysed and appropriate best available technologies, and techniques were prepared. Eco remediation was a joint initiative of scientist, local government, local population and skilled workers. Of course financial resources are a precondition for high tech use, but in many cases, by fostering local population awareness, some of the problems could be solved.

For instance during education at village level by multimedia, we showed the village “black” waste deposits in the nearby forest, and explained that the deposits were made by inhabitants, and only solution for deposited waste was its collection by the work of the people and its re-deposit at the municipal landfill, which is the proper solution. It happened that on the very next day local inhabitants by self-organized action, cleared deposits in the nearby forest, which was a very positive respond. In this case it was not necessary to apply technology, but that was not so in the case of municipal landfill. The eco remediation of the municipal landfill was directed towards co-natural reclamation, which includes number of techniques – a dense woodland establishment, constructed wetland, and irrigation system for pollution prevention and complex problem solving.

In addition integrated water management, sustainable forestry, organic agriculture, permanent lifelong education, sustainable fish production, cultural and historical heritage protection, family planning, sustainable tourism, integrated transport, monitoring, sustainable energy production, and other technologies were introduced. The scientific, and research applied work of an applied nature was done with the intention of ensuring the possibility of a sustainable future for the island, under new challenges from the climate change system, globalization and other complex problems of present and the future.

The Case No. 2

The second case is – integrated water, space, nature, and environment management of the basin of the river Dragonja, the river forming the boundary between Southern-Eastern part of the Republic of Slovenia, and western part of the Republic of Croatia.

During last 50 years the river was polluted from the spring to the estuary, and many hot spots of environment pollution emerged.

The estuary has been developed long time ago into saltpans, and today it is protected area under the Ramsar convention.

The natural habitat is makia and degraded makia gariga, i.e. Mediterranean bush forest with composition quite resistant to fire.

Due to historical changes from antiquity, mediaeval times and modern era the natural habitat was replaced with combination of gariga – degraded makia and agricultural land consisting of fields, orchards and parks.



Many endemic life creatures were extinct, but some of them survived. The climate is Mediterranean with winter temperatures below zero and quite low precipitation.

Traditionally population used to conserve water for both human and agricultural purpose, but with introduction of tap water and a modern life style, water pollution was also introduced. This is reflected in the whole of nature but especially in the river body. Due to irrigation and other river water use, the river flux becomes problematic. The natural water cleaning ability of the river was affected by water pollution and physical changes on the river bed, change in the composition of the forest, different construction along river banks, and modern conventional agriculture. Fortunately the construction of houses and villages, or cities construction works did not have much adverse effect, but roads, cross borders construction, and the small size airport at Secovlje did affect space and the environment. The area is not much populated, and small villages are found alongside the river. The environment is karst and the river Dragonja is a karst river. The total length of the river is 30 km. The catchment area is approximately 150 square km., and there is a relative difference in height from spring to estuary of 315 metres. Salt works Secovlje and river Dragonja are protected area.

Eco remediation of the Dragonja river basin should include social, technical and natural sciences, technology demonstration units, technologies, and techniques as: households -constructed wetlands for primary water treatment and reuse (already constructed), waste water treatment by constructed wetlands (already constructed), eco household (already constructed), eco village with open houses for agro-tourism (the project is under consideration), introduction of organic agriculture, co-natural reclamation of landfills, estuary wetlands restoration, restoration of the river Dragonja and establishment of ecologically acceptable flow, revitalisation of the forest, parks and local habitats including nature protection, reconstruction of the river wetlands, provision of a tourist walking information tour, incorporation of bicycle and horse riding route, life-long education of the local population, sustainable energy production – solar water heating (already in use), solar photovoltaic electricity production, recycling fish production, constructed wetland for polluted water from airport, treatment of polluted water from roads by constructed wetlands, introduction of small especial micro habitats for reestablishment of extinct life creatures, a climate change system alleviation and adaptation programme, protection of local traditional social and agro activities, tourist accommodation and agro tourism capacities, reestablishment of livestock traditional activities (donkeys and Istria oxen), and other initiatives.

The eco remediation of the Dragonja river basin represents a program to help ensure a sustainable future for the region, rendered necessary by new challenges confronting the local people in relation to the climate changes system; nature, space and environment protection; globalization; and other burdens introduced by international, national and regional bureaucracies. As such it serves the alleviation and adaptations of present civilization problems.

Conclusions

Local Agenda 21 processes, eco remediation, nature, space and environment protection, alleviation of and adaptation to climate change system, the linking of social, technical and natural sciences, including geological technologies/techniques, represent a scientific applied research, holistic complex problem solving answer to the challenges of present problems, and a path that leads to the future sustainability of our civilization.

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4. Atlas

For better understanding of space, nature, and environment we represent here our “Atlas” for quality and quantity of environment, which was integrated into our book on climate change system.

When we have been writing our book System Thinking and Climate Change System in 2001/2002 Ecimovic/Mulej/Mayur (please see at www.institut-climatechange.si) we had assistance from lady who drew 23 tables as Atlas for better understanding of book presentation.

We are presenting same Atlas into this book with same purpose of better understanding. The »Atlas is as follows:

A T L A S



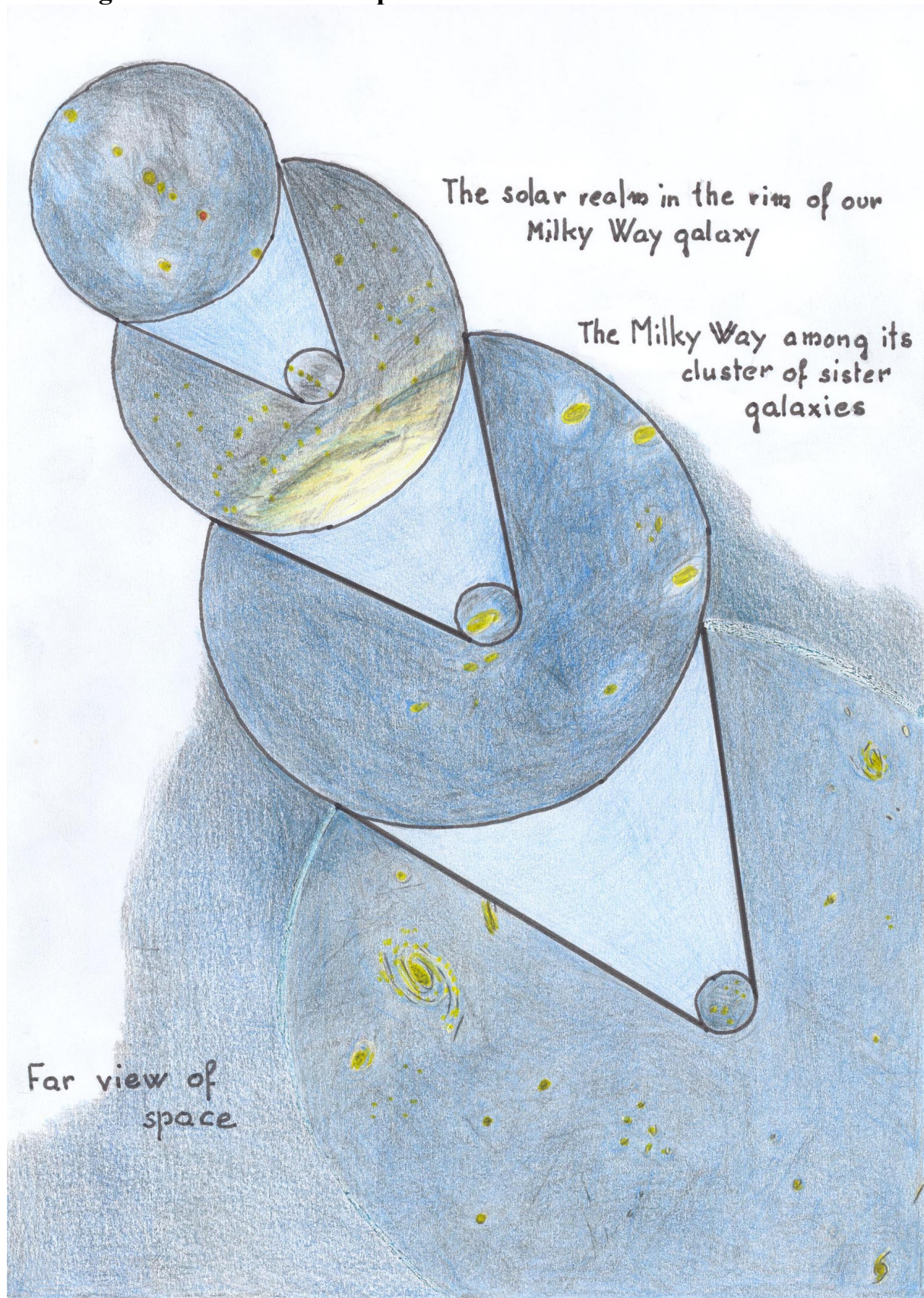
2002

**CONTENT:**

- Drawing No 1. – Far View of Space
- Drawing No 2. – Planet Earth
- Drawing No 3. – Geology of the Earth
- Drawing No 4. – Oxygen Appearance on the Earth
- Drawing No 5. – Earth and Radiation
- Drawing No 6. – Radian Energy
- Drawing No 7. – The Transfer and Transformation of Radian Energy
- Drawing No 8. – The Atmosphere – Temperatures
- Drawing No 9. – Creation of Ozone in the Atmosphere
- Drawing No 10. – Catalytic Ozone Destruction Cycle in Stratosphere Involving Nitrous Oxide
- Drawing No 11. – Catalytic Ozone Destruction Cycle in Stratosphere Involving Water Vapor
- Drawing No 12. – Catalytic Ozone Destruction Cycle Involving Chlorofluorocarbons
- Drawing No 13. – Creation of the Ozone in the Troposphere
- Drawing No 14. – Atmospheric Ozone Destruction
- Drawing No 15. – The Decline of the Atmospheric Ozone over South Pole
- Drawing No 16. – Atmospheric Carbon Dioxide and Earth Temperature
- Drawing No 17. – Variations of Carbon Dioxide in the Earth Atmosphere
– Variations of the Earth Temperature During last Millennium
- Drawing No 18. – Human Population over Past Centuries
– The World use of Coal, Petroleum and Natural Gas
- Drawing No 19. – The Atmospheric Concentration of Methane – Last Millennium
- Drawing No 20. – The Water Cycle
- Drawing No 21. – The Large Scale Salt Transport System in Today's Oceans
- Drawing No 22. – Processes in the Carbon Cycle
- Drawing No 23. – Processes in the Sculpture Cycle

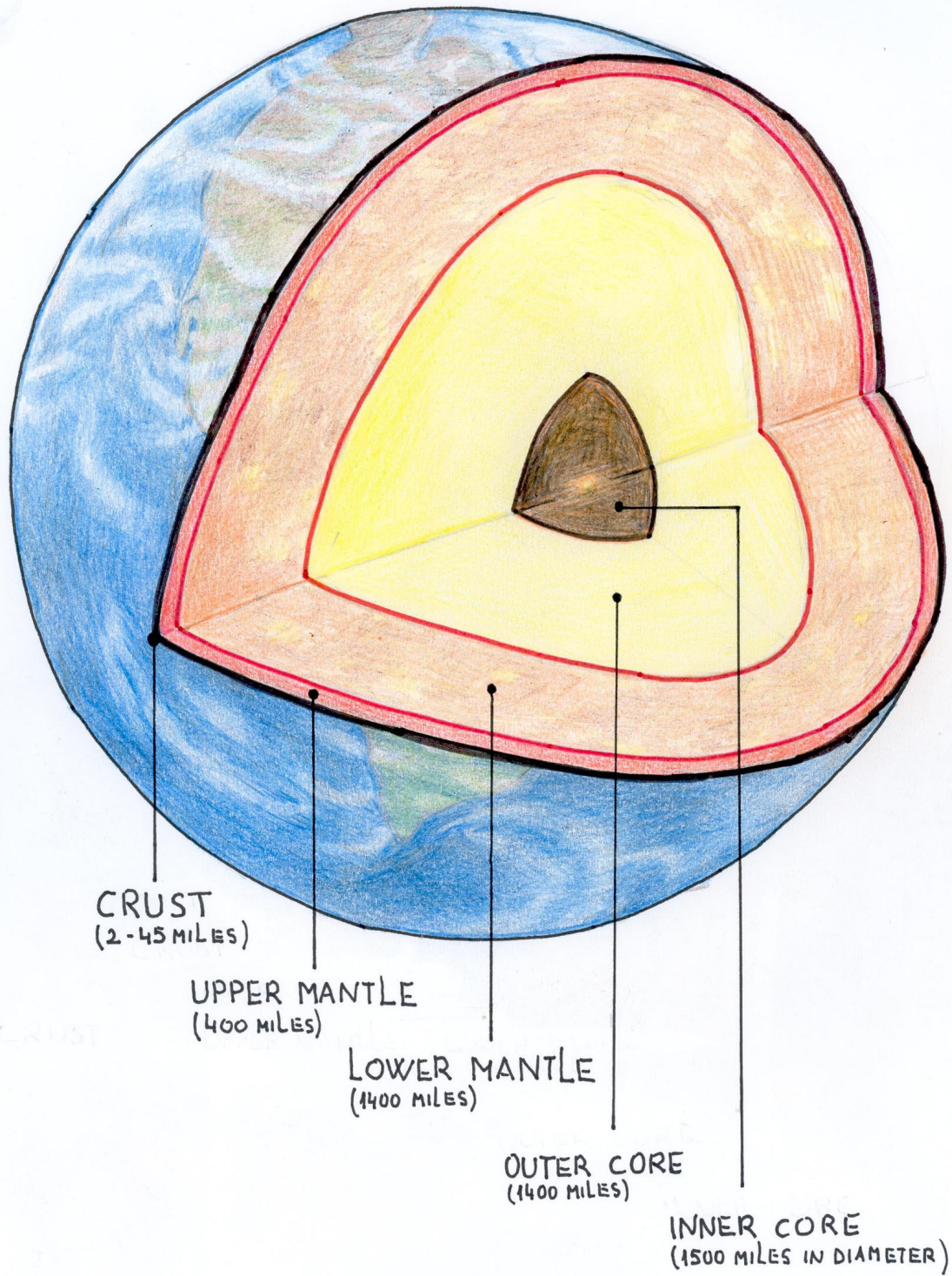


Drawing No. 1 Far View of Space



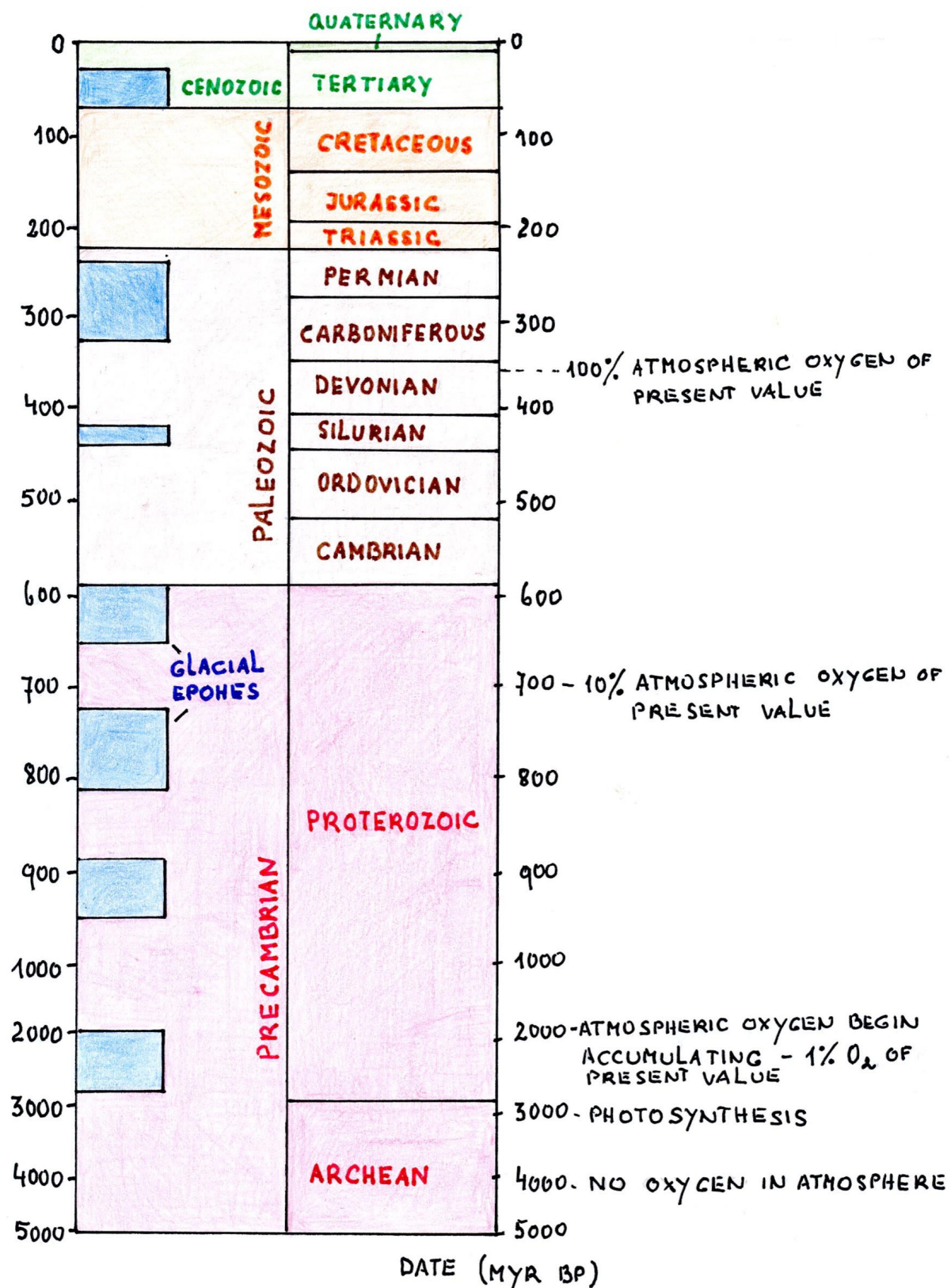


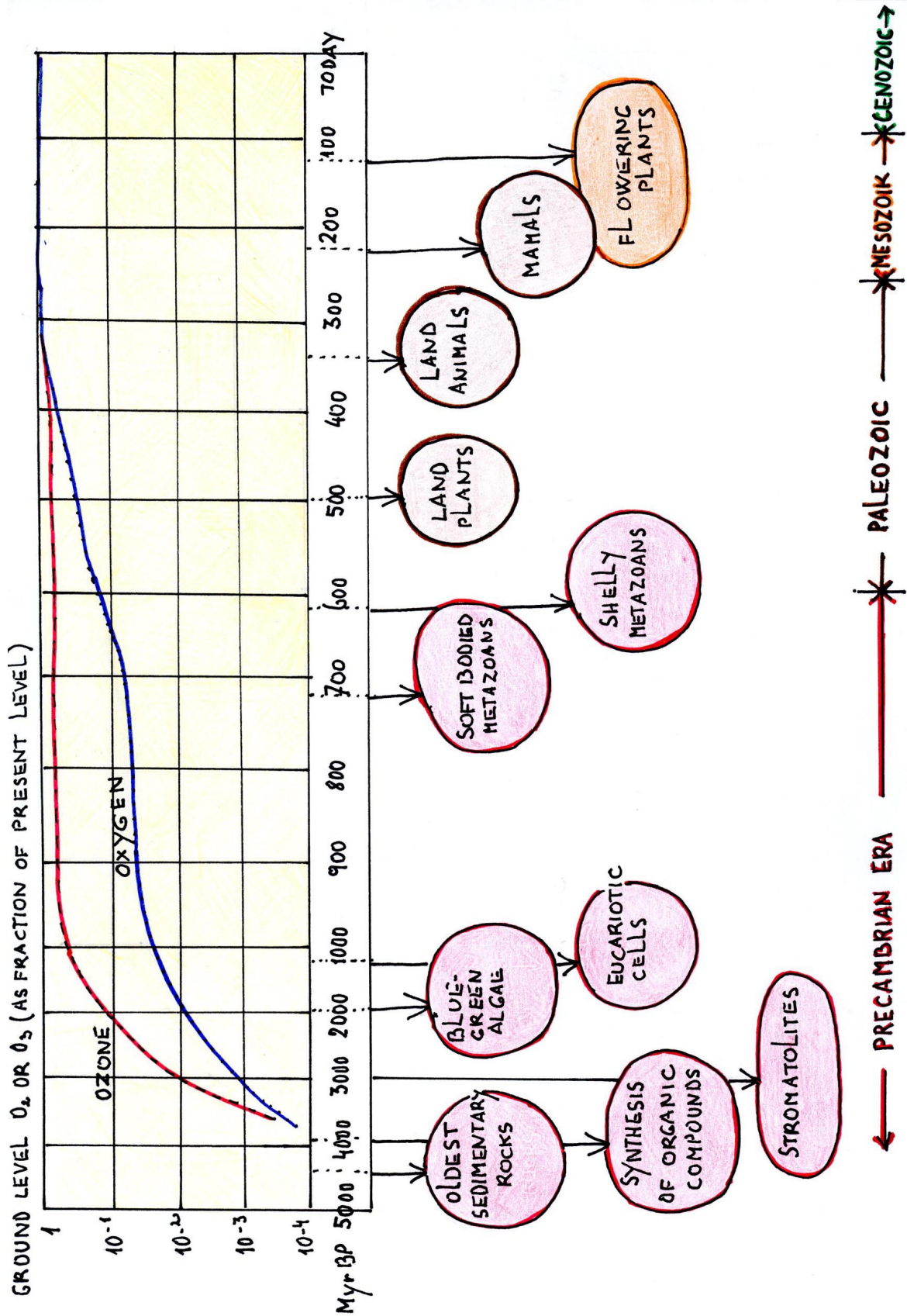
Drawing No. 2 Planet Earth





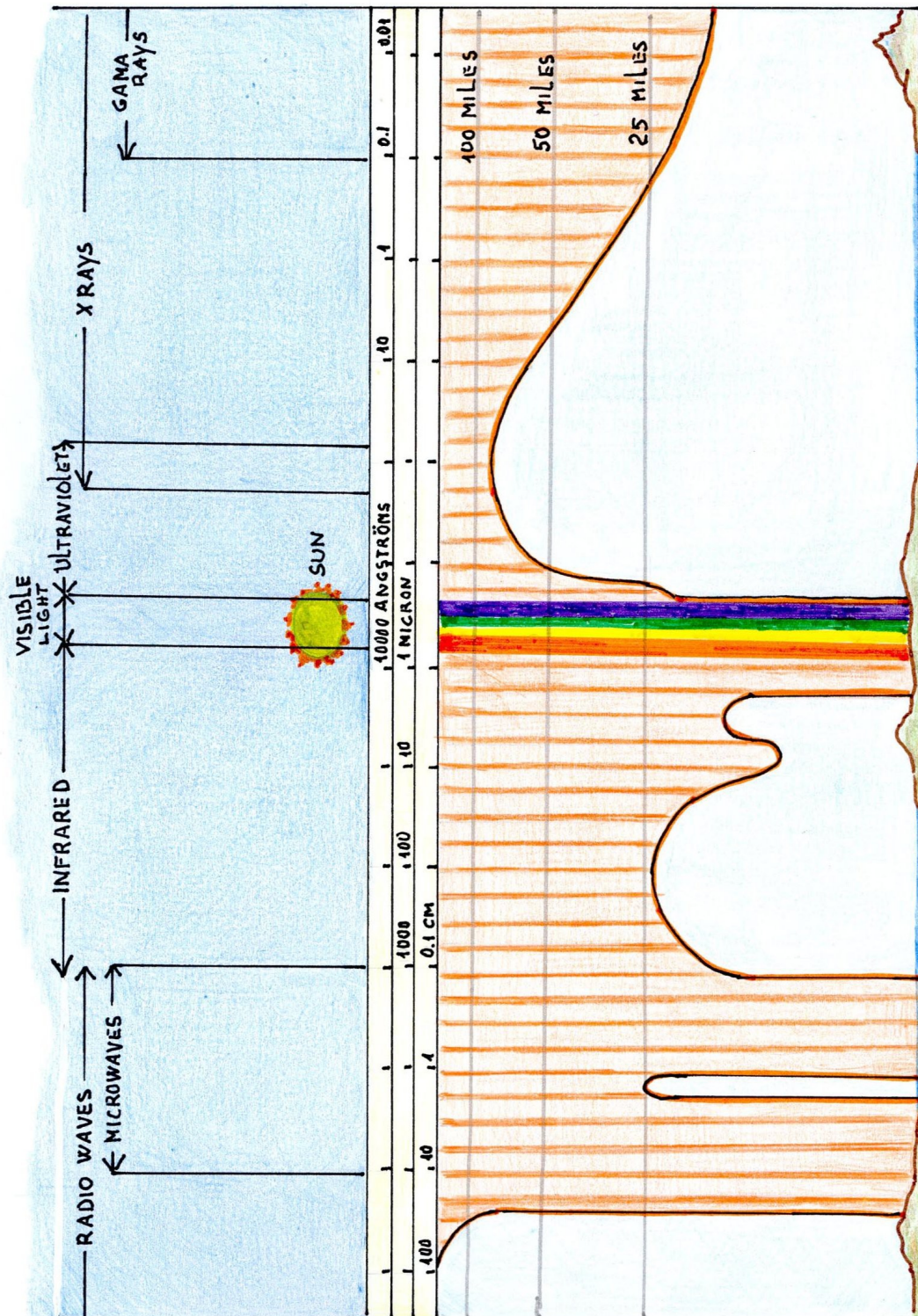
Drawing No. 3 Geology of the Earth

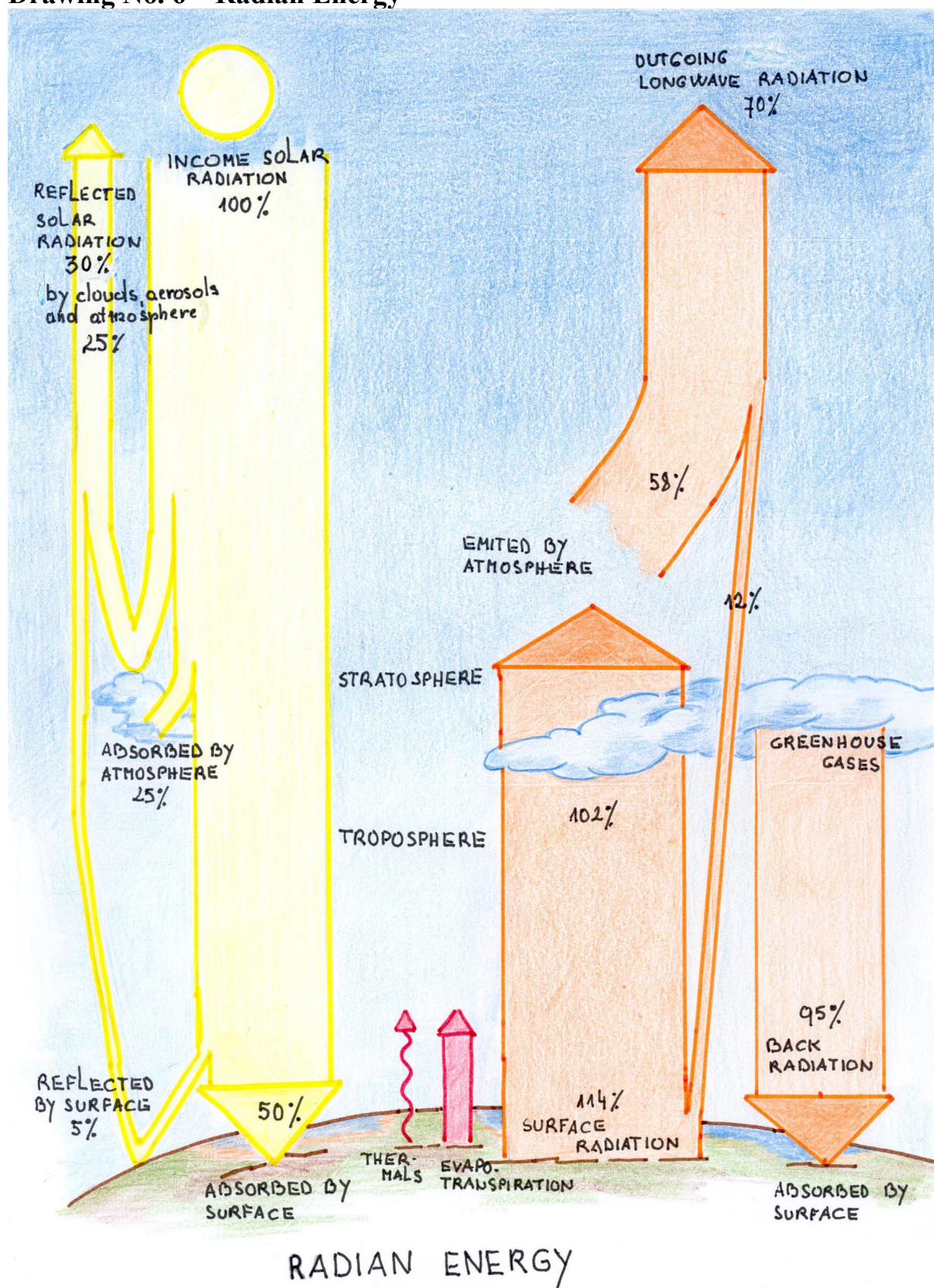


**Drawing No. 4 Oxygen Appearance on the Earth**



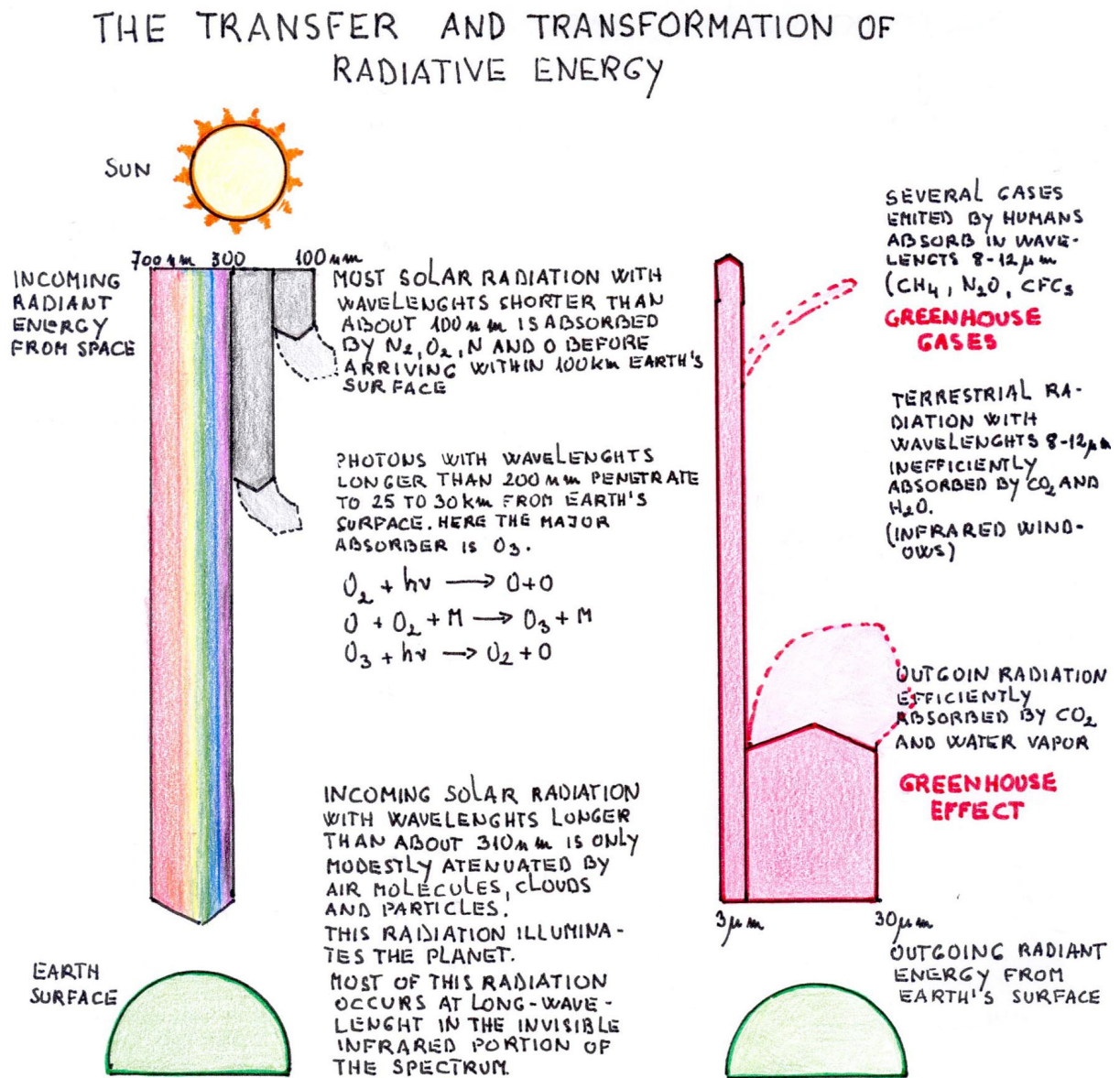
Drawing No. 5 Earth and Radiation



**Drawing No. 6 Radian Energy**



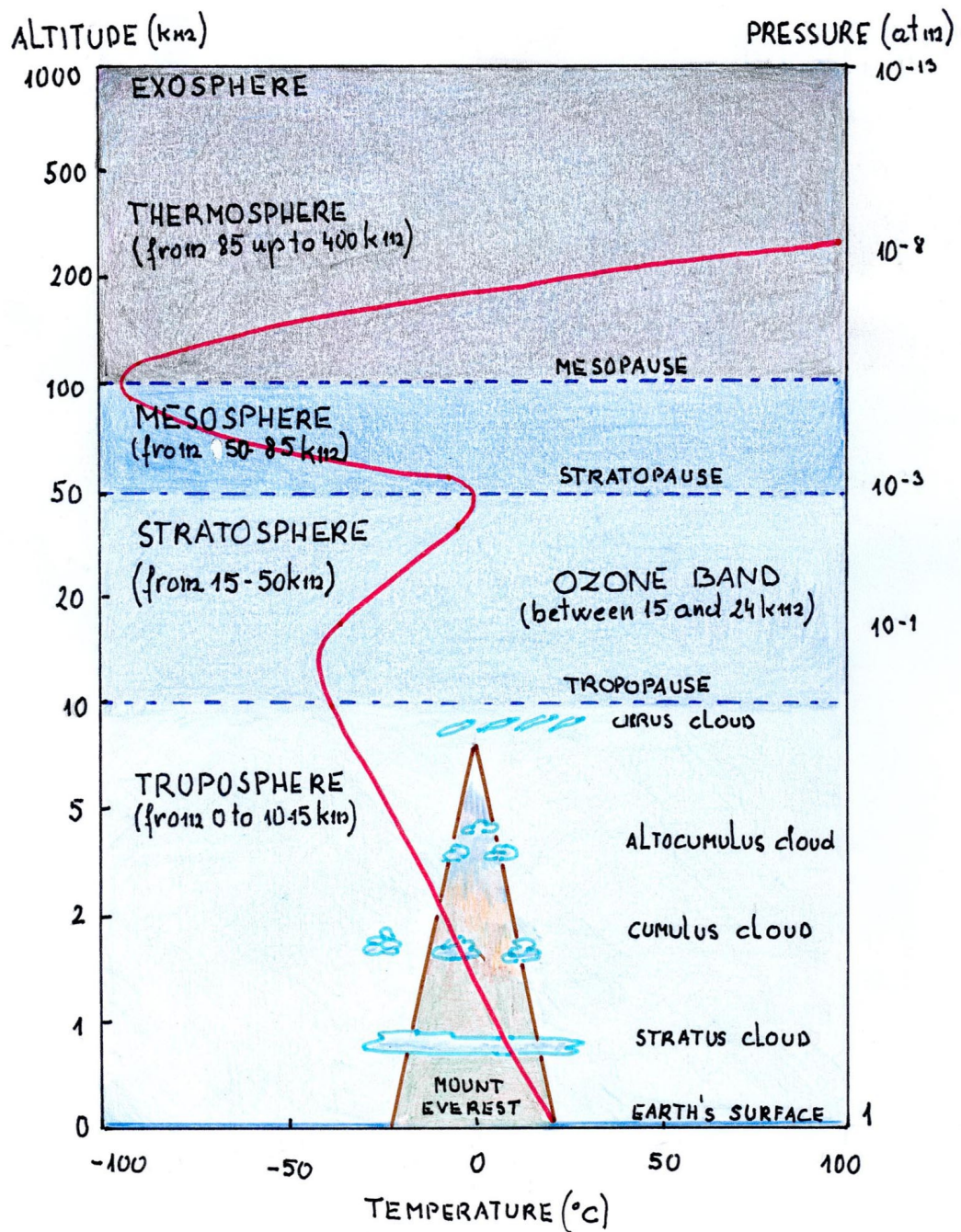
Drawing No. 7 Transfer and Transformation of Radian Energy



- $1 \mu m = 10^{-6} m$; $1 mm = 10^{-9} m$
- $h\nu$ IS STANDARD SYMBOL FOR A SINGLE PHOTON OF APPROPRIATE FREQUENCY TO BE ABSORBED BY, AND FURNISH ENERGY TO, THE MOLECULE DESTINED FOR DISSOCIATION
- M IS ANY AIR MOLECULE (USUALLY N_2) OR OXYGEN THAT ACQUIRES THE EXCESS ENERGY LIBERATED BY REACTION: $O + O_2 + M \rightarrow O_3 + M$



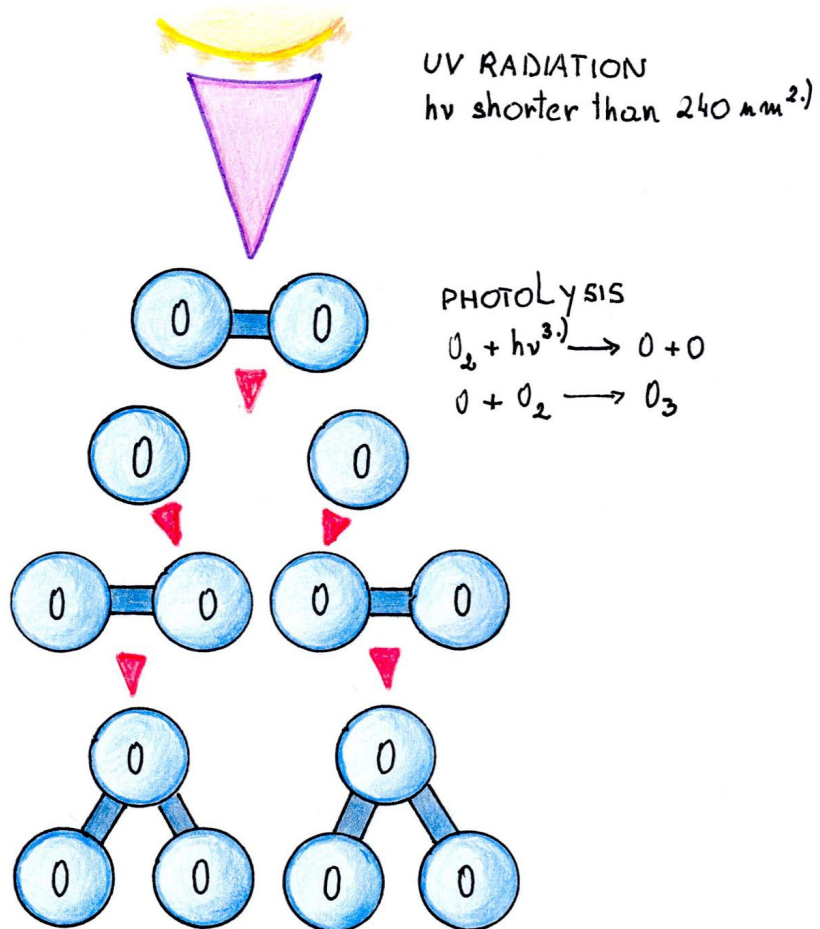
Drawing No. 8 The Atmosphere - Temperatures





Drawing No. 9 Creation of Ozone in the Atmosphere

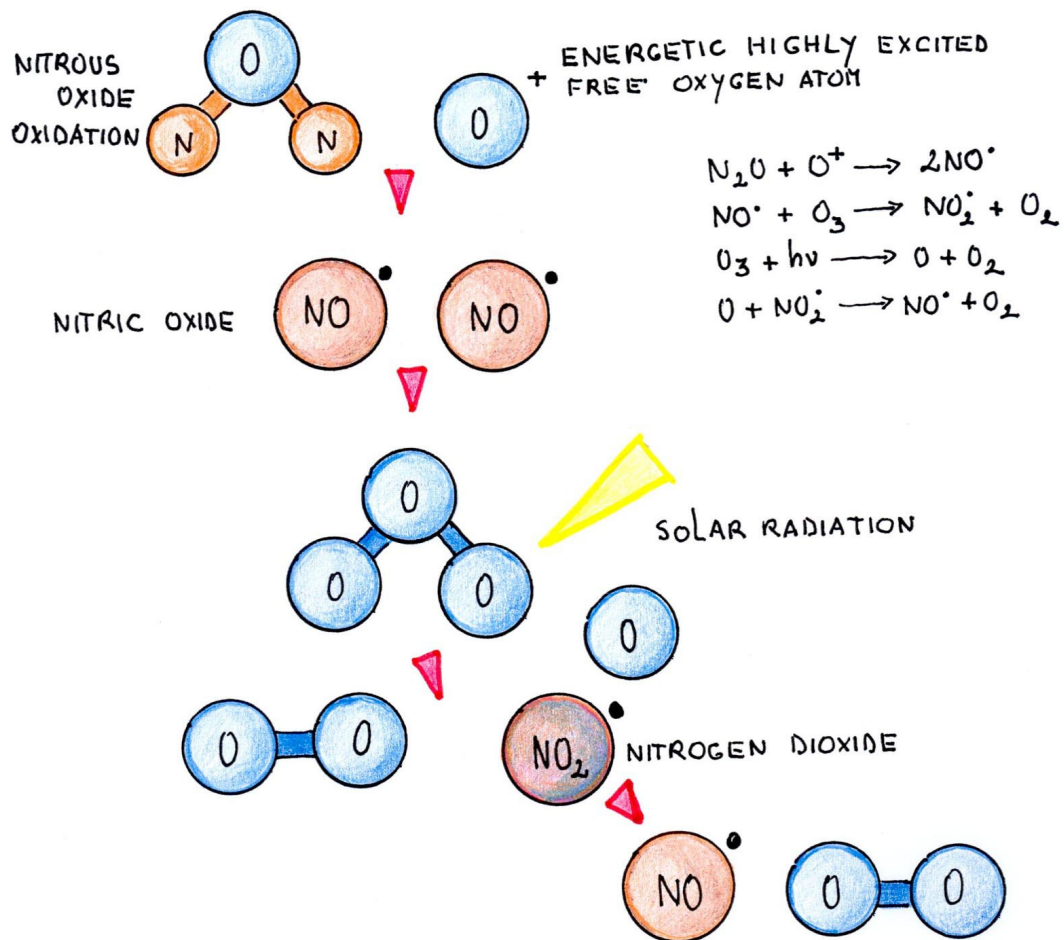
CREATION OF OZONE IN THE ATMOSPHERE ^{1.)}



- 1.) 90% of ozone occurs in the stratosphere, where it is produced by the action of solar radiation on oxygen
- 2.) $1 \text{ nm} = 10^{-9} \text{ m}$
- 3.) symbol for a single photon of appropriate wavelength



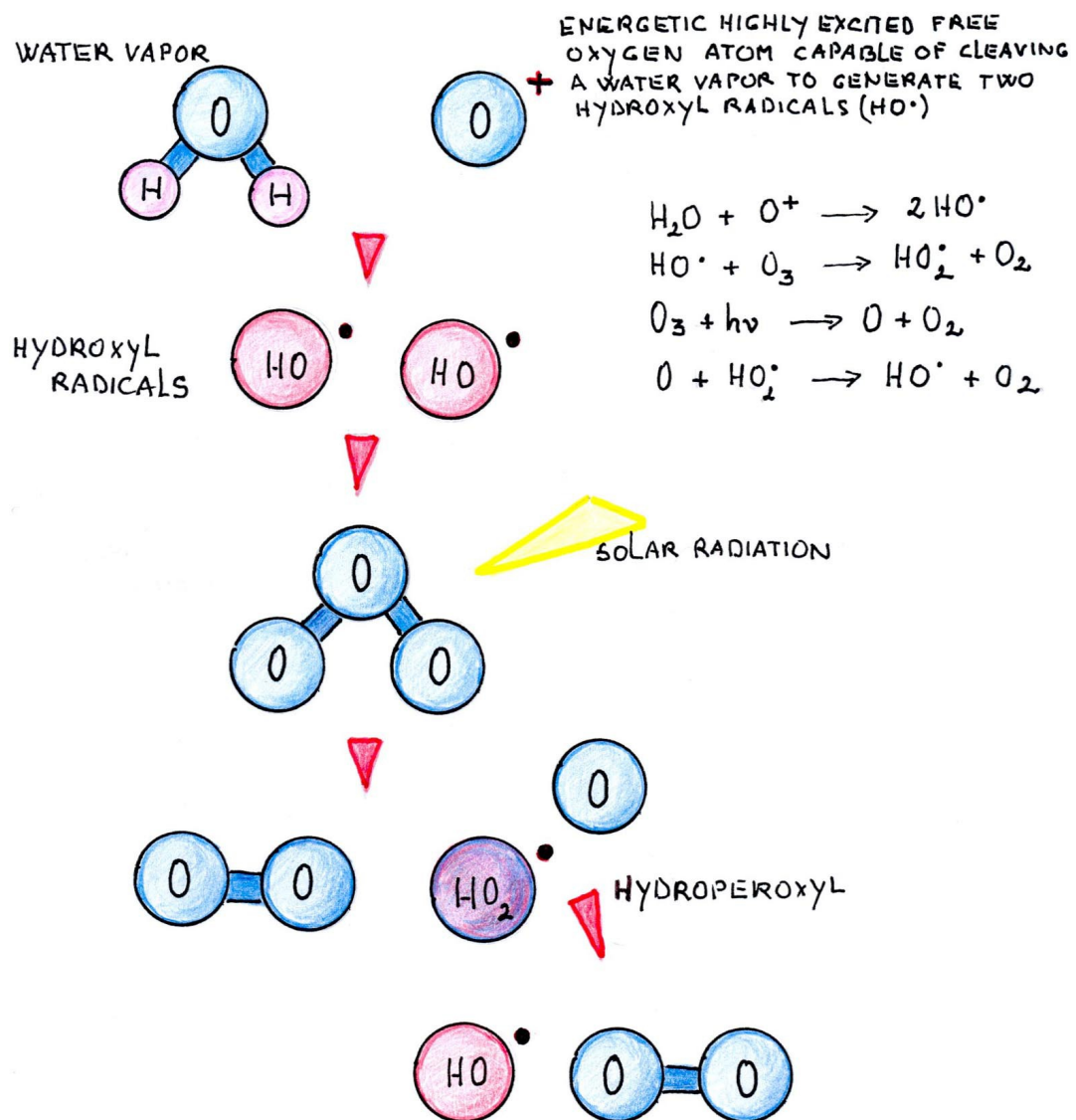
Drawing No. 10

CATALYTIC OZONE DESTRUCTION CYCLE
IN STRATOSPHERE INVOLVING NITROUS OXIDE (N_2O)

- MOST OF NO_x IN STRATOSPHERE IS A CONSEQUENCE OF GROUND-LEVEL EMISSIONS OF N_2O , LARGELY FROM MICROBIOLOGICAL PROCESSES IN SOIL AND OCEANS.
- NITRIC OXIDE CAN ALSO BE INJECTED DIRECTLY INTO STRATOSPHERE, FOR EXAMPLE BY HIGH-FLYING AIRCRAFT. NO_x EMITTED BY AUTOMOBILES AND POWER PLANTS ARE EFFICIENTLY CONVERTED TO THE NITRIC ACID (HNO_3) AND REMOVED FROM THE AIR BY RAINFALL.



Drawing No. 11

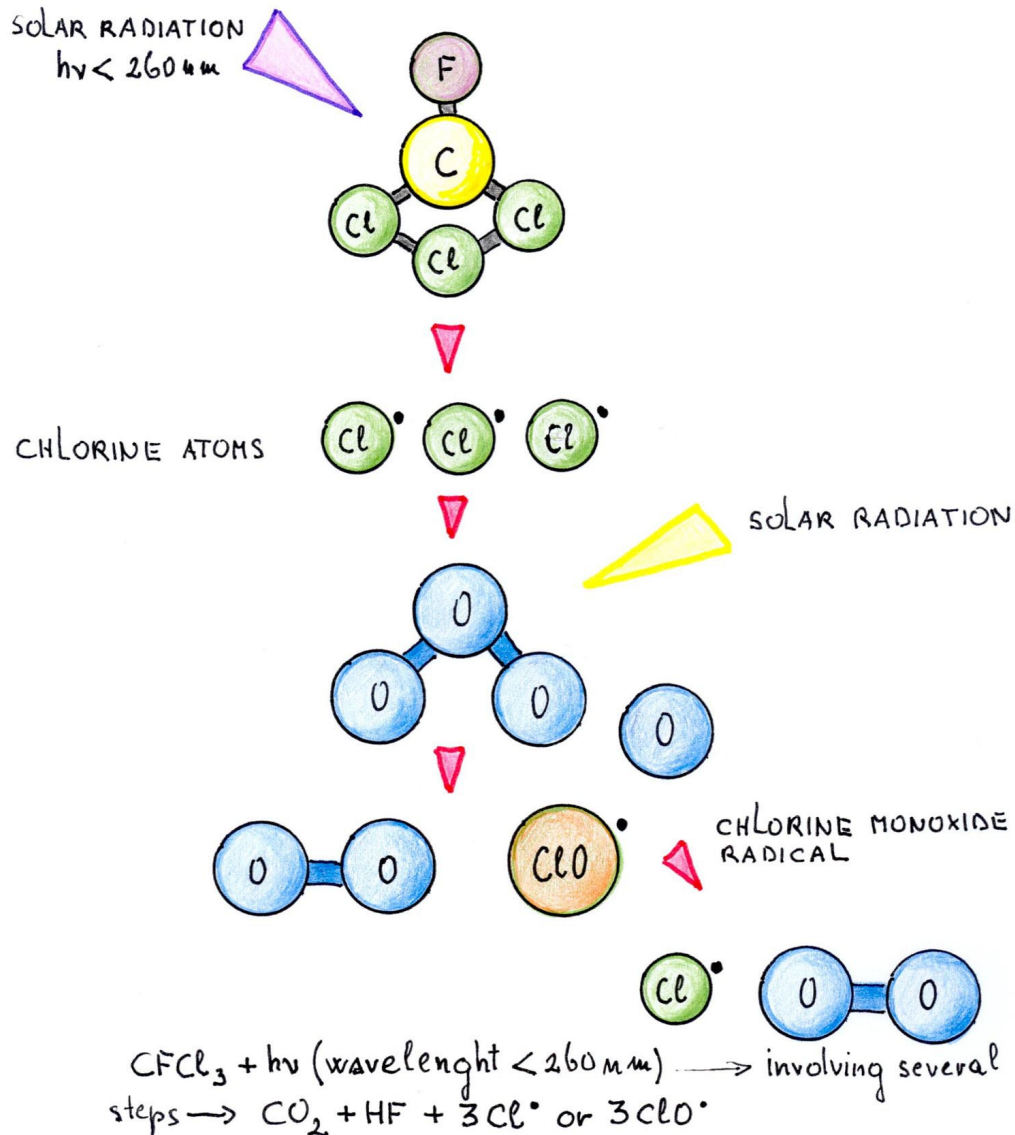
CATALYTIC OZONE DESTRUCTION CYCLE IN STRATOSPHERE INVOLVING WATER VAPOR (H_2O)

+ ABSORBING SOLAR RADIATION OZONE READILY DISSOCIATES. A SMALL FRACTION OF THAT RADIATION HAS ENOUGH ENERGY TO PRODUCE NOT JUST FREE OXYGEN ATOM, BUT A HIGHLY EXCITED ONE.

- FREE RADICALS WITH ODD NUMBER OF ELECTRONS AND THUS HIGHLY REACTIVE

**Drawing No. 12**

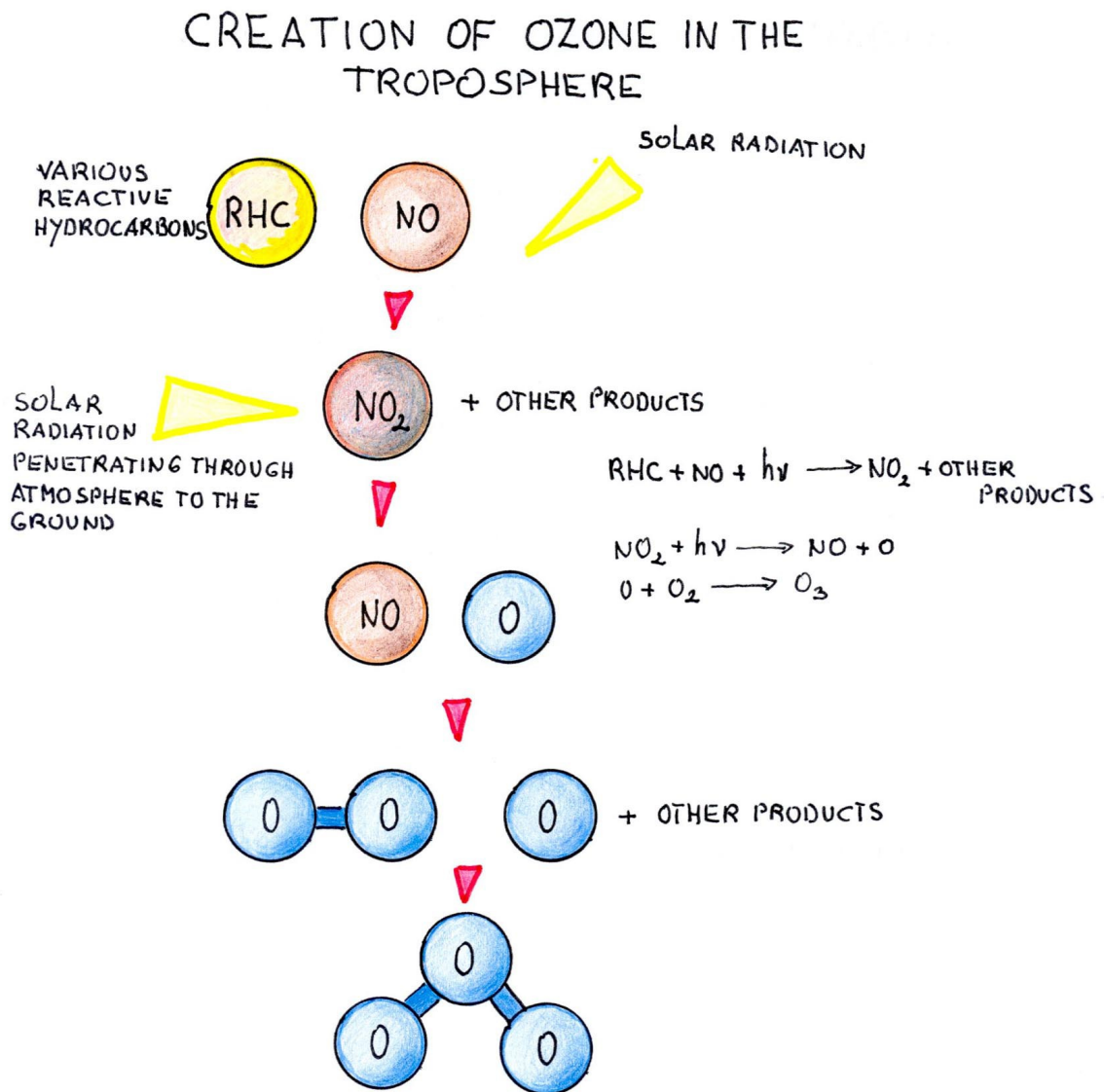
CATALYTIC OZONE DESTRUCTION CYCLE IN STRATOSPHERE INVOLVING CHLOROFLUORO- CARBONS (CFCs)



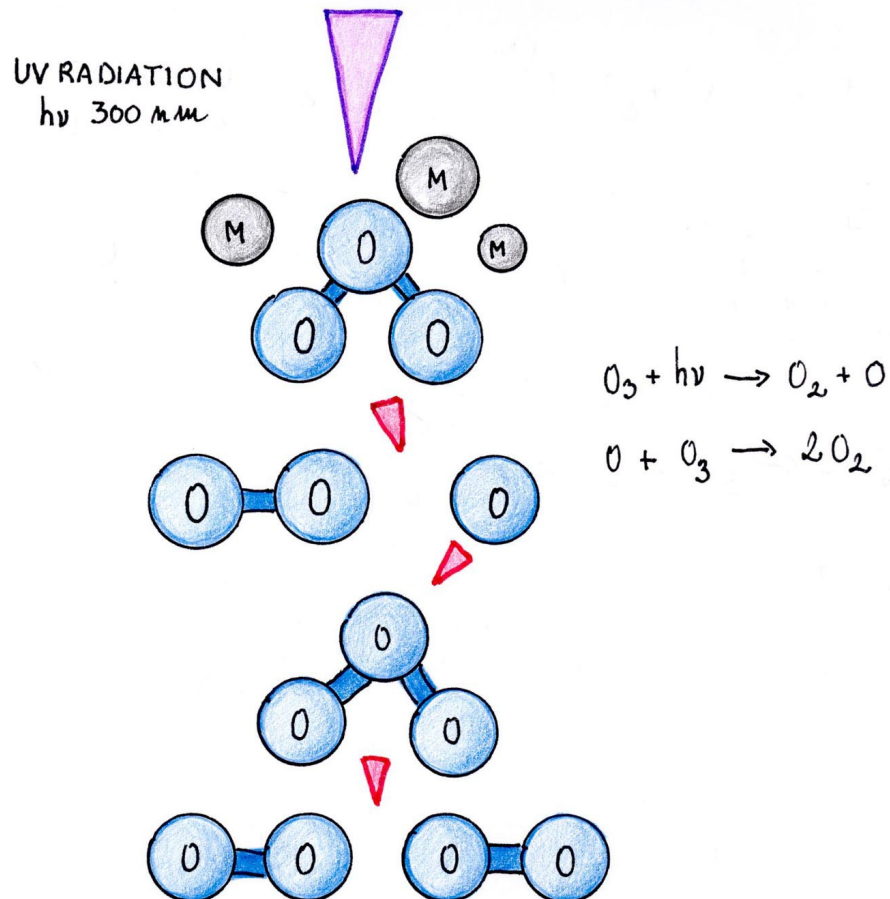
- MINOR AMOUNTS OF CHLORINE ARE ALSO SUPPLIED TO THE STRATOSPHERE BY OCCASIONAL VOLCANIC ERUPTIONS AND BY THE UPWARD TRANSPORT OF METHYL CHLORIDE (CH_3Cl), A PRODUCT OF SEAWEED AND BIOMASS BURNING
- THE NATURAL CHLORINE CONTENT OF THE STRATOSPHERE IS ABOUT 0.6 ppbv, THE QUANTITY SUPPLIED BY CFCs IS CURRENTLY ABOUT 3 ppbv.



Drawing No. 13

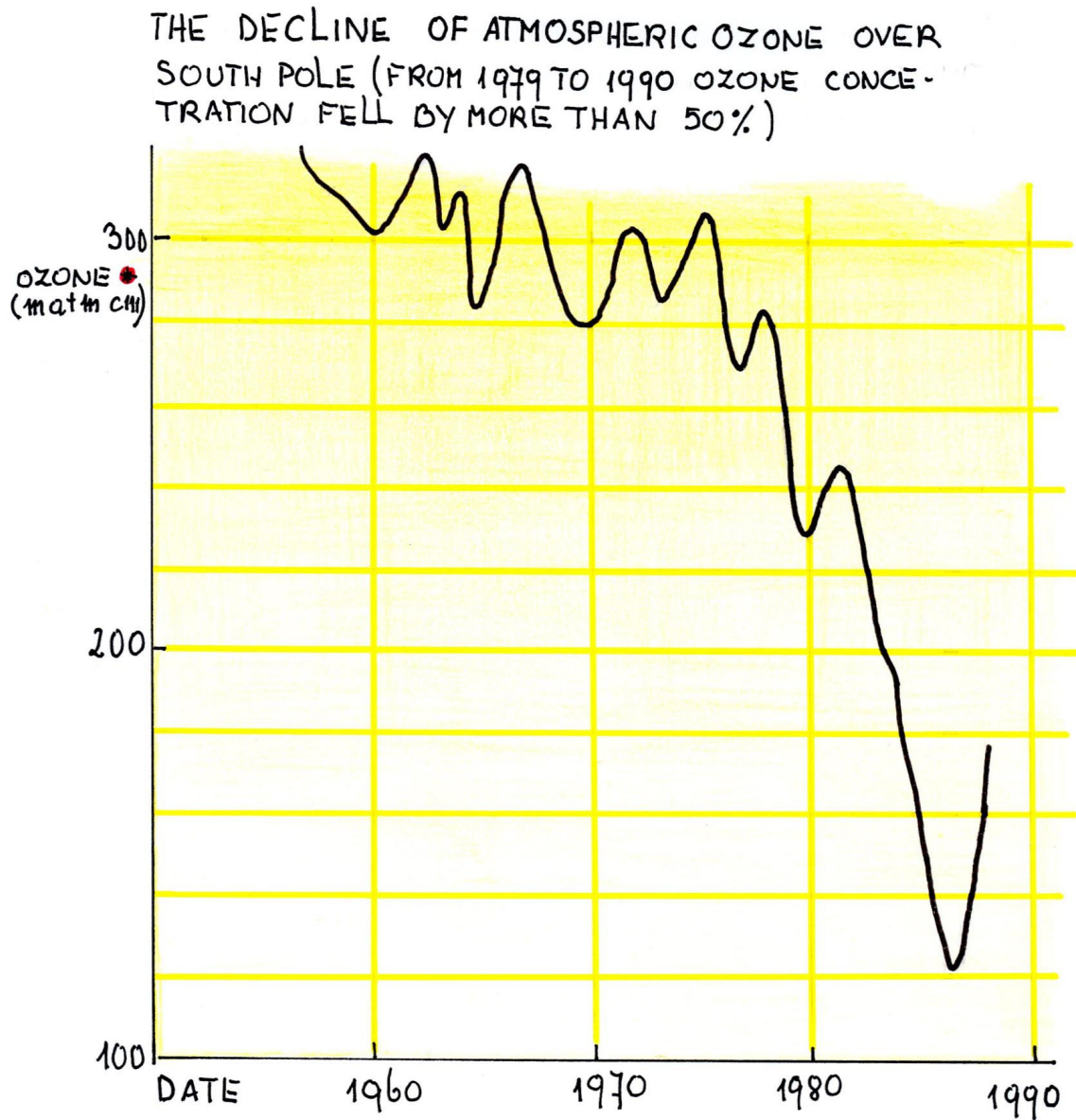


- BEFORE HUMAN TECHNOLOGY PROGRESS, NO_x WERE PRESENT ONLY ON OCCASION, DURING FOREST FIRES OR LIGHTENING FLASHES.
- RHC IN NATURE ARE ALSO EMITED BY VEGETATION (FOR EXAMPLE TERPENES ARE RHC MOLECULES. URBAN OZONE GENERATION IS MOST EFFICIENT WHEN THE RELATIVE PROPORTION OF RHC TO NO_x IS ABOUT 7:1.

**Drawing No. 14****ATMOSPHERIC OZONE DESTRUCTION**

X TROPOSPHERIC OZONE ORIGINATES FROM THE STRATOSPHERE, FROM WHICH IT OCCASIONALLY DESCENDS THROUGH ATMOSPHERIC MOTIONS, SINCE PHOTODISSOCIATION OF MOLECULAR OXYGEN TO PRODUCE OZONE CAN OCCUR ONLY AT WAVELENGTHS SHORTER THAN 240 nm.

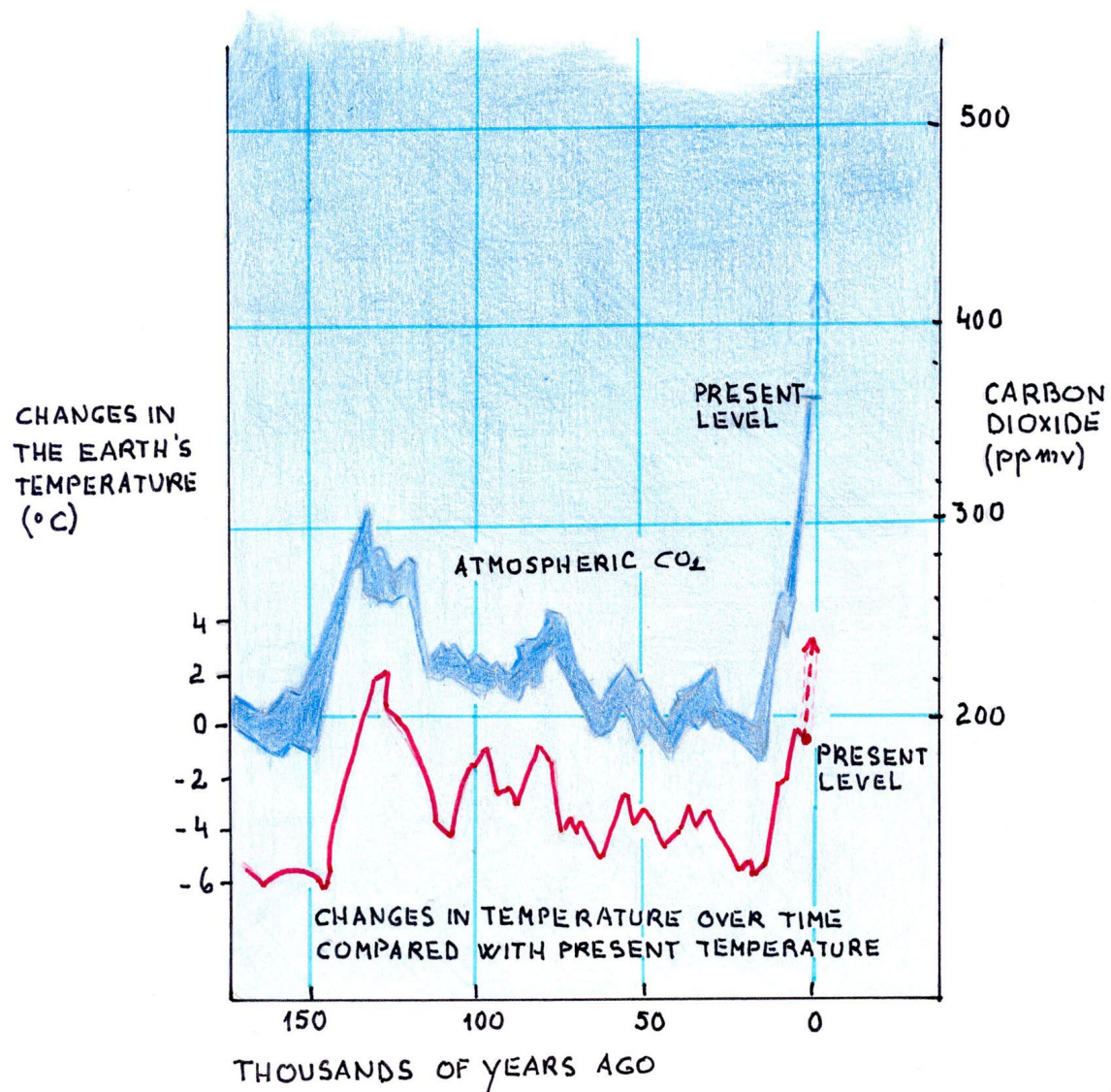
(M) ANY AIR MOLECULE THAT ACQUIRES THE EXCESS ENERGY LIBERATED IN REACTION $O + O_2 \rightarrow O_3$ (FOR EXAMPLE H_2O , N_2 , CFCs, $CHCl_3$..)

**Drawing No. 15**

- A LAYER OF GASEOUS OZONE 1mm THIC A 1 ATMOSPHERIC PRESSURE AND 0°C CORRESPONDS TO 100 matm cm

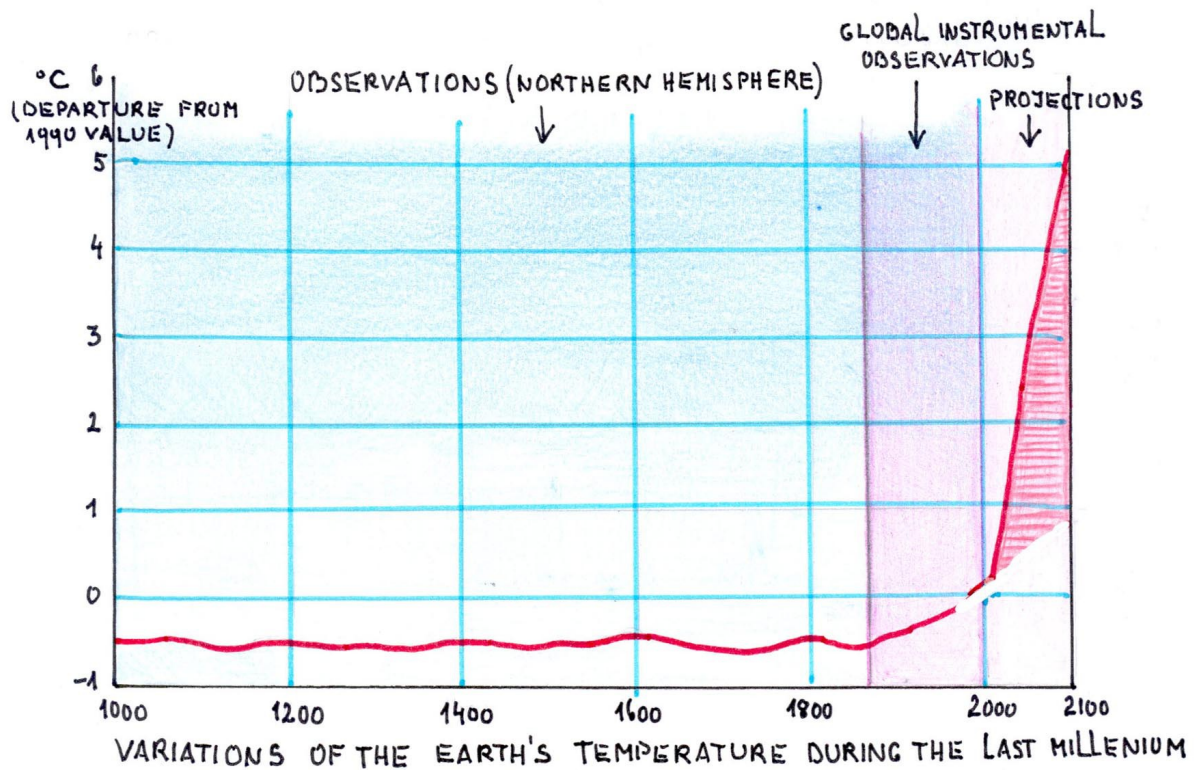
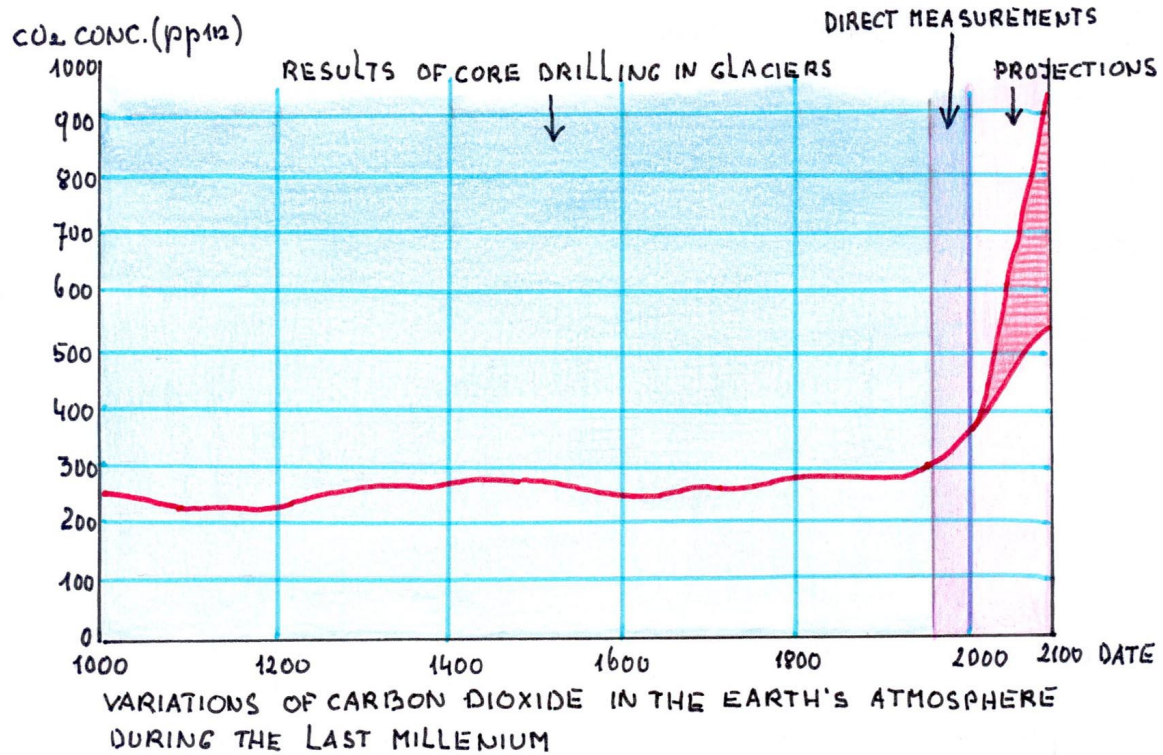


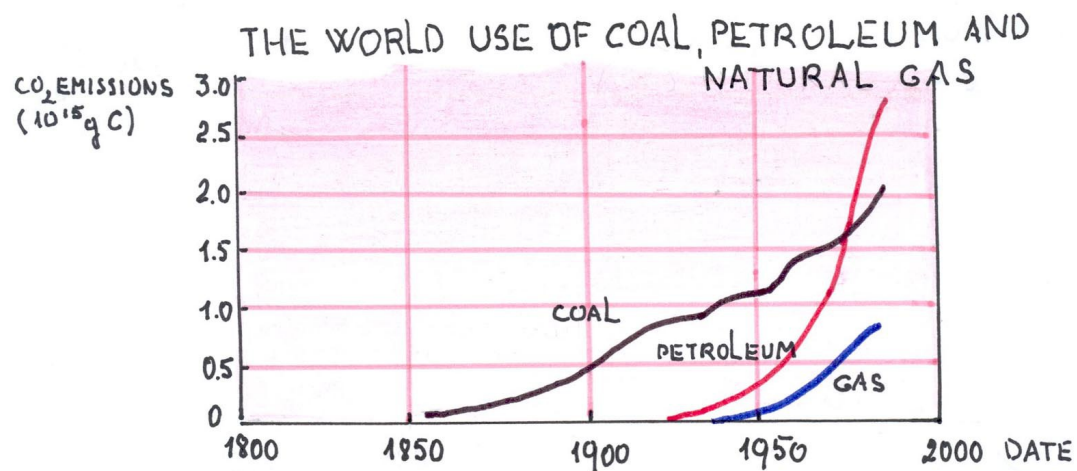
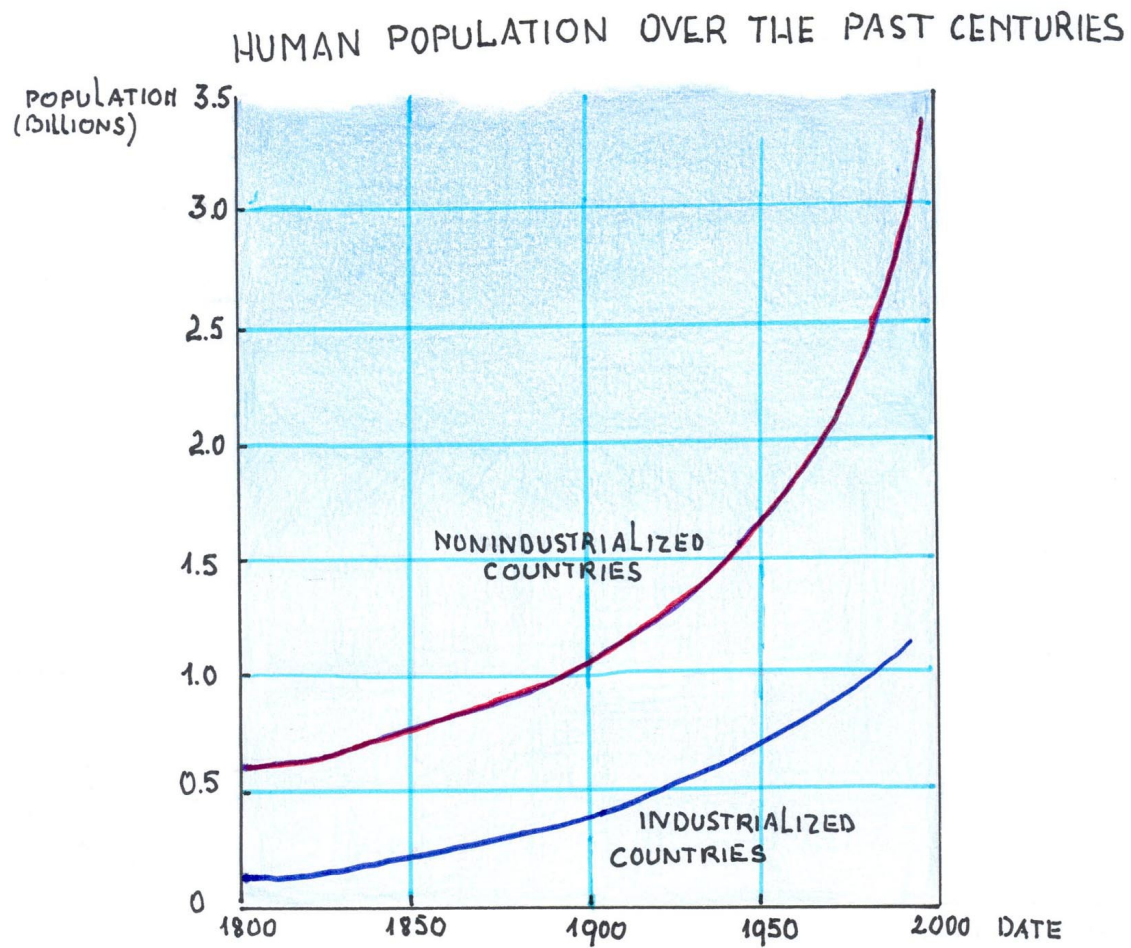
Drawing No. 16

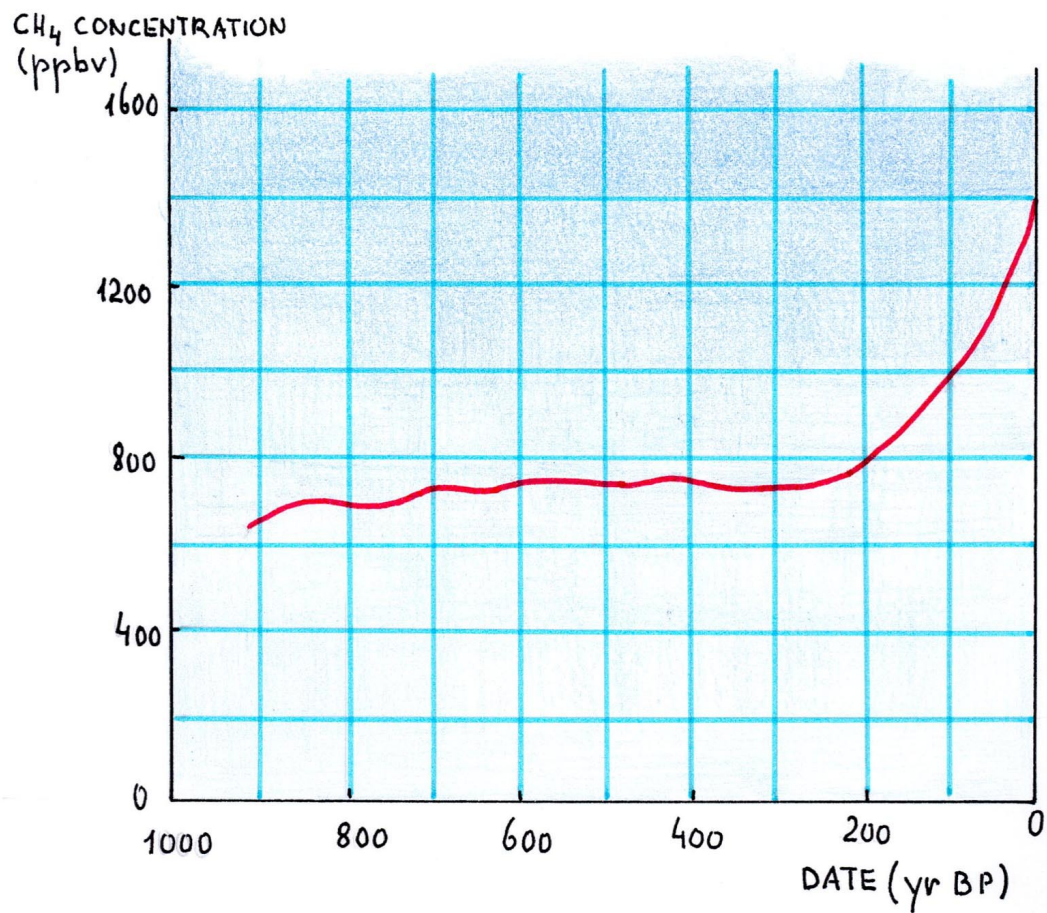
ATMOSPHERIC CONCENTRATION OF CARBON
DIOXIDE AND CHANGES IN THE
EARTH'S TEMPERATURE



Drawing No. 17 Variations of Carbon Dioxide and Temperatures



**Drawing No. 18**

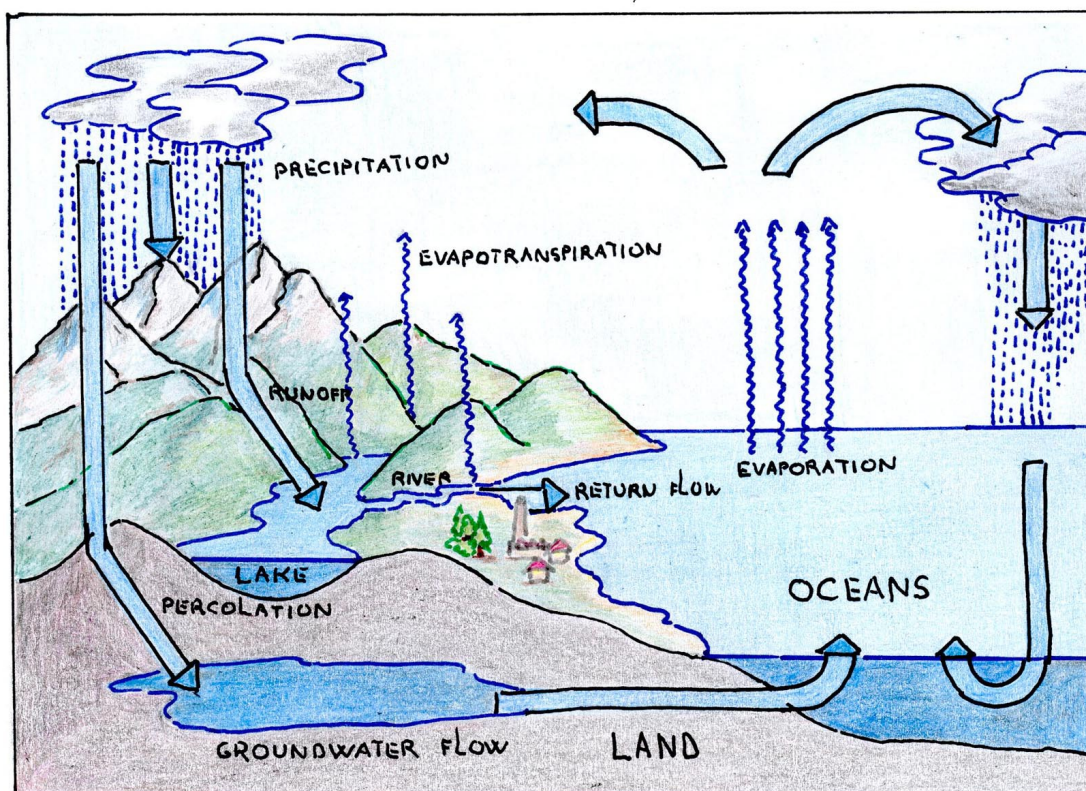
**Drawing No. 19****THE ATMOSPHERIC CONCENTRATIONS OF
METHANE (CH_4) OVER THE LAST MILLENIUM**



Drawing No. 20

THE WATER CYCLE

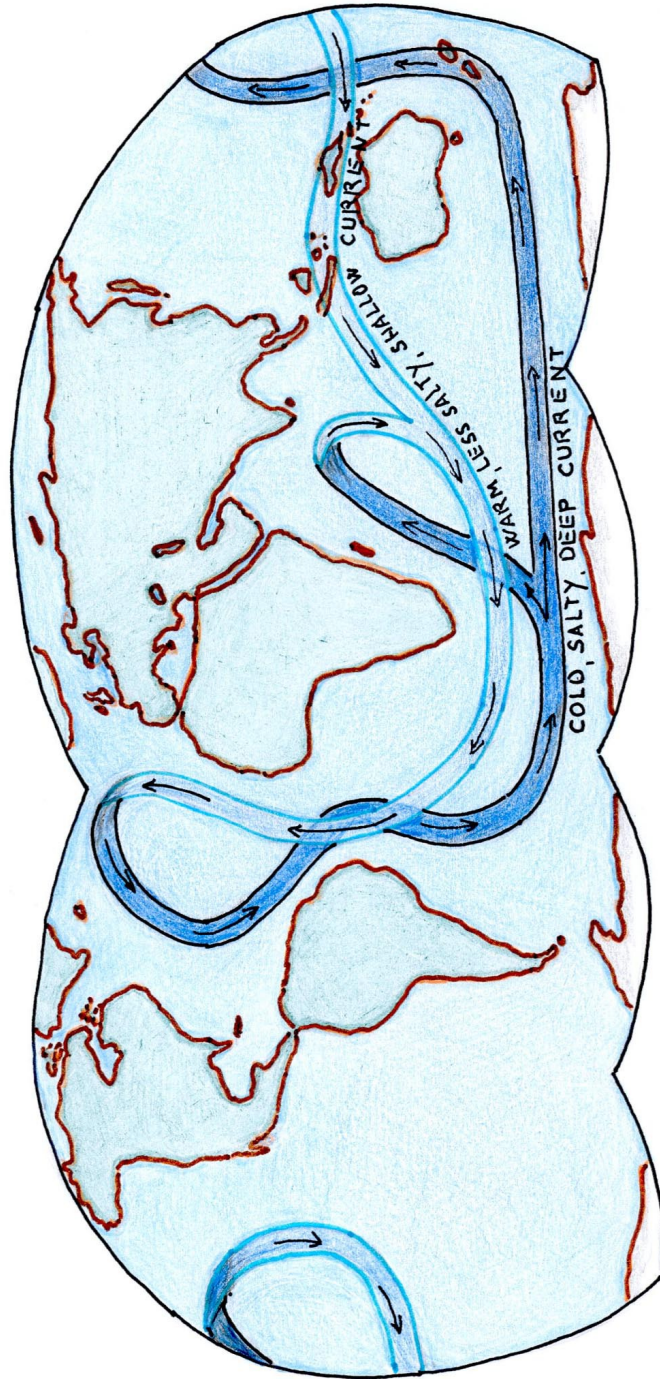
RESERVOIRS OF AVAILABLE WATER ON EARTH		
Reservoirs	Volume(10^6 km^3)	% of total
Oceans	1350	97.3
Glaciers	29	2.1
Aquifers	8	0.6
Lakes and rivers	0.1	—
Soil moisture	0.1	—
Atmosphere	0.013	—
Living biosphere	0.001	—





Drawing No. 21

THE LARGE-SCALE SALT TRANSPORT SYSTEM IN TODAY'S OCEANS

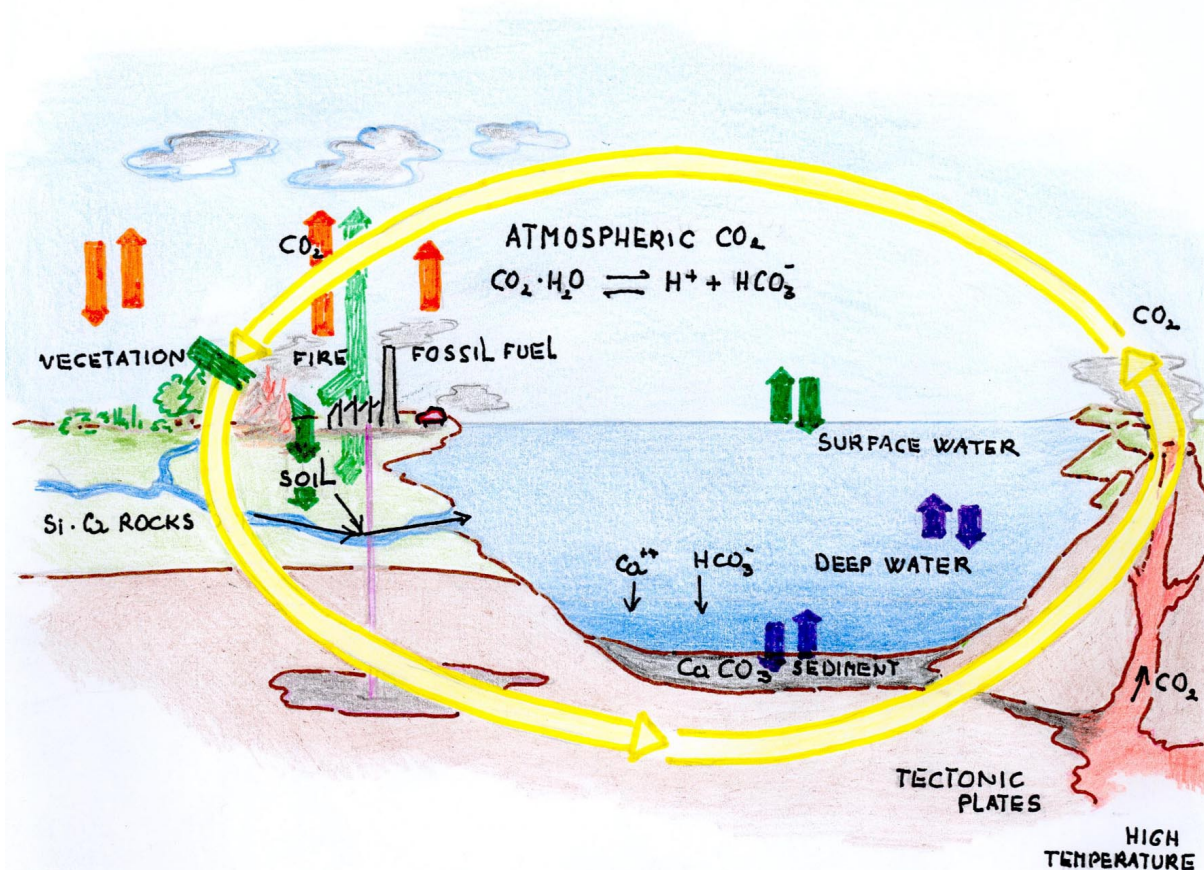


- DEEPER FLOW- THERMOHALINE CIRCULATION - ARISES FROM DENSITY VARIATIONS. WATER IS DENSER WHEN COLD AND/OR MORE SALINE.
- MIGRATION OF COLD, SALTY WATER A FEW THOUSAND METERS BENEATH THE OCEAN SURFACE IS BALANCED BY COMPENSATING CURRENTS CLOSER TO THE SURFACE MOVING TOWARD THE SITES WHERE THE WATER IS SINKING.



Drawing No. 22

PROCESSES IN THE CARBON CYCLE



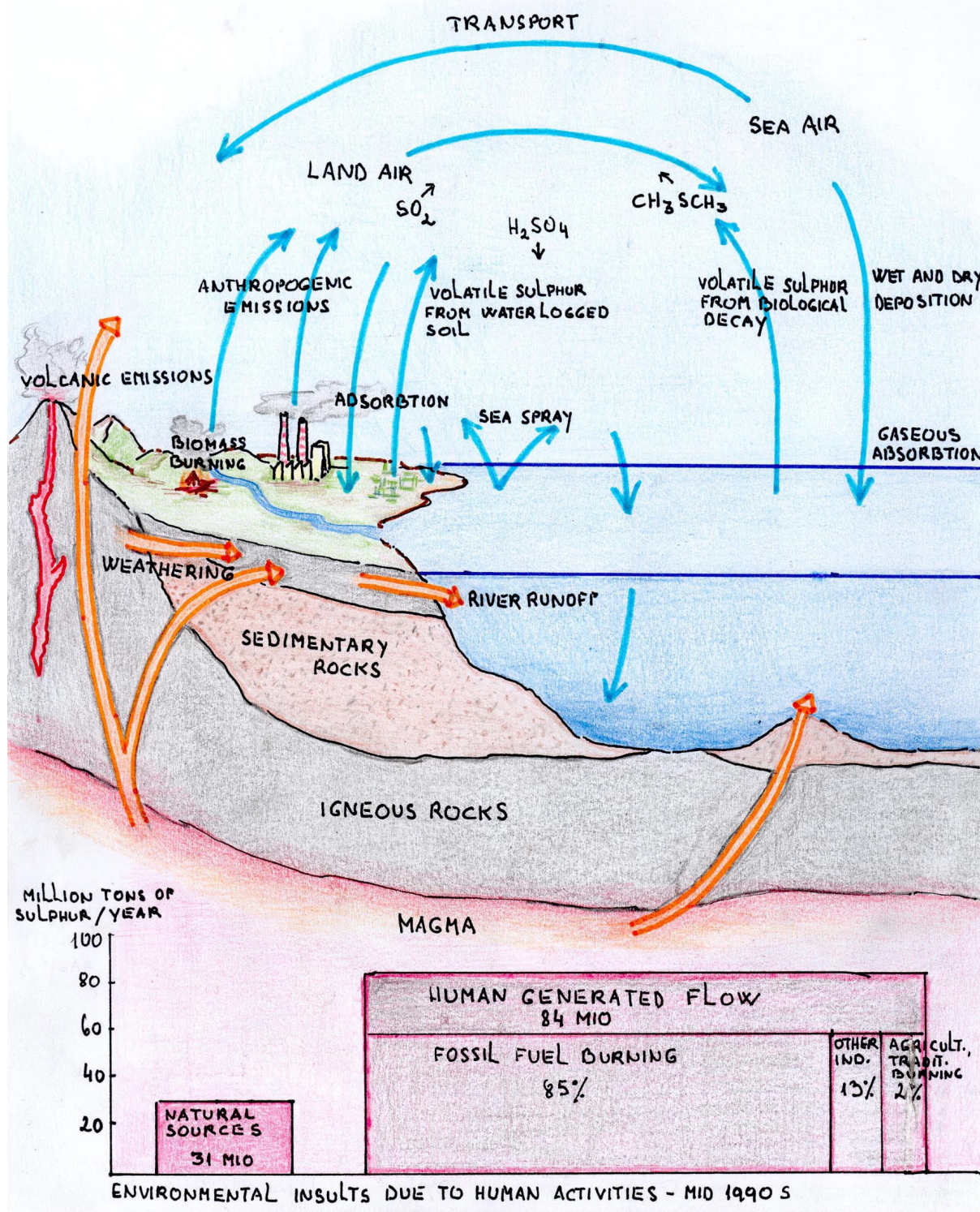
SPEED OF EXCHANGE IN THE CARBON CYCLE

-  Very fast (less than 1 year)
-  Fast (1 to 10 years)
-  Slow (10 to 100 years)
-  Very slow (more than 100 years)



Drawing No. 23

PROCESSES IN THE SULPHUR CYCLE





5.

SEM Institute for Climate Change
Head of Institute Office:
Dr. Timi Ecimovic, Head of Institute,
Korte 124
SI - 6310 Izola - Isola
Slovenia
Phone: ++ 386 5 64 21 360
E - mail: timi.ecimovic@bocosoft.com
Home page: www.institut-climatechange.si



**THE EXTERNAL ECONOMICS: CLIMATE CHANGE AND
SUSTAINABILITY – OWNING THE COST COSTS MUCH LESS
THAN EXTERNALIZING OF COST^{2, 3}**

By

Dr Timi Ecimovic, Head of SEM Institute for Climate Change, Korte 24, SI – 6310 Izola – Isola, Slovenia, timi.ecimovic@bocosoft.com and www.institut-climatechange.si

Dr Elmar A. Stuhler, Chairman of WACRA EUROPE e. V., est. 1984, Hochackerstrasse 7., D – 85356 Freising, Germany, stuhler@wzw.tum.de and www.wacra-europe.org

Prof. Dr Marjan Vezjak, University of Ljubljana, Faculty of Electrical Engineering, Trzaska 25, SI-1000 Ljubljana, Slovenia; marjan.vezjak@fe.uni-lj.si and marjan.vezjak@gov.si

Prof. Emeritus Dr Matjaz Mulej, University of Maribor, Faculty of Economics and Business, Maribor, Razlagova 14, Slovenia; mulej@uni-mb.si

Dr Rashmi Mayur, Director of International Institute for Sustainable Future, Mumbai, India

Prof. Dr Zdenka Zenko, University of Maribor, Faculty of Economics and Business, Maribor, Razlagova 14, Slovenia; zdenka.zenko@uni-mb.si

Prof. Dr Vojko Potocan, University of Maribor, Faculty of Economics and Business, Maribor, Razlagova 14, Slovenia; vojko.potocan@uni-mb.si

Prof. Dr Jozica Knez-Riedl, University of Maribor, Faculty of Economics and Business, Maribor, Razlagova 14, Slovenia; jozica.knez@uni-mb.si

² The contribution was prepared for international conference “54th International Atlantic Economic Conference” Washington, D. C., 10-13 October 2002

³ The contribution is partly based on the research project »Innovative Enterprise in Transition«, sponsored by the Ministry of Education, Science and Sports, Republic of Slovenia, in 1999-2003



Prof. Dr Dusko Ursic, University of Maribor, Faculty of Economics and Business, Maribor, Razlagova 14, Slovenia; dusko.ursic@uni-mb.si

Abstract:

In terms of the theory and practice of the external economics it pays to destroy one's natural environment – but only from a very narrow selection of essential viewpoints. Costs avoided by neglecting one's natural environment, are paid for a lot more expensively to recover it – through taxes, medical expenses, lack of work capacity, life expectancy, etc. A more holistic, and systemic view is hence more economical.

Let us look at this problem from the viewpoint of the climate change. From the viewpoint of nature, the climate change system belongs to the macro systems of the planet Earth. The living conditions within the biosphere are managed by the climate change as a complex system. The relatively stable climate change system has lasted for ten thousand years, and during this time our civilisation has reached its present state.

Triggered by the development of our civilisation, its consumption of natural resources, its production of synthetic chemicals, its life style, and the outcomes, or waste from its nuclear technology laboratories represent the Number One threat to the existence of our civilisation, the second threat being the climate change, reflecting a response to all them by the very nature of our Earth, which is already evolving and seems to be capable of destroying our civilisation. The climate change is at present destroying daily a part of the achievements of our civilisation. Humans fail to feel their/our interdependence with the natural components of the planet Earth and cause this destruction.

Generally, from the anthropological point of view, the climate change system essentially results from the lack of consideration of interdependences and system, and holistic thinking (as a world view exposing interdependence and a methodology making interdependence felt, considered and applied), including business, economics, and management. The life of our civilization on the planet Earth has to be underpinned by a guided action. There is an option for our survival. However, we must put together all our resources, abilities, and action to combat from now on the impact of climate change on the Earth's biosphere. A global mind-set of the decisive persons and organizations may support (informal) systems thinking.

Key words: business, climate change system, economics, management, mind-set, systems thinking

Introduction: The link between climate change and external economics

The present status of the biosphere, nature, space and the environment, the scientific and research-based knowledge at the disposal of humankind, and our civilisation's social system are driving humankind into a kind of self-destruction or a non-sustainable future. Individual, regional, national, and international interests do not allow for a new, more holistic, approach to survival due to one-sided social, financial, political, and bureaucratic pressures, war philosophy, and lack of tolerance between people.



We, the people of the Earth, have to recognise the need for action towards sustainability as a possibility for our survival. Success depends on our responsibility to co-ordinate social issues, and to harmonise the needs of humankind, and the nature, space and environment capabilities.

The present practice on the Earth such as the destruction of all waters by synthetic chemicals, bio and air (rain-induced) pollution, the destruction of air due to land, sea, air traffic, the consequences of wars, the destruction of the ozone layer, agricultural practice destroying soil fertility and producing deserts, global warming, and of course the explosive growth of humankind, etc., cannot be dealt with by simply taking only the single individual, local and national interests into account. They should bear a major responsibility for sustainability of our civilization as a whole and stop being biased – for those and other persons to survive.

The climate change system, which is responsible for living conditions within the biosphere, needs profound research for humans to better understand present and future happenings, especially, when we are dealing with complex social and natural issues, which are in many cases unpredictable. One point tackles rethinking of the concept of the external economics: it says that it pays for you if somebody else covers your cost. If the cost externalisation causes climate change deteriorating the living conditions, etc., the cost is externalised fictitiously and in a short term only. – A more systemic thinking can render such cost unnecessary.

Systemic Thinking – A Brief Description

Leo Troncale, a biologist and systems scientist, puts it very well: Systems Theory is the Science of Synthesis and Integration (Troncale 2002). In other words: it is not good enough, if one says that one uses systems thinking because one defines something as a round-off entity delimited from its environment and calls this a system. Holistic thinking is the point and it hardly can exist without interdisciplinary creative co-operation (Mulej et al., 2000, and earlier, since 1974).

Ludwig von Bertalanffy, the father of the Systems Theory, urged humankind to give up the exaggerated specialization, the thinking as citizens of single countries, and to start considering the entire biosphere taking it as one organization full of interdependencies (Bertalanffy 1968; 1979; Davidson 1983; 2001; 2002; Elohim 2000; Elohim 2002); this is what he called an open system. The history has let us see that most specialists accepted his teaching on a partial basis, limited to an attempt to think rather holistically inside their own selected professions and viewpoints. What results is basically a partially useful and partially fictitious holism. The consequence is that many problems have been solved, but also many new difficulties have been caused such as the climate change. Therefore, let us briefly summarise what we mean by systems thinking.

THE SYSTEM OF THE BASIC SEVEN GROUPS OF PRINCIPLES OF SYSTEMS THINKING

The basic few terms belonging to the concept of systems thinking, may in a summary include the left column, and fight the right column, in *Fig. 1*. (See: Mulej, Zenko 2002):

Systems / Systemic / Holistic Thinking	Non-systemic, Traditional Thinking
1. Interdependence/s, Relation/s, Openness	Independence, Dependence, Closeness



2. Complexity (and Complicatedness)	Simplicity, or Complicatedness alone
3. Attractor/s	No influential force/s, but isolation
4. Emergence	No process of making new attributes
5. Synergy, System	No new attributes resulting from relations
6. Whole and holism	Parts and partial attributes only
7. Networking, Interaction, Interplay	No mutual influences

Fig. 1: The Basic Seven Terms of Systems / Systemic / Holistic vs. Un-systemic Thinking

SHORT COMMENTS TO LINES IN FIG. 1

1) Interdependence/s, relation/s, openness are attributes, which the entire biosphere including the entire humankind has always had very many of, in reality. Humans have not always perceived all of them, as accidents, epidemic diseases, wars, mistakes, etc. tell us. Over the last centuries humans have developed *science* to find out as much as possible about the biosphere including humans. In order to find out *details* of the given facts and in order to be able to use them properly, the *specialization* made, unavoidably, big steps towards concentration on *selected* small parts of reality and its real attributes under the name of specific profession/s.⁴ It is good and crucial to know details, but it is bad to forget that **parts** of reality, details, **do not exist alone**.⁵

2) Complexity is an attribute of reality (and, hopefully, of the human's mental picture of reality, too) expressing one type of entanglement. What complexity denotes are the *attributes resulting from relations, interdependencies*, which mean that these attributes always do exist, but do not always enter the mental picture, if the observer of reality concentrates on parts of this reality and observes them in isolation from the other parts? *Complicatedness*, on the other hand, denotes the other type of entanglement, which applies to *attributes of the parts alone*, seen as entities with no observation of their relation/s with other entities. *Simplicity* (of picturing / modelling the reality and of thinking, basis of decision making and action) comes into existence, when there is no entanglement, or when one is unable and unwilling to observe reality with all / many attributes of its parts and their relations.⁶

3) Attractors – this is an expression, which we can more easily find in the chaos and complexity theories than in the traditional and other systems theory/is. It is another expression for relations and their impact. It attacks the opinion that nature lives in isolated parts, and finds this opinion to be a crucial oversight. Especially interesting has been the notion of *strange attractors*, which basically denotes the surprise of narrow specialists when unexpected attributes showed up, which they did not foresee due to their specialization and lack of a broader interdisciplinary co-operation.⁷

⁴ The contemporary proverb reflecting this history reads: *What I know is a drop, what I do not know is an ocean*. But there is also an old proverb: *Due to caring for a tree, one tends to forget about the entire forest*. And: *The devil seats in details*.

⁵ In the Assembly of United Nations, in fall 2000, the then president of United States said: *We must not forget that we are interdependent*. (Two centuries earlier, United States passed a Declaration of Independence! Both of them are needed.)

⁶ There is a proverb reading: »When you feel capable of mastering a situation, and when you feel incapable of it, you are equally right. « - The same applies to admitting or not admitting the real complexity, complicatedness, or simplicity. It is your attitude which becomes your subjective starting point of your action, its process, and its result, in both cases.



4) **Emergence** – this is again an expression, which we can more easily find in the chaos and complexity theories than in the traditional and other systems theory/is. It speaks of the *process* resulting from interaction of interdependent parts, when they stop being independent and start to influence each other. Attractors cause emergence of new attributes, which are not typical of individual parts as independent rather than interacting entities. If an investigation is limited to the entanglement called complicatedness, no emergence is found, because relations are not the topic of investigation. Emergence does happen anyway. We can discover it, if we concentrate on *complexity, interdependencies, relations, attractors*, rather than on isolation.⁸

5) **Synergy, system** – these expressions denote in two ways the same reality: an entity is made of an ordered set, which is made of two sets, on mathematical formal terms: the set of *parts*, which are considered components of the entity, and the set of their mutual *relations* without which the entity could not differ from its parts. Thus, synergy / system results from the process of emergence of *new attributes*, which are caused by mutual attraction / impacting / influencing / relations / interdependencies of the parts, and which are not caused by the parts themselves and isolated from each other.⁹

6) **Whole, holism** – these terms are the central notions of systems thinking. The above discussion explains this: systems theory came into existence and received public support in times when it was very clear that the terrible destruction of the two World Wars and of the Big Economic Crisis (1914-1945) had been caused by the *lack of holistic / systemic thinking*, which in its turn had been an unfortunate and unforeseen side-effect of the *unavoidably growing narrow specialization*. Narrow-minded individuals (such as Hitler, Mussolini, etc.) were entitled to make decisions with very broad consequences, including many ten million dead humans. As we read, Bertalanffy wanted to prevent the bad consequences of the over-specialization and wanted therefore to provide for **holism as a new worldview** rather than a science of its own narrow scope, e.g. specialized in similarities, only.

A *science about systems thinking* should, like every other science, support its attainment and employment. But, as demonstrated above, the notion *whole*, on Bertalanffy's terms, has come to demand too much in terms of capacities and felt needs of most individuals as specialized persons and professionals. In addition, systems theory and cybernetics of those times did not try to produce *interdisciplinary* and interdisciplinary creative co-operation, but rather tried to produce *isomorphisms*. Isomorphism (= similarities) did allow for transfer of findings and ideas from one speciality to another, but allowed mutually different specialists to keep working in isolation rather than in cooperation. (This is both useful and insufficient for humankind to fight our modern problems.)¹⁰

7) **Networking, interaction, interplays** – these notions express practical ways from one-sided / biased / locked in / tunnel vision specialization to the requisite holism, if we speak of humans and human action. Of course, all three notions express the same process also from the biological, natural viewpoints with no human intervention¹¹.

⁷ This is a point in which the climate change shows up a lot. So does the external cost and its impact on the persons and organizations causing the need for remedies in nature, which are very costly.

⁸ See the foregoing footnote again, please!

⁹ Both the climate and the climate change are such systems / synergies.

¹⁰ The lack of interdisciplinary creative co-operation can be blamed for a lot of human impact over the climate change, too. It allows scientists and practitioners to act on a too narrow basis.

¹¹ Trees, bushes, other plants, animals of different kinds network / interact / interplay to make a wood, a river, an ocean, etc., similarly do cells etc. in a living body, planets in the universe, etc.



The seven groups of attributes of systems thinking apply to nature, technology, and society, including its management.¹² They can be attained or missed, in practice. They are easier to attain with a good formal background in systems theory/is, but they may perhaps also be attainable without it, because they are plain realistic thinking about reality. It all depends on the person/s facing a problem and trying to solve it somehow: they may find holism and hence systemic thinking necessary to a higher or lower degree, consciously or subconsciously. – The higher this degree is, the lower may be the danger for a climate change to show up and threaten the current way of life on the planet Earth.

The Climate Change – A Brief Description

An integral part of nature is the system of the climate change. From the system theory and the natural macro system thinking point of view, we may say that there are macro systems and micro systems. Macro systems are the cosmos, the solar system, the planet Earth, the biosphere, the climate change, etc. Micro systems are individual creatures, aircrafts, automobiles, countries, national governments etc., i.e. technical, socio-economic, political, legal systems, etc.

To be able to understand the need for sustainability, humankind should understand the systems/entities within which we exist, the ones of which we consist, and those we create. It is important, due to the known fact that any system will remain as it is, as long as all (sub-) systems within it are in a similar mode. If and when any major or minor part/s of the system move/s, also their relations change, and the whole system will commence to move. It is not possible to predict in which direction the system will move. This is what is happening at present with the climate change system.

The climate change system, due to the triggering effect of humankind's impact on the biosphere – depletion of the ozone layer, global warming, deforestation, desertification, erosion, input of synthetic chemical substances, consumption of fossil fuels and emission of the resulting waste, etc. – begins to respond in the way a system/entity responds. This means that the living conditions within the biosphere are changing. One important aspect reads: if the mean land mass temperature changes by one centigrade Celsius within 12 months, the change will force extinction of up to 90 % of the known plants. Secondly, it is important how and what will be the evolution of the two major subsystems – (1) the Earth land mass - configuration changes due to a rise of land mass temperature, and (2) sea waters - change in terms of temperature, salinity, currents, ability to store CO₂ (carbon dioxide), expansion due to rise of mean temperature, and possible impact on bio systems: eutrophication, phytoplankton, and other life forms. Not to forget interdependent impacts of both – well known effect of Gulf stream after last ice period protecting/supporting the West European mild climatic conditions.

The climate change system is becoming unstable due to global warming and ozone layer depletion. They are synergies of many one-sided rather than holistic decisions of humans.

¹² In management they may show up as understanding in resolution of conflicts, if the left column in Fig. 1 is used, or in failure to do so and to rather refuse otherness and foster exclusion, if the right column is applied. (Ursic 1996; Jackson 1991; etc.). The climate change results from unsolved conflicts of interests and differences in viewpoints based on different values and knowledge, as we e.g. see in the process of implementation of the Kyoto Protocol.



Each and every one of them may look OK, if the selected viewpoints let the so-called side-effects aside and let them fall in the external rather than own cost, which is a consequence of humans' forgetting about the interdependencies between themselves and other parts of nature.

Scientifically it is possible to correct global warming by fostering phytoplankton reproduction and its resulting consumption of CO₂ (carbon dioxide), which may correct global warming. But if it is used without scientific control, it may produce another Ice Age and hence the end of our civilisation. So we are at this point, as the antic Romans would say between Scylla and Charybdis: there is a myth talking of two equally dangerous locations on the sea route from Greece to Rome, through which boats had to sail, failing either through the evils of Scylla, or in case of avoiding them, through evils of Charybdis. According to that myth many ships sunk. – A clear case of one-sided thinking rather than a systemic one.

Without an appropriate, i.e. systemic, holistic, human intervention in the future, the climate change system ultimately will change the living conditions within the biosphere, and the geography of the Earth so much that our civilisation will collapse.¹³ Sustainability is aimed at.

Sustainability – a Brief Description

Recognising the need for change of our civilisation's impact on nature, space and environment or biosphere, beginning with world thinkers in second half of XIX and during the twentieth century, as well as during the new millennium we have been beginning to become aware of that need for change. Commencing with "Our Common Future" and other reports related to the Rio Earth Summit 1992 and afterwards, the need for sustainability of our civilisation has become an officially felt reality. Unfortunately, international, national and regional politics, governments and bureaucracies, who approved Agenda 21 for Change, which is a document outlining the major domains of activity aimed at the sustainable development, did not do much for its implementation.

The implementation of the policy agreed at the Rio Earth Summit 1992, individual approaches of the politicians and national governments as well as of the international groups of states (even today the president of USA does not agree with data about the status of the climate change) is slow. Therefore the North – South relationship, the G – 7 countries relations, the globalisation, and many other complex processes show a lack of implementation of the Local Agenda 21 Processes. Therefore we cannot discuss major achievements of the sustainability, but we may discuss possibilities of sustainable life.

Without a strong support of an independent research community¹⁴, appropriate teaching, lifelong learning, and the development of a general public understanding of our situation, it is hard to believe, that sustainability may succeed. The present experience with deterioration of

¹³ A total holism is the only real holism, according to the dictionary (Webster 1978). It includes a total system of all viewpoints, which humans can no way attain. Therefore the Mulej/Kajzer law of the requisite holism (Mulej, Kajzer 1998; Rebernik, Mulej 2000; Potocan, Mulej, Kajzer 2001; Potocan, Mulej, Kajzer 2002; Mulej et al. 2000; Mulej, Zenko 2002a; Mulej, Zenko 2002b) enters the scene. It reflects the reality that everybody takes the responsibility for their own selection of viewpoints to be taken in account, and for their consequences. The broader the dialectical system resulting, in the case of the climate change and the human impacts over it, the better may be the humans' chances of survival. They can never be total; of course, the Universe makes its impact, too, not only humans (Korlevic 2001).

¹⁴ Politically independent (to avoid one-sided pressures) and professionally interdisciplinary and interdependent (to find rather holistic solutions), actually.



the natural systems within the biosphere – land degradation, desertification, deforestation, pollution of waters and air, global warming, social complex problems – lack of tolerance, war philosophy, money-based democracies, explosion of the population, etc., are claiming our civilisation to adopt new approaches towards sustainability, i.e. changes of life style, changes of governing systems, protection of nature, space and the local natural environment as well as whole biosphere. Our civilisation must make a new impact toward an eco-remediation for a sustainable future.

It is necessary to work out an action plan for a better implementation of sustainability of our civilisation worldwide. – Why?

Impact of the Climate Change on the Society

The climate change has had an increasing impact on the biosphere, nature, space and the local natural environment with increasing catastrophic consequences during the fourth quarter of the 20th century and present time, and is hence taking its toll on lives and properties all around the Earth. In the USA and countries around the Atlantic, the toll was very high, too, but due to narrow national thinking, the major cause, being “the climate change system” and the system of impacts over it – was not recognised. The reason is that our thinking patterns do not allow us, as unavoidably specialized and localized persons, to see connections, interdependences, and interactions outside our conventional restrictions of thinking. The climate change system is a very complex issue and needs system thinking, analysis, case methodology and complex problem solving techniques for humans to understand networks and to communicate them to the local experts, non-governmental groups, municipalities and local communities.

At all levels of society the changes are at an early stage. Commencing with “what mothers are transferring to babies”, preschool education, school education, life-long learning, social systems, national and international governing and interdependences. The present toll, already being paid by humankind, is already causing more damages, than the production of any individual sector of our civilisation’s economy, for instance armaments production and sales, or tourism industry. But due to the lack of integral information it is not recognised as such.

Knowledge and Ethics of Interdependence – the Basis for Businesses to Achieve Their Own Goals and to Do Something Good for Solving the Climate Change Problems

The climate change problem has to do with all of us. To a critical degree it emerges from the human business interest to keep one’s effort and cost as low as possible (Hawken 1994; UNESCO Courier 1999, 2000, 2001, many contributions). This is the first impression and it is called in basic economics the external economics: my potential cost becomes somebody else’s cost. It is a first impression only because such a calculation makes a serious oversight such as: what I save by putting garbage to the nearby forest, river, swamp, air (through the factory or home chimney etc.), returns to me in the form of the cost for taxes, which are needed to cover the cost of medical problems, revitalization of rivers, cleaning devices in the chimneys, cars, etc. Hawken is quite right when he suggests a change of taxes, a transition from the taxes that support one-sided thinking, decision-making, and action of businesses (and individuals acting as businesses concerning their own pockets) – to taxes supportive of an environment friendly type. The point is not in additional taxes, but in their switch. In Slovenia, too, such a research is going on, right now (UMAR 2002; ib revija 3, 2001).



In other words, the systems thinking are only fictitiously more complex and expensive than a one-sided one. The systems thinking is complex to carry out, but it causes less oversights and hence less complex consequences. It can take place more easily if specialists, who unavoidably have rather narrow views and interests, come to understand that they are better off if they cooperate with other specialists, different mutually. It is our experience that they find it much easier to do when and if they feel mutually dependent, i.e. interdependent. And it is even better, if the interdependence comes to be a part of their ethics, because it is ethics which teaches us right from wrong – and does so on criteria we select ourselves (Mulej, Kajzer 1997 and later).¹⁵ – A more global mind-set of the decisive persons/organizations might help.

Global Mind-set

Based on the dynamic changes taking place, there is a need to have global managers with a global perspective, or mind-set. Globalization has preceded, in many cases, the abilities of managers to deal with the new and complex realities. There are still many managerial mind-sets that are completely out of tune with the requirements of today's global business requirements (Kedia and Mukherji, 1999). The focus or orientation of managers has shifted from the level of the individual manager to that of teams and groups, and indeed the target now is the entire organization that needs to be trained and reoriented to face the remaining global challenges (Tichy, 1992).

Development of a global mind-set for both managers and their respective firms is considered necessary to compete in the hypercompetitive global market. A mind-set is a way of being, not a set of skills. It is an orientation to the world that allows you to see certain things that others do not see. A "global" mind-set means that we scan the world from a broad perspective, always looking for unexpected trends and opportunities to achieve our personal, professional, or organizational objectives (Rhinesmith, 1992). A global mind-set is global thinking placing high value on sharing information, knowledge, and experience across national, functional, and business boundaries and on balancing competing country, business, and functional priorities that emerge in the globalization process (Pucik and Saba, 1998).

Global managers with a global mind-set will have characteristics that include: ambition, enthusiasm, language skills, teamwork, flexibility, willingness to travel, breadth of interests, and computer savvy (Chase, 1998). The primary goal of the global manager is to act as a catalyst within the organization. Here the global manager has to be sensitive to cultural diversity, manage cultural diversity, value this diversity, and leverage the differences in a meaningful way (Kets de Vries and Mead, 1992). Thinking globally means extending concepts and models from one-to-one relationships to holding multiple realities and relationships in mind simultaneously, and then acting skilfully on this more complex reality (Lane, Di Stefano, and Maznevski, 1997).

People with global mind-sets tend to approach the world in a different way such as: 1) driving for a bigger, broader picture, 2) accepting life as a balance of contradictory forces that must be appreciated, pondered, and managed, 3) trusting organizational processes rather than structures to deal with the unspecified, 4) valuing diversity and multicultural teamwork and

¹⁵ Somebody who does not understand the problems of climate change and their impact on his or her own life, as well as his or her own impact on the climate change, has ethics that is different from somebody who does understand these problems and, in addition, values them as important.



team play as the basic from which to accomplish their personal, professional, and organizational objectives, 5) flowing with change as an opportunity, and are comfortable with surprises and ambiguity, and 6) continuously looking to be open to themselves and others by rethinking boundaries, finding new meanings, and changing their direction and behaviour. These six put more succinctly as characteristics are: knowledge, conceptualization, flexibility, sensitivity, judgement, and reflection. (Rhinesmith, 1992).

Business leaders and managers will have to increasingly look for ways to redefine their strategies and realign their organization to the new and more complex realities of the hypercompetitive global environment. This is the challenge for global managers: to articulate a viable global strategy, facilitative and develop supportive processes by which globalization can be managed, and create appropriate conditions by which the overall strategy, process, culture and structure can be meaningfully aligned to achieve organizational effectiveness (Kedia and Mukherji, 1999).

There seems to be a broad spectrum of possibilities to shape the global mind-set including the composition of top management, a strong focus on visions and processes, encouraging network-building, employee selection and career path planning. However it should be borne in mind that developing a global mind-set is a lengthy and time-consuming process. The globalization process demands new global visions, structures and processes in which these visions are conceptualized, articulated and implemented by managers. Hence the global mind-set is an essential requirement of global managers who are expected to lead their organizations into the future and orchestrate worldwide expansion programs (Paul, 2000).

The focus of global leadership development efforts must be aimed at developing the capabilities required to lead and manage organizations in the multinational, multicultural, multilingual, multimedia world that defines relationships with colleagues, subordinates, suppliers, customers, competitors, affiliates and parent organizations (Bonnstetter, 2000).

Some conclusions

To a serious extent, the climate change problems, as a part of the problems of sustainability and sustainable development, are a consequence of the lack of (1) understanding that they result from oversimplification of thinking, decision-making, and action, which (2) results from the lack of understanding of the really existing and hard-to-see relations, especially interdependencies, which (3) result from the lack of knowledge and ethics of interdependence, which (4) result from the lack of systems thinking (and the resulting requisite holism), (5) which results from education (by school, public media and interpersonal relations) fostering a narrow specialization that is unavoidable, of course, but can rather easily be completed up by education for and practice of creative cooperation of mutually different specialists. The Local Agenda 21 opens a lot of room for it, but keeps being neglected. In the name of saving money, one spends much more than saves. But the narrow specialization makes most people blind, especially in the issues as broad as the climate change: too bad – for all of us humans.

References

The contribution is based upon a party independent and party networked, co-operative scientific work of authors within the issues of biosphere, nature, space and environment protection, the climate change system, the systems thinking, economics, and management.



The topic is discussed in the forthcoming book on The System Theory and The Climate Change, written by Dr. Timi Ecimovic, Prof. Dr. Matjaz Mulej and Dr. Rashmi Mayur.¹⁶

6.

WORLD PEACE AND TOLERANCE

By:

Dr. Timi Ecimovic (1)

The presentation of the “World Peace and Tolerance” has been written for International Conference – “World Peace and the Message of Mahatma Gandhi”, 5th October 2002, Vienna, Austria.

The Abstract:

World peace is a precondition for sustainable future of our civilisation, which is an integral part of the living creatures of the planet Earth biosphere.

Present status of the biosphere has been manipulated by humankind of our civilization due to bad understanding of long term responsibilities towards nature, space and environment protection. The present world society is reflecting disturbed health due to misuse of money system and science.

Main threats to humankind of this civilization are coming from own activities (nuclear technologies as first, followed by climate change system, wrongly directed scientific research, misuse of money system, etc.) and weak politicians knowledge of proper management of the global society as well as national and local one's.

Key words: world peace; sustainable future; tolerance;

The article:

WORLD PEACE AND TOLERANCE

During last ten years of the second millennia were killed in war accidents more people as during the Second World War 1939 – 1945 manipulated by fascist of Germany, Italy and co-operating countries.

During USA intervention against terrorist in Afghanistan 2001 - 2002 more explosives were used as during the Second World War bombarding of Germany.

¹⁶ The scientists who, besides the authors, contributed to this contribution by their work or ideas include: the late Prof. Dr. Dr. Helmut Metzner, Tübingen, Germany; Prof. Dr. George Pethes, Budapest, Hungary; Prof. Dr. Slavko Kulic, IOM, Zagreb, Croatia; Richard Bartak, CSM, Prague, Czech Republic; Prof. Dr. Micheal O Suilleabhain, Cork, Ireland; Dr. Marion Hersh, Glasgow, Scotland; Prof. Dr. Glen Martin, USA; Prof. Dr. Danijel Verhovsek, Limnos, Ljubljana, Slovenia; Prof. Dr. Nina Dorofjeva, Ukraine; Yogi Shanti Swaroop, India; Prof. Dr. Elohim J. L., Mexico, and Mautendorf, Austria; and many others working with us in the past and present.



Letting nuclear technologies running out of laboratories has caused more long terms damages to the environment as any other single technology of our civilisation “achievements”.

Money earning synthetic chemical products has caused significant damages to the nature, space and environment, and present one of major threats to humankind of this civilization. In this activity lays responsibility for triggering effect of the climate change system, which is second threat to sustainable future of our civilization.

All above stated tragedies (and many more not stated tragedies at all levels of the society) are result of non-tolerance amongst peoples of the earth.

That is why I am stating following:

“PRECONDITION FOR SUSTAINABLE FUTURE OF OUR CIVILISATION IS TOLERANCE AMONGST PEOPLES OF THE PLANET EARTH AND CONSEQUENT PEACE”

It is not possible to have peace on the earth just because peoples of the earth understand need for peace, due to countless different individual/group/national or international interest. Unity of peoples of our civilisation could be achieved when common enemy could be recognised. And at present we have common enemy, which should be taken into consideration, and is not recognised as such – climate change system impact to the biosphere.

The climate change system impact to the biosphere of the planet earth at present is taking large toll on daily basis – Central Europe floods 8 – 15 August 2002, South France floods 5 – 10 September 2002, and many other events (floods, droughts, extreme winds, fertility of the agriculture soils, fertility of the oceans waters, etc.) around the earth, which are at present counted for natural events, and should be recognised as impacts of climate change system.

The climate change system impact ultimately may and will cause destructions, which will bring to end our civilisation existence at the planet earth, and only chance of the peoples of the earth is in united action for mitigation of the climate change impact.

I think we may conclude with statement that we have recognised common enemy of the peoples of the earth - climate change system. All other threats are an integral part of our civilisation – nuclear technologies, money system, marketing oriented productions for making profit, war incidents, armament industries, transport system (explosive engines with over one billion in function), energy consumption, CO₂ and global warming, social problems, corruption of the politicians and international/national bureaucrats, etc., which could be explained with thirst for power, greed, lack of tolerance and peace.

What is tolerance?

According to Longman Dictionary:

The quality of being able to suffer pain, hardship, etc.

The quality of allowing people to behave in a way that may not please one, without becoming annoyed,



And according to Webster's New World Dictionary 1986

**A tolerating or being tolerant, esp. of views, beliefs, practices, etc. of others that differ from one's own,
Freedom from bigotry or prejudice.**

And in my research it is ability of humankind individual to live together with others.

As M. K. Gandhi says (3):

"I have nothing new to teach the world. Truth and non-violence are as old as the hills."

I may add: "Tolerance is as old as hills"

As Jeffrey Abramson Professor of Law and Politics at Brandeis University has stated (2):

"Tolerance of diversity (diversity of peoples as well as of ideas) is the great achievement of liberal societies and I would not for moment suggests any retreat from the inclusive and non-discriminatory laws that put tolerance into practice. But when the law merely constrains human behaviour without changing it, then the potential for backlash is always present, especially in difficult times. This is why I will argue that liberal societies ought to ask more of their citizens than merely to accommodate or non-discriminate against others. Liberalism ought to build on the habits of non-discrimination to foster in citizens an appreciation of the contribution diversity makes democracy.

The limits of tolerance are both practical and philosophical."

With my comment: Tolerance is quality of individual.

And as Prof. Dr., Dr. h. c. Felix Unger, The President of European Academy of Sciences and Arts has stated (2):

"Tolerance is in our genes. Our approach to evaluate the mean variations, elements of imprecision and bandwidths in life is, moreover, a result of our upbringing. We keep making value judgements: usable, unusable, good or bad. In doing so, we build up our personal existential protection; while at the same time we create the lever that gives us access to our neighbour. Thus, living together with others will always stand in relation to life's central values. Tolerance helps us to co-exist and is ultimately bound to the fundamental values of life. It is a virtue"

With my comment: Tolerance is an integral part of Homo sapiens social behaviour.

And as Mahmoud Zakzouk, Minister of Religious Affairs of Egypt has stated (2):

"Thus, tolerance is based on the premise that a man makes a conscious effort to behave in a just and fair way. For if a man shows tolerance only for sake of personal benefit and not for the sake of fairness, such tolerance is shame. The Koran provides us with example of what we could call "active tolerance" which amounts to more than mere sufferance: "Allah fortieth you



not those who warred not against you on account of religion and drove you not out from your homes, that ye should show them kindness and deal justly with them. Lo! Allah loved the just dealers.” (Sura 60,8)

With my comment: Tolerance should be a part of us, regardless the religion.

And as Jan Pholipp Reemtsma, Philosopher and President of the Hamburg Institute for Social Research has stated (2):

“The word tolerance has a good ring to it, especially if you do not have to think too much about what it means.

And in preamble: Tolerating people with other beliefs should not be seen as something admirable, but as something completely ordinary. Campe”

With my comment: I agree.

Conclusion:

Let us hope that our society will overcome present thirst for power, greed and corruption of the politicians and international/national administration, and will foster tolerance as path for achievement of peace and sustainable future.

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Dr. Timi Ecimovic, Head of SEM Institute for Climate Change, Korte 124, SI – 6310 Izola – Isola, Slovenia, home page: www.institut-climatechange.si and e – mail: timi.ecimovic@bocosoft.com

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7.

Dr. Timi Ećimović, Prof. Emeritus Dr. Matjaž Mulej, Dr. Rashmi Mayur

SYSTEM THINKING AND CLIMATE CHANGE SYSTEM

Anthology 2 – 2001 - 2014



**(AGAINST A BIG “TRAGEDY OF THE COMMONS”
OF ALL OF US)**



Korte, Slovenia, 2002



From our first the Noble Price nomination book we have selected following:

FOREWORD – EXECUTIVE SUMMARY

In this book we are trying to assist our readers to more easily and better understand the following *findings*:

- Life, even survival of us, the modern civilization, depends a lot on conditions provided by the nature in which we all live, and by the climate change system as an essential part of it.

- Nature, climate and climate change system are *no simple systems* (features, entities, and processes), but complex and complicated (see chapters with “TR” in titles).
- So far humans have not been sufficiently successful in their influencing the climate and climate change system: the dangerous consequences result from *too much one-sidedness* of humans, and suggest humans to use more systems/holistic thinking. (See chapters with no TR in titles)
- Most people do not know enough about how usable and useful is *system thinking* when one deals with many, rather complex, life issues, including climate and climate change system.
- This book, we hope, will help us all to live better, even prevent a big “tragedy of the commons” – the end of all of us, which is caused by partial measures causing broader, even global effects!

We humans live on Earth, which is a *small, but integral part of the Universe*. We are able to live here due to suitable climate and other living conditions. All over the billions of years of the existence of our planet Earth, the climate has kept changing. The impacts causing this changing, in general, result from natural processes and/or human interventions. Both kinds of impacts can cause consequences, which are both good and bad by human criteria. E.g. from a rather one-sided/narrow/shallow/oversimplifying viewpoint the changes in the human life over the last 2 – 3 centuries are bringing the so called *progress*: more comfort, a higher standard of living on the basis of the many technological and non-technological innovations. But from a more holistic/broader/systemic/complexity-facing viewpoint we see that the same changes tend to cause our own *extinction*. Which is the *correct viewpoint*? The usual answer would read: the common sense. But the modern experience demonstrates very many destructive consequences of the “common” sense, i.e. the *one-sided viewpoint* as a usual basis of thinking, decisions making and acting, which is normal with all of us individuals as specialists knowing a small fragment of reality. So, at least since the UN (humankind’s highest political body) has planned for “*sustainable* (i.e. no short-term and nature-destroying) *development*”, the humankind of today knows: we should better apply the “uncommon” sense, i.e. the holistic/systemic thinking. Each and every individual human idea, decision, and action may seem to make a small, even negligible impact, but the consequences of all of them together may be tremendous.

In the case of our climate, our human actions tend to cause our own *self-destruction*, because we tend to *lack holism*, both in our knowledge, values, emotions, and resulting actions.

It is hard to believe what we, as humankind, know about the world and the universe. Many well-known issues and insights, however, are fragments of the whole, and we have to understand the whole on the basis of fragments without knowing the whole. And what is the whole, where are limits of fragments, and what are issues of a whole? We, the authors of this book, think *the whole is everything*, and all other features are issues within/without inferior and superior systems/wholes/entities making partial or (fictitiously) absolute whole/s.

We think the *absolute/only/total whole* is what we humans call the *Universe*.

Now, how to understand our own role as humans within the Universe, when our understanding of the nature, space, environment is evolving/innovated from fragments, which have never been put together to allow for a holistic insight?

The present human civilization is following a path to destruction, because it is built on the *unrealistic premise of unlimited resources* – profit at any cost – without accountability and responsibility to humankind of the current and the next generations. Many hard issues of today could have been less



hard, if the thinking process had not taken the paradigm of the narrow-minded profit motivation alone, as the single priority in the active and demanding role of the “developed world”, followed by the “developing world”.

The natural evolvment, which has only one direction – the dynamic multidimensional evolvment ahead, does not include its own payment system, profit, financial institutions, and all other innovation of great importance for our civilization of today. The nature has its own absolute knowledge, energy, matter, ability and possibility to construct systems/entities according to the existing information, matter, and energy of its own. The question is “Why is there a planetary system like the Solar System?” and the answer is “We do not know, but we think that it is a result of the available natural information, energy and matter”.

Does this mean that we have to abandon the existing economic system aimed at profit? It may be impossible to do in the short run. At present we need economy as a social sub-system, and with development of the inter-human relations into a globalize unit, we may find ourselves within a social order with an equitable and just economic system. The point is not in profit as a quantity, but in **human attitudes** behind the style of economy it represents, especially the one-sidedness of thinking, decisions making and acting. Why?

What happens is that **profit kills profit**: the *external economic theory* teaches us to consider the cost that we cause e.g. by pouring toxins in a swamp – an *avoided cost*. But it is actually a *shared cost* that we all cover by taxes, health problems and resulting medical costs, etc. This is a case of “*the tragedy of the commons*”. The side-consequences, in the case of human impacts ruining the climate conditions as preconditions of our survival, tend to become the central consequences. But they are still considered uncertain, as long as the common sense is the narrow rather than requisitely holistic thinking, decision-making, and acting.

What is certain, hence, is that the time has come for our civilization to make a decision about our future, including our own very near future. That decision, we believe, will take us forward to a sustainable future, if a requisitely holistic thinking comes to *complement* the usual narrow specialists’ thinking. It should help us see that we are not independent, but **interdependent**, i.e. needing each other and needed by each other, because we all are specialists. And we all live on the same planet Earth, which we cannot produce. But we can kill/ruin it.

Black/white, shallow/deep, good/bad, positive/negative, primitive/civilized, and many more coupled terms could be put together and enable us humans to see the origin of interdependences, interactions and co-operation of the natural systems. What was first “hen or egg”, “innovation or routine”? The answer is obvious, but rarely taken into account: they are interdependent, as soon as we consider the natural dynamics, not only a moment (which does not exist on its own anyway). So are specialized professionals, needing **creative interdisciplinary co-operation** as their/our shared way out of the blind alley of a too narrow thinking and action.

People, values and knowledge have been making an epic song of our civilization, which has been going on since humans have existed. And so has other nature, including climate and climate change. We people are a part of nature, although this has been admitted less over the last three centuries than ever before. The *climate and climate change reflect this interdependence*, which we may never forget about in order not to suffer another “tragedy of the commons”.

“Tragedy of the commons” is, hence, an expression in the economic literature describing the consequences of decisions favoring one-sided, narrow interest to more holistic, broader ones. While T. Ecimovic and M. Mulej were spending a week in Washington, D.C., in October 2002, a discussion revealed a close link between cases of the “tragedy of the commons”: in China, the government stopped limiting the number of cattle, sheep and goats per square mileage. Entrepreneurial, but one-sided (i.e. normal) individuals made these numbers outgrow the natural capacities. Their land is converting to desert. Similar decisions and resulting processes have been taking place all over the Earth throughout history. But the industrialization and globalization periods brought an essential difference: “*the tragedy of the commons*” is becoming global. We still can stop this dangerous process. – This is what this book is all about.

Coauthors:



Co-authors of assigned chapters:

Dr. Majda **Bastic**, assoc. prof., University of Maribor, Maribor, Slovenia

Dr. Vesna **Cancer**, assist. prof., University of Maribor, Maribor, Slovenia

Dr. Robert G. **Dyck**, prof. emer., Virginia Polytechnic Institute and State University, Blackburg, Va., USA

Maria v. **Gagern**, 4. Welt Kooperative e.V., Munich, Germany

Dr. Stefan **Kajzer**, prof. emer., University of Maribor, Maribor, Slovenia

Dr. Jozica **Knez-Riedl**, assist. prof., University of Maribor, Maribor, Slovenia

Korado **Korlevic**, researcher and manager, Stars Observatory, Visnjan, Croatia

dr. Tanja **Markovic-Hribernik**, assoc. prof., University of Maribor, Maribor, Slovenia

Nastja **Mulej**, manager and editor, New Moment, d.o.o., Ljubljana (all: Slovenia),

Dr. Vojko **Potocan**, assist. professor, University of Maribor, Maribor, Slovenia

Karli **Udovicic**, MBA, owner and manager. Kogal Group d.o.o., Sentilj v Slovenskih Goricah, Slovenia

Dr. Gerald **Steiner**, Karl-Franzens University, Graz, Austria

Dr. Elmar A. **Stuhler**, Technical University Munich, Freising, Germany

Dr. Sonja **Treven**, assoc. prof., University of Maribor, Maribor, Slovenia

Roshni **Udyavar**, International Institute for Sustainable Future, Mumbai, India

Dr. Stuart **Umpleby**, prof., George Washington University, Washington, D.C., USA

Dr. Dusko **Ursic**, assoc. prof., University of Maribor, Maribor, Slovenia

Dr. Marjan **Vezjak**, prof., University of Ljubljana, Ljubljana, Slovenia

Dr. Zdenka **Zenko**, assist. prof., University of Maribor, Maribor, Slovenia

SPACE-GUARD – MYTH OR REALITY?^{17, 18}

I will leave the introduction to a scientist, a wordsmith, one of the most recognized bards of science fiction and the author of the cult SF novel »Space Odyssey 2001« - Arthur C. Clarke. He's the exception among writers because he personally, as a scientist, shaped the time we live in today, weaving his future worlds within the peaks of today's science. From his books arise the futures, which are becoming reality, today, slowly.

MYTH

One of his novels, »Rendezvous with Rama« (1973) cuts a little deeper into the future, depicting a dark scenario that alarms and teaches us. Here's the excerpt from the novel's first page:

Rendezvous with Rama, by Arthur C Clarke CHAPTER ONE - Space guard

¹⁷ Korado Korlevic

¹⁸ Head of the Visnjan Observatory, the best astrometry observatory in Europe, Visnjan, Croatia



»Sooner or later, it was bound to happen. On 30 June 1908, Moscow escaped destruction by three hours and four thousand kilometers - a margin invisibly small by the standards of the universe. Again, on 12 February 1947, yet another Russian city had a still narrower escape, when the second great meteorite of the twentieth century detonated less than four hundred kilometers from Vladivostok, with an explosion rivaling that of the newly invented uranium bomb.

In those days, there was nothing that men could do to protect themselves against the last random shots in the cosmic bombardment that had once scarred the face of the Moon. The meteorites of 1908 and 1947 had struck uninhabited wilderness; but by the end of the twenty-first century, there was no region left on Earth that could be safely used for celestial target practice. The human race had spread from pole to pole.

And so, inevitably, at 09.46 GMT on the morning of 11 September, in the exceptionally beautiful summer of the year 2077, most of the inhabitants of Europe saw a dazzling fireball appear in the eastern sky. Within seconds it was brighter than the sun, and as it moved across the heavens - at first in utter silence - it left behind it a churning column of dust and smoke.

Somewhere above Austria it began to disintegrate, producing a series of concussions so violent that more than a million people had their hearing permanently damaged. They were the lucky ones.

Moving at fifty kilometers a second, a thousand tons of rock and metal impacted on the plains of northern Italy, destroying in a few flaming moments the labor of centuries. The cities of Padua and Verona were wiped from the face of the earth; and the last glories of Venice sank forever beneath the sea as the waters of the Adriatic came - thundering landwards after the hammer-blow from space.

Six hundred thousand people died, and the total damage was more than a trillion dollars. But the loss to art, to history, to science - to the whole human race, for the rest of time - was beyond all computation. It was as if a great war had been fought and lost in a single morning; and few could draw much pleasure from the fact that, as the dust of destruction slowly settled, for months the whole world witnessed the most splendid dawns and sunsets since Krakatoa.

After the initial shock, mankind reacted with a determination and a unity that no earlier age could have shown. Such a disaster, it was realized, might not occur again for a thousand years - but it might occur tomorrow. And the next time, the consequences could be even worse.

Very well; there would be no next time.

A hundred years earlier a much poorer world, with far feebler resources, had squandered its wealth attempting to destroy weapons launched, suicidal, by mankind against itself. The effort had never been successful, but the skills acquired then had not been forgotten. Now they could be used for a far nobler purpose, and on an infinitely vaster stage. No meteorite large enough to cause catastrophe would ever again be allowed to breach the defenses of Earth.

So began Project SPACE-GUARD. «



REALITY

Is such an introduction just another bizarre idea from a writer, just to make the novel a bit more interesting by adding a strong, bloody beginning? Probably not, maybe yes?

Statistical references of collision probability and the historical facts are *unfortunately real*; the writer's poetic license just added the destruction of a good part of Europe and half of humankind's of today cultural treasures. In this scenario the other side of the Adriatic is not mentioned, but there wouldn't be much left here, either. Before that, an earthquake would shake us, far stronger than any quake our planet could produce. Then the water from the Adriatic would rise as a tsunami wave and take over a part of the hinterland.

Put aside his literary value, A. C. Clarke still remains a careful follower of scientific and technological trends. Just before this novel a few scientific works came up *doubting the »pure« evolution of life on Earth*. These works pointed at the black layers of clay that separate geological layers as proofs of the *colossal ecological disasters* that took place in eras of the past. According to those scientists, the majority of plants and animal species would have suffered in these catastrophes.

Monolithic criticism by the scientific establishment of that age was cast against those authors and their works. Nevertheless, A. C. Clarke recognized in them not the »Velikovski-like catastrophists¹⁹«, but rebels who dared to *question* the paradigm of *heavenly harmony* and *universal predictability* that the science of astronomy shared back then.

And...?

And he saw that their arguments were justified, that the puzzle they were putting together was yet incomplete, but still the wholeness of the picture was quite visible - clear and presents **danger**.

A danger bigger than any previously suspected and the probability that such an event could one day even bring our civilization to an end. He saw the pictures of Earth colliding with comets and asteroids in the past and the future as imminent.

In the novel »Rendezvous with Rama« he gave his support to those plotters and today they give back with gratitude. Projects

Searching for potentially dangerous
bodies in the Solar system

were given the name »Project and Foundation SPACEGUARD« in honor of A. C. Clarke.

¹⁹ The novel "Worlds in Collision" by Immanuel Velikovski regarded the End of the World with naïve pseudoastronomical explanations outside the laws of physics. Regardless of the obvious quackery, the novel offered answers to questions science was not able to answer. The novel was immensely successful, with the number of languages it was translated into as well as with the negative attitude of entire scientific community towards any research regarding issues from the novel.



What did Luis Alvarez, Eugen Shoemaker, Brian Marsden, Tom Gehrels and a few others try to prove to their colleagues some twenty years ago? Has the proof about the possible danger and impacts of the past they presented been strong enough?

Yes, but science was still unprepared to accept catastrophic change alongside the all-accepted gradualism of evolution. The explosion in Tunguska and the iron shower in the far eastern Russian mountain range of Sihote -Alin that were mentioned in the introduction of Clarke's novel are only a small part of the information on that subject. Geological and mathematical stories are harder to read and tell, but it was *geologists and mathematicians* who found a ***dissonance in the ruling harmony of the universe***.

Mathematicians had found the orbits of some bodies chaotic, some twenty years before the theory of chaos was accepted. On the Earth geologists have been finding colossal valleys edged with mountain chains of rubble rocks with glass ends and glassed edges, some with a kilometre and some hundreds of kilometres in diameter, and craters, which were not the consequence of volcanic eruptions. In these indents on Earth core crystals have been found that can only originate in extreme circumstances that couldn't possibly be produced on Earth surface, apart from the impact from out of space. They watched and kept in their hands the traces of past collisions of Earth with mountain-size objects that smashed the Earth with the speed twenty times faster than gunshot. Everything was suggesting that even more potential »villains« were hiding somewhere in the dark of the night.

SMALL SPACE OBJECTS HITTING JUPITER

Prompted by these findings, geologist Eugen Shoemaker, alongside his wife and friends, started the quest for something that so far has not been observed flying past the Earth. Something so small, just a few kilometers in diameter, and so fast that the ordinary telescopes were unable to see it. Then more and more of these special objects, ***asteroids and comets*** started to be discovered. Hundreds of objects quickly approaching Earth on their lengthened trails around the Sun were found. Statistical analysis of what has been discovered shows that somewhere out there, there are probably *thousands* of potentially dangerous bodies bigger than one kilometer and very hard to find. Nevertheless, in 1993 one unusual object called »comet SL-9« was found. After a few days of observation, mathematicians from the Center for Small Objects came out with some unbelievable news: » In one year from now 22 pieces previously known as comet SL-9 will hit Jupiter! «

That news was hard to accept. Is it our turn to become the witnesses of what we thought was impossible? Someone must be wrong, we thought.

After a year of preparing telescopes, space probes, computer simulations, came the day of the first impact. It hit Jupiter on the far side, but the splash of thrown up matter rose high above the edge of Jupiter. Due to the planet's orbital progress, a hot scar was still visible from Earth's telescopes an hour after the impact. The ***energy released*** by the collision was thousands of times greater than the one that all our nuclear resources could release together. On average, another impact followed every seven hours 22 times in a row.

Along with the impact of the ice and silicates-made comet, dark dust rose above Jupiter's white clouds and its movement within the planet's atmosphere was easy to see for months.



After that event, *collisions* between sky objects were no longer hypotheses, charts and curves. Now it was a *reality*, right in front of our eyes. Under public pressure, the US Congress ordered NASA and USAF to protect our planet from similar dangers.

SMALL SPACE OBJECTS HITTING THE EARTH

In military research facilities simulations were underway. Instead of Jupiter, the one remaining particle of comet SL-9 was about to hit Earth. The result would be destruction never thought possible. The majority of plant and animal life would be wiped out, *climate disorders* would remain for hundreds of years after the impact, and our civilization would not survive. So,

A couple of years ago a new era began
in the way we comprehended the Universe.

Out there is hidden **the biggest of all enemies** humankind has ever had to face.

PROJECT SPACEGUARD

Project »Space guard« was created for our defense. Its task was to *discover, track and destroy* anything that could represent a threat to planet Earth. New observatories were erected; the old ones were reinvented to tackle the new task: to watch the Earth's immediate neighborhood.

Inspired with new findings during the past years, historians and anthropologists started to connect the Australian Aboriginal legends of the »wall of water« that had come into the desert, or mummified fish from the deserts of Chile. With computer simulations of gigantic waves of ocean water, which arise following the impact of an asteroid or a comet into the ocean? The atavistic fear of a human of today towards comets was suddenly seen with new eyes. And, naturally, there arose a connection of description of floods with the Biblical flood. Astronomic knowledge of our ancestors tells us that the roots of tracking the skies cut much deeper into the past than we thought. All these are just parts of the big picture that show us that the End of the World is something normal, periodical and has so far been unstoppable during our millions of years of history.

IN SEARCH OF STONE DEBRIS FROM THE UNIVERSE

One of the centers of a worldwide computer web, which connects data gathering telescopes, is in Visnjan²⁰. Those telescopes, night after night, film the skies in search of dangerous stone debris. We're all in a **big hurry**, now that we know that the yearly probability of impacts is 1:100,000. This probability, which is rather higher than we ever imagined and a probability that creates discomfort and calls for action. We need twenty years, just twenty years at our current rate of discoveries.

²⁰ One of these observatories operates in Visnjan and at this moment a new one is being built in central Istria, Croatia. Its task will be to take over observing newly found objects indicated to represent imminent danger by preliminary parameters. Apart from the instruments, some students are also having specialized training for that task.



Yes, our civilization had some luck during the past six thousand years.

Hopefully for twenty more to come as well...

SOME CONCLUSIONS ABOUT IMPACTS FROM UNIVERSE OVER THE CLIMATE²¹

It is not only the humans of today who cause the climate change and have been so for long, long times, and it is not only the nature on the Planet Earth, but it is also the nature out there in the Universe. This empirical novelty does not allow us humans to sit back and to wait for the impacts from the Universe to ruin our conditions of life, or to go on to think one-sidedly and pollute the planet Earth. The information of the chapter 6.8 reads more like that:

Let us urgently extend our definition
Of our requisite level of holism
To an even broader horizon than
The one, which LvB has urged us to accept.

And let us accept the experience: Even if an elephant is made of chocolate, it is eaten in many small bytes, with a lot of endurance and permanent work. Let us do more work on preparation and realization of the Local Agenda, Local Agenda 21, documents with scientific findings and political agreements about the actions concerning the climate change. And let us – as individuals and small groups of specialists – work on issues, which are closest to our local part of the Planet Earth and our own profession/s and capacity of co-operation! And let us be dynamic and creative (see Ch. 4 and 6.9 for some general guidelines)!

²¹ Matjaz Mulej