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Energy - Environment Nexus in Eco-Civilization

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ABSTRACT

In this study, electricity, heat, and biofuel production from biomass are demonstrated to be important components of the eco-civilization era. The production of fuel in farmlands and the practice of Under-Tree Agriculture (Agroforestry) in the area where "energy crops" in combination with multiple-function trees are grown are emphasised as highly effective means of combating the phenomenon of climate change. Combatting climate change to achieve the "Negative Carbon Emission" goal will characterise the eco-civilization era. The overarching aim is "Negative Carbon Emission". Farm Forestry (Agroforestry) / Inter-cropping / Energy Farms makes up the major theme of the study to fulfil the function of biofuel production and "Carbon Sink" together. Through these practices, a reduction in greenhouse gas emissions into the atmosphere is envisaged with a simultaneous reduction in the existing greenhouse gases accumulated in the atmosphere. In this way, it will be possible to take steps towards the goal of "Negative Carbon Emission" in the way of establishing an Ecological Civilization by overcoming the existing dominant order, which is the sole responsibility of the phenomenon of global warming and the resulting climate change phenomenon.

Keywords: Agroforestry, biofuel, climate change, energy farm, negative carbon emission

Introduction

WHEN THE TERM "ECO-CIVILIZATION" was first introduced in the 1980s, the concept was understood and accepted widely by various circles as a set of social and environmental reforms to be carried out within a society with no radical transformations. The broad and necessary reforms for modern societies laden with social injustices and negative contributions to the natural environment were subsumed originally under the concept of "ecological civilization". The reforms would supposedly aim at creating a more developed social order to ensure a sustainable change in an evolving process.

Eco-civilization, with revised implications, now represents a new world order in which the relationship between man and nature is harmonised and where ruthless competition is replaced with cooperation. Eco-civilization heralds a new world order that surpasses the capitalist system, which has brought life on earth to the brink of total extinction and replaces it with a much more developed, human dignity. In this sense, the redefined concept echoes "The City of the Sun" (by Tommaso Campanella) in which a decent order takes place across the world. For one thing, this is not a utopia. Humanity stands at a crossroads between eco-civilization and mass extinction.

Today's dominant world-system, while consuming the resources of the world for the sake of self-actualisation (in the sense of A. Maslov), has transformed human beings into unnatural creatures that are seemingly enemies of the ecosystem. Global warming and related climate change are the sums of human actions that are guided and shaped by the collective consciousness of the capitalist system.

In the article titled "Ways of Training Individual Ecological Civilization under Mature Socialist Conditions" published in 1984 in the journal "Scientific Communism" that was being issued in the former Soviet Union, the concept of eco-civilization was expressed for the first time (Ye, 1988). Three years later, in 1987, in China, Prof. Ye Qianji (Ye, 1988) adopted the idea of eco-civilization and touched upon this concept in his works (Gare, 2009).

Later, at the 17th National Congress of the Communist Party of China (CCP) held in 2007, the term Eco-civilization was included in the Central Commission Report by Pan Yue, who was the Director of the State Environmental Protection Administration (SEPA). Since that time, it has been adopted as one of the key policy principles (Pan & Zhou, 2006).

Ecological civilization will replace "non-ecological civilization" with a revolutionary and radical transformation in the social order.

The 18th National Congress of the CCP in 2012 acknowledged that environmental problems in China have reached a gigantic scale, especially in big cities. These include air pollution, pollution of drinking water resources, soil erosion, and more. The phenomenon of climate change due to global warming has come to the fore as the central, growing issue.

The President of China, Xi Jinping, emphasised eco-civilization at the 18th Congress. Eco-civilization, which is expressed in the phrase "Beautiful China", has become a topic President Xi attributes increasing importance to.

In the 19th Congress held in 2017, eco-civilization gained further priority. Since Trump's decision to withdraw from the Paris Agreement in January 2017, it seems that China is trying to play a dominant role in the fight against climate change (Beeler, 2017). In the 19th Congress and afterwards, the issue of eco-civilization, which was previously discussed on a national scale by the Chinese Administration, has been extended to the global scale (Hanson, 2019). Today, eco-civilization is identified with combatting the phenomenon of climate change, which is now recognised as an issue of utmost importance.

Within the scope of the revised interpretation of eco-civilization discussed in this study and with emphasis on the new post-capitalist world order, the intersection of energy and environmental issues in the context of a global struggle with climate change will be examined.

Eco-Civilization vs. "Non-Ecological" Civilization

Before addressing future ecological civilization, it will be necessary and useful to look at civilization today. During the Davos meeting organized by the World Economic Forum in 2016, it was declared that the 4th Industrial Revolution (4IR) was taking place. In what kind of world is the 4IR thought to occur?

- Today, around 730 million people worldwide suffer from extreme poverty with an income of 1.9 dollars a day or less (World relief, n.d.).
- As of 2020, electrical energy has not reached 940 million people around the world. 3.0 billion people cannot benefit from safe and "clean" energy sources while cooking their food. Indoor air pollution threatens these people (Ritchie & Roser, 2019a).
- Based on data available at the end of 2019, 775 thousand people in the world die annually due to inadequate cleaning conditions. 2.4 billion people live in poor sanitary environments (Ritchie & Roser, 2019b).
- According to reports based on 2017 data and published by the World Health Organisation (WHO) and UNICEF in 2019, 884 million people were completely deprived of clean drinking water resources (CDC, n.d.). Due to unhealthy drinking water and unfavourable living conditions, 1.7 billion cases of diarrhoea are seen annually in children under the age of 5 and, accordingly, 446 thousand children under the age of five die annually, mostly in developing countries. It is necessary to add 3.0 million Cholera cases and 95 thousand deaths related to Cholera to this table. With 11 million typhoid fever and 129 thousand deaths resulting from it (CDC, n.d.) per annum added to the

terrifying picture, the outlook becomes even more distressing.

The list of negative indicators regarding the quality of human life can be further extended. However, we end the list here in order not to distract from the major subject of the study.

Is it possible to pierce the atmosphere with human hands? What if the earth can be warmed up by human actions? Can the oceans be contaminated by the human hand, the subject of the capitalist system? Can cities become uninhabitable because of environmental and air pollution? The answers to these questions are, unfortunately, yes because of the catastrophes caused by today's "non-ecological" civilization. With his actions destroying the ecosystem, the capitalist man gives the appearance of being the primitive ancestor of the future "civilized man".

If revolution is a term that describes the radical transformation of a society to improve human life, the 4IR cannot be described as a revolution at all. The so-called 4IR is rather an evolutionary process that finds expression in technological innovations. Technological innovations specified within the scope of the 4IR do not correspond to a leap in the development line or a fundamental break that would be an accurate indicator of the revolution. In discourse surrounding the 4IR, there is no good news of a new, humane order in which people make peace with nature.

Ecological civilization (eco-civilization) will replace "non-ecological civilization" with a revolutionary and radical transformation in the social order. Moreover, for the survival of all life on our planet and protecting an entire ecosystem, the said replacement is imperative. Symbolically stated, "tomorrow" must replace "today". This is more than a choice, it is a necessity that represents a line of demarcation between life and death.

Eco-civilization, as a generalization we accept here, can be characterised by tackling climate change and eventually dealing with this threat.

In the 19th Congress held in 2017, eco-civilization gained further priority. (CGTN, 2017)

In fact, none of the problems stated above, which are definitively caused by today's civilization, pose a threat to the extent of abolishing life in our world altogether. Nothing compares to climate change in that respect. Also, each of these problems become more acute and pronounced as climate change worsens. Therefore, we take the imperative of combatting climate change as the main axis and the foundation of eco-civilization. Thus, central to this study is the means to be used against climate change during the transition to eco-civilization.

Energy - Environment - Climate Change Nexus in Eco-Civilization

In the 19th Congress, the concept of eco-civilization was redefined by President Xi Jinping in a speech delivered to the delegation (China Daily, 2017). He stated, very notably, relations between humans and nature should all be in harmony. So, what is the current state of the said relations in the prevailing world order, as hinted with the remarkable notes above?

The capitalist system, which is currently the dominant world order, has had devastating effects on the ecosystem over the past 250 years and is responsible for bringing life on our planet to the brink of total extinction. The threat to humanity and the ecosystem is the phenomenon of "anthropogenic" (originating from human actions) global warming and associated climate change.

Today, it is clear that energy strategies/ paradigms based on fossil fuels cannot be sustained any longer. There is an absolute need for a radical transformation in energy policies.

From the First Industrial Revolution, which can be considered a milestone, to the present day, an increase in temperature has occurred in the atmosphere and on the earth, largely due to greenhouse gas emissions resulting from energy production based on traditional fossil fuels (IPCC, 2018). Compared to the pre-industrial period, the temperature of our earth has increased by an average of 1.0 °C as of 2017. The phenomenon of climate change emerging as a result of this increase has turned into an existential threat today in terms of the consequences it is very likely to cause. In the next stage, if this process is not tackled, the entire ecosystem will likely collapse in the so-called "Sixth Mass Extinction" (Eearth.org, 2020).

However, the ecological apocalypse is not an inescapable fate. The concept of eco-civilization, redefined by President Xi Jinping, suggests the necessary measures and action plan needed to prevent a disaster. Potential mass extinction and the threat of ecosystem collapse due to climate change are stemming from the lifestyle of human beings and especially the energy production methods and consumption style. When the subject is taken into account from this point of view, it is of great importance to examine Energy and Environment-related issues as integral parts of the same structured whole. In this context, the energy-environment-climate change nexus is the focus of this study.

Regarding the issues addressed in this study, eco-civilization represents a new world order in which the threat of climate change is gradually reduced and ultimately eliminated.

Climate Change- Energy- Environment

First, with the threat of climate change growing increasingly serious every day, these aspects all need to be regarded as a single and unified set of problems, that is a single problem: energy, agriculture, animal husbandry, forestry, and water scarcity, conservation of biodiversity, and the entire food cycle process (abbreviated as Environment hereinafter with Energy not inclusive).

On the way to eco-civilization, it is a priority to formulate "nature friendly" holistic Energy-Environment policies and implement them on a global scale. When the most necessary elements to sustain life are listed, energy comes just after air and water. Energy comes before bread in the list of essential elements for life. In fact, energy is required even to obtain safe drinking water.

In short, energy is an indispensable element for the survival of not only humans but also for sustaining the biosphere. From this point of view, the main indicator of eco-civilization will be the methods of energy production, consumption style, and the radical transformation that will occur in this field.

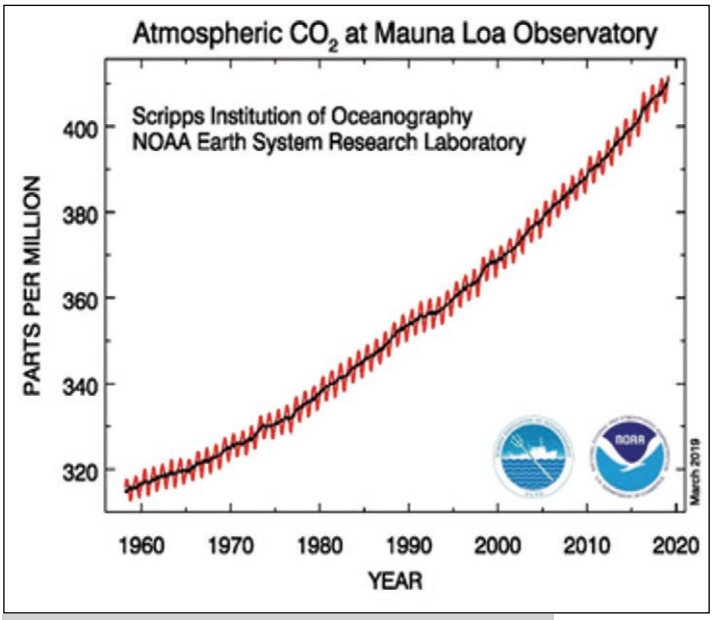
With air, water, and soil pollution, a disturbing environmental problem at the beginning has grown into a global disaster, a phenomenon of climate change that threatens all life and is growing day by day. The crucial factor in this process has been and continues to be energy production based on traditional fossil fuels

(coal-oil-natural gas).

Today, it is clear that energy strategies/paradigms based on fossil fuels cannot be sustained any longer. There is an absolute need for a radical transformation in energy policies. Renewable Energy Resources (RES), in other words, "clean and inexhaustible" energy sources, should replace conventional fossil fuels (CFF) in the shortest possible time. The dominant social order today is essentially a "coal-oil-natural gas" (CONG) civilization. It has become an absolute necessity to create and implement new energy policies based on RES, which is the main component of transitioning to the eco-civilization era, by overcoming the "Non-Ecological CFF Civilization", which brings the Ecosystem and all life to the brink of total extinction.

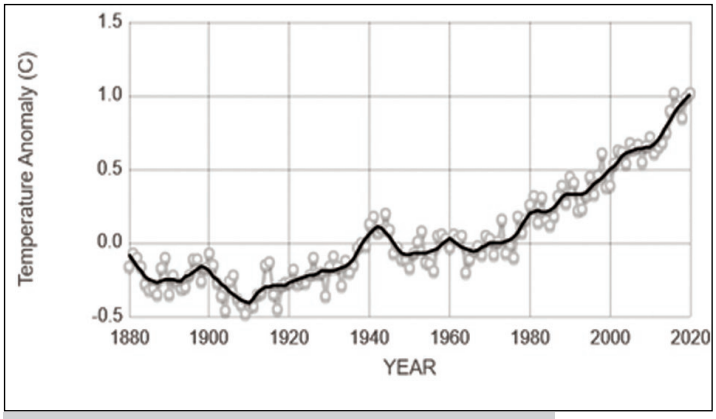
Two graphs depicting the trend in global warming and the steady increase in the level of CO_2 concentration are given right.

Graphic 1: Atmospheric CO_2 concentration in ppm over the years



Source: NOAA National Centers for Environmental Information, n.d

Graphic 2: Global Warming over the past 200 years



Source: NASA Global Climate Change, n.d.

Renewable Energy Sources (RES) and Eco-Civilization

RES range from the relatively popular solar (PV and Concentrated Solar Power, CSP) and Wind to a variety of sources including Biomass, Hydrogen, Sea Waves (including tidal energy and sea currents), and Geothermal Energy (classical and "Hot Dry Rock"). On the RES list, Sun and Wind have an intermittent character, which means that their availability time (2,000 - 3,500 hours per year) is limited and often unpredictable. In this respect, Solar Energy is relatively more predictable compared to Wind Energy.

It is worth noting that biomass, hydrogen, and geothermal, to some extent, have a distinctive "Base Load" character. The technical term "Base Load" refers to the availability of any energy generation plant in a continuous manner out of a year. The energy plants with the Base Load feature, usually operate 7,000-8,000 hours a year in contrast to intermittent wind and solar. A significant advantage of biomass and hydrogen is that they are both storable and transportable.

Energy (electricity and heat) generation based on RES has a determinant feature in the establishment of Eco-civilization. However, there is a question that comes to mind at this point: Does RES have the potential to completely replace CFF (conventional fossil fuels)? The answer to this question is certainly positive.

RES has the potential to completely take over CFF. Moreover, RES has the potential to replace nuclear energy with its substantial risks, as evidenced from awful experiences in the past.

Through global-scale projects, a complete transition to RES while having the adverse effects of climate change mitigated and totally avoided is possible. Such project ideas are explained below:

1. The generation of Energy, the production of Biofuel from Biomass, and the reconstruction of destroyed green cover of the world through Field Forestry/ Agroforestry practices integrates with activities in this direction.

2. Energy production based on hydrogen and "green hydrogen" (the production of hydrogen using wind and solar energy). Eco-civilization, with emphasis, will also be a Hydrogen-Carbon Age. This issue needs to be discussed as a separate and standalone subject. The issues related to hydrogen-carbon will be specifically examined in a separate study that will follow the present study.

3. The establishment of a worldwide, intercontinental DC (Direct Current) "Supergrid" (Grid: Electrical energy transmission network) that will operate at a global scale has been its own individual and important agenda for some time. Like the subject of hydrogen-carbon, the Supergrid needs to be discussed separately as a specific issue. Therefore, Supergrid and related issues will be examined in a study that will ensue in the future. Supergrid will take place as an upper layer over the national grids to transmit electricity over great distances. Supergrid will function as a huge, distributed (in the sense of both geography and time) network of energy generation and transmission. Since Supergrid will be spread over a very wide area and feature a broad time difference (different time zones), RES types with an intermittent character such as wind and sun will gain a "baseload" character as a total over a gigantic, distributed network.

On this intercontinental network, there will be no need for nuclear power plants as well as power plants based on fossil fuels. The subject of this study is limited to the first item above.

Fighting Climate Change in Today and Eco-civilization

As a complementary determination: it is necessary to underline that in accordance with the character of climate change and the threat, which is a global threat, the strategies to be implemented on the global scale need to be implemented urgently within the framework of harmonious cooperation of countries.

A Silk Road Cities Association established within the framework of the Belt and Road Initiative can achieve especially successful results by implementing concrete projects on the road to eco-civilization.

The Conference of Parties (COP), the main decision-making body of the United Nations Framework Convention on Climate Change (UNFCCC) platform, has been organized annually in different countries after the first (COP1) was held in Berlin in 1995. The COP26, which is planned to be held in Glasgow in 2020, will be carried out in November 2021, provided that the threat of the COVID-19 pandemic will be lessened by that time.

The clear reality of the current international system and the current policies of developed states is that central administrations, governments, and global central structures (UN) have failed to cope with the threat of climate change.

Hardly any measures that would be effective at the international level are taken by the Conference of the Parties and associated central organizations. In short,

an effective action plan still does not exist.

Cooperation among cities and local governments instead will have a significant impact on the policies of states in an effective fight against climate change and the realization of concrete plans. A Silk Road Cities Association established within the framework of the Belt and Road Initiative (BRI) can achieve especially successful results by implementing concrete projects on the road to eco-civilization.

Thus, the common understanding based on "joint development by sharing", the underlying principle of the BRI, will be essential in the cooperation among the BRI cities. The joint projects to be developed and implemented by the cities in the spirit of the BRI will inspire not only other cities and states in the BRI but also those not involved in the BRI by then. Win-win projects as such will have resulted in success stories that will be multiplied subsequently on a global scale.

Cooperation among cities will play an essential role in facilitating and encouraging relations between central governments. Setting up close and fruitful co-operation between cities and local governments will pave the way for relations to be developed at all levels. Consequently, the cooperation platform will have an important role in the transformation of the initiative to establish an eco-civilization, which will be established through collective efforts of the countries and turned into a success story.

Eco-Civilization and Tools to Combat Climate Change

Nowadays, topics related to "Transition to Low Carbon Economy", "Bioeconomy", "Net Zero Emission/ Carbon Zero" are remarkably at the centre of the daily discussions on climate change and RES.

At first glance, the intensive discussion of these issues in the international community comprising various NGOs, relevant organizations, and academic circles gives the impression that there is high collective sensitivity in combating climate change, and that the

According to UNICEF, the climate crisis is a child rights crisis. (UNICEF's website)

right path is being pursued. It seems that the discourse in this direction has an enormous fan base.

However, reducing greenhouse gases, primarily CO_2 and methane emitted into the atmosphere from fossil fuel, is not sufficient to overcome the current "climate crisis". As a hypothetical situation, even if vehicle exhausts and greenhouse gas emissions from domestic sources, power plants and factory chimneys suddenly stopped globally, even in such a hypothetical situation that characterizes the concept of "Net Zero Emission", global warming will not be prevented. Even in the event of such hypothetical conditions, the atmosphere and the earth will continue to warm (Kehse, 2017).

This is because the system formed by the atmosphere-sea-land interaction functions like an "electronic memory element". Although there is no additional input to the system, there is an output corresponding to the continuation of the warming. The reason for the memory-like behaviour of the system is the vast amount of greenhouse gases already accumulated within the atmosphere over the past 250 years since the First Industrial Revolution. In short, even if net CO_2 emissions stop, the melting of the polar glaciers and the resulting sea-level rise will continue.

With the permafrost thawing, a short-term outcome of global warming, tens of different viruses and bacteria hibernating in frozen soil layers for thousands of years will probably spread the world through air and water. Some of them may be more dangerous than COVID-19.

Greenhouse gases, especially CO_2, accumulated in the atmosphere also need to be reduced rapidly. We assert that this target can be achieved through "Negative Emission/Negative Carbon" applications.

As the arctic ice and polar glaciers keep melting due to global warming, North Atlantic seawater will become less salty and thus lower in density. This will cause the Gulf Stream to sink into the deep layers of the ocean at latitudes closer to the equator. In that case, the result would be a catastrophe, especially for Northern Europe as the disappearance of the Gulf Stream could lead to a new Ice Age. The list of disaster scenarios can be further extended.

In the sum of the propositions and determinations expressed above, it is quite clear that goals such as "Transition to Low Carbon Economy" and "Net-Zero Emission/Carbon Neutral" will fall short in preventing the destruction and disasters likely to be caused by climate change.

In the meantime, it is necessary to note that efforts to establish production and consumption mechanisms compatible with nature, which are expressed in the term Bioeconomy, will be integral for the establishment of eco-civilization. How can the catastrophic consequences of climate change be avoided? What concrete tool can be a remedy? An effective tool as such is described in the next section.

In short, we urgently require the development of new and alternative methods to achieve the "Negative Emission/Negative Carbon" target and the realization of the projects that will be designed based on them.

In the first stage, the primary goal is to prevent greenhouse gas emissions. This is not enough. Greenhouse gases, especially CO_2, accumulated in the atmosphere also need to be reduced rapidly. We assert that this target can be achieved through "Negative Emission/Negative Carbon" applications.

"Negative Emission" Goal on the Road to Eco-Civilization

According to measurements made at the Mauna Lea observatory in the Hawaiian Islands, for the first time on May 10, 2013, the CO_2 content in the atmosphere reached 400.0 ppm (parts per million - 400 CO_2 molecules out of one million air molecules). This value, which is in a continuously increasing trend, reached 420.01 ppm in the week of April 25, 2021 (Global Monitoring Laboratory, n.d.). Before the First Industrial Revolution, this value was approximately 280 ppm.

In other words, the amount of CO_2 currently in the atmosphere is 3,276 billion tons. If global measures are not taken in a way to halt the current course of events, this amount will increase continuously. As of 2019, the amount of CO_2 released into the atmosphere is 36.44 billion tons (Statista, n.d.).

CO_2 emissions seem to have decreased in 2020 as the pandemic disrupted the world economy. If current energy policies remain unchanged, it is estimated that the increase in the earth's average temperature will be as high as 3.0°C compared to the pre-industrial era by the end of the century. The aftermath will be nothing but an apocalypse. Once "the point of no return" is passed, global warming will sustain indefinitely (Niranjan, 2020).

Based on the above remarks, it is imperative to implement practices that will reduce accumulated greenhouse gases and prevent the increase of CO_2 released into the atmosphere. Is it possible to have an

implementation model that will reduce the amount of CO_2 present in the atmosphere while preventing fossil-based CO_2 emissions from entering the atmosphere? Such an application model is described in the following section.

"Energy Agriculture" – "Energy Farms" Based on Farm Forestry (Agroforestry)

In the Farm Forestry/Agroforestry practices, which have been applied for hundreds of years in China, field crops and trees are grown together on the same agricultural land. In these applications, almost all kinds of field crops and suitable tree species are used. Below are images of typical agroforestry applications where economically valuable trees are intercropped with conventional field crops.

Poplar-Wheat intercropping (by courtesy of Prof. Zhu Zhaohua)

In the transition to eco-civilization, which will resemble revolution rather than evolution in effectively combatting climate change, the inter-cropping application highlighted here is an experiment based on Tree-Energy Plant agroforestry. Regarding a specific case, agroforestry based on Paulownia-Canola inter-cropping is described below. The "Energy Farm" application was a pioneering field study carried out in the Bergama (antique Pergamum) district of Izmir Province of Turkey.

Agroforestry /Farm Forestry /Energy Farm pilot application based on Paulownia – Canola inter-cropping carried out in Bergama (May of 2006)

In this practice, varieties of Canola, an energy crop, were grown under the arrays of Paulownia trees, a fast-growing tree species domestic in China. In the pilot project, eight different high-quality canola species were used and tested for their adaptation and growth capabilities. Up to 400 litres of "First Generation" (esterification method - chemical process) biodiesel was produced per decare after the harvest. Today, methods for biodiesel/biofuel production are second generation "thermochemical" systems characterised by the Fischer-Tropsch method (Science Direct, n.d.(a)) integrated with pyrolysis, gasification (Science Direct, n.d.(b); Science Direct, n.d.(c)) and plasma gasification.

For Pergamon, which is located at sea level, the Harvest/Rotation Period (harvest period - the period elapsed between planting and harvest) is as short as 6 to 7 years. As a fast-growing tree species, Paulownia has the potential to permanently annually remove 2.0 tons of CO_2 per decare from the atmosphere on average during the harvest period. Such numerical data were among the results of the pilot project.

Paulownia-Canola inter-cropping is an excellent example of a new land-use model aiming to realise the target of "Carbon Negative /Negative Carbon Emission".

According to reports based on 2017 data and published by the World Health Organisation and UNICEF in 2019, 884 million people were completely deprived of clean drinking water resources. (UNICEF's website, 2019)

The pilot project briefly described below, not only limited to Turkey, can well be proliferated and generalised across "the Middle Corridor" as a "Green Silk Road /Green Belt" project extending from the Mediterranean to Pacific Basin.

Green Belt - Green Silk Road

The "Green Belt Project", which will be characterised by the Tree-Energy Crop inter-cropping (Farm Forestry), is also a rural development project. Considering the example of Pergamon pilot application and the characteristics of the Paulownia tree, we can see that the following advantages have ensued for rural areas:

- In addition to the existing product range in agricultural lands, new products and agricultural methods will increase the income from cultivated lands and stabilise incomes from agricultural activities in the rural areas.
- It is possible to achieve a significant increase in the yield and thus monetary income through Farm Forestry (agroforestry) practices.
- Planning and developing resilient agriculture and land use models against the phenomenon of climate change can be achieved.
- Thanks to the multifunctional properties of the Paulownia; the leaves, which contain high protein (25%), sugar and vegetable oil, can be used as high-quality fodder in animal husbandry.
- Fragrant Paulownia flowers are useful for producing first-class quality honey.
- Coke can be produced from pruning branches.
- As a fast-growing tree species, Paulownia can be harvested in a noticeably short period of 5 to 6 years. Its timber is used to make premium furniture and even wooden houses. Even the income from the sale of Paulownia logs and lumber provides an advantage.
- It is unnecessary to plant a new sapling after harvest, a new plant will sprout from the buds on the root to form a new tree. Resprouting (reproduction)is repeated several times after the original planting, with no

need to plant a new sapling for the next rotation period.

• In alternative applications, virtually all traditional field crops can be grown under trees. For example, regarding the case of Paulownia-Wheat inter-cropping, part of the organic waste left in the field after harvest can be used as biomass for energy and biodiesel production.

• When a multi-functional plant (forage or biomass for energy) such as alfalfa is selected as an alternative product, it will be possible to benefit from it as a forage plant or energy plant/biomass feedstock.

• Multi-functional wood and field crops will provide a wide range of application possibilities. Significant additional income is possible through forage and energy crops and multifunctional trees.

• Thanks to the production of premium quality and abundant industrial logs/timber through Farm Forestry /Agroforestry applications, the natural "green cover" and biodiversity will be preserved, with the production of timber shifted to the cultivated lands, thus eliminating the existing pressure on natural forests.

• Farm Forestry, and Energy Farming as the specific case under consideration, constitutes a model for capital transfer to rural areas due to its potential to greatly increase the income of farmers and villagers. In this way, a balance between rural and urban can also be achieved. The aforementioned applications can be evaluated as an effective tool within the scope of the "Rural Development Strategy".

• The future balance between rural and urban parts of the country will facilitate the prevention of "population erosion" by controlling the phenomenon of migration to cities.

• One of the expected consequences of climate change in the short term is that the existing traditional crop pattern in agricultural lands cannot be sustained due to the negative environmental effects to arise. Providing many benefits and options, Field Forestry and "Energy Agriculture" practices create "durable" (tolerant to the negative consequences of climate change) agriculture models.

• The Green Belt & Road, which will be characterised by Farm Forestry/ Energy Farming/ Agroforestry practices, will also have the function of preventing international terrorism and fundamentalist formations that originate from rural poverty.

Result and Concluding Remarks

With the widespread use of the practices we referred to as "Energy Farming" in this study, a dynamic tool in combating climate is available. Energy farming provides a method aiming at a "carbon negative/ negative carbon emission" solution. Besides this, the application in question also makes up a "Rural Development Model". Field Forestry and Energy Agriculture practices will make up a very important and even indispensable building block in the establishment of eco-civilization by allowing the harmony between human beings and nature to be restored. I propose to name such practices with the term Agropark, as an overarching and general concept. When Agropark projects, which will be initiated from the Mediterranean Basin and specifically from the Aegean Region of Turkey, are multiplied and reach the Pacific Basin through the "Middle Corridor", the Green Belt - Green Silk Road will have been formed. The Green Silk Road comprising a multitude of Agroparks that cross the middle corridor represents an integral part of the BRI. The proliferation of pioneering and guiding practices to be initiated at the western gate of the New Silk Road on the Aegean coasts, reaching the Pacific Basin along the "Middle Corridor", and forming the Green Silk Road, should be adopted as an indispensable tool and an important goal in the establishment of eco-civilization.

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