30th International Conference Ecological Truth & Environmental Research 2023

Proceedings

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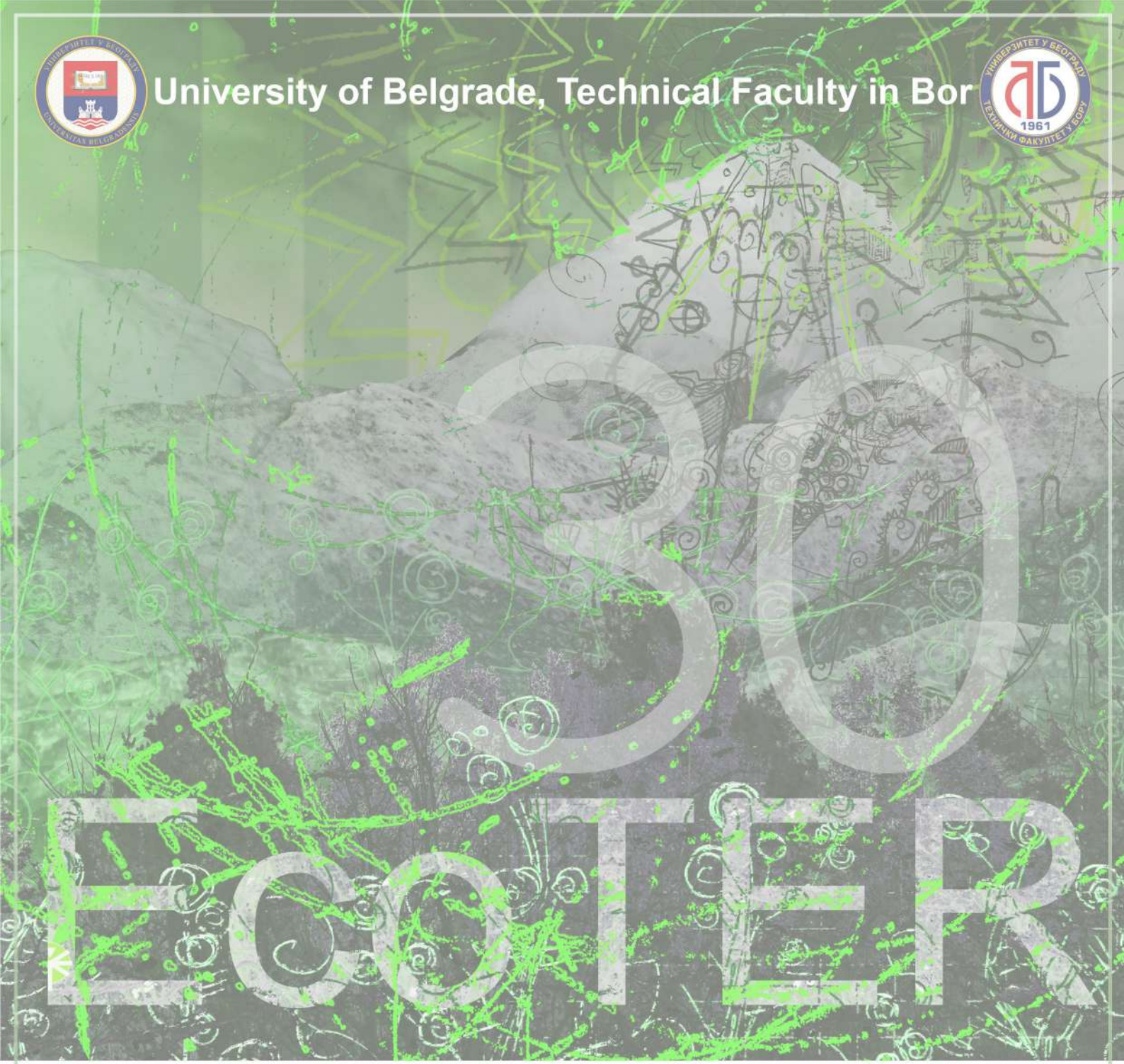

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PROCEEDINGS

30th INTERNATIONAL CONFERENCE

ECOLOGICAL TRUTH AND ENVIRONMENTAL RESEARCH – EcoTER'23

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PREFACE

The 30th international conference Ecological Truth & Environmental Research – EcoTER'23 kept three areas in focus: ecology, environmental protection and sustainable development. The conference will be held on Mt Stara Planina in hotel Stara Planina, Serbia, 20–23 June 2023. The monograph is published on the occasion of the 30th anniversary of the conference. On behalf of the scientific and organizing committee, it is a great honor and pleasure to wish all the participants a warm welcome to the conference.

The monograph is published on the occasion of the 30th anniversary of the conference.

We hope to convey the message of the conference, which is that a transformation of attitudes and behavior would bring the necessary changes. This is also an opportunity for the participants who are experts in this field to exchange their experiences, expertise and ideas, and also to consider the possibilities for their collaborative research.

The 30th international conference Ecological Truth & Environmental Research – EcoTER'23 is organized by the University of Belgrade, Technical Faculty in Bor, and co-organized by the University of Banja Luka, Faculty of Technology, the University of Montenegro, Faculty of Metallurgy and Technology – Podgorica, the University of Zagreb, Faculty of Metallurgy – Sisak, the University of Pristina, Faculty of Technical Sciences – Kosovska Mitrovica and the Association of Young Researchers, Bor.

These Proceedings 103 papers from the authors coming from the universities, research institutes and industries in 11 countries: Australia, USA, Brazil, Spain, Portugal, Libya, Italy, Bulgaria, Bosnia and Herzegovina, North Macedonia, and Serbia.

As a part of this year's conference, the 5th Student Session – EcoTERS'23 is being held. We appreciate the contribution of the students and their mentors who have also participated in the conference.

The support of the Gold donor and their willingness and ability to cooperate has been of great importance for the success of the EcoTER'23. The organizing committee would like to extend their appreciation and gratitude to the Gold donor of the conference for their donation and support.

We appreciate the effort of all the authors who have contributed to these Proceedings. We would also like to express our gratitude to the members of the scientific and organizing committees, reviewers, speakers, chairpersons and all the conference participants for their support to the EcoTER'23. Sincere thanks go to all the people who have contributed to the successful organization of the EcoTER'23.

Prof. Snežana Šerbula,

President of the scientific and organizing committee

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A RENEWABLE ENERGY SOURCES AND SUSTAINABLE DEVELOPMENT EQUATION

Milan Nedeljković[1*], Srba Mladenović[1], Jasmina Petrović[1]
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Abstract

Natural resources are an essential part of our planet, providing us with everything from food and medicine to energy and building materials. Oil, metals, ores, minerals, plants and animals, water, air, land, etc. are all examples of natural resources. A nation's wealth, status in the world economy, power, and political influence are determined by its natural resources. Natural resources are a universal good and a common resource. Their use, economic implementation and economic exploitation should be committed and well planned. Human activities such as overconsumption, pollution, and deforestation are placing increasing stress on these resources. To ensure that we can continue to rely on them in the future, we must use natural resources according to the principles of sustainable development. The process of meeting the needs of the present without compromising the ability of future generations to meet their own needs is called sustainable development. It involves striking a balance between economic growth and the protection of the environment and the conservation of biodiversity. By sustainably conserving natural resources, we can reduce the impact of climate change and ensure that ecosystems continue to perform important functions such as pollination, carbon sequestration, and air and water purification.

Keywords: sustainable, biodiversity, greenhouse.

INTRODUCTION

The most important principle of sustainable development is the protection of the natural environment. This includes the conservation of biodiversity (diversity of life on Earth) and ecosystems. Biodiversity and ecosystems are critical to the functioning of our planet because they provide us with various needs, such as food, medicine, and purification of air and water. However, human activities such as deforestation and pollution are placing increasing stress on these systems. We can help reduce these impacts and ensure that ecosystems continue to provide these essential services by conserving natural resources in a sustainable manner [1].

Sustainable development also includes ensuring that economic growth is transparent and equitable so that everyone benefits. This includes reducing poverty and promoting social equity. Natural resources are an important source of income and employment in many developing countries, and sustainable development can help ensure that these resources are used in ways that benefit local communities [2].

The use of renewable energy sources is one way to achieve sustainable development. The fossil fuels currently used for energy production are limited, and they are also the main source of harmful gas emissions. Renewable energy sources such as solar panels, wind turbines, and

hydroelectric power plants are unlimited and do not emit harmful gases, making them ideal for long-term development [3]. Solar energy, together with other renewable energy resources, is a promising and accessible energy source for dealing with long-term concerns in the energy crisis.

SUSTAINABLE ENERGY SOURCES

Solar and wind energy

Two forms of renewable energy that generate electricity by harnessing the power of natural resources are solar and wind energy. They are abundant, green, silent, and renewable sources of energy [4,5].

Solar energy is a renewable energy source that is derived from the sun's radiation. It is captured via a variety of technologies, including solar panels or photovoltaic (PV) cells (Figure 1). These panels use semiconductor materials to directly turn sunlight into electricity. When sunlight reaches the solar panels, photons (light particles) are absorbed and an electric current is generated [6].

Figure 1 *Photovoltaic cells [6]*

Figure 2 *Wind turbines [6]*

Wind energy is generated by converting the kinetic energy of the wind into electricity using wind turbines (Figure 2) [6].Wind turbines generate electricity by using the wind to turn blades that drive a generator. They come in various sizes, from small turbines for domestic use to large turbines for commercial use [4,5].

Both solar and wind energy have significant advantages over more traditional energy sources like fossil fuels. They don`t emit greenhouse gases and are less harmful to the environment than fossil fuels. They are also becoming more competitive, making them available to more and more people. However, there are some limitations to both solar and wind energy. They are weather dependent, and output varies depending on the time of day and weather conditions. They also require a lot of land and space to generate a large amount of energy, which can be difficult in densely populated areas.

It is expected that the use of solar and wind energy will increase in the future as the technology improves and the cost continues to decrease [4,5].

Geothermal energy

Geothermal energy is a type of renewable energy that generates electricity by using heat from the earth's core. It is a clean and sustainable energy source with low environmental impact that can provide a reliable source of energy. Geothermal energy is generated by using the heat that is naturally produced in the earth's core. This heat is captured by geothermal power plants and used to generate steam, which in turn generates electricity. There are two types of geothermal power plants. Dry steam power plants, which use steam directly from geothermal reservoirs to drive turbines, and flash steam power plants, which use hot water from geothermal reservoirs to produce steam and generate electricity [7].

Compared to other energy production methods, geothermal energy has a number of advantages. As a renewable energy source, it can be produced indefinitely. It also has a lower environmental impact than fossil fuels and emits no greenhouse gases. Unlike solar and wind energy, which are dependent on the weather, it provides a steady and constant source of energy. This makes it a reliable source of energy.

Geothermal energy is also used in industry to pasteurize milk, dry fruits and vegetables, dry clothing, and heat and cool buildings. It has the potential to significantly reduce dependence on non-renewable energy sources (Figure 3) [8].

Geothermal energy also has some limitations. It necessarily requires access to special geological conditions, such as geothermal reservoirs, which are not available in all areas. In addition, the initial investment required to establish a geothermal power plant can be significant, and there is also the risk of seismic activity if not properly managed.

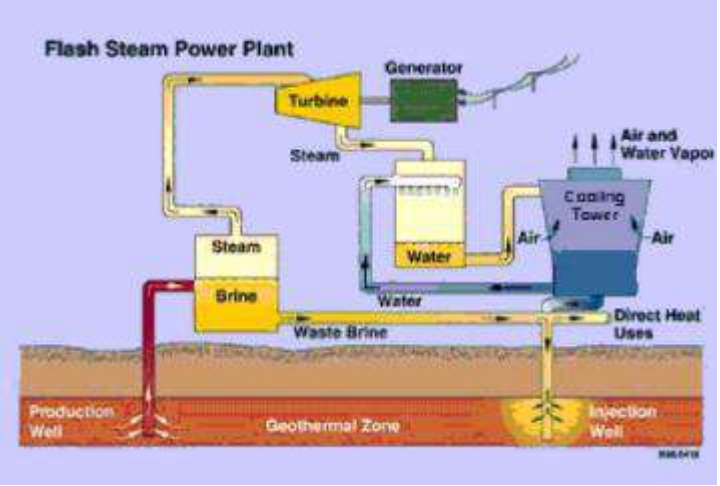

Figure 3 *Geothermal Power Plant [8]*

Hydroelectric power

Hydroelectric power plants (HPP) generate environmentally safe energy and are in line with modern efforts to achieve sustainability because they are powered by renewable energy sources.

HPP is a form of renewable energy in which electricity is generated by absorbing the kinetic and potential energy of water (Figure 4). It is one of the most widely used forms of renewable energy and has several advantages over other energy generation methods [9].

The kinetic energy of water is used to drive turbines, which then spin generators to produce electricity. There are two types of hydroelectric power plants: impoundment power plants and diversion power plants. Impoundment plants, also known as dammed hydroelectric power plants, store water and release it through a turbine with the help of a dam. A diversion power plant, sometimes called a "run-of-river" facility, channel part of the river through a turbine and return the remaining water to the river downstream [10].

Hydropower is the cheapest way to generate electricity today. It is a renewable energy source and provides nearly one-fifth of the world's electricity. It also generates electricity from a renewable natural resource and accounts for six percent of the world's energy supply or about fifteen percent of the world's electricity [11].

A hydropower plant with a dam and reservoir is a flexible source because the amount of electricity generated can be increased or decreased in seconds or minutes as electricity demand changes. Once built, a hydroelectric plant produces no direct waste and almost always emits significantly less greenhouse gases than a fossil fuel power plant. Hydropower has several advantages over other forms of energy production [12].

In addition, generation costs are low and it can be used for irrigation and flood control. However, hydropower also has some disadvantages. It requires access to certain geographic conditions, such as a good water source and a large difference in elevation. The construction of hydropower plants, especially dams, can have serious environmental consequences, such as habitat loss and disruption of river ecosystems. Local communities may also be displaced as a result [13].

Figure 4 *Hydroelectric power plants [12]*

CONCLUSION

Significantly faster development and increasing levels of production and industrialization have led to much faster exploitation and consumption of natural resources. Under the conditions of increased exploitation, environmental problems occur, which also affect the environment. Natural resources are a necessary element for the functioning of society in the modern world. Basically, every form of human activity is based on the use of natural resources in some form. Sustainable development is an essential issue for humanity and means empowering all citizens to acquire the knowledge, skills, habits, values and awareness

to participate in making choices that improve their quality of life without compromising the satisfaction of the needs of future generations.

Finally, conserving natural resources based on the principles of sustainable development is critical to the well-being of our planet and future generations. We can ensure that resources are used in ways that meet the needs of the present without compromising the ability of future generations to meet their own needs by balancing economic growth with environmental protection and biodiversity conservation. Adopting sustainable development principles in the use of natural resources can help mitigate the effects of climate change, promote social equity and poverty reduction, and ensure that ecosystems continue to provide important services such as air and water purification, pollination, and carbon sequestration.

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