YOUTH'S PERSPECTIVE ON SUSTAINABLE DEVELOPMENT

Gathering of Analytical Articles

2023

supported by Visegrad Fund

Experience Exchange among V4 and Georgian Youth for Building Sustainable Communities

RSDI · FutuReg · pzr pracownia zrównoważonego rozwoju · Youth Bridges Budapest

The project is co-financed by the Governments of Czechia, Hungary, Poland and Slovakia through Visegrad Grants from International Visegrad Fund. The mission of the fund is to advance ideas for sustainable regional cooperation in Central Europe.

FOREWORD

This document was prepared as part of the 'Experience Exchange among V4 and Georgian Youth for Building Sustainable Communities' project, which is supported by the International Visegrad Fund. It features contributions from fellows who initially participated in a summer school, "Youth for Building Sustainable Communities," held in Kutaisi. This served as a platform for them to acquire the necessary knowledge and join our organizations as fellows. Subsequently, they undertook two-month fellowships within partner organizations in Georgia and V4 countries. During this time, these fellows engaged in an in-depth exploration of sustainable development challenges in their respective cities, culminating in the preparation of analytical articles. Now, they are ready to present their innovative ideas to the audience.

Analytical Articles

Unlocking Potential: Sagarejo's Path from Desertification to Sustainable Land Management and Renewable Energy Transformation

By Dea Bakashvili

INTRODUCTION

Sagarejo has been identified as especially to the risk of uncontrollable on-going desertification. A large part of agricultural land is affected by soil erosion. Mechanical irrigation systems in the region are out of operation and the internal irrigation network linked to the systems is out of order. Due to the climatic conditions, east Georgia has the potential for the use of solar energy (270 sunny days per year). However, based on the data, opportunities are misused and wasted. Besides the government's priority to develop renewable (water resources) energy resources, a large part of villages are using gravity water and artesian wells. Only Sighnaghi and Lagodekhi have a 24-hour water supply in the region by the United Water Supply Company of Georgia, ltd. The other cities are supplied with water on schedule. The problem is linked to frequent outbreaks of water-borne diseases as well. Agriculture has long been listed by the National Communication Documents of Georgia to UNFCCC as among the sectors vulnerable to climate change.

RESEARCH OBJECTIVES

In the research, we will highlight the essentials to understand the current and future trends of weather patterns for large-scale investments in Sagarejo. Especially, to encourage the use of sustainable resources, such as SLM, LDN and SPIS via resilient technologies. Since Sagarejo has no assessment of potential solar energy sources, we will emphasize the necessity of solar-powered water channel systems to improve the melioration system and to restore the importance of supply. According to Sagarejo's potential for the use of solar energy for irrigation purposes, we will discover possible opportunities and international experiences which can be assessed and applied in practice.

HEATWAVES AND THIRSTY DRYLANDS: EXPLORING THE IMPACT OF RISING TEMPERATURE IN SAGAREJO MUNICIPALITY

Heatwaves and the increasing aridity of drylands are significant consequences of rising global temperatures. These changes have wide-ranging impacts on ecosystems, water resources and agriculture. Sagarejo municipality land is damaged by the rising temperature, over-grazing, and weak irrigation system.

A CLOSER LOOK AT SAGAREJO MUNICIPALITY: FROM LANDSCAPES TO WEATHER PATTERNS

Sagarejo municipality is in the Kakheti region of the eastern part of Georgia. From one look it may seem like an average Municipality, however with lots of hiding potential behind it. How do we know? Let's dig deeper to unleash opportunities.

The municipality unites one main town – Sagarejo and 43 villages with an area of 1491 km2. It is one of the leading in the region, with a total agricultural area – 94 382 ha[1]. Arable land covers 29 386 ha, perennial crops cover 5275 hectares, 1407 hectares for mowing land, 56 884 hectares of pastureland and 1430 hectares of land underlying dwellings. The land seems diversified.

[1] Local Economic Development Plan, Sagarejo Municipality, Georgia, September 2019, Pg 9

Agricultural scientists have divided Georgia into 13 zones and 11 sub-zones due to their suitability for various agricultural productions. all of Kakheti is included in Zone 1. Subzone 1c referred to as Gare Kakheti is essential because of the Iori River valley with its three municipalities of Sagarejo, Sighnaghi, and Dedoplistskaro.

According to Displace, Sagarejo municipality agriculture is mainly developed regarding Viticulture [2]which makes up to 15% of grapes produced in the region and Cereal production [3]including 12% of the region's grains and cattle-breeding. The soil of the municipality is favourable for the cultivation of various grape varieties, such as Rkatsiteli, Saperavi, and Manavi Green – from the Manavi special village zone where this unique wine variety comes from.

Sagarejo weather station, located 802 meters above sea level is the main reference point for climate data of the municipality. The climate in Sagarejo municipality is characterized by cold winters and hot summers, and two precipitation maxima per year[4].

The eastern Georgia region's weather patterns are influenced both by dry central Asian-Caspian Sea air masses from the east and humid Black Sea air masses from the west. However, penetration of the humid air masses from the Black Sea is often blocked by the Likhi and Meskheti mountain ranges that separates the west from the east. As a result, annual precipitation [5]is considerably less in the east at 400-1,600 mm (16-63 inches).

The importance of the aim of eliminating unnecessary landfills and taking proper measures to combat desertification should be highlighted. The further economic development of the Municipality largely depends on accomplishing planned activities by solving specific economic and climate challenges.

FROM GREEN TO BROWN: COPING WITH REDUCED PRECIPITATION IN DROUGHT-AFFECTED AREAS

Georgia's arid and semiarid regions, especially the southeastern part, are especially sensitive to desertification. Many dryland areas face increasingly low and erratic rainfalls, coupled with soil erosion by wind and the drying up of water resources through increased regional temperatures. In addition, such areas also suffer from land degradation due to over-cultivation, overgrazing, deforestation, and poor irrigation practices.

According to UNDP (2014) on one hand, Sagarejo municipality has one of the shortest vegetation periods, with low levels of precipitation. Furthermore, Sagarejo suffers increasing numbers of all types of one-month-long and extreme droughts and hence is amongst the most sensitive regions of Kakheti in terms of the response of climate elements to ongoing global warming processes.

As it is known desertification is the degradation of land in arid[6], semi-arid and dry sub-humid [7]areas caused by climatic changes and anthropogenic activities. The process of desertification is accompanied by depletion in surface, sub-surface and groundwater resources and reduction of flora and fauna.

[2] The cultivation, growing and harvesting of grapes.
[3] harvesting crops for dry grain only.
[4] Final Report, Assessment of Pasture Condition in Sagarejo Municipality, Georgia, October 2019, 1st Edition, Pg 10
[5] Diversification and development in the Kakheti Food and Agriculture sector, UNDP, Pg 13
[6] Too dry and having little or no rain.
[7] Slightly to moderately moist.

In Georgia desertification is well correlated with climate alteration. The climate warming process is a serious threat to the Caucasus glaciers, as it causes melting due to high temperature, low relative humidity and fall in solid atmospheric precipitation. Gare Kakheti is in one of the dry regions of Georgia which is confronting a real danger of local desertification.

Caucasus Ecological Balance [8]is evidentially under threat, the more so if the processes become irreversible. Comprehensive study of droughts and desertification, and elaboration of a long-term strategy and plan of action to combat desertification is one of the most pressing problems for Georgia.

SILENT CRISIS: LAND DEGRADATION AND DESERTIFICATION IN SAGAREJO

In Georgia, desertification and land degradation is as ecological, as a social and economic problem. Overgrazing, Reduction of Woodland Areas, Unsustainable Practices in Agriculture, and Irrational Assimilation of land for urban development are the main causes of land degradation.

Due to Global Warming, the existence of eroded and degraded soil in the Sagarejo municipality is critical. Within the region, Sagarejo has the largest stock of cattle [9]. Villagers often use various fragile public lands such as windbreaks, scrublands, and secondary forests for grazing. There is no widespread perception of pasture degradation being caused by livestock.

In terms of development tendencies of pasture degradation in Sagarejo Municipality, 83% of the respondents assume [10] that the condition of the pasture they use has changed for the worse during the last 10 years. Besides factual numbers, the representatives of the Sagarejo municipality claim that there is no land degradation, and the quality of pastures depends on climate.

The decrease in soil fertility is caused by Salinisation [11]processes. Soil salinisation is likely due to depletion in salt-containing rock formations, underground mineral waters or other factors. Also worth mentioning is the **disordered watering of arid agricultural lands**, due to which secondary salinated soil is formed.

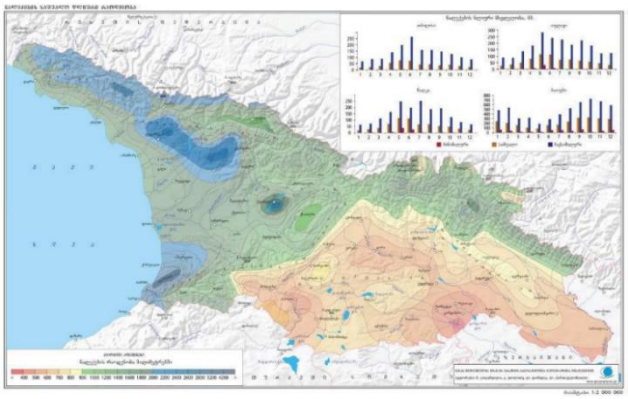
CURRENT CLIMATE VARIATION AND EXPECTED HEAT INFLUENCES

To meet the agricultural requirements, it is necessary to know the distribution of precipitation in the warm periods of the year. In the last 4-5 decades, Georgia has experienced unfavourable climate conditions. Droughts and powerful winds have been occurring more frequently and temperatures have *increased by 50 per cent*. Subsequently, this will cause an increase in the demand for irrigation in such areas.

According to the **REC Caucasus Final Report[12],** 95% of the interviewees witnessed the influences of climate change in Sagarejo Municipality. The most frequently cited effect of climate change is drought (cited by 75%), associated with decreasing rain and snowfall, especially winter snowfall.

[8] Droughts and Desertification Problems on the Territory of Georgia, Volume 23, 2009, Pg. 15
[9] National Statistics Office of Georgia, cited in Westerberg et al. 2017.
[10] Final Report, Assessment of Pasture Condition in Sagarejo Municipality, REC, Georgia, October 2019, 1st Edition, Pg. 32
[11] The process that leads to an excessive increase of water-soluble salts in the soil
[12] Final Report, Assessment of Pasture Condition in Sagarejo Municipality, Georgia, October 2019, 1st Edition, Pg. 32

Moreover, rising temperatures are observed by 33% of respondents. Some of the interviewees (6.6%) put erosion phenomena in connection with climate change. All these reasons have an impact on the land's productivity. *"Finally, summer in Sagarejo zone became significantly hotter and relatively drier"* (UNDP 2014:24).



Annual precipitation, scale 1:200 000

J.Dolidze, L.Kartvelishvili, N. Gogishvili, L.Dondua

National Atlas of Georgia, 2012

According to the UNDP report on "Climate Change and Agriculture in Kakheti Region" the analyses of changes in climate elements between the periods 1961-1985 and 1986-2010 show that the average annual ***temperature in Sagarejo municipality has increased by +0.5 C.***

An ongoing rise in temperatures for all seasons can be observed – with the strongest trends in summer (+0.9 0C) and autumn. Winters have become milder during the last 25 years. Local governments and communities in Sagarejo municipality and other regions must consider climate adaptation strategies, such as improving water management and using new technologies.

SOIL MATTERS: THE CRITICAL ROLE OF SLM AND LDN IN ACHIEVING SUSTAINABILITY

By the 21st of October 1999, Georgia became the party of the UN Convention to Combat Desertification. The Agricultural Development Fund (ADF) was considered the core of the agrarian reform organizational structure and aimed to increase competitiveness in international and local agricultural sectors by providing human, material, and technical synergy[13].

Databases such as the World Bank sourcebook, and the voluntary Guidelines for Sustainable Soil Management (**VGSSM**) provide comprehensive and the most effective recommendations for SLM practices. It reveals how sustainable soil quality and water content can be linked to climate change. At the same time, It can be a very beneficial practice to solve the land degradation problem in Sagarejo Municipality.

So, the question – What is SLM? Mere abbreviation or clever mechanism for sustainability?

Sustainable Land Management (SLM) [14]represents an inclusive approach to preserve ecosystem services in long-term productive ecosystems by integrating Biophysical, Socio-cultural, and Economic needs and Values.

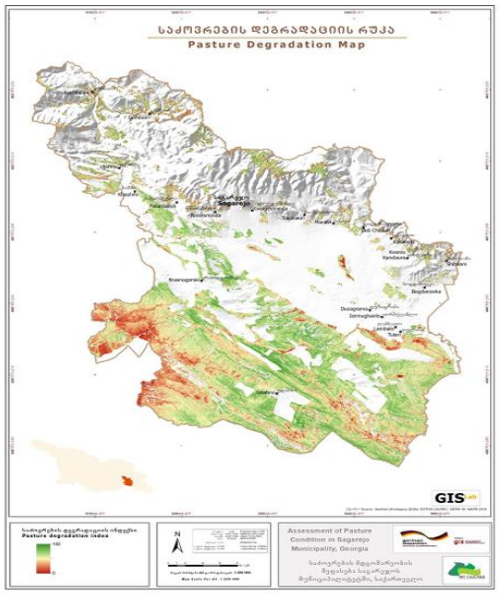


Figure 2: Pasture degradation map depicting the Pasture Degradation Index (PDI) for Sagarejo municipality.

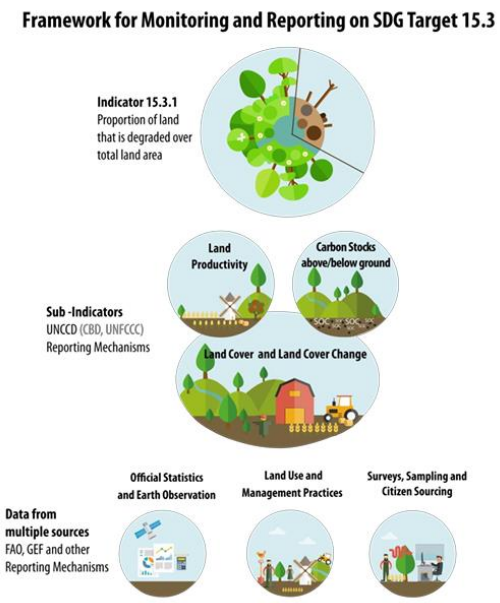
[13] (Georgian Agriculture Development Strategy (ADS)

[14] Sustainable Land Management contribution to successful land-based climate change adaptation and mitigation, UN, UNCCD, 2017

SLM can be defined as "*the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions*" (UNCCD).

To foster successful implementation of SLM, more attention must be paid to some of the core elements[15], such as:

- Land-user-driven and Participatory Approaches
- Integrated Use of Natural Resources at Ecosystem and Farming System Levels
- Multi-level and Multi-Stakeholder Involvement
- Targeted Policy and Institutional Support, including the development of incentive mechanisms for SLM adoption and income generation at the local level.



Moreover, scientific evidence shows that SLM practices, if widely adopted, can prevent, or reduce land degradation and overgrazing problems in achieving the **LDN – Land Degradation Neutrality** (SDG 15.3[16]) and contribute to adapting to climate change.

The Land Degradation Neutrality Target Setting Programme (LDN-TSP) aims to help countries establish national voluntary targets for LDN and to identify long-term projects to achieve these goals. It provides opportunities for leverage and coordination among various state bodies from sectors involved in land management as it should be aligned with national policies and development plans. [17]

LDN has 3 indicators to track progress, such as Land cover, Land Productivity, and Carbon stocks above and below ground. The baseline should be calculated by estimating the average value across 10-15 years. And, to achieve LDN, ***integrated water management, the rehabilitation and restoration of degraded land*** are key concepts.

Georgia is a part of UNCCD regarding the crucial objectives as the protection and sustainable management of land resources of the country. Implementing SLM and LDN in a developing country like Georgia requires a multi-stakeholder approach, strong political commitment, and long-term investment in sustainable land use practices. Especially, involving local communities in a decision-making process.

[15] Land Degradation Neutrality Target Setting Programme, UNCCD, 2016, Pg. 16
[16] Aims to combat desertification, restore degraded land and soil.
[17] Land Degradation Neutrality Target Setting Programme, UNCCD, 2016, Pg. 25

BUT WHERE ARE WE NOW?

In the Report from Georgia (7 March 2023) regarding the **United Nations Convention to Combat Desertification**, GEF SGP Seventh operational plan seems the only plan to improve the management policy of rangelands and restore degraded pastureland. (View second question SO5-5.2)

SO5-5.2: Planned provision and mobilization of international public and private resources

Please provide information relevant to the planned provision and mobilization of international resources for the implementation of the Convention, including information on projected levels of public financial resources and support to capacity building and transfer of technology, target regions or countries, and planned programmes, policies and priorities.

As overgrazing and degraded rangelands are one of the significant problems of the country, under GEF SGP Seventh Operational Phase it is planned to improve management policy of rangelands and restore degraded pasturelands.

However, as in the SGP Country Programme Strategy for OP7, Georgia 2019-2023, it is shown that the very least of resources have been allocated for the Land Degradation (LD) problem – **4%** out of **USD 2 164 442** through OP5 and OP6. The government of Georgia is allocating budget funds for expanding protected territories and improving forest management and amelioration systems.

Moreover, are the resources enough or do we face investment problems?

As stated in the Report from Georgia (2023) we face challenges regarding LDN concept investment.

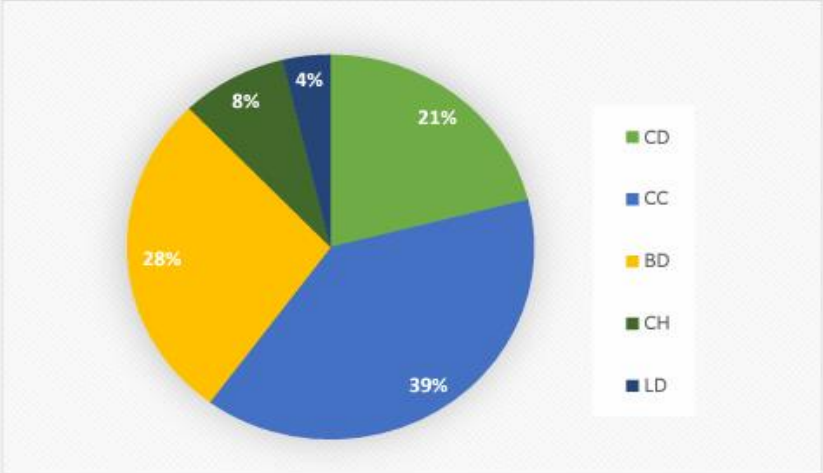


Figure 1. Distribution of SGP OP 6 grant funds by thematic area (CC – climate change; BD – biodiversity; CD – capacity development; LD- land degradation; CH – chemicals; IW- international waters;)

Using Land Degradation Neutrality as a framework to increase investment:

From your perspective, would you consider that you have taken advantage of the LDN concept to enhance the coherence, effectiveness and multiple benefits of investments?

- (•) Yes
- ( ) No

Use this space to describe the experience:

Georgia has no investments on the LDN concept yet.

Hence, GEF (Global Environment Facility) via the program "Achieving Land Degradation Neutrality Target of Georgia through Restoration and Sustainable Management of Degraded Pastureland" is supporting the restoration and sustainable management of degraded pasturelands. As highlighted Baselines (View the chart below, **Baseline**) in the FAO-GEF Project Implementation Report 2023 (Period covered: 1 July 2022 to 30 June 2023) LDN principles are not yet integrated into the existing national legal frameworks related to agricultural lands. It has been 8 years since our willingness to participate in the LDN TSP.

2. Progress towards Achieving Project Objective(s) (Development Objective)

Please indicate the project's main progress towards achieving its objective(s) and the cumulative level of achievement of each outcome since the start of project implementation.

Project or Development Objective	Outcomes	Outcome indicators[8]	Baseline	Mid-term TargetMid-term Target[9]	End-of-project Target	Cumulative progress[10] since project start	Progress rating[11]
Support the national efforts to implement LDN targets of Georgia through restoration and sustainable management of the degraded pasturelands (National Targets 1 and 4)	**Outcome 1** **Enhanced policy and institutional frameworks for LDN with the focus on the implementation of SLM principles on pasturelands**	LDN principles integrated in the national legal and policy frameworks with the focus on pasturelands. LDN principles integrated in the national institutional framework with the focus on pasturelands	LDN principles are not yet integrated in the existing national legal and policy frameworks related to agricultural lands. There is no framework in place to mainstream LDN into sectoral planning and decision-making processes. LDN principles are not yet integrated in the existing national legal and policy frameworks related to agricultural lands. No monitoring system for the LDN indicators exists at national and/or local levels	LDN principles are formulated in response of national priorities and context and agreed with stakeholders for further integration into national legal, policy, and institutional frameworks.	National legal and policy frameworks for LDN with the focus on the implementation of SLM on pasturelands are developed and presented to the Government. Strengthened national institutional framework with the functional coordination mechanism and LDN DSS. A monitoring system for the LDN indicators in place at national and local levels. Proposal for the MEPA Budgetary Programme for implementation of the recommendations from the cost-benefit analyses submitted for inclusion in the state budget for the following years.	**92%** Legislation drafted; adoption process ongoing but not completed	S
	Outcome 2					**50%**	MU

All these require more attention for implementing international practices regarding SLM and LDN. Municipalities such as Sagarejo are in crucial need of support and to find a contemporary way out. Involving locals in achieving and enacting all these practices will enrich the potential of Sagarejo Municipality.

INSTITUTIONAL AND REGULATORY ISSUES LEADING WATER DISTRIBUTION CHALLENGES

Sagarejo Municipality may face several institutional and regulatory issues that contribute to water distribution challenges. These challenges can impact the availability, quality, and equitable distribution of water resources within the region. Some of the key issues related to water distribution challenges in Sagarejo Municipality may include Inefficient Water use and Regulatory Framework.

As mentioned, Mechanical Irrigation Systems in the region are out of operation and the internal irrigation network linked to the systems is out of order. Misusing irrigation systems that are not properly maintained can lead to a variety of problems, including:

- **Water Waste**: A malfunctioning irrigation system may leak, overspray, or distribute water unevenly, leading to significant water wastage. This not only strains water resources but can also increase water bills for property owners.
- **Erosion and Soil Compaction**: Overwatering in certain areas can lead to soil erosion and Soil Compaction, making it more challenging for plants to establish roots and access oxygen, as excessive water can wash away topsoil and nutrients. This can affect the health of the landscape and the stability of the ground.
- **Contamination:** Misused irrigation systems may spread contaminants such as pesticides, fertilizers, or debris throughout the landscape. This can harm the environment and potentially pollute water sources.
- **Increased Operating Costs:** Repairs and maintenance costs can escalate if irrigation systems are misused or allowed to deteriorate. Fixing the damage and inefficiencies caused by misuse can be costly.

NEEDS EXCEEDED? IRRIGATION INFRASTRUCTURE SYSTEM IN SAGAREJO

To address these challenges, Sagarejo Municipality may need to work on improving its water infrastructure, enhancing regulatory frameworks, and investing in efficient water management practices. Collaboration with relevant stakeholders, community engagement, and the allocation of appropriate resources are crucial for ensuring sustainable and equitable water distribution in the region.

Remark: We wanted to discover how Municipal Water Property and Utilities in Desertified Regions are managed regarding changing climate and to detect problems concerning reduced water availability. We made an official requisition of some documents from Sagarejo Municipality, such as complete information about the quantity of natural water resources owned by Sagarejo Municipality, Which water resources are being actively used and which are unexploited with geographical indicators to identify the location. Also, the Report on Municipal Water Resources management. Specifically, which companies are responsible for water supply, where does the water supply come from, and which water resources are used for agriculture and daily consumption purposes? What are existing watering and irrigation systems and how soil consolidation is avoided; Also, the Information about the amount and functioning of existing or probable future number of Solar Panels and distributed Energy Resources (DER), in Sagarejo Municipality.

Within the framework of the UNEP/GEF project (April 2018 report) under the name: "Generating Economic and Environmental Benefits from Sustainable Land Management for Vulnerable Rural Communities of

Georgia", land use planning processes should have been established in four municipalities: [18]Sagarejo, Kvareli, Gori and Kareli. The staff of four pilot municipalities would be trained to create an enabling policy and relevant institutional environment that would take into account the LDN principles towards avoiding, reducing and/or reversing the levels of land degradation in the municipalities.

We requested full information on the measures taken or a report published. However, **NONE of the abovementioned requested information has been provided by the Municipality**. The people in charge have not been answering the calls and even violated the 10-day official deadline to hand over public information that must be transparent.

SUN-POWERED SOLUTIONS: SOLAR PANELS FOR SUSTAINABLE LAND MANAGEMENT

Solar panels play a crucial role in sustainable land management by providing clean and renewable energy to power various applications, from agricultural operations to water management and infrastructure development.

International methods of irrigation, combined with model calculations, are used to optimize water use, enhance agricultural productivity, and manage water resources efficiently in drought-affected regions. Accordingly, Anti-drought measures are essential for mitigating the impact of droughts on agriculture and water resources.

Solar panels are cost-effective solutions for powering various irrigation methods, helping farmers improve water management, reduce operating costs, and increase agricultural productivity while minimizing their carbon footprint. Over other irrigation systems, SDI – Subsurface Drip Irrigation has the potential to be the most efficient method available today.

Subsurface Drip Irrigation (SDI)[19] supplies water directly and involves burying drip irrigation lines beneath the soil surface. It minimizes soil evaporation [20]due to irrigation and there is no runoff. Solar-powered pumps are compatible with SDI, which is ideal for water conservation and reducing evaporation losses. Solar pumps can provide the necessary and proper amount of water supply to crop root-zone.

CASE STUDY FROM SPAIN – MODERN IRRIGATION SYSTEM – "MODERNIZATION AND SUSTAINABILITY OF IRRIGATED AGRICULTURE" PROGRAM

Spain is a world leader in the use of modern irrigation systems. The country has a long history of irrigation dating back to the Roman era. In recent decades, Spain has made significant investments in modernizing its irrigation infrastructure.

The "Modernization and Sustainability of Irrigated Agriculture" program was launched by the Spanish government in 2009. The program aims to help farmers modernize their irrigation systems and make their operations more sustainable. The program has provided subsidies to farmers to help them purchase and install modern irrigation equipment. It has also provided training to farmers on how to use modern irrigation systems efficiently.

[18] View the attached document, page 12

[19] Research on Subsurface Drip Irrigation, Department of Biological Systems Engineering, Suat Irmak, Pg. 2

[20] The movement of water directly to the air from sources such as the soil and water bodies

"*It is not a matter of choosing whether to irrigate or not, but rather choosing efficient and sustainable irrigation for all*", said the minister during the inauguration of the "Spanish irrigation, a benchmark of sustainability and modernity" conference, held in the province of Cordoba.

The plan for the improvement and efficiency of irrigation sustainability in charge of the recovery mechanism will have a second phase in 2022 with a public investment of 303 million euros and 48 new actions.

It is the largest public investment in sustainable irrigation in recent decades which will represent a very important advance not only in environmental sustainability, resource efficiency and technology but also in improving the productivity and profitability of the agricultural sector.

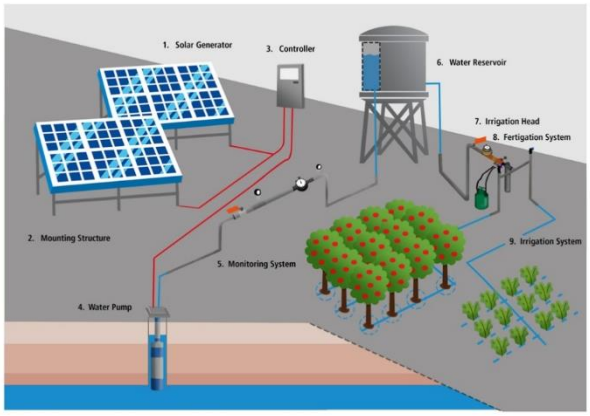
Modernization of the irrigation system in Spain has resulted in several benefits[21], including:

Increased water efficiency: The plan has helped to increase water efficiency in Spanish irrigation by an average of 20%. This has saved Spain over 4 billion cubic meters of water per year.

Reduced soil erosion: The changes in the system have caused a reduction of soil erosion in Spanish irrigation by an average of 30%. This has helped to protect soil fertility and improve crop yields.

Improved crop yields: The plan has brought about an average of 10% improvement in crop yields, which increased agricultural productivity.

Increased farmer income: The increase of farmer incomes in Spanish irrigation has occurred by an average of 15% which has begun to improve the livelihoods of farmers and their families.



SOLAR POWERED IRRIGATION SYSTEMS (SPIS): DRAW ON ALL AVAILABLE VIA COST-EFFECTIVE MAINTENANCE

Sun-powered water pumps can assist in solving the desertification problem by providing a reliable and sustainable source of water for irrigation. Desertification is the process by which land becomes increasingly arid and sterile, and it is a major problem in Sagarejo Municipality. As stated, one of the main causes of desertification is overgrazing, which removes vegetation and leaves the soil exposed to erosion. Sun-powered water pumps can help to address this problem by providing farmers with a way to irrigate their crops without relying on traditional methods, such as diesel pumps[22], which can be expensive and polluting.

[21] Effect of the irrigation modernization in Spain, 2002-2015

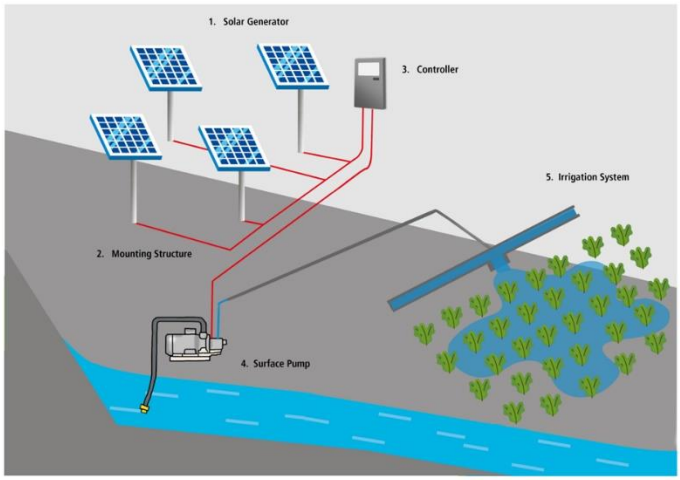
[22] So called, Diesel Fuel Injection pump – the mechanism that is used to pump fuel from the fuel tank into the carburetor.

It is worth mentioning that sun-powered water pumps can be more expensive to purchase and install than conventional water pumps. However, sun-powered water pumps can save money in the long run by reducing or eliminating energy costs.

Overall, sun-powered water pumps are a promising solution to the desertification problem. They are reliable, sustainable, and can be used in a variety of settings. As the cost of sun-powered water pumps continues to decline, they are becoming increasingly accessible to farmers and communities in desertification-affected areas. [23]

Solar Powered Irrigation Systems (SPIS) are passively self-regulated because the volume of water pumped increases on clear hot days when plants need more water, and vice versa. It is important to note that a SPIS is more than just a solar pump used for irrigation. Panels, pumps, and irrigation systems are designed based on water availability and local crop water requirements.

The most common SPIS configuration is when a solar generator on a fixed mounting structure (2) provides electricity for a submersible pump installed in a borehole[24]. The water is then pumped to a reservoir elevated a few meters above the field where it is stored at a constant pressure. When released, it flows into a low-pressure drip irrigation system where the water is filtered and mixed with fertilizer before reaching the plants[25].



This technology helps farmers grow crops and trees in arid regions, reducing the risk of desertification and is beneficial for SLM practices. It is directly linked to Water harvesting and management practices to help increase water availability and reduce the impact of drought in arid and semi-arid regions, like Sagarejo Municipality.

LIFE-CYCLE COST ANALYSIS (LCCA) FOR WATER PUMPING

Giving the farmers all the information to estimate profit can be a useful practice to implement new practices in Sagarejo Municipality. The outcomes can be easily understandable and tangible after comparing the total cost of various alternatives. When comparing different pumping technologies we should take into consideration life-cycle cost analysis (**LCCA**) whereas all future costs and benefits are calculated in today's money value. Because the value of money changes over time it would be unrealistic to add up costs incurred in different years. Instead, those costs are converted into money value at the same point in time, so the present time. It would be a great support for farmers to acknowledge such mechanisms which can improve inner courage and attitude toward new technologies.

[23] https://energypedia.info/index.php?curid=65999
[24] A hole drilled in the Earth.
[25] Simple configuration – with a tracking system – of the different components of an SPIS (Source: GFA)

A life-cycle cost analysis considers the following concepts: [26]**Life-cycle costs** - The sum of all costs and benefits associated with the pumping system over its lifetime in present-day money. This is called the present worth or the net present value of the system. **Payback period** - The length of time required for the initial investment to be repaid by the benefits gained. **Total cost saving** -The difference in total costs incurred between two different investments at the end of the appraisal period.

HOW SOLAR WATER PUMPS WORK: BANGLADESH RE EXAMPLE – GOVERNMENTAL INITIATIVE "INFRASTRUCTURE DEVELOPMENT COMPANY LIMITED (IDCOL)

Solar water pumps work by using solar panels to convert sunlight into electricity. This electricity is then used to power a motor, which drives the pump. Solar water pumps can be used to pump water from a variety of sources, such as wells, rivers, lakes etc.

One example of a government initiative to promote the use of solar water pumps in Bangladesh is the Infrastructure Development Company Limited (IDCOL) program. IDCOL provides financial assistance to farmers and entrepreneurs to purchase and install solar water pumps. The program has helped to install over 100,000 solar water pumps in Bangladesh, making it one of the world's leaders in the adoption of solar water pumps.

Supporting private sector participation in establishing and developing infrastructure projects has become the priority of IDCOL which offers long-term financing in both local and foreign currencies. It also provides concessionary financing [27]and grants as well as capacity-building support to non-governmental organizations (NGOs), micro-finance institutions (MFIs) and private sector entities in the RE sector. In addition, IDCOL has advisory services on project finance, financial modelling, rural electrification, public–private partnership and more.

Since Solar water pumps are powered by the sun and do not require any electricity from the grid, this saved significant amounts of money on their energy bills to farmers and entrepreneurs. Crop yields have been improved by providing a reliable source of water for irrigation which is especially important in Bangladesh, where droughts are a common problem. IDCOL has also increased water availability in areas where there is a shortage of water.

UNITED STATES EXAMPLE: U.S. DEPARTMENT OF AGRICULTURE (USDA) GRANT PROGRAMS AND TECHNICAL ASSISTANCE PROGRAMS FOR FARMERS

The United States Department of Agriculture (USDA) offers diverse grant programs and technical assistance programs for farmers. These programs assist farmers in improving their operations, adopting new technologies, and protecting the environment. These are some of the significant examples of such programs.

Environmental Quality Incentives Program (EQIP): provides financial assistance to farmers to implement conservation practices [28]on their land.

[26] Solar pumping for water supply, Asenath W. Kiprono and Alberto Ibáñez Llario, 2020, Pg. 152
[27] South Asian Journal of Business and Management Cases 1–18, 2020, Pg. 4
[28] Activities that help to conserve, protect, and enhance natural resources while addressing environmental problems.

Conservation Stewardship Program (CSP): CSP provides financial assistance to farmers and ranchers who are already using conservation practices on their land.

Regional Conservation Partnership Program (RCPP): RCPP provides financial assistance to public-private partnerships that are working to implement conservation projects on a regional scale.

Agricultural Management Assistance Program (AMAP): AMAP provides financial assistance to farmers to develop and implement farm plans. Similar programs exist for beginners as well.

The USDA also offers a variety of technical assistance programs for farmers which is crucially important for implementing modern practices. These programs can help farmers to learn about new technologies, adopt best practices, and manage their operations more effectively.

A CALL TO ACTION: GUIDANCE FOR STAKEHOLDERS IN PROMOTING SUSTAINABILITY

In the research, we encountered challenges regarding a full understanding of SDG 15.3 requirements. Government subsidies, training programs and proper allocation of budget can play a crucial role in encouraging Sagarejo Municipality farmers to adopt sustainable land management practices, invest in solar-powered water pumps and use water conservation practices, such as irrigation scheduling and drip irrigation. Involvement from each group of stakeholders can establish unity to achieve efficiency.

The government should provide financial and technical assistance to farmers to implement irrigation technologies and SLM practices based on international experience. Special emphasis should be set on the creation of up-to-date development and enacting policies that support sustainable agriculture. Based on statistics, the awareness of the locals needs to be improved about the importance of LDN and the negative consequences of land degradation. Fostering partnerships between the public and private sector are also vital for promoting investment in sustainability.

GENERATING AGRICULTURAL PRACTICES FROM ENVIRONMENTAL VARIABILITY: ADJARA GROUP ALMOND TREE PLANTATIONS "UDABNO"

Among perennial crops besides the vineyard, almonds and so-called pistachio orchards have been actively cultivated in recent years, for which the soil and climate conditions are favourable in Sagarejo municipality. Currently, the leading and the most efficient local agricultural company in terms of size and annual turnover is Ltd City Loft and Ltd Udabno, which have invested approximately Gel 500 million in Sagarejo municipality. With all the effort and measurements, Almond production[29] in the country will be increased by 70%. By developing up to 8000 ha in Kakheti, Udabno is playing a pivotal role in fighting desertification, while bringing biodiversity to the region.

Udabno owns 25 kilometres of water pipes and automated irrigation systems. However, they can develop and manufacture new irrigation technologies that are more efficient and water-saving using Sun-Powered Water Pumps. Since the company follows sustainable agriculture practices, it would be an additional advantage to give other companies an example of how to implement contemporary and responsive corporate sustainability by taking the first steps.

By implementing solar-powered water pumps and advanced irrigation systems**, Udabno** should consider: **Scalability**: To design the project with scalability in mind. Udabno can gradually expand the use of solar-

[29] Local Economic Development Plan, Sagarejo Municipality, Georgia, 2019, pg. 6

powered irrigation systems as it develops more land for almond and pistachio cultivation; **Economic Viability**: Assess the long-term economic viability of solar-powered irrigation systems by considering the initial investment, operational costs, and potential savings in energy and water bills.

Udabno can enhance its agricultural operations, reduce energy, and water costs, and contribute to sustainable agriculture in the region while playing a crucial role in combating desertification and promoting biodiversity.

INNOVATIVE APPROACHES TO ENVIRONMENTAL GOVERNANCE: STRENGTHENING SECTORAL POLICIES AND REGULATORY MECHANISMS

According to local statistical data, in 2019 there were 760 operating enterprises in the municipality, including 16 large, 36 medium and 708 small enterprises. In addition, 29 agricultural cooperatives are present in Sagarejo municipality[30]. These enterprises can be useful to cause action from locals, such as:

***Encouraging entrepreneurship environment (startups) and using contemporary technologies**. Governmental assisting programs in connection with private enterprises can simplify the process of using modern methods in Agriculture based on U.S.A and Bangladesh examples. It can yield a wide range of benefits for the community. Promoting entrepreneurship and technology diversifies the local economy. Accordingly, reducing dependence on traditional sectors can make the municipality more resilient to economic fluctuations.*

Start-ups often focus on innovative solutions and technology-driven products or services. In Sagarejo Municipality, this can lead to advancements in various sustainable fields, fostering a culture of research and development in the municipality.

***Establishing Governmental Assistance Programs to implement Sustainable Agricultural Practices in Municipalities** - Sustainable agricultural practices help preserve the environment by reducing soil erosion, preventing water pollution, and conserving biodiversity. Government programs can incentivize farmers to adopt these practices, leading to healthier ecosystems through incentives and subsidies. These programs can help farmers adhere to evolving agricultural regulations and standards, ensuring that their practices are in line with legal requirements. It will facilitate the transfer of knowledge and best practices to farmers through training, workshops, and educational resources. Government can position their agricultural sectors favourably in international markets where sustainability and responsible production are valued.*

*In terms of cooperation and partnership between business entities operating within the territory of Sagarejo municipality emphasize some challenges regarding less experience and passive business sector. Accordingly, it is vital to remove barriers and **foster business-friendly communication** to strengthen the private sector in Sagarejo.*

***Improving the investment environment and attracting financial resources** can increase the availability of small enterprise office space. It can develop an investment portfolio that will accumulate the Municipality's free-standing and unused property resources for investment purposes.*

An innovative approach to enhance the online governance of Sagarejo Municipality also involves transforming its website into a robust, multilingual, and user-centric platform. Due to current data, the

[30] Local Economic Development Plan, Sagarejo Municipality, Georgia, 2019, pg. 6

website is not working in order and has technical errors. Also, another language is not provided. The key component of this approach includes ***Comprehensive Website Revamp****: Redesign the website with a modern, user-friendly interface and intuitive navigation. Ensure it is responsive and accessible on all devices;* ***Multilingual Support****: Implement a multilingual website that supports Georgian and English, making essential information accessible to a broader audience, including residents, tourists, and potential investors.* ***Community Engagement:*** *Develop a dedicated section for community engagement, where residents can submit feedback, complaints, and suggestions. Create online surveys and polls to gather public opinion on key issues.*

CONCLUSION

In conclusion, the future opportunities in Sagarejo Municipality for transitioning towards renewable energy sources and implementing sunflower water pumps for irrigation hold the potential to usher in a new era of sustainability, economic growth, and environmental conservation. With its favourable climate and vast agricultural potential, Sagarejo is primed to harness the power of the sun and transform its current conditions into a beacon of renewable energy and sustainable agriculture.

The importance of governmental programs cannot be overstated in this transition. These programs play a pivotal role in incentivizing and facilitating the adoption of renewable energy solutions and water-efficient irrigation practices. By offering financial support, technical expertise, and regulatory frameworks that promote sustainable development, the government can empower local businesses and farmers to embrace eco-friendly technologies and practices.

Furthermore, the regional government needs to be more responsive and active in Sagarejo Municipality. As the driving force behind policy and regulatory decisions, the regional government can proactively support and engage with local initiatives aimed at achieving renewable energy and sustainable agriculture goals. Effective collaboration between all stakeholders, including local authorities, entrepreneurs, and the community, is vital to drive progress and ensure that the municipality thrives in the renewable energy era.

The future of Sagarejo lies in its ability to harness the power of renewable energy, revitalize its agricultural landscape through innovative irrigation methods, and foster a spirit of collaboration and sustainability. By seizing these opportunities and investing in a greener, more prosperous future, Sagarejo can serve as a model for other regions, showcasing the benefits of environmentally conscious development and the vital role of government support in making these ambitions a reality.

REFERENCES

REC Caucasus. (2020). "Desertification and Land Degradation in the South Caucasus: National Reports on Georgia." Retrieved from https://rec-caucasus.org/wp-content/uploads/2020/08/1574947051.pdf.

Davitashvili, T. (n.d.). "Desertification in Georgia: Current Situation and Challenges." Retrieved from http://www.viam.science.tsu.ge/enl_ses/vol23/davitashvili.pdf.

Ministry of Environment and Agriculture of Georgia. (n.d.). "National Report on Combating Desertification and Land Degradation in Georgia." Retrieved from https://mepa.gov.ge/En/Files/Download/1602.

Green Alternative. (2021). "Community-Based Sustainable Land Management in Georgia." Retrieved from https://greenalt.org/app/uploads/2021/04/CCD_ENG.pdf.

United Nations Convention to Combat Desertification. (2017). "Land-Based Sustainable Development: A Success Story from Georgia." Retrieved from https://www.unccd.int/sites/default/files/documents/2017-09/UNCCD_Report_SLM_web_v2.pdf.

Sagarejo Municipality. (n.d.). "Local Economic Development Plan." Retrieved from https://www.sagarejo.gov.ge/sites/default/files/local_economic_development_plan_eng_0.pdf.

Organisation for Economic Co-operation and Development (OECD). (n.d.). "Environmental Performance Reviews Georgia." Retrieved from https://www.oecd.org/countries/georgia/36472918.pdf.

Food and Agriculture Organization (FAO). (n.d.). "Georgia: Legal Framework for Combating Desertification and Land Degradation." Retrieved from https://faolex.fao.org/docs/pdf/geo200876.pdf.

United Nations Development Programme (UNDP). (n.d.). "Sustainable Agriculture Development in Kakheti, Georgia." Retrieved from https://www.undp.org/sites/g/files/zskgke326/files/migration/ge/GE_kakheti_agriculture_eng.pdf.

United Nations Convention to Combat Desertification. (n.d.). "Official Report on Combating Desertification in Georgia." Retrieved from https://reporting.unccd.int/api/country/GEO/report/official/pdf/.

Georgia Today. (n.d.). "Desertification in Kakheti: A Threat to Kakhetian Agriculture." Retrieved from https://georgiatoday.ge/iset-economist-desertification-in-kakheti-a-threat-to-kakhetian-agriculture/#_ftn2.

United Nations Convention to Combat Desertification. (2018). "Georgia Land Degradation Neutrality Target Setting Programme: Country Report." Retrieved from https://www.unccd.int/sites/default/files/ldn_targets/2018-11/Georgia%20LDN%20TSP%20Country%20Report.pdf.

United Nations Convention to Combat Desertification. (n.d.). "Land Degradation Neutrality Target Setting Technical Guide." Retrieved from https://knowledge.unccd.int/sites/default/files/2018-08/LDN%20TS%20Technical%20Guide_Draft_English.pdf.

Global Environment Facility. (n.d.). "Project Implementation Report for FAO Georgia." Retrieved from https://publicpartnershipdata.azureedge.net/gef/GEFDocuments/42858d09-c12b-e911-8146-3863bb3c4538/PIR/ProjectImplementationReportPIR_GEFID10512023PIRFAOGeorgia.pdf.

Irmak, S. (n.d.). "Subsurface Drip Irrigation." Retrieved from https://water.unl.edu/documents/subsurface%20drip%20irrigation_Irmak_S.pdf.

CEMAS Global. (n.d.). "Spain Launches an Ambitious Plan to Improve Irrigation." Retrieved from https://cemas.global/en/spain-launches-an-ambitious-plan-to-improve-irrigation/.

Ministry of Economy and Business (Spain). (n.d.). "Modernization of Irrigation Plan." Retrieved from https://portal.mineco.gob.es/ca-es/comunicacion/Pagines/plan-modernizacion-regadios.aspx.

WARM-D. (2018). "Final Report: Modernization of Irrigation System in Spain." Retrieved from https://digital.csic.es/bitstream/10261/207337/3/WARM-D-18-00706_final.pdf.

Infrastructure Development Company Limited. (n.d.). "Official Website." Retrieved from https://www.idcol.org/.

ResearchGate. (n.d.). "Solar Home System Program: A Sustainable Solution for Energizing Rural Bangladesh." Retrieved from https://www.researchgate.net/publication/339428956_Infrastructure_Development_Company_Limited_Solar_Home_System_Program_A_Sustainable_Solution_for_Energizing_Rural_Bangladesh.

Oxfam. (n.d.). "Solar Pumping for Water Supply." Retrieved from https://www.oxfamwash.org/water/solar-pumping/solar-pumping-for-water-supply.pdf.

Energypedia. (n.d.). "SPIS Toolbox - Solar-Powered Irrigation Systems." Retrieved from https://energypedia.info/wiki/SPIS_Toolbox_-_Solar_-_powered_Irrigation_Systems.

The Vistula riverside: the unfulfilled potential of Toruń's blue space
by Joanna Koter

INTRODUCTION

The Vistula (Polish: *Wisła*) is the longest river in Poland. It runs for 1047 km from its source in the Tatra Mountains to the Baltic Sea, crossing many Polish cities on its path. One of these cities is Toruń, established in its riverside location in the 13th century. Toruń, with ca. 180,000 residents, is the 16th most populous city in Poland (*Mieszkańcy - dane liczbowe | www.torun.pl*, no date). Despite the city's status as an important cultural and educational centre, over the last twenty years it has been noted that Toruń's development in the recent decades has omitted the part of its landscape that had previously been key to its success – the riverside. This article aims to present the Vistula riverside as a space with potential to create a new, accessible green space and open the public's access to the river, opening them with a type of space lacking in Toruń, namely blue space.[31]

I will first describe the nature of the challenge, its significance, impacts and likely causes. Then I will present a review of international examples of how the riverside was developed to promote well-being and improve access to green and blue space, while taking into account the local environmental and cultural context. The final part of the article proposes the development of a riverside trail to improve access to the river, encourage active recreation, and increase the awareness and knowledge of the Vistula's significance.

This project responds to four strategic goals outlined in the United Nations Sustainable Development Agenda: creating sustainable cities and communities (Goal 11), supporting good health and well-being (Goal 3), protecting life on land (Goal 15), and providing opportunities for decent work and economic growth (Goal 8) (United Nations 2023). The specific ways in which the project addresses the goals and concrete target will be discussed in the Recommendations section.

CHALLENGE

The Vistula River is an important part of Toruń's landscape. The river flows through the city, dividing it asymmetrically into two parts connected by two bridges for pedestrians and vehicles and one railway bridge. The length of the northern shore within Toruń's administrative area is 19 km, the southern shore – 13 km. The river is approximately 300-500 m wide, and it has dense vegetation cover along the majority of its riverside.

In the past, the Vistula played an important role in regional transport, industry and trade. In the 19th century this economic aspect was still emphasised and the riverside was subject to intensive changes carried out by the Prussian authorities. These changes included evening out the river depth and width and constructing new ports (Szymkiewicz 2017). However, from the mid-20th century onwards, the Vistula has largely been relegated to its aesthetic role or as a space for boat cruises for tourists (Miejska Pracownia Urbanistyczna 2017). Most of the riverside is difficult to access, generally left undeveloped and overgrown with vegetation. While this has a positive effect of providing wildlife habitat and allowing for natural fluvial

[31] *Green space* is understood here as open, public space characterised by a high percentage of vegetation and permeable surfaces (Swanwick et al. 2003). *Blue space* is defines as natural and manmade surface water, regardless of form – that includes rivers, lakes, canals, the ocean, and so on (Smith et al. 2021).

processes to happen, the Vistula's lack of visibility in the public sphere contributes to its overall neglect and lack of engagement over potential threats to the river.

The riverside areas are a bank of much needed green and blue space that are not easily accessible to the public. They lack infrastructure such as benches or litter bins, and without maintenance, they are often overgrown and littered. Paths in the area, if present, may be sandy or muddy due to fluvial deposits, which makes them difficult to access. The presence of discarded bottles and cans suggests that the riverside, in places, is often used as an alcohol drinking spot. The lack of designated paths, overgrown vegetation and litter can make the space feel unsafe to some visitors, and in fact it presents opportunities for petty crime due to the lack of supervision. The riverside still attracts visitors, especially anglers and wildlife enthusiasts. Still, many more people could benefit from improving the access to the green and blue space along the Vistula River.

The unfulfilled potential of the Vistula riverside in Toruń has previously been noticed and addressed by city-commissioned strategic documents as well as non-governmental organisations (NGOs). For instance, a 2007 analytical report prepared within the *InWater* regional development programme suggested utilising the Vistula for recreation and tourism through focusing on existing points along the riverside, such as Port Drzewny, Port Zimowy and Bulwar Filadelfijski (Miejska Pracownia Urbanistyczna 2007). A later, 2012 landscape management plan commissioned by the city planning office proposed the creation of a river park and a trail for walking, biking and horse riding, preserving the open landscape and existing viewpoints along the shore (Miejska Pracownia Urbanistyczna 2012).

The most recent document concerned with the future of the Vistula in Toruń was prepared by Pracownia Zrównoważonego Rozwoju (PZR) as part of the *Wisła Wciąga* project realised in the years 2021-2023 (Fundacja Wolna Wisła, no date). The document reports on the state of activities on the Vistula in the kuyavian-pomeranian voivodeship and the cooperation of stakeholders in that field, such as local authorities, small business owners, environmental scientists, historians, farmers, and NGOs. PZR's report identified several challenges faced by the Vistula community, among them: the lack of sustainable water management in the Vistula basin; the local community's low awareness and knowledge of the Vistula's history; low accessibility of the riverside in terms of infrastructure (such as walking trails, sanitary facilities, spaces for recreation and so on); and the perception of the river as polluted and inappropriate for the development of river tourism (Pracownia Zrównoważonego Rozwoju 2022).

While the issues surrounding the Vistula's unfulfilled potential are complex, addressing the need for better infrastructure along the river may help encourage people to spend time by the riverside and change the perception of the river. Developing access to the riverside could act in a positive feedback loop manner, as increased activity around the water would lead to people demanding a better care of the river's environment. Improved quality of the water and riverside would in turn improve the public perception of the Vistula and create demand for access to the riverside and opportunities for waterside activities.

IMPACTS AND SIGNIFICANCE OF THE CHALLENGE

The significance of the underuse of the Vistula riverside mostly matters in terms of missed opportunities rather than direct effects. It has already been mentioned that the Vistula does not have a good reputation among Toruń residents, it lacks infrastructure and is largely unknown with regards to its historical and environmental significance. The absence of knowledge of the Vistula, both theoretical and practical, impacts the residents' attitude towards the river. A low awareness could contribute to inaction facing

environmental threats, and it diminishes the potential for proactive attitudes of residents towards the protection of local ecosystems.

Making use of the Vistula riverside would respond to the local and regional strategic programmes . For instance, the 2030 Tourism Development Programme for the City of Toruń advises creating and promoting new ways to spend leisure time outside of the strict city centre, placing emphasis on developing water sports and recreation in riverside areas (Sikora et al. 2021: 58). At the regional level, the kuyavian-pomeranian voivodeship's Acceleration Strategy 2030+ designated "A healthy, active and wealthy community" and "Accessible space and clean environment" as two of the main objectives of regional development (Strategia Przyspieszenia 2030+, 2020: 141-142). Therefore, the Vistula is a strategic space for development at both local and regional levels, and so far the objectives associated with the riverside's use in Toruń have not been adequately addressed.

INTERNATIONAL PRACTICE AND SOLUTIONS

The review sought to identify rivers with similar characteristics to the Vistula (temperate climate, location within an urban structure, large distance from the coast, natural, unregulated river channel), where complex projects of increasing access to the riverside have been carried out. The projects reviewed in this section were chosen considering their attention to: preserving the natural environment, connecting the natural with cultural and historical heritage, accessibility to all, range of activities available, and creating opportunities for engagement of the local community.

River's Edge Trail, Montana

River's Edge Trail along the Missouri River is a paved urban trail which links local parks and attractions on both sides of the historic waterfront of the City of Great Falls, Montana (*River's Edge Trail | City of Great Falls Montana*, no date). The trail is available for walking, running, biking, and in-line skating. Beyond the paved section of the trail, there are additional miles of singletrack trails for mountain biking along the canyon walls to the dams of the Missouri River. The trail is stewarded by the River's Edge Trail Foundation, which coordinates and raises funds for the trail's maintenance and improvements and organises community events. The trail is made more attractive by public art displays, sculptures, and interpretive panels with information on the local context. River's Edge Trail runs a volunteering programme, where activities range from trail building and maintenance to assisting on other projects in the park (River's Edge, 2022). An interactive map of the trail is available online (fig. 1), featuring the locations of public toilets, landmarks, scenic viewpoints, boat launches, kiosks, dog bag dispensers, and parking facilities. The map also displays the surface type of each trail segment (*Interactive River's Edge Trail Map | City of Great Falls Montana*, no date).

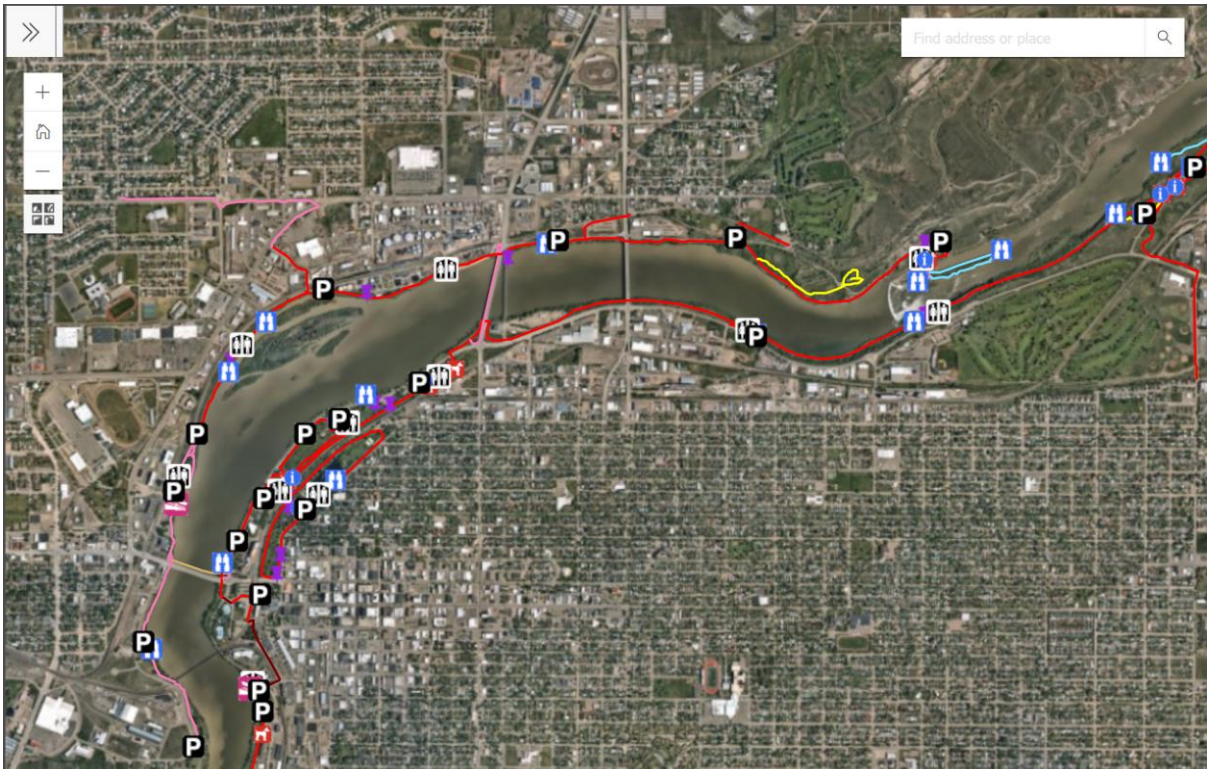


Figure 1. A fragment of the interactive map of the River's Edge Trail, Montana. Source: https://greatfallsmt.net/recreation/interactive-rivers-edge-trail-map Accessed 9 October 2023.

Kerrville River Trail, Texas

Kerrville River Trail is a walking and biking trail for public use, running for about 6 miles (9.7 km) along the Guadalupe River in Kerrville, Texas. The river is available for water sports, with boat rentals available during peak seasons at each end of the trail. The trail is to be used during daylight hours only, walking off trail is not permitted, and dogs are to be leashed at all times. These rules aim to protect the trail users and the riverside wildlife. There are several trailheads along the river, marked on the trail map available both online and at selected spots along the route.

The significant feature of the Kerrville River Trail is its affiliation with the Upper Guadalupe River Authority (UGRA). UGRA is a government-owned corporation established in 1939 to protect the health of the Guadalupe River by managing water quality and quantity, promoting river stewardship, and supporting local communities (Upper Guadalupe River Authority 2023). UGRA is a type of organisation that the Vistula lacks – there is no organised body responsible for water quality or working with the Vistulan communities. Aside from river monitoring and management, UGRA coordinates a volunteer summer study programme, an internship programme, provides resources for teachers, runs outreach and education, and has made accessible an educational outdoor exhibition of water conservation and stormwater detention practices (Upper Guadalupe River Authority 2023a). These activities provide numerous opportunities for local people to get engaged and broaden their knowledge of the Guadalupe River ecosystem.

Figure 2. A Kerrville River Trail map located at the Lowry Park trailhead. Source: https://www.kerrvilletx.gov/1341/River-Trail Accessed 9 October 2023.

Michigan Paddle Stewards

The Michigan Great Lakes Water Trails Working Group is an organization working to promote public access to the Great Lakes shoreline and form a statewide water trail system. The group runs a volunteer programme called Michigan Paddle Stewards, which aims to work with volunteers towards tackling the problem of invasive species in Michigan's water trails. The programme includes a brief training session for volunteers and has developed a smartphone app where stewards can report invasive species encountered on paddle. The programme both supports a sense of responsibility for the local environment and combats invasive species through organized action and the citizen science project. The Michigan Paddle Stewards programme also encourages paddlers to spread information in their area about how to help prevent the spread of invasive species, e.g. by thorough cleaning of watercrafts after use (Michigan Paddle Stewards - Michigan Water Trails, no date).

Edinburgh & Lothian Greenspace Trust

The Edinburgh & Lothian Greenspace Trust (ELGT) is an independent charity and social enterprise founded to protect and maintain local greenspaces around the Edinburgh and Lothian area in Scotland (*About Us – Edinburgh & Lothians Greenspace Trust*, no date). The ELGT runs projects aimed at improving greenspace and play space in the Edinburgh & Lothian region. Its primary programme are weekly conservation activities running for about 2 hours per session, in various green spaces around the region (*Volunteering – Edinburgh & Lothians Greenspace Trust*, no date). Participation in the activities is on a voluntary basis and tasks change seasonally, but often involve tasks such as path clearing and maintenance, tree and bulb

planting, and clearing invasive species. The ELGT also organises community events such as weekly walking groups, jogging and fitness groups, and woodland activities for children (*Our work – Edinburgh & Lothians Greenspace Trust*, no date).

RECOMMENDATIONS: THE TORUŃ VISTULA TRAIL AS AN ACCESSIBLE GREEN AND BLUE SPACE

The examples of international practice in the previous section show the large potential of green and blue space to provide opportunities for both local people and visitors to spend free time leisurely and actively. They indicate that local residents are willing to work together as a community to maintain and advocate for their neighbourhood natural spaces. It must be noted that the creation of spaces such as Kerrville River Trail or River's Edge Trail did not require large financial investments or making extreme changes to the surroundings. It is argued here that similar solutions can be adopted for the Vistula, placing focus on making minimal changes to the existing environment and investing in the development of community organisations that would take care and advocate for their new, accessible green and blue space.

The proposed solution is the creation of a river trail along the Vistula in Toruń, stretching along the entire riverside within the city's administrative area. The course of the trail is presented in figure 3. The trail's length totals 33 km, divided into two parts – 21 km along the northern riverside and 12 km along the southern side. The project, for the sake of this article, will be addressed as the Toruń Vistula Trail (*Toruński Szlak Wisły*).

The form of a trail was chosen considering the diversity of functions it can serve. For one, the trail will connect now separate places along the shore, improving the cohesion of the city landscape and creating new routes for pedestrians and cyclists. The trail along with its infrastructure encourages people to visit, attracting them to green and blue space that help improve physical, mental and emotional wellbeing (Swansea et al. 2003). Extra green and blue space are also highly desirable in light of more extreme heatwaves and weather events that have intensified in the recent years (Degórska 2014). Designated spaces for specific sports such as kayaking, paddling or cycling encourage these sports and may attract people from beyond the local area.

The trail can also serve an educational function, creating opportunities for both passive and active education. Passive education can take the form of informative boards installed along the trail, that the visitor can read in their own time. Active education might include educational walks, both for schools and individuals, and volunteering opportunities, where volunteers gain practical knowledge through doing hands-on conservation tasks. However, opportunities for active education can only be efficiently used if an organised body is created to manage these responsibilities, as will be discussed in the following section.

From the environmental perspective, the trail can also act as a green corridor which is helpful to wildlife, and it supports the preservation of valuable species (Zellmer and Goto 2022). Speaking of the environmental aspects, the proposed trail would fall within the Dolina Dolnej Wisły Natura 2000 special bird protection area (Generalna Dyrekcja Ochrony Środowiska, no date). While the Natura 2000 framework does not prohibit development, the trail's design must take into consideration environmental scientists' recommendations aimed to preserve habitats along the shore and limit its impact on local wildlife. The part of the trail crossing through the Kępa Bazarowa nature reserve will make use of the existing educational trail through the reserve.

Figure 3. The proposed course of the Toruń Vistula trail. The total distance for the northern riverside trail is 21 km, for the southern side trail – 12 km. Map source: OpenStreetMap.

INCLUSIVITY OF THE VISTULA TRAIL

In line with the Sustainable Development Goal of creating accessible green spaces in urban areas, the new Vistula trail should be fully accessible to people regardless of their age, disability level or type, or any other additional needs. The primary aspects to consider in regard of accessibility are path width and surface type, trail gradient and ascent rate, and accessible trailheads. According to the *Switch* guide to accessible design, the minimum path width is 180 cm to accommodate wheelchair users (Kowalski 2018, 22). This requirement will be met as a two-way cycling path should be at least 200 cm wide. The path surface must be hardened and even, but in this project the choice must also consider the surroundings – it should look as natural as possible as to not disturb the natural landscape of the riverside. The chosen surface should also prevent the accumulation of water puddles, mud, and sand. A suggested material is a mineral surface that is permeable, blends in with the surrounding nature, and is suitable for wheelchair users (Jakubisová and Rollová 2017).

The gradient of the planned trail is gentle, with some steeper sections, most notably the hills in Winnica area. This section does not exceed the maximum recommended ascent rate (Kowalski 2018, 94), but the section should be marked on the map as more challenging. As in examples from the review section, a detailed map of the trail should be made available online and offline, with information on surface type, the location of resting points, and any possible difficulties such as steeper sections. This will allow visitors to plan their visits and adjust their routes according to their ability.

Any informational boards and signage on the trail should be accessible visually (e.g. font choice) and have an alternative for people with visual impairments (e.g. educational boards in Braille). The trail should have enough resting points to accommodate people without the ability to walk longer distances at once, and it could be divided into fragments that allow to adjust the walk's length appropriately to the walker's ability.

Further actions – beyond the trail

The recommended actions are not limited to developing physical infrastructure but must also include the social environment of the river. Many recommendations in this sphere were included in the PZR report for the *Wisła Wciąga* project. While the report provided a much wider-ranging and more complex guidance, I find it necessary to mention actions I find the most important from the standpoint of developing the Vistula riverside into an accessible space for outdoor recreation that considers both the social and environmental needs of the area. The three recommended actions are:

- Establishing an official system of monitoring water quality in the Vistula;
- Authorities' continuous support for companies offering Vistula-based active recreation, such as kayaking and paddling, and for organisations and individuals working to increase awareness of Vistula's historical, cultural and environmental significance;
- Forming a Toruń Vistula Trail Trust which will coordinate educational and community activities on the trail, including volunteering and organised walks.

Volunteering in local green spaces has documented well-being benefits and helps to build and strengthen community ties, at the same time as contributing to the upkeep of the local environment in its practical sense (Ohmer et al. 2009). Therefore, it is recommended that a community volunteering scheme is established as part of the trail project, to help maintain the trail as well as build a network of individuals concerned with the well-being of Toruń's green and blue spaces.

The detailed plans for the location of essential infrastructure and trailheads, as well as activity points along the trail, can be developed in further design stages.

The table below summarises the key features of the trail in the fields of environmental benefits, inclusivity, and opportunities for recreation and the development of business and tourism (table 1).

Environment • The trail acting as a corridor for wildlife • Increased awareness of the Vistula's environmental significance, accomplished by educational boards and information campaigns • Unregulated riverside allows for natural fluvial processes to occur • Increased focus on good water quality in the Vistula	**Inclusivity** • Path width and surface type suitable for wheelchair users, people with visual impairments, and individuals with other specific needs • Activity stations for children and adults with learning difficulties and disabilities • Trailheads accessible by public transport and vehicles for individuals with specific mobility needs
Business & Education • Educational boards installed at different points along the trail, containing information about different aspects of the Vistula's significance (cultural, historical, environmental, economic) • Space for businesses at trailheads, e.g. cafes • Free educational resources for teachers to lead outdoor lessons on the trail • Access to the trail for environmental educators working in non-formal education	**Recreation** • Boat and kayak launch and landing spots, accessible by vehicles for equipment collection and delivery • Small architecture – benches, roofed resting points, picnic tables, litter bins • Path width and surface type suitable for different kinds of recreation, including walking, jogging and cycling • Suggested loops of different lengths to cater to different target audiences • Educational trails and marked points of interest along the river

Table 1. The key elements of the proposed Toruń Vistula Trail for each of the four target fields.

CONCLUSION

If Toruń truly is to turn back to the river, it has to make it easily accessible for everyone in the city, no matter their location and ability. Hence the need for a riverside trail that will be integrated with the public transport network and present opportunities for outdoor recreation as well as educational and community activities. At relatively low cost and effort, the city could gain a new green space with the added benefit of a water trail that will diversify the opportunities available to both local residents and tourists. The analysis has also shown that the proposition of a river trail in Toruń had previously been put forward and so it is a workable project that should be considered in the near future.

As an important urban centre in northern Poland, Toruń should strive to learn from the good practices that succeeded elsewhere and stimulate the development of waterside life in the wider region. The trail proposed in this article should only be a starting point in the journey to develop a stronger relationship between the river and the local community and connect the city's residents over their shared blue space.

If implemented, the trail needs careful design to ensure its viability, particularly in its environmental aspect. It needs to stay committed to pursuing the Sustainable Development Goals outlined in the beginning section of this article – supporting healthy lifestyles and sustainable urban communities, protecting life on land, and creating decent work opportunities and economic growth. Finally, the trail would work in agreement with the development strategies for Toruń itself and for the kuyavian-pomeranian voivodeship. Therefore, the project would respond to needs existing at all levels from global to local, considering even individuals' needs for therapeutic spaces and need for community.

REFERENCES

'About us – Edinburgh & Lothians Greenspace Trust' (no date) Available at: http://www.elgt.org.uk/about-us/ (Accessed 9 October 2023)

Degórska, B. (2014) 'Wrażliwość i adaptacja dużych miast do zmian klimatu w kontekście wzrostu temperatury powietrza [Sensitivity and adaptation of large cities to climate change in the context of increasing air temperature],' *Biuletyn Polska Akademia Nauk. Komitet Przestrzennego Zagospodarowania Kraju* (254).

Generalna Dyrekcja Ochrony Środowiska (no date) 'Obszar Natura 2000 Dolina Dolnej Wisły [Natura 2000 Area Lower Vistula River].' Available at: https://crfop.gdos.gov.pl/CRFOP/widok/viewnatura2000.jsf?fop=PL.ZIPOP.1393.N2K.PLB040003.B (Accessed 9 October 2023)

Interactive River's Edge Trail Map | City of Great Falls Montana (no date). Available at: https://greatfallsmt.net/recreation/interactive-rivers-edge-trail-map (Accessed 9 October 2023)

Jakubisová, M. and Rollová, L. (2017) 'Barrier-free or universal design of tourist trails in the forest landscape,' *Public recreation and landscape protection – with nature hand in hand? Conference proceedings* (1-3 May 2017, Brno), 30-36.

Kowalski, K. (2018) *Switch to Inclusive Design.* Warsaw: Fundacja Integracja. Available at: https://www.integracja.org/wp-content/uploads/2018/11/switch_td03b_corr_p1-95_str.pdf (Accessed 9 October 2023)

Michigan Paddle Stewards - Michigan Water Trails (no date). Available at: https://www.michiganwatertrails.org/mipaddlestewards.asp (Accessed 9 October 2023)

Miejska Pracownia Urbanistyczna w Toruniu (2007) *Analiza możliwości zagospodarowania nabrzeży Wisły w granicach administracyjnych miasta Torunia [Analysis of the possibilities of developing the Vistula riverside within the administrative area of Toruń]*. Available at: http://mpu-torun.pl/?page_id=1444 (Accessed 9 October 2023)

Miejska Pracownia Urbanistyczna w Toruniu (2012) *Plan zarządzania krajobrazem [Landscape management plan]*. Available at: http://mpu-torun.pl/?page_id=1504 (Accessed 9 October 2023)

Mieszkańcy - dane liczbowe | www.torun.pl (no date). Available at: https://www.torun.pl/pl/miasto/mieszkancy-dane (Accessed 9 October 2023)

Ohmer, M. L., Meadowcroft, P., Freed, K., and Lewis, E. (2009) Community gardening and community development: Individual, social and community benefits of a community conservation program. *Journal of Community Practice*, 17(4), 377-399.

'Our work – Edinburgh & Lothians Greenspace Trust' (no date). Available at: http://www.elgt.org.uk/our-work/ (Accessed 9 October 2023)

Pracownia Zrównoważonego Rozwoju (2022) *Diagnoza społecznego otoczenia Wisły w województwie kujawsko-pomorskim [Diagnosis of the social environment of the Vistula in the kuyavian-pomeranian voivodeship]*. Available at: https://www.pzr.org.pl/diagnoza-spolecznego-otoczenia-wisly-w-wojewodztwie-kujawsko-pomorskim-raport-z-badania/ (Accessed 9 October 2023)

'Projekt Wisła Wciąga – Wolna Wisła' (no date). Available at: http://fundacja.wolnawisla.pl/projekt-wisla-wciaga/ (Accessed 9 October 2023)

'River's Edge Trail | City of Great Falls Montana' (no date). Available at: https://greatfallsmt.net/recreation/rivers-edge-trail (Accessed 9 October 2023)

River's Edge Trail (2022) 'Volunteer opportunities.' Available at: https://thetrail.org/volunteer-opportunities/ (Accessed 9 October 2023)

Sikora, B. et al. (2021) *Program rozwoju turystyki dla miasta Torunia do 2030 roku [Tourism development programme for the City of Toruń until 2030].* Available at: https://www.torun.pl/sites/default/files/pliki/859_22_zal_01.pdf (Accessed 9 October 2023)

Smith, N. et al. (2021) 'Urban blue spaces and human health: A systematic review and meta-analysis of quantitative studies,' *Cities*, 119, p. 103413.

Swanwick, C., Dunnett, N. and Woolley, H. (2003) 'Nature, role and value of green space in towns and cities: an overview,' *Built Environment,* 29(2), 94-106.

Strategia Przyspieszenia 2030+ (2020) *Strategia rozwoju województwa kujawsko-pomorskiego do 2030 roku [Development strategy for the kuyavian-pomeranian voivodeship until 2030].* Available at: https://kujawsko-pomorskie.pl/pliki/2020/planowanie/20201229_strategia/Strategia_Przyspieszenia_2030plus.pdf (Accessed 9 October 2023)

Szymkiewicz, R. (2017) 'Problemy gospodarczego wykorzystania Dolnej Wisły [Problems of exploitation of the Lower Vistula River],' *Budownictwo i Inżynieria Środowiska* 64: 141-151.

United Nations (2023) The Sustainable Development Agenda - United Nations Sustainable Development. Available at: https://www.un.org/sustainabledevelopment/development-agenda/ (Accessed 9 October 2023)

Upper Guadalupe River Authority (2023) Welcome to UGRA | Upper Guadalupe River Authority | Kerrville, TX. Available at: http://www.ugra.org/ (Accessed 9 October 2023)

Upper Guadalupe River Authority (2023a) Major Initiatives | Upper Guadalupe River Authority | Kerrville, TX. Available at: http://www.ugra.org/major-initiatives (Accessed 9 October 2023)

'Volunteering – Edinburgh & Lothians Greenspace Trust' (no date). Available at: http://www.elgt.org.uk/working-with-you/volunteering/ (Accessed 9 October 2023)

Zellmer, A.J. and Goto, B.S. (2022) 'Urban wildlife corridors: Building bridges for wildlife and people,' Frontiers in Sustainable Cities, 4. https://doi.org/10.3389/frsc.2022.954089 (Accessed 9 October 2023)

IMAGE SOURCES

Figure 1. A fragment of the interactive map of the River's Edge Trail, Montana. Source: https://greatfallsmt.net/recreation/interactive-rivers-edge-trail-map (Accessed 9 October 2023)

Figure 2. A Kerrville River Trail map located at the Lowry Park trailhead. Source: https://www.kerrvilletx.gov/1341/River-Trail (Accessed 9 October 2023)

Figure 3. The proposed course of the Toruń Vistula trail. The total distance for the northern riverside trail is 21 km, for the southern side trail – 12 km. Map source: OpenStreetMap (Accessed 27 September 2023).

Sustainable Development Challenge In The City Trnava
By Sabina Rýzková

INTRODUCTION

The town Trnava is situated on the edge of the West Slovak Lowland, about 50 km from Bratislava, the capital of the Slovak Republic. The town is traversed by a motorway and the main railway corridor connecting the west and east of the Slovak Republic. Trnava is both a district and a regional town. Since December 2001 it has also been the seat of the Trnava Self-Governing Region.[32]

In Trnava there are residential areas with mostly mass housing construction. Specific conditions for housing are provided by the local part of Modranka with the character of a rural settlement. The city currently covers an area of almost 72 square kilometres. Trnava is surrounded by many smaller villages.[33] For the inhabitants of smaller villages, Trnava offers shopping as well as employment opportunities that are lacking in the villages.

Sustainable development of the Trnava Self-Governing region is in the context of digital and green transformation Europe and of megatrends is an essential condition for the increasing quality of inhabitants of the municipality. The city has developed strategic plans which are important in the light of increasing globalisation, climate change, capital movements, foreign investment, the dynamically growing rate of digitalisation, the need for innovation and current energy challenges.[34] The implementation of the strategies is expected to improve the quality of the environment, as well as the conditions for the intelligent and all-round development of the municipality.

DESCRIPTION OF THE CHALLENGE

One of the 17 goals of the SDGs is by 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.[35]

Sustainable transport in Slovakia remains a challenge, as the share of public transport in all passenger transport is well below values from the beginning of the 21st century. COVID-19 also dealt a heavy blow to public transportation.[36]

---

[32] TRNAVA: Poloha. [online]. TRNAVA.sk, [s.a.] [viewed 2023-09-20]. Available from: https://www.trnava.sk/sk/clanok/poloha

[33] TRNAVA: Poloha. [online]. TRNAVA.sk, [s.a.] [viewed 2023-09-20]. Available from: https://www.trnava.sk/sk/clanok/poloha

[34] Zastupiteľstvo TTSK: SMART stratégia rozvoja regiónu Trnavského samosprávneho kraja. [online]. © Enviro portál [2023-02-28] [viewed 2023-09-20]. Available from: https://www.enviroportal.sk/sk/eia/detail/smart-strategia-rozvoja-regionu-trnavskeho-samospravneho-kraja

[35] United Nations: Make cities and human settlements inclusive, safe, resilient and sustainable. [online]. United Nations [s.a.] [viewed 2023-09-22]. Available from: https://sdgs.un.org/goals/goal11

[36] MIRRI: *Second Voluntary Netional Review of The Slovak Republic.* [online]. MINISTRY OF INVESTMENTS, REGIONAL DEVELOPMENT AND INFORMATIZATION OF THE SLOVAK REPUBLIC [2023-07-01] [viewed 2023-09-25]. Available from: https://mirri.gov.sk/wp-content/uploads/2023/07/VNR-2023-Slovakia-Report_0-2.pdf

Trnava, like many other cities around the world, faces numerous challenges on its path towards sustainable development. Some of the key challenges specific to Trnava include urban mobility, waste management, energy efficiency, preservation of green spaces, green economy, community engagement and education, historical and cultural preservation.[37]

One of Trnava's biggest challenges is bring an achieving sustainable transport goals into harmony with solutions that do not come at the expense of its own citizens. Trnava struggles with traffic congestion and limited public transportation options. Promoting sustainable transportation methods such as cycling, walking, and investing in an efficient and widespread public transport system is crucial. Creating pedestrian-friendly zones and improving cycling infrastructure can make a significant contribution to alleviating this problem, but at the expense of car traffic, which is excessively used in Trnava.[38]

IMPACTS AND SIGNIFICANCE OF THE ISSUE TO BE ADDRESSED

The town of Trnava offers full civic facilities not only for its citizens, but also for the citizens of the surrounding villages. Trnava is home to 13 kindergartens, 2 primary schools, 7 elementary schools with kindergarten, 2 elementary art schools, 15 secondary schools and 3 universities.[39] Until 2022, the city of Trnava was a single school district, which meant that a child could attend a school chosen by a parent according to his or her own criteria. This brought with it problems in the form of increased interest in some schools beyond their capacity and the burden of transport in the morning arrival and afternoon departure of children. The new general binding regulation on school districts is intended to eliminate these factors starting in 2023. According to the general binding regulation, a pupil shall attend compulsory school in the school district in which he or she resides, unless his or her legal guardian chooses another school and the principal of the chosen school accepts him or her for compulsory school attendance.[40] This regulation may go some way to alleviating traffic, but as long as parents are still able to choose their school of preference, the effect of the regulation on transport will still be insufficient.

According to older statistics from 2005, 11806 economically active persons from 201 municipalities commuted daily to Trnava for work. The total daily population in Trnava is 89479 persons, with a total of 19193 commuters, which is 21.45% of the total daily population in the regional city.[41] We can say that these are high numbers, and we need to look at how people arrive to the city. Train and bus services can be used to get to the city, but they operate at certain intervals. For many commuters, the connection times are inconvenient and they have to choose their own car as a means of transport. Every morning, this raises

[37] Zastupiteľstvo TTSK: SMART stratégia rozvoja regiónu Trnavského samosprávneho kraja. [online]. © Enviro portál [2023-02-28] [viewed 2023-09-20]. Available from: https://www.enviroportal.sk/sk/eia/detail/smart-strategia-rozvoja-regionu-trnavskeho-samospravneho-kraja

[38] Trnava: *Program hospodárskeho rozvoja a sociálneho rozvoja mesta Trnava na roky 2024 – 2030 s výhľadom do roku 2035.* [online]. TRNAVA [2023-08-03] [viewed 2023-09-25]. Available from: https://www.trnava.sk/userfiles/file/Oznamenie%20o%20strategickom%20dokumente%20TT%20PHRSR.pdf

[39] Portal VS: Zoznam vysokých škôl v meste Trnava. [online]. Portal VS [s.a.] [viewed 2023-09-25]. Available from: https://www.portalvs.sk/sk/mesto/trnava

[40] TASR. *Trnava is facing changes in the enrolment of freshmen in schools. Parents will register them according to their place of residence.* [online] TASR [2022-03-26]. Available from: https://trnava.zoznam.sk/trnavu-cakaju-zmeny-v-zapise-prvakov-do-skol-rodicia-ich-budu-prihlasovat-podla-svojho-bydliska/

[41] FÁZIKOVÁ, M., et al. *Denne prítomné obyvateľstvo v centrách osídlenia, spracované pre krajské mestá.* [online]. Slovenská poľnohospodárska univerzita v Nitre [2005-05-01]. Available from: https://www.komunal.eu/images/pdf/Denne_pritomne_obyvatelstvo_v_krajskych_mestach.pdf

the question for commuters - where will I park? Many companies do not have their own parking lots, and if they do, they do so in insufficient numbers. People therefore have to park in parking spaces that fall under the city's parking policy, but even then, they are not guaranteed to find a free parking space.

CAUSES OF THE PROBLEM

A serious problem of the city is the solution of static traffic, which means parking and parking of vehicles. This problem is linked to the rapid development of car traffic and the growing number of car owners. In the past, the development of towns and cities did not envisage such a significant development of car traffic, which is why even housing estates built more than 30 years ago do not have sufficient parking and parking spaces.

The population of the city of Trnava is still decreasing, yet the demands of residents and visitors for parking and parking are increasing. This problem is most acute in the historic part of the city, the Central Urban Zone, where the number of parking spaces has doubled in the last seven years, but the shortage of parking and parking spaces has not diminished. This is due to the importance of the town as the natural and administrative centre of the region, providing higher level services alongside basic services. It is the provision of higher-level services, especially government and public administration, and the offer of cultural attractions that are concentrated in town centres, where offices and cultural facilities are located. The increase in parking spaces in Trnava until 2015, the adoption of Agenda 2030, was largely at the expense of public green spaces. The lack of urban greenery is one of the city's biggest environmental problems.[42]

The promotion of public transport is an important factor in helping to address urban transport problems, especially their intensity. Urban bus transport has a tradition of more than 60 years in Trnava. In recent years, however, there has been a reduction in the number of lines in the city and the number of passengers transported per year has been decreasing. The reason for the decrease in interest in public transport is likely to be its declining attractiveness.[43]

INTERNATIONAL PRACTICE AND SOLUTION

Cities around the world employ various strategies to tackle parking problems, especially in densely populated urban areas. Here are specific examples of innovative solutions implemented in different cities.

Park and Ride Facilities in Singapore: Singapore encourages the use of park and ride facilities located near major public transportation hubs. These facilities allow commuters to park their cars securely and use public transport for the rest of their journey, reducing the number of private vehicles entering the central business district.[44]

Underground Automated Parking in Tokyo, Japan: Tokyo, known for its space constraints, has adopted automated underground parking systems. These facilities use robotics to park and retrieve cars efficiently,

[42] THE CITY OF TRNAVA: Traffic. In *Problem Analysis Of The City Of Trnava.* 2014, p. 48
[43] THE CITY OF TRNAVA: Traffic. In *Problem Analysis Of The City Of Trnava.* 2014, p. 48
[44] Poon, Yin Foong. Park-and-ride facilities in Singapore. [online] Nanyang Technological University [2012-05-16] [viewed 2023-10-05]. Available from: https://dr.ntu.edu.sg/handle/10356/49240

maximizing the use of limited space. Drivers drop off their cars at an entrance, and the system automatically parks the vehicle in an available spot.[45]

Bicycle-Friendly Infrastructure in Copenhagen, Denmark: Copenhagen has invested heavily in creating a bicycle-friendly urban environment. By promoting cycling as a primary mode of transport, the city reduces the need for parking spaces. Dedicated bike lanes, bike-sharing programs, and secure bicycle parking facilities encourage residents to choose bicycles over cars for short trips.[46]

Mixed-Use Parking Facilities in Portland, USA: Portland encourages the construction of mixed-use parking facilities that combine parking with commercial or residential spaces. These structures optimize land use by serving multiple purposes, reducing the overall demand for parking spaces and promoting a vibrant urban environment.[47]

Multimodal Transportation in Amsterdam, Netherlands: Amsterdam promotes a multimodal approach to transportation, integrating various modes such as trams, buses, trains, and ferries. By providing efficient public transportation options, the city reduces reliance on private cars, alleviating parking problems and reducing traffic congestion.[48]

Car-Free Zones in Oslo, Norway: Oslo has introduced car-free zones in certain parts of the city, restricting private vehicles and prioritizing pedestrians, cyclists, and public transport. By limiting car access, the city reduces traffic, making it easier for residents and visitors to find parking spaces in surrounding areas while promoting sustainable transportation methods.

Bratislava Parking Assistant in Bratislava, Slovakia: From 2022, the City of Bratislava will introduce a system of regulated parking, known as the Bratislava Parking Assistant. New zones are being created, where parking is provided according to city-wide parking rules. The aim of parking regulation is to improve the availability of parking for residents in their place of residence. This is to be achieved by introducing hourly rates for visitors and better parking control. At the same time, the public space, where pedestrians, cyclists and cars often interfere with each other today, needs to be tidied up. That is why a system is being introduced into parking, with uniform rules and conditions determining where parking is allowed and where it is not.[49] The parking policy brings many disadvantages for commuters. They must pay for an hour of parking and at the same time they have to find a free space, which is marked with a green sign with a zone code. These measures can be considered discriminatory as they have a large negative impact on commuters.

---

[45] GIKEN. *Automated Parking Facility ECO Park.* [online] GIKEN [s.a.] [viewed 2023-10-10]. Available from: https://www.giken.com/en/products/automated-parking-facilities/eco-park/

[46] THOEM, J. *What makes Copenhagen the world's most bicycle friendly capital?* [online] Visit Compenhagen [s.a.] [viewed 2023-10-10]. Available from: https://www.visitcopenhagen.com/copenhagen/activities/what-makes-copenhagen-worlds-most-bicycle-friendly-capital

[47] Marshall, W. E., & Garrick, N. W. (2006). Parking at Mixed-Use Centers in Small Cities. Transportation Research Record, 1977(1), 164-171. https://doi.org/10.1177/0361198106197700119

[48] van Eck, G., Brands, T., Wismans, L. J. J., Pel, A. J., & van Nes, R. (2014). Model Complexities and Requirements for Multimodal Transport Network Design: Assessment of Classical, State-of-the-Practice, and State-of-the-Research Models. Transportation Research Record, 2429(1), 178-187. https://doi.org/10.3141/2429-19

[49] Hlavné mesto SR Bratislava. *Systém regulovaného parkovania PAAS.* [online] Bratislava [s.a.]. Available from: https://bratislava.sk/doprava-a-mapy/parkovanie/system-regulovaneho-parkovania-paas

Smart Parking Systems in San Francisco, USA: San Francisco has implemented a smart parking system that adjusts metered parking prices based on demand. Using sensors embedded in the pavement, the system detects parking space occupancy and adjusts the pricing dynamically. This encourages turnover, reduces congestion, and helps drivers find parking spaces more efficiently.[50]

Congestion Pricing in London, UK: London has implemented congestion pricing, where drivers are charged a fee for entering the city centre during peak hours. The revenue generated is reinvested in public transport and infrastructure. By discouraging unnecessary car trips, congestion pricing reduces traffic, making it easier to find parking spaces and improving overall urban mobility.[51]

These examples demonstrate the diverse approaches cities take to address parking problems, emphasizing the importance of innovation, sustainable transportation, and efficient land use planning in creating urban environments that are both functional and liveable. However, some of the solutions are like an inappropriate example of how to solve the problems of sustainable transport in cities, as they only solve problems unilaterally. Today, cities are large and walkability is not always possible. It is therefore necessary to find solutions that are sustainable and at the same time do not discriminate against people from more remote parts of the city or from other places commuting to work or school.

RECOMMENDATIONS FOR THE STAKEHOLDERS

Addressing these challenges requires a coordinated effort from local authorities, businesses, and the community. By implementing sustainable policies, investing in green technologies, and fostering a sense of environmental responsibility among its residents, Trnava can move towards a more sustainable and resilient future.

We recommend the use of electric vehicles in urban transport, which should be a model for the citizens of the city. To increase interest in public transport, more buses should be deployed with more frequent routes and connections, also in cooperation with the railway company. We also recommend cooperation with larger companies to ensure that routes are linked to working shifts. Invest in the development of public transport to make it more reliable and accessible for people. Improved public transport can reduce demand for parking spaces.

Create parking houses or areas with long-term employee parking near major employment centres. These areas should be well connected to work centres by public transportation. However, it is necessary to have enough city buses.

We support Smart Parking. An implementation of smart parking systems with sensors would allow drivers to see available parking spaces via mobile apps. This will help minimize the time it takes to find a parking space. At the same time, this solution will bring satisfaction to people, taking away the stress of searching for free parking spaces.

Promote shared parking systems or platforms that allow people to rent out their private parking spaces when they are not using them. There are many unused parking spaces in Trnava that are privately owned

[50] GAUTAM, S. *How San Francisco Reduced Traffic with Smart Parking?* [online] Visit Compenhagen [s.a.] [viewed 2023-10-10]. Available from: https://blog.getmyparking.com/2021/07/11/how-san-francisco-reduced-traffic-with-smart-parking/

[51] Litman, Todd (2005): London Congestion Pricing – Implications for Other Cities, CESifo DICE Report, ISSN 1613-6373, ifo Institut für Wirtschaftsforschung an der Universität München, München, Vol. 03, Iss. 3, pp. 17-21

and their prices are too high to buy. Therefore, an obligation to rental them for a fixed amount should be introduced.

Build a better network of cycle tracks. Many cycle tracks are built at the expense of parking spaces, which we do not consider to be a solution if cycle routes are not sufficiently connected and, in many parts cyclists must use the roads together with cars.

Time and Demand Based Parking Charges: Introduce differential parking rates based on time and demand. For example, downtown may have higher fees at peak times to encourage faster parking space release.

Green Parking Areas: Create green parking areas where trees and plants would be part of the parking zones. These zones will not only provide parking spaces but will also improve the air quality and aesthetics of the City.

The Education and Awareness: Publicize information about available parking options and the benefits of using public transportation through campaigns and mobile apps.

Promote Alternative Means of Transportation also support of sustainable transport. Provide discounts or other benefits for people who use electric vehicles, bicycles, or other environmentally friendly means of transportation.

System Park and Ride: The Park and Ride (P&R) system is connection point between private vehicles and public transport. The P&R system is a set of facilities distributed throughout the urban environment of a city to establish a connection point or modal interchange to transfer private vehicle users to a more sustainable mode of transport, such as public transport. Private vehicle users who live in areas outside the urban perimeter or where there is few or no direct connection to public transport wish to commute daily to their destination.52

The obligation to have youth representation on the municipal government. The purpose of the cooperation is to ensure systematic work with youth in the fields of education, leisure activities, culture, sports and the overall functioning of the city. The main objective is to identify and analyse the needs of young people in Trnava. Young people should be involved in workshops, working meetings and project implementation, as they are the next generation that will have to face all the challenges.

Implementing these suggestions could create a balanced approach to parking that would improve convenience and quality of life for city residents while making commuting easier for those who cannot use public transit.

52 ORTEGA, Jairo, TÓTH, János and PÉTER, Tamás. Planning a Park and Ride System: A Literature Review. Future Transportation [online]. 19 May 2021. Vol. 1, no. 1, p. 82–98.

CONCLUSION

Solving the traffic and parking problems in Trnava requires a coordinated effort of local authorities, businesses and the community. By introducing sustainable policies, investing in green technologies and strengthening the sense of environmental responsibility of residents, Trnava can move towards a more sustainable and resilient future. However, it should be borne in mind that the move towards sustainability needs to be gradual, so that people do not become negatively emotional about the sustainable policies being introduced, but rather are motivated and willing to change their actions to be sustainable themselves.

REFERENCES

FÁZIKOVÁ, M., et al. *Denne prítomné obyvateľstvo v centrách osídlenia, spracované pre krajské mestá.* [online]. Slovenská poľnohospodárska univerzita v Nitre [2005-05-01]. Available from: https://www.komunal.eu/images/pdf/Denne_pritomne_obyvatelstvo_v_krajskych_mestach.pdf

Hlavné mesto SR Bratislava. *Systém regulovaného parkovania PAAS.* [online] Bratislava [s.a.]. Available from: https://bratislava.sk/doprava-a-mapy/parkovanie/system-regulovaneho-parkovania-paas

Litman, Todd (2005) : London Congestion Pricing – Implications for Other Cities, CESifo DICE Report, ISSN 1613-6373, ifo Institut für Wirtschaftsforschung an der Universität München, München, Vol. 03, Iss. 3, pp. 17-21

Marshall, W. E., & Garrick, N. W. (2006). Parking at Mixed-Use Centers in Small Cities. Transportation Research Record, 1977(1), 164-171. https://doi.org/10.1177/0361198106197700119

MIRRI: *Second Voluntary National Review of The Slovak Republic.* [online]. MINISTRY OF INVESTMENTS, REGIONAL DEVELOPMENT AND INFORMATIZATION OF THE SLOVAK REPUBLIC [2023-07-01] [[viewed 2023-09-25]. Available from: https://mirri.gov.sk/wp-content/uploads/2023/07/VNR-2023-Slovakia-Report_0-2.pdf

ORTEGA, Jairo, TÓTH, János and PÉTER, Tamás. Planning a Park and Ride System: A Literature Review. *Future Transportation* [online]. 19 May 2021. Vol. 1, no. 1, p. 82–98. DOI 10.3390/futuretransp1010006. Available from: http://dx.doi.org/10.3390/futuretransp1010006

Portal VS: Zoznam vysokých škôl v meste Trnava. [online]. Portal VS [s.a.] [viewed 2023-09-25]. Available from: https://www.portalvs.sk/sk/mesto/trnava

Poon, Yin Foong. Park-and-ride facilities in Singapore. [online] Nanyang Technological University [2012-05-16] [viewed 2023-10-05]. Available from: https://dr.ntu.edu.sg/handle/10356/49240

TASR. Trnava is facing changes in the enrolment of freshmen in schools. Parents will register them according to their place of residence. [online] TASR [viewed 2022-03-26]. Available from: https://trnava.zoznam.sk/trnavu-cakaju-zmeny-v-zapise-prvakov-do-skol-rodicia-ich-budu-prihlasovat-podla-svojho-bydliska/

THE CITY OF TRNAVA: Problem Analysis Of The City Of Trnava. In *Programme for the economic and social development of the municipality* [online]. 2014, p. 48
Available from Internet: https://www.trnava.sk/userfiles/file/PHSR_Tnava_Problemova_analyza_final.pdf

THOEM, J. *What makes Copenhagen the world's most bicycle friendly capital?* [online] Visit Compenhagen [s.a.] [viewed 2023-10-10]. Available from: https://www.visitcopenhagen.com/copenhagen/activities/what-makes-copenhagen-worlds-most-bicycle-friendly-capital

TRNAVA: *Poloha*. [online]. TRNAVA.sk, [s.a.] [viewed 2023-09-20]. Available from: https://www.trnava.sk/sk/clanok/poloha

Trnava: *Program hospodárskeho rozvoja a sociálneho rozvoja mesta Trnava na roky 2024 – 2030 s výhľadom do roku 2035.* [online]. TRNAVA [2023-08-03] [viewed 2023-09-25]. Available from: https://www.trnava.sk/userfiles/file/Oznamenie%20o%20strategickom%20dokumente%20TT%20PHRSR.pdf

van Eck, G., Brands, T., Wismans, L. J. J., Pel, A. J., & van Nes, R. (2014). Model Complexities and Requirements for Multimodal Transport Network Design: Assessment of Classical, State-of-the-Practice, and State-of-the-Research Models. Transportation Research Record, 2429(1), 178-187. https://doi.org/10.3141/2429-19

Zastupiteľstvo TTSK: *SMART stratégia rozvoja regiónu Trnavského samosprávneho kraja.* [online]. © Enviro portál [2023-02-28] [viewed 2023-09-20]. Available from: https://www.enviroportal.sk/sk/eia/detail/smart-strategia-rozvoja-regionu-trnavskeho-samospravneho-kraja

Cans recycling in City Olomouc
by Martina Kyselá

INTRODUCTION

The Czech Republic especially the place where I am living now, city called Olomouc people are really respectful to nature, to the environment and to the planet as well. Is hard to think about things that are not working here at all, because in my opinion we are really good in the sense of taking care of the environment. We already have a lot of projects that are helping the environment of the specific place, city and the whole Czech Republic as well.

Instead of cars people in the cities are using a bicycle path and shared bicycles or electric scooters. So many phone apps are offering them for a special price or some specific groups of people can use them just for a little payment. You can park them almost everywhere or on specific places. It's pretty same for bicycle owners, because there is a lot of places where you can park them, close to the shopping malls, parks, school, universities, offices and so on.

The Czech Republic is one of the most popular country in the sense of recycling and waste sorting. In The 2022 we celebrated a 25 years anniversary of the first waste sorting. Thanks to the EKO-KOM system, 99% of the population of the Czech Republic already has access to sorting containers, and each person sorts an average of almost 67 kg of paper, glass, plastics, beverage cartons and metals into them per year.

RECYCLING IN THE CZECH REPUBLIC

The idea of establishing a system that would take back and sort packaging waste was born as early as 1994. The impetus for the creation of the system was the effort of the beverage industry to build a system that would enable every company producing packaged goods to sell what the consumer demands, but at the same time ensure that increasing consumption will not increase the mountain of waste at the landfill. The system itself, called EKO-KOM, was founded in 1997 by 10 shareholders as a non-profit joint stock company. He started the implementation of pilot projects and tested various options and options for collecting packaging waste with the mayors of several municipalities outside the Czech Republic.

In 1999, 20 companies producing packaged goods voluntarily decided to join the EKO-KOM system and participate in the creation of a nationwide solution for the collection of sorted packaging waste. EKO-KOM then operated on the basis of a Voluntary Agreement between the packaging industry and the Ministry of the Environment. In 2002, EKO-KOM received its first authorization and two years later the second. In 2020, this authorization was extended to December 31, 2024, and thanks to this, he can provide take-back and recycling of packaging waste for his clients.

Through the non-profit EKO-KOM system, companies producing packaged goods fulfill their legal obligation to ensure that their packaging is sorted and processed into usable secondary raw materials. Municipalities receive a financial reward from the system for the sorted amount of waste, which they report regularly through quarterly reports.

PRESENT DAY

Today, the EKO-KOM system serves 21,223 companies and 6,160 municipalities in the Czech Republic. During its existence so far, the company has managed to increase the share of packaging waste, which is handed over for use and recycling within the system, to 76% and to convince almost ¾ of Czechs that sorting waste makes sense. In 1999, when statistics began to be systematically monitored, only 28% of the population of the Czech Republic sorted. We also have a high-quality network of colorful wheelie bins and smaller containers for sorted waste located right next to the houses. There are currently over 558,000 of them. On average, there are around 100 residents per collection point, who do not have to walk far to get there. On average, we only have to walk 90 meters from our homes to the nearest colored containers - that's roughly 130 steps.

The average resident of the Czech Republic produces 562 kg of municipal waste per year. From the point of view of the requirements of the waste legislation, it is desirable to reduce the production of mixed municipal waste from municipalities below 150 kg per citizen per year. From 2024, bio-waste, which still makes up 30 to 40% of the share in containers for residual waste, must be consistently sorted. The minimum amount of waste we must sort is set by law.

HOW MUCH WASTE DO I HAVE TO SORT?

From 2025, municipalities must sort at least 60%, from 2030 at least 65% and from 2035 at least 70% of mixed municipal waste Mixed municipal waste must not contain bio-waste, starting in 2024. From 2025, municipalities are obliged to ensure the sorting of textiles.

WHAT I THINK WE MISS IN THE CZECH REPUBLIC ABOUT RECYCLING?

But there is still something that I miss the most and that's a chance to recycle cans the same way as paper, plastic bottles and glass bottles can be. Or much better way to get some money from cans that we used. We can see that there are a lot of places with special bins for almost every type of trash. But the one that I miss the most is a special bin for cans. Czech Republic is the country that drinks the most beer in Europe up to some statistics in the world as well. The average Czech person has 138 liters of beer per year. The way how beer is selling is either in glass bottles, plastic bottles or in cans. Most of the people are buying the beer in the cans because it's not that heavy as a glass bottles.

PROJECT CASH FOR TRASH

In some countries around the europe there is a program called “cash to trash” witch is helping to the eco system. This program tries to motivate a people to collect and keep a waste. The idea is to collect plastic bottles or drinks cans that have a specific logo on the cover. Those bottles or cans you can bring back to the store where you bought them and put them into the deposit machine that will give you a coupon with a money that you will get from. Then you can simply go to the store or supermarket and when you will pay you can just use the coupon.

In my opinion this project is good in the sence that people are motivated to sort waste and put most of the waste separately and not only to the one regular rubbish bin. Most of the countries already use this deposit system for a glass bottles. The deposit system in the Czech Republic is working very well. You can just simply bring a glass bottles back to the stor. There are just few types of of beer, water or syrup bottle that you can bring back to the supermarket. On every bottle that you can bring back to the store you probably have a sign on the cover where is written something like “vrátný obal” that means that if you will

those bottles back to the store you will get money from. This deposit system is alreday working for a many years.

The simple idea about the project or program “Cash to trash” is to make the same system of the deposit for the cans as well. Durring another next years to also add a most of the plastic bottles as well. Not to simply put them to the specific rubbish bun with the yellow color but to also give a try to make a program for plastic bottles deposit. But at least recycling is very important here and a lot of people follow it. There are specific rubbish buns for a paper, plastic, glass and the regular one almost everywhere. Especially in public places you have a chance to sort waste, places as train station, schools, shopping malls, offices and others are.

Project “Cash to trash” can better motivate a people to put more intention into a sort waste. The amount of regular waste is super high and even the system of sort waste is working very well there are still things that are not recycled. For example cans. The project will help to reduce a waste, motivate people to buy drinks more in a cans and also to dont throw the cans somewhere on the street.

“Cash to trash” can be also a motivation for some group of people. Kids can take it as a prevention to collect some types of rubish that later on they can sort waste and get money from. Also other people will be more motivated to sort waste or to care about a nature more. This system of deposit is already working in countries as UK and Sweden is. You can bring there cans and bottles with a Swedish deposit marking.

DEPOSIT SYSTEM IN SWEDEN

All cans and bottles with a Swedish deposit marking are included in the Swedish deposit system. These packages have passed our inspection before they were connected to the system and are thus guaranteed to be recycled into new cans and bottles. The fact that a package can be recycled means that you pay a deposit for it at the time of purchase, which you get back when you return the package.

A package that is deposited can be recycled into food-approved aluminium or plastic. This means that the material can be used for new cans and bottles again and again and again. In addition, the closed material recycling means that we save enormous amounts of carbin dioxide. According to a life cycle analysis that we carried out in 2018, we saved as much as 150 000 tonnes of carbon dioxide during the 2017 recycling year.

SWEDISH DEPOSIT LEVELS

The deposit on cans and small PET bottles are SEK 1 and SEK 2 on big PET bottles. For you to get back the deposit on your cans and bottles it demands that:

- it is included in the Swedish deposit system. Look for the deposit marking.
- that the barcode is undamaged and readable (in the machines, all approved codes are registered and the register are updated every week).
- that the package remains intact and not flattened (that way it does not meet the correct dimensions).

Every reverse vending machine - with a few exceptions - now also accepts foreign aluminium cans so that they can be recycled into new cans. It is important that the barcode is undamaged. However, you do not get paid a deposit for them, as you did not pay a deposit when they were purchased.

WHY IS IT IMPORTANT TO RECYCLE CANS?

Both steel and aluminium can be recycled time and time again without losing any quality and more and more people are recycling their cans which helps to conserve non-renewable fossil fuels, reduce the consumption of energy and the emission of gasses like carbon dioxide into the atmosphere.

Aluminium is a resource that forms about 8% of the earth's crust. It is mined and extracted from bauxite, which contains the compound alumina, in an energy-intensive electrolytic process. Four tonnes of bauxite contains two tonnes of alumina, which yields one tonne of valuable aluminium. The metal is used in buildings, transport and other industrial applications, as well as packaging. Aluminium is the most cost-effective material to recycle, using around only 5% of the energy and emissions needed to make it from the raw material bauxite.

In addition, all the scraps left over from the aluminium production process can be melted down and used again and again. For this reason, recycling is part of the normal lifecycle for large industrial products - around 75% of all the aluminium ever made is still in circulation. Aluminum takes more energy to mine and produce than any other metal so it is worth paying for these cans. Recycling aluminum not only prevents more resources from being extracted from the Earth but it also saves energy as well. This is the classic example of cash for trash that’s been around for years.

When collecting aluminum cans for profit, crushing them saves a lot of space for storing even more cans. A common way to store these cans is in a commercial trash can, or a plastic bag. Then you just have to bring them to your local recycling or scrap metal center to get paid. Depending on your local recycling facility, if you are tossing individual cans into your outdoor recycling bins it’s not advised to crush them as they can get caught in the sorting machine and slow things down.

HOW ARE CANS RECYCLED?

Aluminium cans are shredded, removing any coloured coating. They are then melted in a huge furnace and the molten metal is poured into ingot casts to set. Each ingot can be made into around 1.5 million cans. Aluminium foil is a different alloy and is usually recycled separately with other aluminium scraps to make cast items such as engine components.

Steel cans are put into the furnace where molten iron is added. Oxygen is then blasted into the furnace which heats up to around 1700°C. The liquid metal is poured into a mould to form big slabs which are then rolled into coils. These coils are used to make all sorts of steel products. In some countries in the world there is a deposit, where you are putting a cans, plastic bottles and glass bottles as well. Then you are getting a cupon that you can use in the supermarket or show where the deposit was used.

WHAT WE HOPE WILL CHANGE

There was a chance to see what is working in the Czech Republic and what is not or not that good in the moment. The project topic with “Cash to trash” program is the way how to reduce rubbish and help more to the planet. Motivate people to help eco system and dont “use” the planet more then is necessary. There as some project that want to suport an idea of giving a new life to the cans. The proces of bringing a new can back to the customer can take only 2 months. This 2 months proces will take a steps as taking a can from customers is, bringing to the factory, making a recycled aluminum and then a new can again. This new recycled can will already have a logo and brand name on the cover and will hold a new drink inside. There are some plans and project for “Cash to trash” and factories that will make a recycled aluminum from the cans and I really hope that it will work as soon as is possible.

REFERENCES

Sdružení KŠČM. (2023). System třídění odpadu v ČR oslaví příští rok 25 let. Retrieved from https://sdruzeniks.cz/system-trideni-odpadu-v%E2%80%AFcr-oslavi-pristi-rok-25-let/

Komunální ekologie. (2023). Průměrný obyvatel České republiky vyprodukuje 562 kg komunálního odpadu za rok. Retrieved from https://www.komunalniekologie.cz/info/prumerny-obyvatel-ceske-republikyvyprodukuje-562-kg-komunalniho-odpadu-za-rok

CleanRiver Recycling. (n.d.). The Best Items to Recycle for Money. Retrieved from https://cleanriver.com/blog-best-items-to-recycle-for-money-trash-for-cash/

Recycle Now. (n.d.). Can Recycling. Retrieved from https://www.recyclenow.com/how-to-recycle/can-recycling

Palacký University Olomouc. (n.d.). Sustainability. Retrieved from https://udrzitelna.upol.cz/en/

Česká televize. (2023). Nová plzeňská továrna vyrobí ročně miliardy recyklovatelných nápojových plechovek. Retrieved from https://ct24.ceskatelevize.cz/regiony/3614181-nova-plzenska-tovarna-vyrobirocne-miliardy-recyklovatelnych-napojovych-plechovek

Energy prospects in Hungary
by Dorottya Mészáros

INTRODUCTION

2023 has been the worst year of climate disasters on record. There have been 23 separate climate disasters reported by the National Oceanic and Atmospheric Administration (NOAA)[53] and we still have a couple of months left. The consequences of unregulated human activities and expansionary economic policies have without question been starting to crawl upon us.

Global consumption of materials such as biomass, fossil fuels, metals and minerals are expected to double in the next forty years, while annual waste generation is projected to increase by 70% by 2050. Half of the total greenhouse gas emissions and more than 90% of biodiversity loss and water stress come from resource extraction and processing. It is absolutely essential to accelerate transition towards regenerative growth models with renewable energy sources that considers giving back to the planet more than it takes, reduce its resource consumption and increase circular material use.[54]

As in many other instances, the issue of green energy cannot be solved with a one-dimensional approach. Energy is the heart of sustainability[55] as the reduction of misuse of resources is vital in terms of sustainable existence on this planet. Failure to do so further compounds challenges to poverty eradication such as climate change, natural disasters, or economic consequences of conflicts e.g., Ukraine- Russia war. The elimination of poverty is critical as in almost all aspect of development, people belonging to this group are the most vulnerable when it comes to almost all aspects of development and because its presence also poses an obstacle in the process of implementation of green policies. In the Hungarian case, the situation is the most distressing in the country's post-social industrial regions.[56] The marginalization of gypsy communities due to a general impotence of the society and the government, has been posing a great risk for the consolidation of any national development project[57] and therefore hindering progress towards more sustainable energy models as well. Targeting these people and creating localized solutions that understands their specific needs, therefore is at utmost urgency in order to facilitate development.

Global efforts summarized in a set of 17 objectives are clearly outline the complexity of the matter and signal the need to consider pressing issues such as green and sustainable energy sources, in the context of the reality of the problem, poverty.

[53] https://www.forbes.com/sites/roberthart/2023/09/12/2023-worst-year-on-record-for-billion-dollar-climate-disasters-noaa-says/
[54] https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF
[55] https://www.iea.org/commentaries/energy-is-at-the-heart-of-the-sustainable-development-agenda-to-2030
[56] https://index.hu/gazdasag/magyar/roma060508/
[57] https://karpathaza.hu/K%C3%B6z%C3%B6ss%C3%A9gi%20alap%C3%BA%20kezdem%C3%A9nyez%C3%A9s/toldi-modell/

SDGs

'Development which meets the needs of the current generations without compromising the ability of future generations to meet their own needs'. This is the definition of sustainable development that was first introduced by the World Commission on Environment and Development (WCED) in 1987, and it is the one most widely used nowadays.[58] The several important milestones in the international pursuit of sustainable development, such as the World Summit for Social Development (1995), the Millennium Declaration (from which the Millennium Development Goals were derived), the World Summit on Sustainable Development (2002), the 2005 World Summit paved the way for the 2030 Agenda.[59]

The 17 Sustainable Development Goals (SDGs) adopted in 2015 by all United Nations Member States recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.[60]

It is important to understand how the 2030 agenda realizes an integrated path for achieving critical global goals which are not incompatible and can successfully be met together.[61] The goals convey a very complex, versatile, and interconnected set of policy propositions in order to simultaneously solve social, economic and environmental issues. It captures the idea of creating methodologies and attitudes and changing mindsets regarding development. It is not only about solving crucial issues but transforming the way societies function in order to find a balance between sustainability and development.

Energy is at the heart of many of these Sustainable Development Goals – from expanding access to electricity, to improving clean cooking fuels, from reducing wasteful energy subsidies to curbing deadly air pollution that each year prematurely kills millions around the world. One of these goals – commonly known as SDG 7 – aims to ensure access to affordable, reliable, sustainable, and modern energy for all by the end of the next decade.[62]

It is clear that the energy sector must be at the center of efforts to lead the world on a more sustainable pathway. The European Green Deal launched a concerted strategy for a climate- neutral, resource-efficient, and competitive economy, scaling up the circular economy which will make a decisive contribution to achieving climate neutrality by 2050 and decoupling economic growth from resource use, while ensuring the long-term competitiveness of the EU and leaving no one behind.

INTERNATIONAL ENVIRONMENT

Before the COVID-19 pandemic, progress was being made on implementing the goals, however, those advances were not enough and in truly transformative areas progress had either stalled or reversed. As a result, by early 2020, the world was off-track to meet the targets by 2030. The economic downturn has

[58] https://ec.europa.eu/eurostat/documents/15234730/16817772/KS-04-23-184-EN-N.pdf/845a1782-998d-a767-b097-f22ebe93d422?version=2.0&t=1688373085450
[59] https://ec.europa.eu/eurostat/documents/15234730/16817772/KS-04-23-184-EN-N.pdf/845a1782-998d-a767-b097-f22ebe93d422?version=2.0&t=1688373085450
[60] https://sdgs.un.org/goals
[61] https://www.iea.org/commentaries/energy-is-at-the-heart-of-the-sustainable-development-agenda-to-2030
[62] https://www.iea.org/commentaries/energy-is-at-the-heart-of-the-sustainable-development-agenda-to-2030

pushed between 119 and 124 million more people into extreme poverty in 2020 and atmospheric concentrations of the major global greenhouse gases increased, while the global average temperature was about 1.2°C above pre-industrial levels, dangerously close to the 1.5°C limit established in the Paris Agreement.[63]

There has been tremendous progress in delivering universal electricity access (SDG 7.1.1) in Asia and parts of sub-Saharan Africa between 2000 and 2016, but more than 670 million people are still projected to be without electricity access in 2030. When it comes to access to clean and modern cooking facilities (SDG 7.1.2), about 2.8 billion people rely on polluting biomass, coal, and kerosene to cook their daily meals, a number which has not changed since 2000. The share of modern renewables in global final energy consumption (SDG 7.2) has been growing steadily in the past decades, reaching nearly 10% in 2015. This share needs to more than double to 21% by 2030. But while wind and solar deployment has accelerated, thanks to falling costs and policy support in many parts of the world, this goal is still out of reach under current policies. In Hungary, the regulatory environment poses several challenges to the development of renewable energy. In the last decade, the expansion of wind energy generation capacity has been virtually on hold and since 2020, the feed-in of companies' solar power generators has not been allowed. Since April 2021, no new accession right has been granted for solar power plants. In the last quarter of 2022, the government suspended, for an indefinite period, the possibility for small residential solar power generators to feed in into the grid. Between 2013 and 2021 Hungary's investment in electricity and gas was 0.6% of GDP per year on average, compared to 1.3% in regional peers. uncertainty and hinder the deployment of residential solar power systems. In October 2022, the government abolished the generous feed-in tariffs for newly installed residential solar panels, however, the new tariff system is still unknown, adding to the uncertainty. A sizeable and rapid expansion of renewables, in particular through new wind power capacities and the untapped potential of geothermal energy and biomethane production, would support the electrification of the economy and the shift away from fossil fuels.[64] Thus, data and analysis show that nations fall well short of achieving our critical energy-related sustainable development objectives.

ENERGY CRISIS AND (ENERGY) POVERTY

Energy markets already started to feel the in 2021 due to extraordinarily rapid economic rebound following the pandemic, but the situation escalated dramatically into a full-blown global energy crisis following Russia's invasion of Ukraine in February 2022.[65] Higher energy prices have contributed to painfully high inflation, pushed families into poverty, forced some factories to decrease output or even shut down, and slowed economic growth to the point that some countries experienced severe recession. Europe, whose gas supply is uniquely vulnerable because of its historic reliance on Russia (quarter of all energy consumed in the EU coming from Russia in 2021), especially suffered with its population seeing sharply higher energy import bills and fuel shortages.

In emerging and developing economies, where the share of household budgets spent on energy and food is already large, higher energy bills have increased extreme poverty and set back progress towards

[63] https://hlpf.un.org/sites/default/files/28467E_2021_58_EN.pdf

[64] https://economy-finance.ec.europa.eu/system/files/2023-06/ip241_en.pdf

[65] https://www.iea.org/commentaries/what-is-behind-soaring-energy-prices-and-what-happens-next

achieving universal and affordable energy access. Even in advanced economies, rising prices have impacted vulnerable households and caused significant economic, social and political strains.[66]

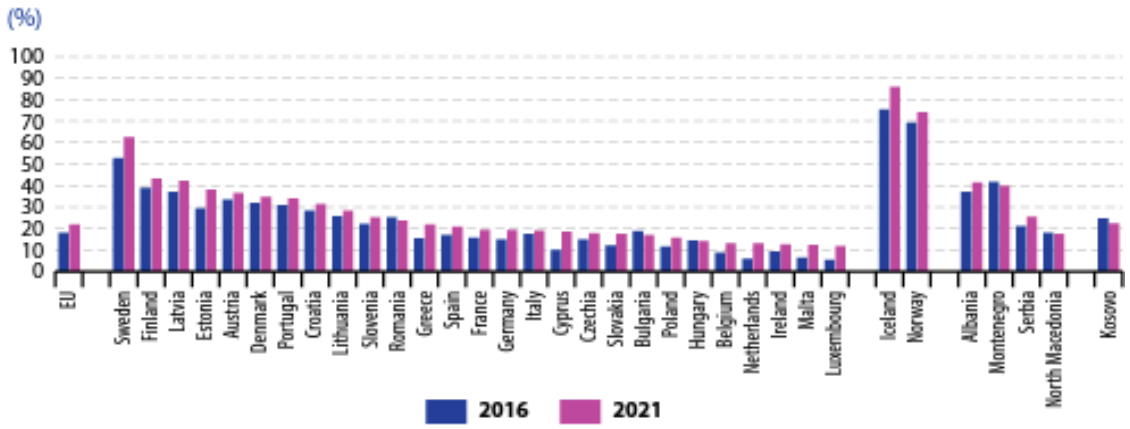
Poverty does not only imply a gap in income, but also its inevitable ratification of social exclusion paired with multiple disadvantages such as standard of education or competitiveness on the labor market. In the case of Hungary, it is especially true for children growing up in poor families ending up living in poverty themselves[67] and it poses a threat to the development of sustainable policies as it is affecting economic output, health care and environmental pollution.

SDGS AND HUNGARY

While Hungary is making progress towards achieving most of the United Nations Sustainable Development Goals (SDGs), there is still a gap with other EU countries. While many EU countries managed to reduce their dependency on Russian gas and oil products by the end of 2022, Hungary still relies on them to almost the same extent as before 2022. This is partly due to limited short-term substitution possibilities, but also, partly, to limited policy efforts to mitigate demand and diversify imports.[68] Considering the rising energy market prices, this makes the situation of the economically vulnerable especially tight.

Residential buildings, which account for about one-third of energy consumption and about one- third of the total natural gas consumption, have low energy performance. Reducing energy consumption would not only lead to less dependence on Russian fossil fuels, but also to lower greenhouse gas emissions and other air pollutants.

Figure 7.10: Share of renewable energy in gross final energy consumption, by country, 2016 and 2021

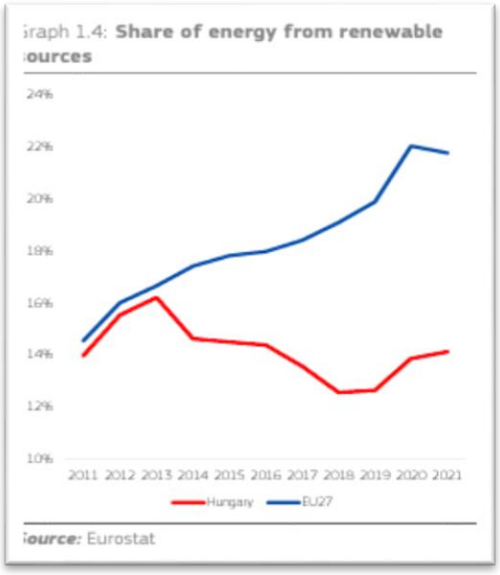


[69]

Source: Eurostat (online data code: sdg_07_40)

[66] https://www.iea.org/topics/global-energy-crisis
[67] https://telex.hu/belfold/2022/12/09/szegenysegmeres-magyarorszag-segely-egyensuly-intezet-jovedelem-fogyasztas
[68] https://economy-finance.ec.europa.eu/system/files/2023-05/HU_SWD_2023_617_en.pdf
[69] https://ec.europa.eu/eurostat/documents/15234730/16817772/KS-04-23-184-EN-N.pdf/845a1782-998d-a767-b097-f22ebe93d422?version=2.0&t=1688373085450

Although there is an upward trend when aggregated, Hungary is a bit behind not only comparing the brute percentage share, but also compared to its own data.



iraph 1.4: **Share of energy from renewable ources**

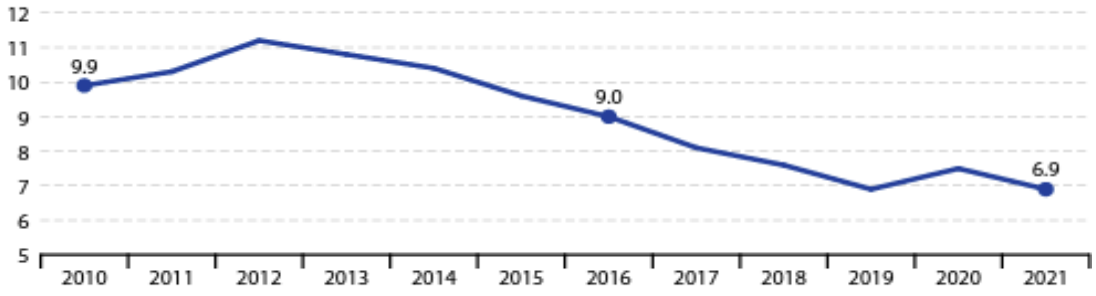
ource: Eurostat

The low level of regulated energy prices has limited the incentives for households to use fossil fuels efficiently. Hungary uses more energy and materials to produce a unit of income than the EU average. Contrary to the general trend among EU countries, resource productivity in the Hungarian economy has not improved over the past decade. In recent years, greenhouse gas emissions in the transport sector have risen sharply, damaging air quality and posing risks to public health. The share of energy from renewable sources is one of the lowest in the EU and has fallen over the last decade (Graph 1.4) as the generation of green energy could not keep pace with the economy's increasing use of energy.[70]

Although Hungary is not a pioneer when it comes to renewable energy, there is a promising downward trend when it comes to energy poverty. To monitor the development of poverty and social inclusion, when asked about abilities to keep home adequate warm, the self-reported indicator among the population massively drops when compared to 2010. The share of the total population unable to keep their homes adequately warm fell from 9.6% in 2015 to 4.2% in 2020 but then rose to 5.4% in 2021 (below 6.9% in the EU) (67). In particular, 16.3% of the population

at risk of poverty (EU: 16.4%) and 4% of lower middle-income households (in deciles 4-5) were affected in 2021 (EU: 8.2%). Before the energy price hikes, an estimated 64.5% of the total population and 82.4% of the (expenditure-based) at-risk-of poverty (AROP) population had expenditure shares on electricity, gas, and other fuels (68) above 10% of their household budget, well above the estimated EU average of 26.9% and 48.2%, respectively.

Figure 7.13: Population unable to keep home adequately warm, EU, 2010–2021
(% of population)

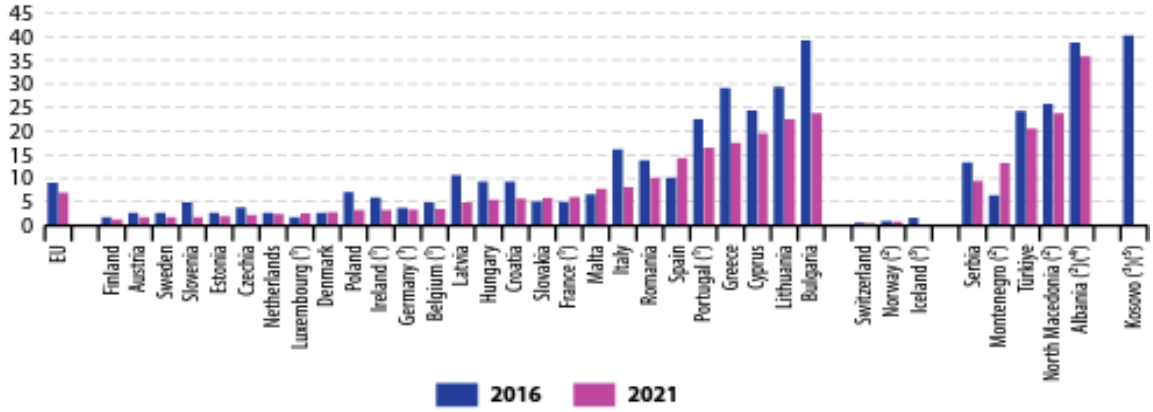


Note: 2010–2019 data are estimated.
Source: Eurostat (online data code: sdg_07_60)

[70] https://economy-finance.ec.europa.eu/system/files/2023-05/HU_SWD_2023_617_en.pdf

There is a considerable drop in case of Hungary as well when we check the by country breakdown of the chart.

Figure 7.14: Population unable to keep home adequately warm, by country, 2016 and 2021
(% of population)



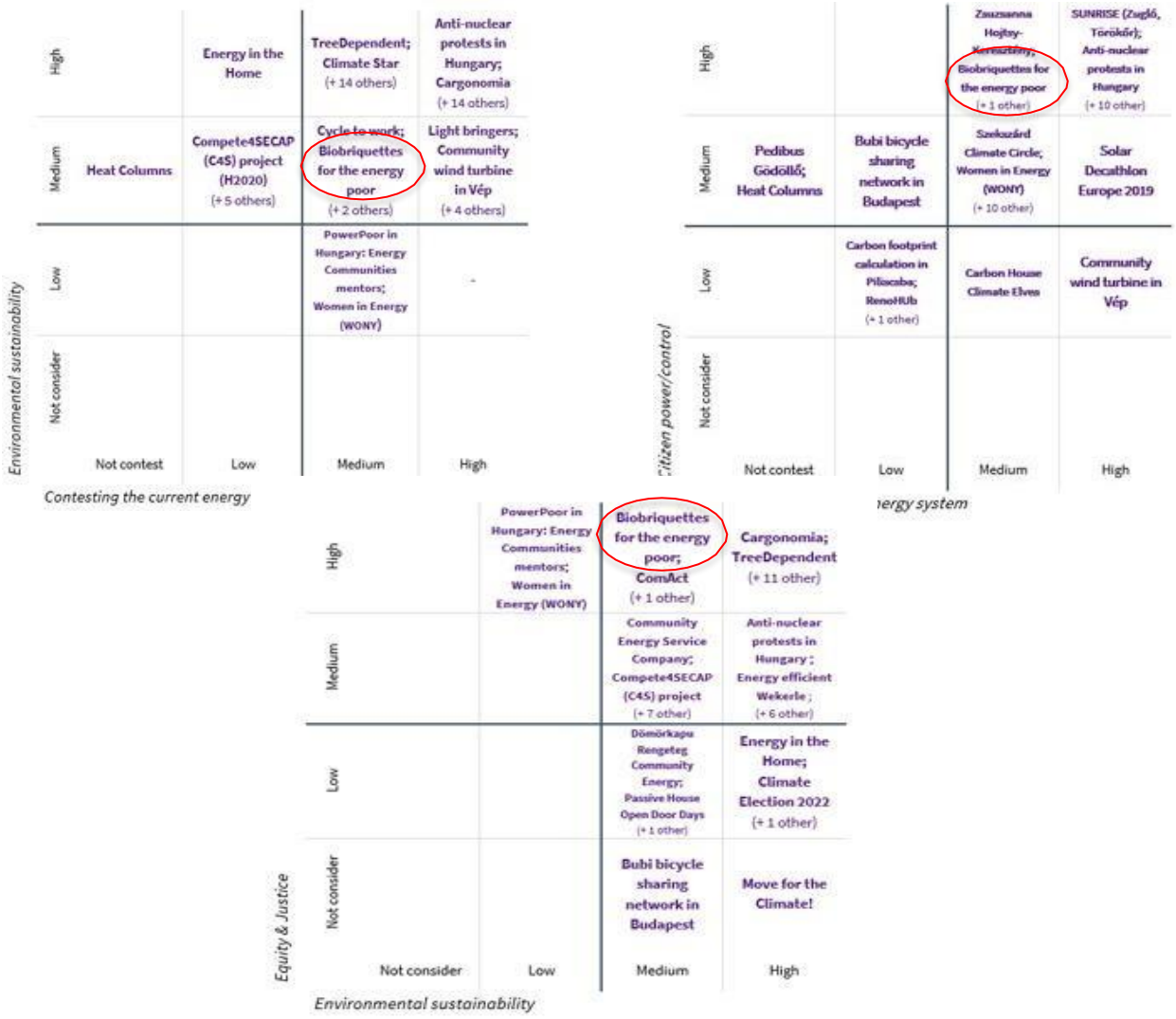
(1) Break(s) in time series between the two years shown.
(2) 2020 data (instead of 2021).
(3) No data for 2021.
(4) 2017 data (instead of 2016).
(5) 2018 data (instead of 2016).
Source: Eurostat (online data code: sdg_07_60)

ENERGY POVERTY - HUNGARIAN CASE STUDY

An international initiative EnergyPROSPECTS (PROactive Strategies and Policies for Energy Citizenship Transformation) partnered with a Hungarian non-profit organization GreenDependent Institute in 2021 to work with a critical understanding of energy citizenship that is grounded in state-of-the-art Social Sciences and Humanities (SSH) insights. It aims to develop a broad understanding of energy citizenship as a policy concept, a sociotechnical imaginary, a knowing-of-governance, i.e., a social construction of desirable/normal civic agency in future energy systems. The project identifies and examines a range of cross-cutting issues in energy citizenship and selects of 500 case studies to present. Results will then produce practical policy outputs which will be revised with policy actors in knowledge exchange workshops. Overall, the project will advance state-of-the-art energy research and provide recommendations

for harnessing energy citizenship to achieve energy and decarbonisation goals in Europe.[71] It was of specific interest to the research team to study how cases of ENCI contest current energy systems, and whether the forms of contestation that are observed indeed help move society towards creating a more sustainable and democratic energy system.[72]

[71] https://www.energyprospects.eu/about-the-project/about-the-project/
[72] https://www.energyprospects.eu/fileadmin/user_upload/lu_portal/www.energycitizen.eu/EP_ENCIcountryprofi%20les_Hungary_2022_corr1_.pdf



As it can be seen on the mappings one of its case studies, the Biomass briquettes programme scores exceptional in all instances. The project was developed within the framework of the Igazgyöngy Foundation and Art School with the aim of hand-making biomass briquette, a cheap, environmentally friendly fuel.

The foundation has been active since 1999 in the disadvantaged regions of Hungary, where the unemployment rate is higher than the national average and many people live below the poverty line. As of 2009, the foundation's core business and activity, which grew from personal, competency and community development built on art education and visual training, expanded

into a complex development program in the region. The main objective of the Igazgyöngy Foundation is to facilitate changes in the core of the community that could be carried on by the target without the presence of a third party. "The foundation has to liquidate itself, our goal is not to be".[73] In essence that is perfectly in line with what the SDGs stand for.

[73] https://www.youtube.com/watch?v=sxLzI_5Z9Ao&t=150s

Igazgyöngy works with socially marginalized groups living in poverty and help them in several aspects of their lives, most importantly education of the youth. Early on they realized that it is impossible to separate the children from their family background, and the involvement of the parents are vital for the project to succeed. This triggered the social programs of the adult population, hence the current employment focused attitude of the organizers, based on the tenets of functional practices of the acquired competencies to transform the participants into a valuable labour force and to utilize their skills in their community.

In family support type of social work, crisis situations are the most problematic. In Hungary, energy poverty poses a problem to many resulting in a number of occurrences of people freezing to death in their own home each year. In families where this issue is so relevant, many times the survival is the strategy regardless of law or environmental impact. It is critical therefore, to assist those in need of fuel to heat their homes. The Biobrikett program is seeking a solution to this problem exactly.[74]

The centre of this project is a 'dead-end village' called Told, near the Romanian border. The population is 350. It is ignored by both the government and the market, there is no water nor electricity in most of the houses, transport and job opportunities are de facto non-existent, there is no grocery store, no school, the local pub too, had closed down a long time ago. The per capita social innovation, however, is certainly nationally leading. Nóra L. Ritók and her foundation, within the framework of their own complex integrational program, is at constant battle at all fronts with the causes and effects of deep poverty. Igazgyögy Foundation helps in the local education centre to the children after school and the bests are rewarded with scholarships, the women are working in the garden and utilize the produce and the men are trained in the workshops created by the foundation.

The biobrikett program provides access to combustible materials to fuel. The process was configured considering local needs by Nóra Feldmár, volunteer of the foundation, who finished her studies in the Netherlands, and was looking for a case-study for her dissertation in Industrial Ecology. The goal was to find a technology that provides solution to the problem with local resources, minimal budget, unskilled labour and can be sustainable.[75]

Since transportation costs are high even from the nearest settlements, it was important to react to the problem locally as well as to acquire the ingredients for free, so it doesn't add to the expenses. As a first attempt in 2010, they started the production by hand with sunflower seed oil and paper, but the bricks couldn't yield to a sufficient calorific value in order to keep home adequately warm in the low temperatures. Now the briquettes are made of compressed combustible material such as agricultural by-products, timber and paper industrial waste, straw and the most importantly, hay. Together with Ciklonómia, the foundation is developing a mechanic version where the shredded organic material is dried, refined, and placed in a special briquetting machine. There, it is easily compressed or extruded to a desired shape and density. The mechanization is subsidies by UniCredit Bank's the "Lépj velünk!" program with a non-refundable loan of 15 000 EUR. It's an important objective of the program to support initiatives that seek long-term solutions for local communities.

[74] https://tudatosvasarlo.hu/biobrikett-kornyezetbarat-olcso-futesi-alternativa/
[75] https://index.hu/belfold/2013/05/20/mintafalu_a_vilag_vegen/

The briquettes are cheap, efficient, and extremely eco-friendly. They burn low on smoke, do not emit unsafe gases, and do not give off creosote. And they are legal. The villagers don't have to steal wood or fuel with domestic waste stuffed into their worn-out fireplaces. They can make 60-70 kg briquette of 100 kg hay in the mill, where they not only provide the locals with fuel but also with an employment opportunity. "The real product is not the briquette, but the man himself who we make self-sufficient and capable of work."[76]

Apart from the Brikett manufacture, the Igazgyöngy Foundation has two ongoing projects under the name of Szuno and Amari. Szuno has been present as an individual brand since 2018 with the objective of becoming relevant in the market, merchandising textiles in their webshop, embroideries of children's drawings made by the local women community. Within the Amari program, they also sell produce and its products such as jams and marmalade.

The Brikett manufacturing grew itself out of the household level to an industrial level in 2018. Its main objective is to assist families in deep poverty to be self-sufficient and at the same time reduce the use of illegal materials, lots of which are harmful for the environment. The numbers are promising. The daily need of one family is 20-30 kg briquettes, the new mill can manufacture 80 kg hay bricks per hour which burn slower, yielding to double the calorific value of the wood's. The industrialization of the project not only created new employment possibilities but with the excess briquettes Told is able to help other settlements in similar situations. If the model sustainable in the community, the long-term goal of the foundation to extent the program to other villages facing similar difficulties.[77]

Due to the employability program, the attitude of the target involved has drastically changed. Their day-to-day lives became more reliable; therefore, they are more capable of making independent decisions or organizing their lives. Considering the success of the program measured by the improvement of their quality of life, it enhanced the targets' social and communication skills by shedding light to cooperation and their interdependence as well as the lengths one can go to when a community is healthy and functions properly. The employment rate is growing constantly, and the targets are more prone to adapt and enforce community regulations measured in the improvement of living conditions and the drop in the number of police interventions. The change in attitude can be observed at individual, household, and community level as well.[78]

CONCLUSION

The most important aspect of the intervention is its ability to look at the problem embedded in the society as a whole rather than a separate entity and look for a solution from this perspective; hence, making its complexity its key to success. The general state of inertia in the country poses a big obstacle for the intervening organizations and it's important to emphasize that the program tightly fits the local circumstances and individual needs resulting in greater insight into the prominent issues. "I think this is the most complex model among the civil initiatives, not even does the state offer such comprehensive

[76] https://hvg.hu/elet/20190325_Az_uzenet_egyszeru_ha_teszel_valamit_magadert_segitenek_neked
[77] https://www.szeretlekmagyarorszag.hu/kozosseg/brikettet-gyartanak-igy-segitenek-az-emberek-egymason-a-350-fos-zsakfaluban/
[78] https://karpathaza.hu/K%C3%B6z%C3%B6ss%C3%A9gi%20alap%C3%BA%20kezdem%C3%A9nyez%C3%A9s/told-i-modell/

models that provide opportunities. We deal with children, families then we deal with the community"[79] Nóra L. Ritók, more than halfway through its 20-year plan. The changes in one area such as energy consciousness, have a positive spillover effect and synergically impact other areas.[80] Consequently, it is evident that issues such as energy efficiency or clean energy development are very strongly related with issues such as poverty and equality and finding sustainable solution to them involves a set of interrelated initiatives to establish a strong and coherent product policy framework that will make sustainable products, services and business models the norm and transform consumption patterns so that no waste is produced in the first place.

"Ten years ago, I was still seeing the word of charity through pink lenses, and I was thinking that helping only will suffice. On the first Christmas I gathered a bunch of presents, we made the community house open up for the night and provided them with a Christmas tree and music, I put candles around the stage and collected non- perishable food for the families so each can take home some. When I opened the door, everyone just rushed inside, the children ripped up the presents and immediately started comparing the price of theirs to the peers and wanted to trade. They started fighting. Eventually the parents joined in as well. In the meantime, some of them tried to take as many bottles of oil as they could grab regardless of my asking of only taking one. They were tearing the packs out of each other's hands, I remember the flying pasta across the room. They called me names for only bringing this much and at the end they just vehemently left in a hurry. And I was left alone in the community house, standing in the trash not being able to comprehend what just happened. I worked really hard and could not believe the reaction. Then five years passed by, with community development. At that point we were already present in multiple settlements, the woman of Told took over the organization, I only needed to attend the ceremony. When I arrived and opened the door the whole village was inside. The table was full of pastries, the room was decorated beautifully, the children were standing on the stage in full white, singing a Zámbó Jimmy song. At the back were the mothers, Roma or not, together. I teared up. It doesn't happen very often, which is surprising considering my job, but there and then I couldn't hold it back. I felt for the first time that it is working. What we can accomplish with conscious community development."[81]

[79] https://www.youtube.com/watch?v=sxLzI_5Z9Ao&t=150s

[80] https://karpathaza.hu/K%C3%B6z%C3%B6ss%C3%A9gi%20alap%C3%BA%20kezdem%C3%A9nyez%C3%A9s/told i-modell/

[81] https://hvg.hu/elet/20190325_Az_uzenet_egyszeru_ha_teszel_valamit_magadert_segitenek_neked