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Hydropower and its socio-ecological impacts. Rapuni Hydropower Project - A case study from Albania

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Abstract

Electric energy is essential for human activities. Various energy sources exist, each with distinct methods and devices for generation. In Albania, the utilization of water resources through hydropower plants is significant, accounting for 95% of electricity production. This reliance on hydropower extends within Albania and beyond its borders.

The Rapuni Hydropower Project represents a significant investment in Albania`s energy sector, with far-reaching benefits for the country, particularly the Elbasan district and the city of Librazhd. This project's integral components, dams, and reservoirs, play a pivotal role in economic development by serving multiple purposes, including electricity generation, flood control, and irrigation.

The study aims to assess the socio-ecological impact of the Rapuni Hydropower Plant on the residents along the Rapuni River. A comprehensive analysis examines the socio-economic and ecological consequences of constructing this hydropower facility. Notably, the Rapuni River in Librazhd, one of Albania`s last untouched rivers, including Valbona River, is a unique ecosystem with rich biodiversity, making it a significant focus of this study.

The study employs a mixed-methods approach, combining both qualitative and quantitative methodologies. Specifically, it utilizes purposeful sampling, resembling an avalanche, across two dimensions:

1. Interviews with professionals: these interviews involve experts directly involved in implementing the Rapuni Hydropower Project;
2. Residents Interviews: residents from the Rapuni area in Librazhd are also part of the study.

The study's key findings emphasize the importance of ecological measures and the establishment of standards that involve all political actions and initiatives from interest groups. Decision-making should rely on more than just information available at the time of environmental activity decision.

Enhanced ecological awareness and adherence to environmental protection policies, including those related to the Rapuni hydropower plant, are essential. Additionally, responsible utilization of energy resources is crucial. However, the Rapuni hydropower plant presents challenges rather than a straightforward path to a better future. The residents, who are directly impacted by the plant, face these challenges, and play a vital role in shaping the

region's social and ecological aspects, an essential element of this study.

Abstract auf Deutsch

Elektrische Energie ist für menschliche Aktivitäten unerlässlich. Es gibt verschiedene Energiequellen mit jeweils unterschiedlichen Methoden und Geräten zur Erzeugung. In Albanien ist die Nutzung von Wasserressourcen durch Wasserkraftwerke von großer Bedeutung und macht 95 % der Stromerzeugung aus. Diese Abhängigkeit von der Wasserkraft erstreckt sich sowohl innerhalb Albaniens als auch über die Landesgrenzen hinaus.

Das Rapuni-Wasserkraftwerksprojekt stellt eine bedeutende Investition in den albanischen Energiesektor dar, die weitreichende Vorteile für das Land, insbesondere für den Bezirk Elbasan und die Stadt Librazhd, mit sich bringt. Die integralen Bestandteile des Projekts, Dämme und Stauseen, spielen eine zentrale Rolle für die wirtschaftliche Entwicklung, da sie mehreren Zwecken dienen, darunter Stromerzeugung, Hochwasserschutz und Bewässerung.

Ziel der Studie ist es, die sozio-ökologischen Auswirkungen des Rapuni-Wasserkraftwerks auf die Anwohner entlang des Rapuni-Flusses zu bewerten. In einer umfassenden Analyse werden die sozioökonomischen und ökologischen Folgen des Baus dieser Wasserkraftanlage untersucht. Der Rapuni-Fluss in Librazhd, einer der letzten unberührten Flüsse Albaniens, einschließlich des Valbona-Flusses, ist ein einzigartiges Ökosystem mit reicher Artenvielfalt, was ihn zu einem wichtigen Schwerpunkt dieser Studie macht.

Die Studie verwendet einen gemischten Methodenansatz, der sowohl qualitative als auch quantitative Methoden kombiniert. Insbesondere wird eine gezielte Stichprobenauswahl verwendet, die einer Lawine ähnelt und zwei Dimensionen umfasst:

1. Interviews mit Fachleuten: Diese Interviews beziehen Experten ein, die direkt an der Umsetzung des Rapuni-Wasserkraftprojekts beteiligt sind;
2. Interviews mit Anwohnern: Anwohner aus dem Rapuni-Gebiet in Librazhd sind ebenfalls Teil der Studie.

Die wichtigsten Ergebnisse der Studie unterstreichen die Bedeutung ökologischer Maßnahmen und der Festlegung von Standards, die alle politischen Maßnahmen und Initiativen von Interessengruppen einbeziehen. Die Entscheidungsfindung sollte sich nicht nur auf die Informationen stützen, die zum Zeitpunkt der Entscheidung über Umweltaktivitäten verfügbar sind.

Ein stärkeres ökologisches Bewusstsein und die Einhaltung von Umweltschutzmaßnahmen,

auch im Zusammenhang mit dem Rapuni-Wasserkraftwerk, sind unerlässlich. Darüber hinaus ist eine verantwortungsvolle Nutzung der Energieressourcen von entscheidender Bedeutung. Das Rapuni-Wasserkraftwerk stellt jedoch eher eine Herausforderung als einen geradlinigen Weg in eine bessere Zukunft dar. Die Anwohner, die von dem Kraftwerk direkt betroffen sind, stellen sich diesen Herausforderungen und spielen eine wichtige Rolle bei der Gestaltung der sozialen und ökologischen Aspekte der Region - ein wesentliches Element dieser Studie.

Table of Contents

1. Introduction

1.1 Background

Preserving the Environment and sustainably managing our existing natural resources and assets plays a crucial role in establishing a high quality of life for the present population while protecting the well-being of future generations. The environmental impact assessment of a hydropower plant follows a systematic approach, ensuring that all environmental and socio-economic implications related to its construction are thoroughly identified and carefully considered during both the planning and implementation phases.

The Environment in this study will be the fundamental context within which economic and social development unfolds in a specific geographical area (EBRD, 2008). It involves the mutual relations between the living and non-living environment, i.e., between living beings and climate, earth, water, and air (Peculi & Kopali, 2014). So, with the term ecology, we understand the scientific discipline that investigates how organisms interact with their surroundings' living (biotic) and non-living (abiotic) components. It involves the mutual relations between the living and non-living environment, i.e., between living beings and climate, earth, water, and air (Peculi & Kopali, 2014).The same authors have explained ecological sustainability: Ecological sustainability (or sustainable ecology) describes the long-term and careful management of natural resources (Peculi & Kopali, 2014).

Indeed, the construction of dams raises growing concerns due to their potential impact on the Environment. These projects can lead to irreversible, multifaceted changes that often negatively affect people's lives. Among these consequences are displacement and resettlement, which significantly affect local communities. The complex interaction between environmental changes and human well-being underlines the need for thoughtful consideration and sustainable practices in dam development (Autocephalous Orthodox Church, 2016),

Throughout history, dams and reservoirs have played pivotal roles in economic Progress, serving diverse functions such as electricity generation, flood control, and irrigation. However, the construction of such infrastructure has sparked debates and disputes among residents and professionals, dividing opinions into steady supporters and opponents (Albania, 2017).

In Progress Reports about Albania, which aims to assess conditions for EU membership, it is mentioned that all hydropower plants must comply with the EU's environmental legal

framework, and constructing hydropower plants in protected areas is seen as a problem (EU Comission, 2022). The report specifically demands that the authorities ensure the sustainable use of Hydropower.

The Rapuni Hydropower Plant, operational since 2016, represents a significant investment in Albania's energy sector. Executed by the Autocephalous Orthodox Church in Albania, this project aligns with the national energy strategy and adheres to regional development for the Elbasan district, specifically Librazhd (Autocephalous Orthodox Church, 2016).

The purpose of the master thesis is to reflect on the socio-ecological impact of the hydropower plant on the inhabitants of the Rapuni River through a detailed analysis. This socio-economic and ecological analysis of the effects of the construction of the Rapuni Hydropower Plant is fundamental because the Rapuni River in Librazhd is one of Albania's last rivers with diverse biodiversity and unique ecosystems.

As Albania is already facing severe impacts from climate change, it is essential to understand the project's potential impacts on local communities and the Environment. Focusing on the socio-ecological impacts that dam construction has on local people and the Environment, as well as the threat it poses to biodiversity, is a valuable perspective on understanding the complexity of the problem. Despite constructing numerous hydropower facilities, Albania has constructed numerous hydropower facilities, but it needs comprehensive studies assessing their environmental impact on the local flora and fauna (Albania, 2017).

By conducting a case study on the Rapuni hydropower project, it will be possible to examine the power dynamics between the various actors involved in the project, such as government officials, private companies, and local communities, and understand how these actors shape the decision-making process, and environmental impacts of the project. In addition, it will also be possible to analyze how the project affects different social groups, such as local communities and other marginalized groups. All in all, it will be possible to include in the analysis the perspectives of local communities, who are often affected by the hydropower plant projects, and to identify alternatives to the problems they face.

One of the main goals of this study is to understand the social and ecological impacts of dam construction, namely the Rapuni project in Albania. The Rapuni Dam was built in 2015-2016, and in 2017, the social problems caused by the damage started to be present among the area's residents. An essential factor in the emerging issues was that the Rapuni hydropower project caused the residents a total lack of transparency and mismanagement or monitoring

(Vejnovic, 2017).

It is important to look on the power relations to reflect the social and ecological impact of hydropower plants in general and that of Rapuni in particular on citizens.

At the end of the study, recommendations will be added to address critical issues that local governments face during the decision-making process concerning environmental interventions. These recommendations aim to inform and guide current policies and practices and benefit those interested in exploring this field further. We aim to provide insights that act as a base for other researchers interested in pursuing more research in this area.

The specific objectives of the study are:

1. To present evidence of the socio-ecological impact of the construction of the hydropower plant through exploring studies;
2. To identify the advantages and disadvantages of the construction and operation of the hydropower plant by citizens and interest groups;
3. To address possible concrete problems related to hydropower plants.

Research questions:

1. What are the socio-ecological impacts of the construction of hydropower plants?
2. What is the correlation between the losses and benefits from hydropower plants for citizens and the environment?
3. What are some of the main issues that need to be addressed on the activities of hydropower plants and the approaches of citizens and professionals?

Throughout history, dams and reservoirs have played pivotal roles in economic Progress, serving diverse functions such as electricity generation, flood control, and irrigation. However, the construction of such infrastructure has sparked debates and disputes among residents and professionals, dividing opinions into steady supporters and opponents.

Indeed, dam construction raises growing concerns due to its potential impact on the environment. These projects can lead to irreversible, multifaceted changes that often negatively affect people's lives. Displacement and resettlement, which significantly affect local communities, are among these consequences (EBRD, 2008).The complex interaction between environmental changes and human well-being underlines the need for thoughtful consideration and sustainable practices in dam development.

This study tries to answer the question of the socio-ecological effects of the construction of the Rapuni hydropower plant. What have been the central dynamics of its construction, and how much have they been represented in the residents' decision-making?

In this study, all the actors, as members of the local government, the local community, and private companies, have had different roles in the decision-making of such an important project with an impact on society. We also need to appreciate that the power agreements may have influenced adopting environmental policies that directly affect the area's inhabitants. The positioning of each of them is considered essential to understanding the developments that took place in the Rapuni hydropower plant and if they constitute a social problem. By social problems, we will understand a phenomenon that affects many people in a particular area and is a situation that can and should change. However, when we refer to social developments with this term, we will understand The Progress of social groups, marginalized or not, in terms of their material, health, psycho-emotional well-being, and Progress based on the increase in evaluation standards compared to their quality-of-life years ago.

The hydropower plant's environmental impacts will be explained concretely, specifying sustainable development trends. Thus, sustainable development will be understood as fulfilling present-day environmental, social, and economic requirements without compromising the prospects for future generations to meet their own needs (Daci & Daci , 2014)

It will also be possible to analyze how the project affects different social groups, such as local communities and other marginalized groups. In a word, it will be possible to incorporate the perspectives of local communities, often affected by dam projects, in the analysis and to identify alternative problems they are facing. Also, they present their concerns that have been largely overlooked in hydropower projects, with little focus on the social and ecological aspects of the affected population. These factors can have far-reaching consequences that affect the social fabric of communities.

This study tries to answer the question of the socio-ecological effects of the construction of the Rapuni hydropower plant. What have been the central dynamics of its construction, and how much have they been represented in the residents' decision-making?

2. Hydropower in Albania

2.1 Situation about hydropower in Albania

The Environment is the basis for economic and social development in a particular territory. Protecting and sustainably managing natural resources and assets in this Environment constitutes a critical element of creating a good living standard for the current population and guaranteeing it for future generations.

The Western Balkans are actively pursuing sustainable development, leading to the exploitation of rivers and streams for Hydropower. While this benefits various stakeholders, it often neglects the local population. The richness of water resources and the unique landscape of Albania, accompanied by the climatic, hydrographic, and geomorphological conditions suitable for creating natural flows with large flow and precipitation, make possible hydropower exploitation with considerable economic interest. Albania is ranked in the Balkans as a country considerably rich in water resources, with an extension hydrographic area almost throughout the territory. With its surface of 28,748 km2, it is generally a mountainous country, where mountains, hills, lakes, and the surface of riverbeds occupy 70% of it. The hydrographic territory of Albania has a catchment area of about 68,000 km2, or 57% more than the national territory. In the hydrographic territory of Albania, about 1400 mm of rainfall is on average per year. Snow falls at an altitude of over 1000 m, whereas in the deep mountain areas, it stays for several months, ensuring the water supply of the rivers and their branches for spring and even summer. Due to the non-uniform precipitation distribution during the year's seasons, the flows of rivers and their branches have significant changes. The flows are enormous in the winter, while in the summer, there are few. The flow in the winter is 70%, while in summer and autumn 30%.

Albania has the highest number of hydropower plants in the Western Balkans, particularly in central Albania (Pavlakovič, Okanovic, & Vasič, 2022). As a result, Albania produces 90% of its electricity from hydropower plants. Recently, the initiative for the construction of small hydropower plants has also increased, finding the government's support, which, with its legislation, eased the bureaucratic difficulties by making it possible to obtain their permission within a reasonably short time. As a dynamic system, the preservation of the Environment must be seen in all the natural factors and the human activity exerted on it. It is vital for the population and essential for the country's economic development. Hydropower can lead to land degradation and displacement of local populations, while economic benefits can be

calculated elsewhere.

The Environmental Impact Assessment of the hydropower plant is a systematic process that aims to ensure that all the environmental and socioeconomic consequences of the development have been identified and considered proposals for the activity, both during its preparation phase and after implementation.

Indeed, electric energy represents one of the existential sources of human activities and lives. The energy sources are different, as are the ways and the devices used for its generation. The use of energy resources from renewable materials, particularly water resources through engineering works called hydropower plants, nowadays represents particular importance not only on a national scale but also in a broader area. Electricity production in Albania is based on hydropower plants to the extent of 95% (Commerce, 2021). Hydropower plants, which do not emit greenhouse gases, are the primary and most dominant source of energy in Albania. Only 5% of electricity in Albania is produced using coal-fired power plants.

Albania consumes more electricity than it can produce, thus facing a shortage for which it must import. First, other alternatives must be found on how to eliminate shortages by increasing production capacities is necessary. Such an alternative can only be achieved by investing in new capacities, whereas non-renewable ones have a more promising perspective. It should be emphasized that the shortage comes more from the loss of electricity produced instead of unused capacities. Loss in transmission and distribution in 2014 reached 23 % in Albania (OECD/IEA, 2018).

Another problem Albania constantly faces is the loss of electric power during distribution, which is also considerably higher than the average for EU countries (Musabelliu, 2022). While the need to focus more on renewables and alternative energy has been exaggerated, a more urgent task is to improve efficiency in transmission and distribution, as this problem can also be traced to alternative energy. Apart from the loss during distribution, another concern is that only some of the electricity distributed is billed, so a part of it, although not significant, is theft. All these factors contribute to the high price of energy. Therefore, first, energy distribution costs should be decreased to increase energy production.

In summary, as the literature asserts, non-renewable resources such as coal, which the country relies on for electricity production, harm the Environment. At the same time, there is little room for renewable energy sources to make any significant progress or meet the demand for electricity consumption. The focus of attention on exploiting more renewable

resources without careful consideration for the Environment and biodiversity can also have adverse effects in the medium and long term. In the short term, this exploitation can directly impact the local people and economy, such as agriculture, livestock, irrigation, tourism, fishing, and sometimes even drinking water.

The HPP Rapuni Hydropower Plants three and four were inaugurated on August 2, 2016. This hydropower project is a significant investment in the energy sector for the country's benefit. The Autocephalous Orthodox Church of Albania was built in accordance with the Albanian government's strategy for the energy sector and in full accordance with the regional development of the district of Elbasan, the city of Librazhd in particular (Albania, 2017).

Dams and reservoirs have played a key role in economic development, serving various purposes, including electricity generation, flood control, and irrigation. However, the construction of large dams is the subject of significant international debate and controversy. Disputes and confusion about past events have polarized the debate environment between people into opponents and supporters of dam construction. A growing concern is that dam construction projects cause irreversible environmental changes that are complex, multiple, and inherently harmful. Large dams have far-reaching consequences for people's livelihoods, including displacement and resettlement.

This study analyzed the social, economic, and ecological effects of building hydropower dams on the Rapuni River. It highlighted its importance as one of Albania's unique rivers, like the Valbona River, known for its rich biodiversity and special ecosystems. The research found that building dams on the Rapuni River has harmed its unique ecosystem. These findings highlight the need to assess and address these impacts to protect Albania's natural environment.

As a dynamic system, the preservation of the Environment must be seen in the totality of natural factors and human activity exerted on it. This is vital for the population and an essential element for the region's economic development. Librazhd Municipality's focus is the sustainable growth and development of the economy and the increase of investments. However, this can only be achieved by ensuring a balance between business development and economic, social, and ecological factors so that future generations have the same development alternatives.

Most hydropower plants planned to be built or built in Albania take place mainly in particular natural and protected areas with more significant hydraulic potential. Executing these

projects can cause many environmental issues, such as the destruction of the natural image and negative impacts on flora and fauna, which are already endangered. These projects can also have significant problems concerning changes in river flow, drying, erosion, deforestation, contamination of water with oils and inert tools, damage to tourism, and disappearance of rivers and streams through kilometers of pipes. Furthermore, non-compliance with the biological minimum is around 30% of the average water flow, especially during the summer.

Since Hydropower is an affordable energy source for Albania, its environmental impact raises concerns. Even small barriers in rivers disrupt ecosystems. Developed countries are removing barriers to protect nature, with around 240 removed in Europe in 2021, led by Spain, Sweden, and France (Hart & McSweeny, 2022). In contrast, the Western Balkans, especially Albania, are increasing barrier construction, even in pristine rivers like the Vjosa. The case of Rapuni exemplifies how such projects can harm the Environment and local communities (Dreschner, 2018).

2.2 Studies and evaluations on the effects of hydropower

According to Conserve Energy Future (Olanrewaju & Kabeyi, 2022), an Amazon Services Associates Program participant, environmental pollution has existed for centuries but only became necessary after the Industrial Revolution in the 19th century. This section suggests some solutions for environmental pollution to reduce or prevent it.

Environmental planning should be considered as a cornerstone for sustainable development planning. Therefore, before starting any project, a study should be conducted to assess the environmental impacts.

Four hydropower plants are built on the Rapuni River, and three more on the Qarrishte River, a branch of the Rapuni River, so there are seven hydropower plants in a tiny basin. According to the evaluation study developed by Echo Albania (Albania, 2017), a non-profit civil society organization in defense of the ecosystem, Hydropower has an irreversible impact on the Environment and the community living in the area.

Deviation of the Rapuni River, which is virtually 98% of water, creates drought and disconnection in a longitudinal connection of a river ecosystem. The state's role in the whole process is to sign the contract with the concessionaire and then disappear without facing the parties. In all the Balkan countries and every hydropower plant in Albania, there was no

information, and there were conflicts. From a financial point of view, only the private sector wins. If ¼ of the investment value of the construction of hydropower plants were invested in increasing energy performance and energy efficiency in consumption, we would not need to build any of these hydropower plants. There would be no need for road interruptions, court conflicts, legal costs, or species extinction. The cheapest and cleanest energy is energy saved. 39% of small hydropower plants are in Protected Areas in Albania and 50% in the Balkans. Half of the hydropower plants are in environmentally protected Areas (International Enmergy Agency, 2021).

Experts voice that another chaotic wave of HPPs could have irreversible consequences on the ecosystem, while this model is a modification of typical concessions that did not have investment power. The other concern comes from hydrologists who demand an increase in good management in the conditions when the projections for Albania's water resources show that our country is drying up and will have at least 20% less quantity in the future.

Albania, as a candidate country for membership in the European Union and a party to the Energy Community Treaty, must implement community legislation and commitments to implementing the Strategy for Southeast Europe 2013-2020. In the field of Environment, this strategy is closely related to energy, and the government's commitments should reflect the alignment and full implementation of the Environmental Impact Assessment Directive. Energy and the Environment are essential factors of sustainable development.

With the increase in population and rapid economic development, states should consider implementing sustainable development strategies to protect the Environment. From the Johannesburg Summit (Nations, 2002) to that of Rio (UN, 2012), the UN has continuously promoted the development of renewable energies to achieve the set objectives.

Consequently, governments are required to protect water resources and promote global, regional, and national renewable energy development, protecting nature and the Environment, as well as requests and recommendations that apply to our country. The cooperation and interaction of these two companies are regulated with legislation for the energy sector, under the continuous monitoring of the Energy Regulatory Entity to provide the necessary energy to consumers.

Experts point out that the environmental and socioeconomic impacts of HPPs are still unknown, although some studies reveal essential data on the negative environmental and socioeconomic impacts of HPPs. Studies and assessment reports have consolidated data on

the negative impact on ecosystems and biodiversity. While the focus of these reports was on the impact of HPPs within protected areas, where it becomes clear that the impact on the ecosystem, such as the quality and quantity of water, the loss of biodiversity, and species of economic value, have direct negative impacts on local communities and their well-being and living standards.

2.3 Socio-economic impacts of hydropower

Since the beginning, the development of HPPs has been strongly driven by the demand for energy and the growth of private investment. The approach of allowing unsolicited proposals has encouraged small investors who can only sometimes implement HPP projects.

These investors need more financial resources and technical knowledge, which can result in investment delays, failures, and unfavorable environmental consequences. The current mechanism for HPP development is not based on integrated and sustainable approaches and needs to include risk assessments, such as vulnerability to climate change.

Losses of external value due to environmental degradation, lack of water, or loss of income from tourism and fishing are not considered during the approval process for hydropower plants. The above phenomenon happens because neither a cost-effective nor cost-benefit analysis that considers environmental losses is performed. The legislation that adjusts the required permits, or forms of the concession or as an additional generator to energy, allows a limited environmental integration, thus causing conflicts of compliance with other legislation such as that on water and nature protection. The existing mechanism for environmental integration in the HPP concession procedure needs to be revised. It does not guarantee environmental protection standards or the implementation of environmental legislation.

The potential impacts of HPP projects on local communities can vary from positive to highly negative. Possible impacts should always be considered during the EIA procedure, which was considered during this EIA's review. The results show that the number of the that include social influences is higher.

Such an impact on the local population is hindering the use of water for irrigation, because even in cases where there is currently no direct impact on irrigation, it is defined as possible.

The development of the HPPs sector in Albania was not based on an in-depth analysis of potential hydrological capacity of the country. There is no official document proving the benefits or limitations of this development. The Ministry of Infrastructure and Energy, which

is responsible for licensing HPPs, does not even have a national or regional development plan for determine the hydropower capacity of river basins in the country, the area where they can be built and the most suitable size. As a result, there is a lack of clear vision, policy, and strategy for the development of the HPP sector in the country.

Current development of the sector HPPs in Albania, it is happening while the country is in the process of developing key strategic documents, such as:

1. The National Strategy for Development and Integration, with water management being among the main priorities;
2. Strategy for Combating and Adapting to Climate Change

The development of the HPP sector will affect the use of water resources by other vital sectors for the country, such as agriculture or drinking water supply. There is currently no mitigation plan in place to reduce the amount of rainfall. This unfavorable climate change scenario will result in less water in the country's rivers and streams and the amount of water available to farmers will be controlled by HPP companies.

Cost-benefit analyzes of the construction of HPPs in Albania have not been carried out, which means that there is no assessment of their benefits versus their negative impact on the economy local. These analyzes are essential for strategic planning and to provide support for the important economic activities of the region. Furthermore, potential economic development activities that would contribute to local employment and income generation for the population are not considered.

Finally, no cost-benefit analysis has been done that considers the possible effects of climate change caused by phenomena such as a reduction in the amount of precipitation.

Climate change will further exacerbate the socio-economic impacts of hydropower on the local population, especially during dry seasons, due to the pressure caused by increased needs for larger amounts of water for agriculture and consumption.

It has a relatively much lower cost; The hydropower plant can bring to work several other industries, such as: metal or oil extraction; Since hydropower plants work with water, there are no releases of CO2 or other gases that damage the ecosystem.

It can be used as an 'aquarium'. The hydropower plant creates a good habitat for the gathering of fish, making it fishable. From 100% energy produced by a hydropower plant, only 20% is lost in the hydropower network. Hydropower acquires reconstruction for at least

50 years old.

Hydropower plants can cause soil loss due to their construction: since the hydropower plant blocks the natural flow of rivers, the water is not naturally filtered. Relocation - to build a hydropower plant requires considerable space, and for this reason there may be a need to relocate objects and people from the construction site.

If a hydropower plant fails in its work, it has serious consequences for the surrounding area, such as floods. To build a hydropower plant takes a long construction time, after construction is somewhat complicated and requires qualified people.

This facility was built in the lower reaches of the Rapuni River and consists of several main sub-works such as the level-raising work, the decanter, the hydrotechnical tunnel, the HPP building, the Balance Tower and the substation (connection to the Albanian energy system).

During the design and construction of the work, the strict implementation of the Albanian and international legal and bylaws was considered according to all the instructions of ESHA, IEA, European Commission, Austrian National Committee on Large Dams, Swedish Environmental Protection Agency.

This investment will support the further strengthening of the economic independence of the Autocephalous Orthodox Church in this way, continuing its strong contribution in this area.

The obtained funds will serve to support and guarantee the continuation of the social work of the Church, numerous educational and health institutions established in these years throughout the country. It will also help support numerous programs and activities for children and youth, as well as care for people in need. At the same time, it will also help in providing funds for the restoration and maintenance of churches and monasteries with spiritual, historical, and artistic values, but also in supporting the construction work of new churches and their maintenance.

These funds will generally serve for the continuity of the normal progress of all Church structures. At the same time, the Autocephalous Orthodox Church of Albania will be able to contribute to the support of other Orthodox Churches abroad that are in difficult conditions or face various challenges in their mission to spread the Gospel throughout the world. the world.

2.4 About Rapuni hydropower plant

Picture 1 – Rapuni Hydropower Plant- Photo from Reporter.al, 2016

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Picture 2 – Riverbed after Rapuni Hydropower Plant- Photo from Albanian telegraphic Agency, 2015

According to Autocephalous Orthodox Church of Albania, this investment will be in support to further strengthening of the economic independence of the church. The obtained funds will serve to support and guarantee the continuation of the social work of the Church, numerous educational and health institutions established in these years throughout the country

(Autocephalous Orthodox Church, 2016).

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From the deed of acquisition (which we must emphasize, that it is the first deed of this type in Albania for rivers mountain), water passes through decanter of the pool with pressure and through the tunnel under pressure passes directly for the water supply of Francis type turbines, 3 such installed in the power plant building.

Picture 3 - Francis type turbines- Photo from Musine Kokalari Institute, 2021

The construction of this facility increases the reliability of the electricity supply, improves the efficiency of energy production, solves many social problems such as employment, infrastructure, and tourist development of the area, and increases local and national income. It reduces GHG gases; specifically, the annual reduction of GHG gases from green energy production is 37,029 tons of CO2/year.

2.5 Legal basis

This economic activity is supported by an agreement with the Council of Ministers and the status of the Autocephalous Orthodox Church of Albania.

1. According to Law 10057, dated 22.01.2009, "*Agreement between the Council of Ministers of the Republic of Albania and the Autocephalous Orthodox Church of Albania for the regulation of mutual relations*" articles 10 and 18, etc., the Orthodox

Church is allowed to exercise economic activity aimed at supporting of her spiritual, social, philanthropic, and educational work.

2. Article 59 of the Statute of the Autocephalous Orthodox Church of Albania states: "*The Holy Synod can create special societies with limited responsibility*."
3. The purpose of the company "*Ecologic Energy,*" created by the Autocephalous Orthodox Church of Albania, as stated in its statute, is: "*Study, construction, and operation of power works is based on renewable sources or the provision of services in Albania and abroad, with the exclusive aim of creating financial resources for the work of the Autocephalous Orthodox Church of Albania, based on the principles of honesty, transparency and strict implementation of the legislation in force.*" (Autocephalous Orthodox Church, 2016).

2.6 Local government's role in sustainable and socio-ecological development

Albania, a member country of the Council of Europe, actively participates in the commissions and activities developed to grow and consolidate local democracies. Through these participations, it has benefited from the experiences of other member countries in developing and enriching the philosophy of decentralization and increasing local autonomy.

The decentralization reform represents a complex and ongoing process aimed at shifting certain responsibilities from the central government to local authorities. Among these responsibilities is the management of the supply of drinking water and sewerage systems. This includes the transfer of state-owned immovable properties from publicly owned water companies to local governance structures (Kalemaj, 2021).

2.7 Role of the CRRT in urban planning and environmental management

The Council for the Regulation of the Territory (CRRT) plays an important role in Albania's urban planning and environmental management framework. Ecological protection, carried out by the relevant local government bodies in cooperation with the Regional Environmental Agencies, is established at the prefecture level and subordinate to the Ministry of Environment, Forests and Water Administration.

Within the framework of the decentralization of competencies related to the Environment, the structures of environmental protection in local government units, as well as the municipal and commune inspectorate and police, have responsibilities derived from the organic law of their organization and operation, environmental legislation, and acts of other norms.

The specific local competencies for the Environment have qualified the Regional Environmental Agencies as specialized bodies for monitoring and controlling the Environment and its elements.

Since environmental problems are specific and depend on the geographical location, the best way to solve them is to build and implement strategies/action plans in a decentralized manner. Below are the reasons why decision-making decentralization (delegation of functions from central to local government) being more effective for addressing environmental problems:

1. Local government bodies and local institutions have a better knowledge of the environmental and socio-economic problems of their area, and, consequently, they are also the ones directly interested in protecting their environment, if they have been given rights to clear (and duty) related to natural resources;
2. Higher responsibility in decision-making is associated with higher motivation for more efficient use of natural resources.

There are more opportunities to include less favored social groups in decision-making. This facilitates local participation due to the higher homogeneity of common needs for a more limited number of people. It increases transparency during the decision-making process. It allows the building of local capacities for the provision of services in compliance with local requirements.

The law on local government covers the range of functions and powers that it defines for local government in various areas of economic and social activity, such as infrastructure, cultural, economic, and sports services, economic developments, order, and civil protection. Some of these are directly or indirectly related to environmental protection.

This range of functions and powers includes:

1. Insurance, at the local level, measures to protect the quality of air, soil, and water from pollution;
2. At the local level, insurance is a measure to protect against noise pollution;
3. The development of educational and promotional, at a local level, which is related to the protection of the environment;
4. Production, treatment, transmission, and supply of drinking water.

Environmental education helps people develop sensitivity to their surroundings and the natural world. Environmental education promotes understanding of the natural, physical, and social things that make up our environment. Environmental education motivates people to work to improve the environment (Heimlich , 2002).

Environmental education is relatively easy to define. It was first emphasized and developed by Patrick Geddes (1854-1932), the pioneer of the environmental movement. His ideas, such as "*think globally, act locally,*" have become commonplace. He dedicated his life to education and the Environment and emphasized a holistic approach that has influenced the study of environmental education.

Environmental education aims to develop a world population that is aware of and concerned about the environment and related problems. It has the knowledge, skills, attitudes, motivations, and commitment to work individually and collaboratively to solve problems. Current and prevention of new problems to solve problems (UNESCO, 1975).

Environmental education is a learning process that increases people's knowledge and awareness of environmental problems and related challenges, develops the skills and expertise needed to meet the challenges, and fosters the behaviors, motivations, and commitments to make informed decisions and take responsible action (UNEP, 1977).

Through environmental education, people understand how their actions affect the Environment, acquire skills for weighing different sides of problems, and are equipped with the tools to make informed decisions.

Environmental education fosters critical thinking, problem-solving, and decision-making skills. It teaches individuals to weigh different sides of environmental problems and equips them with the tools to make more informed decisions.

Environmental education is a complex process that covers not only events but also a fundamental approach to building society. Environmental education equips people with the awareness needed to create partnerships, understand NGO activities, participate in urban planning, and secure future markets for eco-businesses.

Much of the current impetus around comprehensive and holistic environmental education comes from Agenda 21. Chapter 36 of Agenda 21, "*Promotion of Public Responsibility Education and Training,*" (UN, 2012), specifically calls for the reorientation of education towards sustainable development, raising public awareness and promoting training:

> *Education, increasing public responsibility and training are practically related to all areas of Agenda 21/1, but even more closely to those related to meeting basic needs, building capacities, data and information, science, and the role of the main groups. This chapter presents broad proposals, while specific suggestions related to sectoral issues are in other chapters. Declaration and Recommendations of the Tbilisi Intergovernmental Conference on Environmental Education/1/ organized by UNESCO and UNEP in 1977, have provided the basic principles for environmental protection.*

As stated in the paragraph above, awareness regarding environmental education is essential because it helps people comprehend the connection between human activities and the Environment, recognize the importance of preserving natural resources, and act when addressing environmental changes. Encouraging people to care about the Environment helps them to make smarter choices, speak up to protect the Environment, and take action that helps to protect and preserve nature. Interdisciplinary approaches, starting from schools and universities, are needed to bring awareness to the population.

3. Methodology

3.1 Political ecology

To understand the Albanian case study, political ecology will be used as it provides the framework to identify the nature and extent of the controversies between bureaucratic state agencies and technocratic engineering companies on the one hand and environmental activist groups, non-governmental and negatively affected people on the other (Nüsser, 2003). Why is it important to analyze the situation? Also, it analyzes the behavior of the government and society in Albania after the year 2000, focusing on analyzing the context of development and the Environment. In the context of dam projects, political ecology would examine how the decisions and actions of political actors, such as government officials and private companies, shape the environmental impacts of projects. This way, political ecology is a field study project designed to find comfortable and simplistic 'truths' about the relationship between society and its natural Environment (Bridge, McCarthy, & Perreault, 2015).

It also contributes to better seeing how institutions of power dynamics shape decision-making processes around dam projects and how these decisions ultimately affect the Environment and local communities.

Furthermore, it would explore the historical and cultural context of dam projects, including how they are situated within a wider political economy and how they relate to other land use and management decisions and resources.

3.2 Description of study phases

In Albania, more research studies need to focus mainly on citizens' experiences and attitudes regarding the construction of public works such as hydropower plants.

Studies on environmental factors that affect society are general. There are not many opinions of professionals on the concrete impact of interventions for the protection of the ecosystem and social developments. This study has previously conducted interviews with professionals and then with the residents of the area since the professionals' main recognition of the difficulties makes the situation simpler even for the evidence and emphasis of the problems of possible.

The first phase of the research focused on the literature review. This stage of the study is focused on finding similar research related to the impact of Hydropower on social and ecological development to avoid repetition and familiarize ourselves with the findings and

recommendations of existing studies. The literature review has also served as a framework to compare the research results in Albania with those of another research. Conducting the literature has been a phase that initially required much time to study the situation, as stated above, due to the need for more literature. Together with studies and evaluations, it has required about four months.

In the second phase, professionals in socioeconomic and environmental development discussed reorienting the study's purpose and objectives and specifying its research questions.

The main instrument for collecting primary data is the semi-structured questionnaire. Due to its structure, this instrument measures attitudes and opinions by offering open, alternative, and closed questions to the participants, allowing them to gather information in each context.

This instrument allows participants to clearly express their attitudes and beliefs regarding the study's focus. The researcher administers the search tool, which contains straightforward questions and concrete alternatives for the participants.

The semi-structured questionnaire guide was piloted using purposive sampling, where participants were previously identified for this purpose. Piloting aimed to clarify the terms, promote comprehensive inclusion of participants in the study, reduce the possibility of misunderstanding questions, and increase the accuracy of responses. It is important to note that these participants were not included in the selected group for analysis. Following piloting, the researcher refined the final questionnaires.

The third phase of the research focused on determining the research methods and instruments and the population that will be included in the research. The information collected in the first phase has been carefully analyzed in studies in the region and beyond.

Based on the above research questions, the literature review method was selected through the analysis of secondary data, as well as mixed methods and semi-structured questionnaires.

In the fourth phase, semi-structured questionnaires were carried out. Specialists in economic, social, and environmental issues, activists, and academics can elaborate more concretely on the socio-ecological impact of hydropower plant construction.

In the fifth phase, semi-structured questionnaires were developed with the citizens who are closer to Rapuni. These areas' residents also closely touch the reality offered by the construction of the Rapuni Hydropower Plant. All the data analysis and the transcription of the interviews were concluded during an intensive two-month work period.

The final phase of the study consists of drawing findings and conclusions and preparing general discussions and recommendations for the relevant institutions and further research. This last phase was carried out within a month.

3.3 Methodology used

The research developed in this study is mixed, which means qualitative and quantitative. The study is based on a mixed methods design. For this, semi-structured questionnaires with open and closed questions were carried out. In this study, purposive avalanche sampling was used. Citizens were represented in a sample of 30 participants, where the gender ratio was 20 men and 10 women aged 24-73. The condition was that the subjects were not part of a family, but a subject represented a family. The subjects were interviewed in the period February-March-April 2023.The interviews are in two dimensions: interviews with professionals implementing the hydropower project and with residents of Rapuni, Librazhd. Also, 15 professionals answered the questionnaire for the period February-March 2023.

3.4 Characteristics of the sample

Initially, a professional was identified and contacted, who then contacted us sent to three professionals. The subjects were identified through purposive sampling. Therefore, identifying the subjects who are professionals was realized by identifying three professionals who had previously worked in the field, and one belonged to civil society. This sampling is conducted in the form of an avalanche (Dhembo, 2015). As for the questionnaires with the citizens, after visiting the place twice, contacts were established with four citizens, who sent us in an avalanche to each other who shared problems, challenges, and perspectives on the impact of the project on the area and their families not only in the environmental aspect but also in the socioeconomic aspect.

The sampling of our citizens consists of 30 participants, specifically heads of households. Gender representation among the participants did not adhere to the area's patriarchal tendencies; instead, most participants were men. The ratio was 20 men to 10 women, aged 24 to 73 years, representing various professions. Each participant represented a family, resulting in 30 participants representing 30 families. Identifying subjects who are part of the target group and their inclusion in this thesis has been a process that has previously required three months. The identification is also performed through sampling in the form of an avalanche, where one family is sent to another.

The number of participants could not be more significant for two factors: First, the aim was that part of the research were the families that lived closest in the geographical position of the apartment to the radius of influence in the area near the hydropower plant, and secondly, due to the high number of migrant and emigrant families from the area, which has also brought about their reduction in the area.

We specify that 15 professionals, such as a biologist, a geological engineer, a project manager, and an environmental engineer, were interviewed. The professionals are part of echo-Albania, a non-profit organization that has conducted a study about the effects of the Rapuni hydropower plant on the area's residents.

The transcriptions of the interviews with open questions and the presentation with diagrams and graphs of common quantitative data were carried out for the data analysis.

To support the research questions, part of the research will also be existing documents by analyzing power relations from different actors involved in the project.

3.5 Data collection and analysis

The literature review served as the analysis of this study through secondary data.

The quantitative data of the study will also be reflected through graphic presentation and tables, making the positioning of the participants more complete and clearer.

All questions with alternatives at the end of the quantitative processing are expressed as percentages, while the open questions measure attitudes and experiences through everyone's specific answers. During the qualitative data analysis, the operationalization of terms and questionnaire transcription of open questions were developed by interpreting information obtained from the participants' quotes, expressions, and concrete statements.

3.6 Sustainability and validity of the study

The authors state that understanding how to deal with sustainability issues is one of the most crucial research problems we face today. Furthermore, they add that another issue that sustainability faces is the lack of a standard definition for this term and the number of synonyms that are used in the literature (Proctor, et al., 2015).What makes it more challenging for the researchers to navigate through the various studies they work on?

Validity determines whether the research measures what the study intends to measure or how reliable the study results are. Researchers usually determine validity by asking questions and

often look for answers in others' research. Measuring a goal in qualitative research means choosing an appropriate method for a question, for a given question and applying that method in a rigorous, understandable, and justifiable way. (Kvale, 1995).

The instrument has higher validity in this research since the student administers the data.

The design of two instruments with participating citizens of the area and professionals of social and ecological developments in the evaluated process increases the study's validity and reliability.

Intensive engagement with directly collected data, as well as occasional browsing of the data and interpretation made by the student, and deciding on connections between the researchers' interpretation and the data increases the consistency and ease of understanding of the data.

3.7 Limitations of the study

This sample cannot generalize the situation for every family affected by the positive or negative impact because the representative sample is relatively small.

Also, this study does not represent the purpose of the policies raised in relation to this purpose, as it is an approach of professionals not part of the project's work but civil society and citizens.

The population under study is distributed throughout the country. As a result, to conduct a more comprehensive study, participants from each region were necessary. This could only be achieved in electronic form, which increases the speed of data collection. However, self-administration may lead to avoiding some essential questions of the instrument.

1. The participants included in the study have difficulty expressing thoughts and opinions in open questions even when they are anonymous;
2. The lack of similar studies in the region and beyond regarding the concrete impact of small Hydropower makes the assessment difficult to compare findings and rely on specific recommendations.
3. The study presents only the attitudes of the residents who live in the vicinity of the Rapuni Hydropower Plant, Municipality of Librazhd, and not residents of other areas and cities in Albania where there are existing hydropower plants, so the data can also be specific in assessing the situation.

3.8 Ethical issues

In all research projects, ethical issues that can affect the design and execution of the research as well as its results, and these become particularly evident in studies such as this, which deal with disadvantaged people. These ethical problems arise because "*the researcher is ethically and morally responsible to his/her participants, to the general public, and to his/her beliefs*" (Kitchin & Tate, 2001).

In this case a requester must determine whether the inclusion of such information could result in personal or social harm to the person, jeopardize the identity of the participant, or otherwise breach confidentiality.

In order to protect participants' privacy, their responses will be aggregated for purposes only in the study, not to mention identifying details when analyzing the findings. The researcher strictly applies the ethical and professional principles of scientific research and does not include in published reports sensitive data of participants of the population but only discussions and recommendations that can improve the situation and address possible problems to make it more efficient and professional.

4. Data analysis

Through the conducting of interviews with professionals in their specific fields, they have expressed their opinions through open questions regarding the impact that the construction of hydropower plants, in general, and that of Rapuni, in particular, has on social and environmental development has been expressed. The interviews were conducted directly with the civic and professional subjects by arranging meetings according to their possibility through preliminary contact numbers. During the interviews, specific notes were kept, which would also help identify the findings, and the subjects were made aware of this. Regarding the realization of the entire research process, the book of 2023 was the support. "*Guide to Research Methods,*" by Rejla Bozdo. It served as an excellent example in designing the semi-structured questionnaire for this thesis.

Regarding question number 1, "*Has the construction of the Rapuni Hydropower Plant been accompanied by studies regarding the socio-ecological aspects?*", the experts answered as follows.

The environmental biologist and expert on the biological assessment of water quality Mr. Olsi Nika has expressed his opinion that: "*There was no genuine and detailed study of the area, but it was rather fictitious and not concrete in relation to the residents' needs since they were not in the public meetings with the citizens*."

The environmental researcher and geographer, Mrs. Eva Garori says: "*There were no open meetings with the residents, and this indicates a lack of consultation with interest groups before the decision to build the HPP was taken. The avoidance of active citizenship in decision-making and their lack of prior information regarding the socio-ecological transformations in the HPP community, which are normally viewed as suspicious due to the lack of transparency*."

The economics and project management lecturer, Mrs. Elona Cera, describes the lack of information on expectations as a lack of balance in the economy and the lack of information on the expectations that this project may have on a macro, medium, and micro level. She emphasizes that: "*Families cannot plan their economy on a long-term level if the environment does not provide them with this security, and of course, when studies are missing, the unprotected ground increases the risk of economic collapse for vulnerable groups."*

A researcher in the field of social work, lecturer in the Faculty of Social Sciences, and expert

concerning social policies, Mrs. Esjurda Tallushi quotes: "*Definitely a study has been undertaken regarding the socio-ecological aspect, but the whole problem is in the fact that these studies are done simply for procedure at the moment when the agreement with the contacting agency is made about service. At this moment. The studies should be presented as results to the residents of the area so they can evaluate the advantages and the disadvantages of such a project.*"

Albania has built countless hydropower plants, but today, no study measures the impact of this policy on the Environment, flora, or fauna. The environmental biologist and expert on the biological assessment of water quality, Mr. Olsi Nika, also active in the non-governmental organization Eco Albania, said that the authorities must conduct an analytical study on this aspect. He estimates that there are two problems encountered in connection with HPPs. "*First, their construction is not based on any nationwide master plan, which means that their distribution is so chaotic that it is difficult to judge whether they are built for energy purposes or are simply 'business orientation' of companies with more decision-making access. Secondly, although chaotic and unplanned, most of these HPPs do not respect the environmental standards defined in the relevant environmental permits.*" says Mr. Nika.

As mentioned above, the experts' approach to social studies has yet to focus on involving citizens in decision-making. At the same time, this project explicitly affects the social and ecological aspects of the residents who live in that area.

When addressing the data analysis on question number 1.1, "*If so, what were the socio-ecological impacts for the area?*", the experts approached the questions as follows.

Suppose we were to evaluate the socio-ecological impacts according to this study. In that case, the focus is not only on presenting the possible problems of the citizens because of the hydropower plant but only on its strengths, which means the main positive social aspects that it brings to the Social Environment. So, according to the social affairs expert, this analysis is biased.

Environmental researcher and geographer Mrs. Eva Garori says, "*I do not see the problem concerning the socio-ecological impacts, but rather the failure to foresee measures to mitigate the socio-ecological problems that the hydropower plant can bring*."

The lecturer for economics and project management, Mrs. Elona Cera, emphasizes that: "*The social aspects in the study are viewed only on the positive side, such as economic growth and the possibility of employment for the workforce, and only the interventions in the*

environment, which are considered temporary, are mentioned as a negative aspect."

Another environmental assessor, lecturer Mr. Emiliano Qose, says about the environmental impact: "*There is another impact on the vegetation and fauna of aquatic ecosystems. In general, small HPPs with derivation create drought, sometimes even permanent, in entire segments along the river*."

Professionals have thus expressed the lack of balance between ecological and social impacts, as according to them there is a direct correlation to the detriment of citizens if the ecological system is damaged. Below, we can see the statement of the assistant lecturer of the Department of Geography at the Faculty of Philology, Mr. Dritan Lloci, when he quotes: "*Environmental problems are inevitably linked to social issues because they affect the lives of these residents*."

In question number 1.2, "*To whom have they (the indicators) been made known at the level of local government and civil society?*", the researchers emphasize a lack of transparency and clarity throughout the process among the citizens.

Expert and researcher in Geography, specifically environmental protection issues, Mrs. Xhulia Bygjymi states that "the *possibility of prior consultations by direct interest groups is generally overlooked*."

Thus, the social policies expert, Mrs. Esjurda Tallushi, states, "*Even if they were made known to the community, the decision-making consultation stage was skipped, and the decision about what will happen to the environment was simply communicated*".

Another expert, Mr. Emiliano Qose, says: "*Undoubtedly, the local government has been part of the main interest groups and is fully aware of it. It is also his responsibility to inform the citizens and behave ethically towards them*."

Also, the lecturer for economics project management, Mrs. Elona Cera further states that: "*Civil society in most parts and its organizations such as non-profit organizations are informed, but their reaction is lukewarm because they only react when they have projects for certain target groups*."

The environmental researcher and geographer, Mrs. Eva Garori, states, "*Organizations with a focus on the environment and civic activism in its defence definitely express themselves, but sometimes the lack of investments makes them not undertake studies that identify environmental damage in your area inform the citizens*."

Another expert on social issues, Mrs. Julia Hoxha states: "*These studies that are addressed to a considerable number of people can also be part of the media that would serve them as faster grasping of the public, especially to the direct groups of interests who are the citizens, but these topics are not in their interest*."

The sociologist Mrs. Brunilda Zenelaga adds: "*The lack of prior information clearly leads to a lack of citizen reaction, which apparently also interested the local government*."

Based on the questionnaire responses and various quotations, citizens lack significant information about the Rapuni Hydropower Plant and misunderstand its consequences. Project implementers are perceived as biased, often to the residents' detriment. Additionally, it is worth mentioning that civil society, including NGOs, has responded somewhat lukewarmly.

Environmental biologist and expert on the biological assessment of water quality Mr. Olsi Nika states that: "*Residents do not find support anywhere because in most cases those who should have supported the people should have been municipalities and communes, but they do not find support anywhere because the municipalities have been subordinate to the government*."

NGOs have morally and strongly supported residents through their assets and knowledge, orienting them toward resolving conflicts in court. Furthermore, international institutions, such as the EBRD and NGOs, and the complaint mechanisms of financial institutions, such as the National Bank, have been the most significant supporters of residents by making their concerns public in the media.

Regarding question number 2, "*In your opinion, what are the advantages of the construction of the hydropower plant for the area?*" it is essential to mention that while professionals predominantly expressed disadvantages associated with the construction of the hydropower plant, a few respondents from the citizen questionnaire highlighted positive aspects or advantages. This contrast underscores differing perspectives between the two groups regarding the impact of the hydropower plant.

Thus, the social policies expert, Mrs. Esjurda Tallushi, said: "*I do not see any advantage, except that this area is finally being discussed, and we hope that this can have a positive side, although I doubt it*."

Environmental protection activist Mrs. Enida Sheme said, "*One cannot talk about advantages when the environment is damaged*."

The sociologist, Mrs. Brunilda Zenelaga said: "*Every engineering work can have positive sides related to the employment of residents, but when this is temporary and not sustainable as a benefit, then the potential of people to see it positively decreases.*"

Environmental researcher and geographer Mrs. Eva Garori said, "*You cannot talk about advantages when the disadvantages dominate*." In fact, almost all participants did not announce a positive side to the construction of the hydropower plant.

Mrs. Elona Cera, the economics and project management lecturer, said: "*When an action does not bring social re-dimensioning to the residents, then the possibility that it will bring progress is small. I must be reserved about talking about infrastructural development opportunities as a positive side when residents complain about them*."

The environmental biologist and expert on the biological assessment of water quality, Mr. Olsi Nika, emphasizes in the interview that he does not see any positive points in connection with the Rapuni Hydropower Plant when he points out: "*I do not see even a single positive point with a positive impact on the residents, on the contrary...*"

Thus, some of the experts in the activities of the Environment and social issues were categorical about the lack of advantages, saying that for the sake of truth, they do not see any advantage or positive social impact for the residents of the area that may have brought relief or improvement in daily life a little.

Regarding question number 3, "*What are the disadvantages of hydropower construction for the area?*", the participants answered by arguing the concrete problems that the construction of the Rapuni Hydropower Plant has brought to the city of Librazhd.

Mr. Kristo Goga, an engineer and one of the most representative names in the hydropower plants sector, says: "*The 'trend' of 2MW hydropower plants is an invention that is followed by failure of small hydropower plants. With this model, the previous structure that forced the concession to be obtained for the entire cascade of a river or stream is undermined. The concession was taken with that model, but problems came out later for the bravery shown. They needed real investment power. This contingent invented the concession of hydropower plants with a power of up to 2MW, and the minister should have this competence*." According to him, in general, these hydropower plants can rarely be profitable.

Mrs. Elona Cera, the economics and project management lecturer, says: "*There is an oversight in taking precautions regarding the protection of the environment and especially in*

preserving the quality of social life in the community, in addition to the positive effects related to the economic and social development that such a hydropower plant can have."

The environmental protection activist, Mr. Anri Pashaj, says, "*In the situation Albania is in, it is impossible to talk about benefits for citizens. Disadvantage greater than destroying the 'dwelling' is no fish, and consequently, there is a lack of birds*."

The hydro-technical engineer of the Institute of Geoscience, Water and Energy, Mr. Klodian Zaimi, states, "*The problem is not the construction of hydropower plants, but the lack of integrated development of the basins. Albania has a weak culture of monitoring, management plans, and the predictability of floods*."

According to Mr. Olsi Nika, the environmental biologist and an expert on the biological assessment of water quality: "*the successive placement of several hydropower plants in a watershed can have irreparable consequences on the ecosystem*." Also, Mr. Nika further analyses the damage caused and what can be done to reduce this risk; he says: "*Small hydropower plants in the same stream can have significant and irreversible impacts on aquatic ecosystems by damaging the stream, flora, and fauna, but also causing conflicts with the users of water*."

The minimal media coverage on the environmental impacts of constructing hydropower plants in protected areas has severely limited community awareness of the significant planning needed to mitigate potential environmental damage. The oversight was apparent in the case of the Rapuni hydropower plant, where a lack of direct dialogue with residents meant missed opportunities to weigh the hydropower plant's societal benefits against its ecological impact.

The prevailing financial model disproportionately favours the private sector. An analysis or comparative study would illustrate how investing a quarter of the funds allocated for new hydropower projects in enhancing energy efficiency could significantly reduce, if not eliminate, the need for additional hydropower plants. This investment in energy savings, the most cost-effective and environmentally friendly form of energy, presents a missed opportunity for sustainable development.

Mr. Nika also states, "*The citizens and the state do not gain anything. Only the company has corrupt affairs. The target is not energy because they do not give much energy. One loses economically in the medium term and long term. In the long term, one will not win because 85% of the reservoirs are filled with gravel, and the energy production decreases by 15-20%.*

As a hydrobiologist, hydropower plants are the worst and most consequential way to produce energy because the concession contracts are 35 years long. However, after so many years, the power of energy reproduction drops to 15%, and then the citizens have no benefit."

"*There is a lack of interest in monitoring investments concerning monitoring hydrological and climate parameters. To measure bodies of water and hydrographic surface, compare with a country like Italy, and do acceptable monitoring of the standards of the European Community, we would have to invest 3-5 million Euros per year. Our investments for monitoring after the 90s have been negligible.*", says Mr. Zaimi.

Regarding question number 4, "*How do you think the outlook for the residents of the area could change with the hydropower plants?*" experts answered as follows.

The environmental protection activist, Mr. Anri Pashaj, said: "*Focusing on the socio-ecological impacts that the construction of dams has on the locals and the environment, as well as the threat it poses to biodiversity, is a valuable perspective to understand the complexity of the problem*."

According to environmental researcher and geographer Mrs. Eva Garori's assessment, "*Impact on tourism. The construction of HPP is accompanied by improving the road infrastructure in the vicinity of HPP, which, combined with the region's beauty, will always be attractive for local and foreign tourists.*"

Mr. Roland Subashi, a lecturer at Metropolitan University, states, "*Impact on the economy. The project will create employment opportunities for the area's residents, directly affecting their economic growth and indirectly affecting Librazhd Municipality's economic growth. With the production of electricity from this project, the regional light and food industry will also develop, and the services will also expand*."

As mentioned above, even from the answers to the interviews with researchers, professionals, and activists, it is evident that the orientation towards hydropower production can have its positive aspects. However, it does not exclude the negative ones either.

Sociologist Mrs. Brunilda Zenelaga says: "*The social Impact would be greater if the development plan of a project considers the interest of the residents, and its results are expected. The lack of concrete and visible steps for the residents shows that the opportunity for intervention in development is late, and now we can only look at the consequences of this negligence on the livelihood and socioeconomic well-being of residents.*"

The experts answered question 5, "*How can the situation be improved according to your professional point of view (as a biologist, geological engineer, environmental activist, or an expert in social, environmental, or economic policies)?*" as follows.

Social policies expert Esjurda Tallushi emphasizes, among other things, that "*the big problem of the construction of hydropower plants is that there is a lack of transparency and environmental standards, and there is the possibility of manipulation with different permits.*"

According to the surveying engineer, Mr. Elton Kolgjini: "*There is an oversight in taking measures and precautions regarding the protection of the environment, especially in conserving the quality of social life in the community, in addition to the positive effects related to the economic and social development that such a hydropower plant can have*."

Orientation towards hydropower production may have positive aspects, but it does not exclude negative ones. Mr. Klodian Zaimi, the hydrotechnical engineer of the Institute of Geoscience, Water and Energy, says: "*The problem is not the construction of hydropower plants, but the lack of integrated development of the basins*." Albania has a weak culture of monitoring, management plans, and flood predictability.

Also, an essential point from the interview with the environmental expert remains evident: "*The change of destination of the zonal map, from Zone 1 or Zone 2 to Zone 3, is made to benefit from these capacities and incentive fees*." There is also a lack of public debates, and the demands and concerns of the residents, or even of the local authorities, are not considered; on the other hand, they do not even have a place to complain, resulting in social conflicts.

The only impact on people's health is that abnormal situations can be caused during the project's construction. The implementation of technical security rules minimizes this impact. The personnel who will work during the construction will be qualified and trained for technical safety and potential risks.

National governments and relevant regulatory bodies must enhance their auditing and oversight functions to address these concerns. This involves intensifying the scrutiny of hydropower projects for compliance with environmental, social, and economic standards and promoting greater transparency and public engagement. Such improvements in governance can directly respond to the challenges highlighted by our experts, ensuring a more responsible and beneficial development of hydropower resources.

During the study, professionals and experts said that diversifying energy production is a slow and long process that introduces new factors to the country, which can inevitably delay the process or prevent the adoption of new technologies. Therefore, preliminary, and collective consultations should always be present.

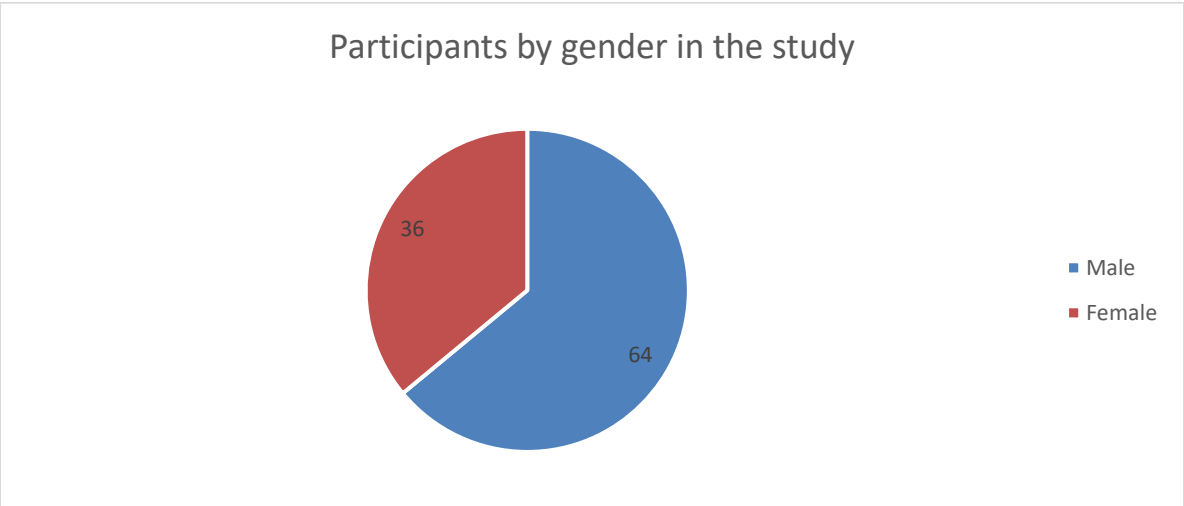
4.1 Analysis of questionnaires with citizens

Referred general data that relate to citizens is presented as follows: regarding gender, men dominated as participants with 64%, compared to women with 36%.

Participants by gender	Females	Males
Participants in percentage	36%	64%

Gender balance was not maintained in the responses, but measures were taken to ensure that members of the same family did not answer the questionnaire. This approach resulted in a more realistic survey of families in the area. The total number of questionnaires was 30, representing 30 different families. This number realistically represents the area, given the small number of families remaining, as outlined in the sample characteristics and the reasoning behind its size in the methodology of our work.

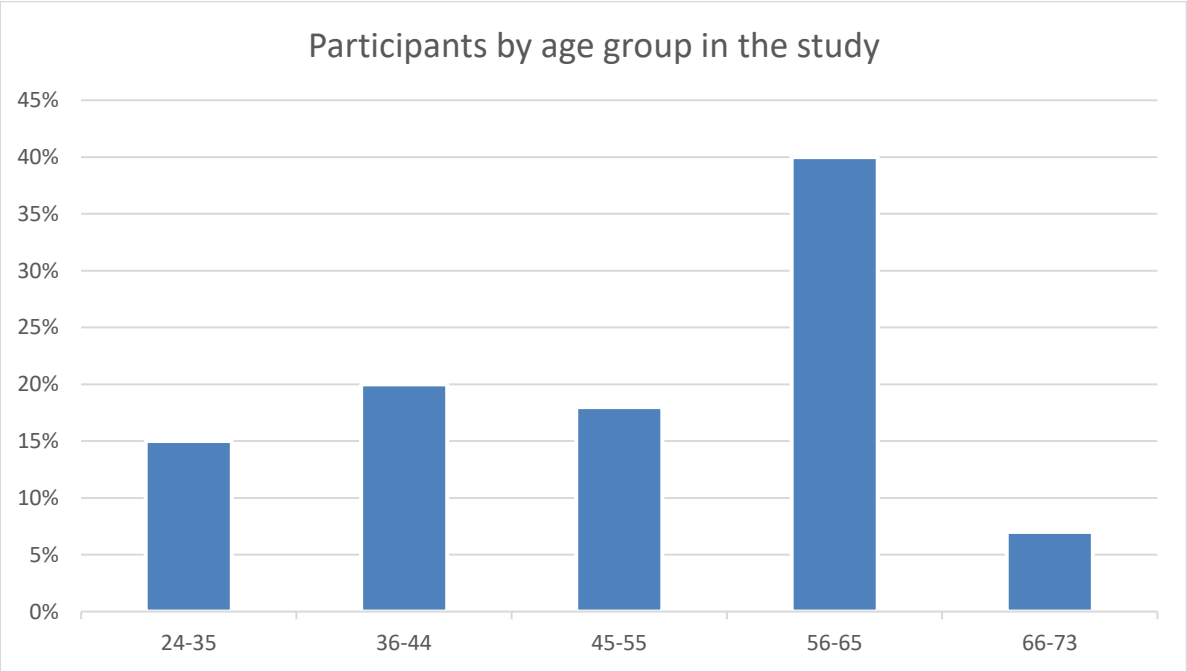
Below, we will have the graphic representation:



The age of the participants represented was:

Age	24-35 years old	36-44 years old	45-55 years old	56-65 years old	6-73 years old
Percentage of participants	15%	20%	18%	40%	7%

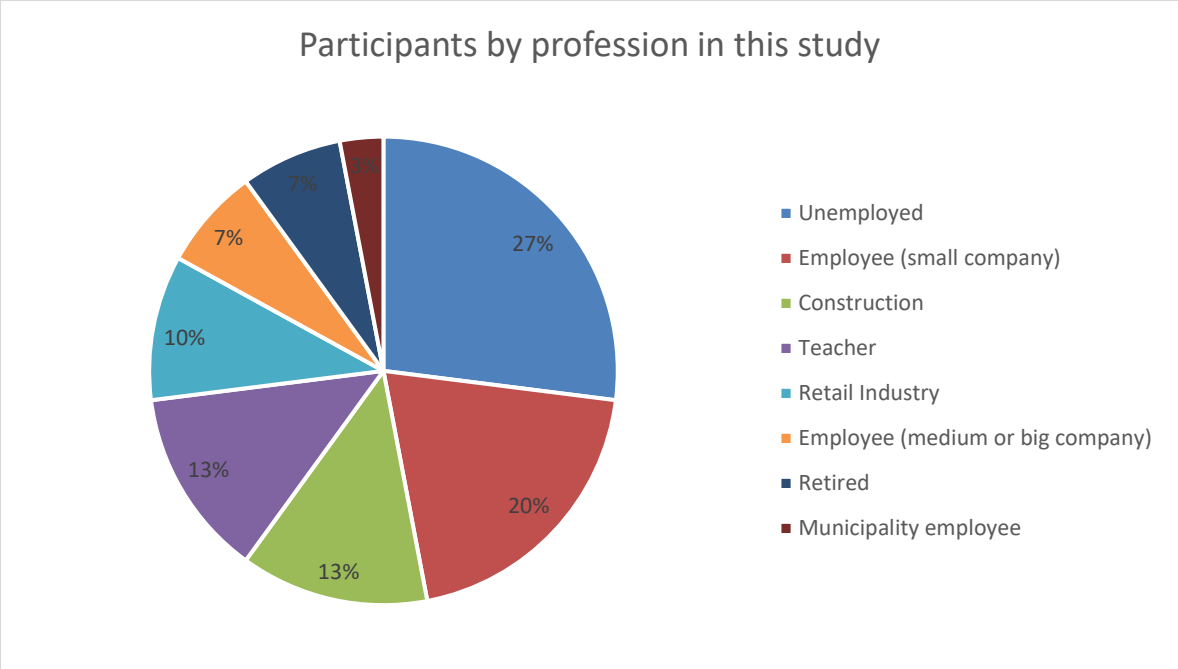
As can be seen, the dominant age is the middle age, from 56 to 65 years old, which constitutes many % of the five age group categories, with 40%. At the same time, the externs of the younger and third age groups make up the lowest percentages, with 15% and 7%, respectively.



4.2 The profession of participants

Among the participants, the "*Unemployed*" dominate with 27%, followed by "*Employee (small company)"* with 20% and a smaller percentage, 7% are "*Retired*," and only 3% are "*Employee (medium or big company)*."

Unemployed	Employee (small company)	Construction	Teacher	Retail Industry	Employee (medium or big company)	Retired	Municipality employee
27%	20%	13%	13%	10%	7%	7%	3%



4.3 Residence time in this area

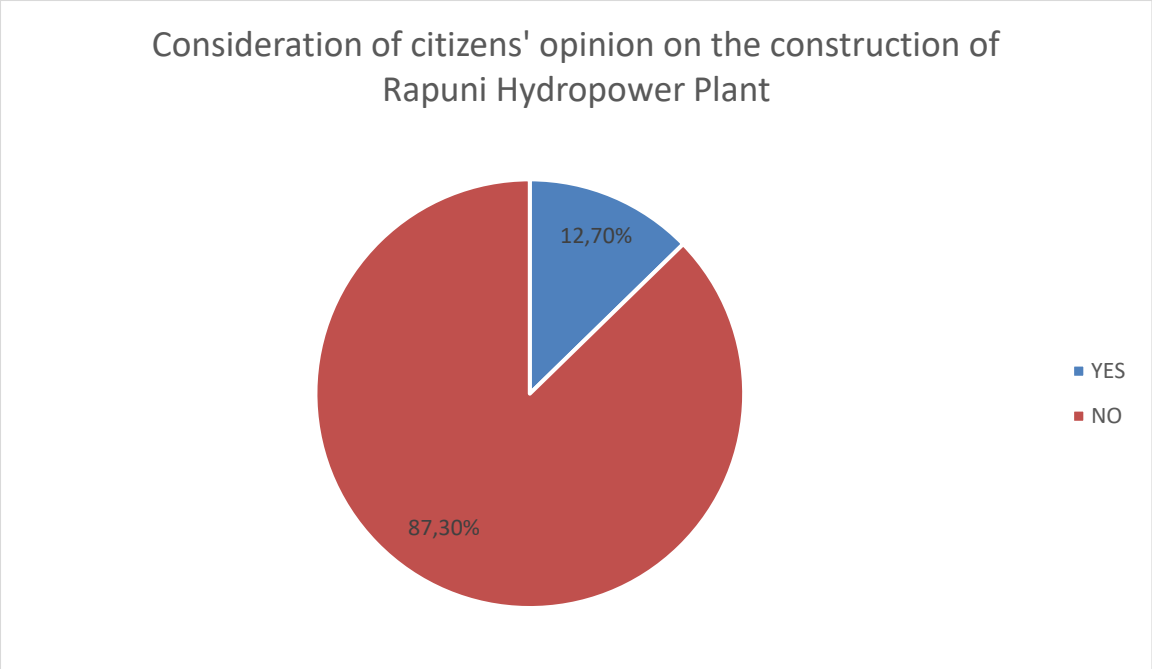
Years of residence in the area	10-20 years	20-30 years	Over 30 years
Percentage	15%	30%	55%

Regarding question number 1, "*Before the hydropower plant was built, was your opinion taken into consideration?*", only 12.70% of the interviewees answered this question with "*yes*" and with "*no*" the dominant part of citizens, 87.30%. As can be seen, most of the surveyed citizens have been residents of the villages of Rapuni and Librazhd for over 30 years, so they know well how the area's socio-economic and ecological development was before the construction of the HPP.

Regarding question number 1, "*Before the hydropower plant was built, was your opinion taken into consideration?*", only 12.70% of the interviewees answered this question with "*yes*" and with "*no*" the dominant part of citizens, 87.30%.

The presentation of statements in a table is shown as follows:

Yes, our opinion has been taken into consideration	No, our opinion was not taken into consideration
12.70 %	87.30 %



This question is followed by two sub-questions if the citizens answered it positively and one sub-question if they answered it negatively.

Regarding question number 1.1, "*If your answer was yes to the previous question, how clear and detailed was this information?*" some answered as follows.

A citizen said, "*I was told that a hydropower plant will be built, and that is it, nothing more*." Meanwhile, another states, "*I was accidentally involved with a group of individuals, experts according to them in the village who told me that the hydropower plant is a project that we will see only good things*."

Another citizen answers, "*One of those men told us that you will have economic benefits as a businessman, and you will see how much your business develops*."

A citizen answers, "*The information was very little, absolutely no more details were given, and our opinion was not taken on whether it should be built*."

Referring to the answers given by 12.70% of the citizens who considered that they had prior information about the Rapuni hydropower project idea, it is estimated that this information was focused only on the benefits that would benefit the residents and not on the problems that could arise to bring this hydropower plant.

Also, when this project was presented, no specific meeting place was left to involve citizens in a project of community importance where individuals were notified in advance. It is even

more noticeable that the citizens have yet to be introduced to the experts who have told them about the project, what function they had, and what they represented in the project.

Regarding question number 1.1.1, "*If some of you had questions about the project, did the architects clarify?*", the citizens of this area answered as follows.

"*Not at all. We were not told if you had any questions, but just made aware that the hydropower plant would be built*." Another said, "*How could I have questions when I did not even understand what was being built and why it would be built in Rapuni?*" Another answered, "*I did not ask any questions because I believed when they told us the area would be developed*."

A concerned citizen, revolted by the lack of information, expressed indignation: "*What clarifications would they give when the discussion was informal, and something happened that I might not be aware of at all*?"

Based on the answers given by participants living in this area, it is understood that the opportunity to ask questions and provide details was not left to the people presented as experts. On the contrary, they went to the citizens now when the decision to build it was made and not as part of the preliminary consultations for decision-making.

Regarding question number 1.2, "*Whether your answer is no (your opinion was not considered), why do you think that information was not provided?*", the citizens answered it as follows.

Some citizens answered, "*Where* there is informational interest, there are other interests." Another replied, "*No one is interested in what happens to the people*."

Another citizen believes that it was attractive to the citizen experts that the community was not informed about the effects of the construction of the hydroelectric power plant in Rapuni, as another citizen quotes: "*They knew very well that if we if we had the right information, we would oppose it.*" or as another resident of the area who sees this as connected to the fact that the truth has been hidden, that there were interests for third parties: "*(...) because they hid the truth saying you will have benefits, when in fact we had no benefits*."

Also, there were those citizens who looked at the lack of information with the fact that the community was not united in the same issue that affected the common interest and would require a reaction of an active citizenry to stop taking decisions to their detriment: "*(...) but we never even got together and asked for an account (...) because we did not ask them*

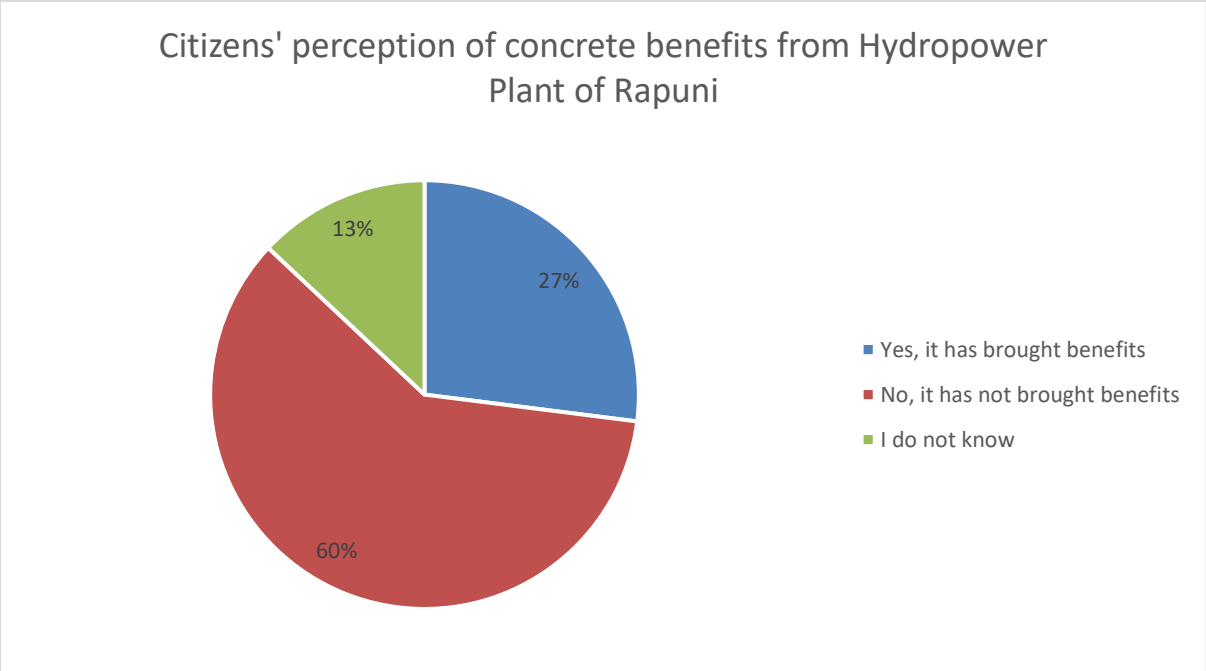
either."

A citizen sees the lack of reaction as also related to the lack of social factors that have affected the area, such as the youth's youth. So, he says: "*They knew that here they remained motionless in other cities and outside only the poorest people, so they knew very well that none of us would raise our voice and do anything against them*."

Regarding question number 2, "*Do you think that the construction of this hydropower plant has brought benefits to you and other residents?*" citizens chose from alternative responses: "*Yes*," "*No*," or "*I do not know*." The breakdown of responses is as follows: 27% responded "*Yes*," 60% responded "No," and 13% responded, "*I do not know*".

Presentation of answers in the table on the possibility of benefits of the hydropower plant:

Yes, it has brought benefits	No, it has not brought benefits	I do not know
27% of citizens	60% of citizens	13% of citizens



Referring to the graph, most citizens say that the construction of the Rapuni Hydropower Plant has not brought them any concrete benefits since the beginning of work in 2016.

Also, some citizens expressed themselves with the alternative: "I do not know," to the extent of 13%, indicating that the border between the benefits non-profits has not been distinct and their socio-economic situation compared to the previous period has not changed much.

It is essential to notice that the lack of an affirmative or no answer also comes because of the possibility that the citizens need to be appropriately informed about its effects, as was the first question.

Only 27% of citizens have provided positive answers regarding the benefits.

This question has been accompanied by the opportunity for citizens to express themselves about the affirmation or denial of concrete benefits from the Rapuni Hydropower Plant through two more open questions as part of the clarifying sub-question.

Regarding question number 2.1, "*If yes, what are they?*" (the benefits provided by the hydropower plant) the citizens stated: "*My business has progressed more because the workers have been here until recently*." Another states: "*The road has been paved to connect you faster with the villages in Librazhd. There has been more attention from the government.*"

Another person claims, "*For years, I was an employee of the company while the HPP was being built.*" Another citizen says, "*At least the village now has a big investment, and it is known everywhere in Albania, which we did not even know the name of before.*"

From the answers, we notice that the hydropower plant has had a positive impact on the residents in terms of the development of the economy for some families, such as small businesses and employment, but also infrastructure, in relation to the construction of roads, the attention of development policies or the recognition of the area in a wider community.

Regarding the benefits of the hydropower plant, the participants were further asked question number 2.2, "*If not, why do you think so?*" (the hydropower plant provided no benefits) and they expressed themselves regarding some of the reasons such as: "*We have had problems with drinking water for a long time, from a 24-hour supply to only 3 hours a day*."

Another participant refers to that question this way: "*I had received the permit for the construction of a restaurant, which I had paid for, and no one is responsible for the hydropower plant's cancellation*."

Another citizen has almost the same problem: "*I had a stand (small shop) not very close to the river but on the main road. It collapsed, and I was not even reimbursed. It was far from the area*."

Another citizen expresses concern: "*It took seven years to build and expand the work area without any notification about the hydropower plant. All this time, there have only been*

problems blocking the roads."

Another citizen said, "*The whole area here had forests; where are they?! They have all been cut.*" *Another said,* "*They said that they would replace the forests and cut trees, but there has been no replacement.*" Another resident added, "*Here, it has become repulsive compared to the beautiful nature, the pure water, the trees, and the birds that were here before. Even those residents who were here have fled.*"

Also, a citizen expresses another disappointment: "*Even though it was said that the hydropower plant would help with jobs, this is not true because no one is employed for its maintenance. None of the employees are from the area; they are all from other areas. There were some areas at the beginning of the works, but later, the places were shortened*."

A citizen firmly states: "*I think that we have not had any benefit because even those good things we had, this hydropower plant made it worse for us; now the surrounding areas do not have water for irrigation, plus we have problems with drinking water, something we did not have before*." Another says: "*since the construction of the hydropower plant, we have even more people leaving, much poverty, the government finished their work and left, that is it*."

From the answers, the Rapuni Hydropower Plant has caused obvious difficulties in dealing with problems with drinking water, irrigation, and infrastructure, non-utilization of workplaces, the departure of many young people because of poverty, non-implementation of the recovery plan area, and damage to nature, flora, and fauna.

Regarding question number 3: "*How do you see the socio-economic situation in your area after the construction of the hydropower plant compared to before?"* citizens have expressed their views: "*We see the situation as it is: no possibility for more development, for more money*." Another citizen remarked, "*Nothing has changed; on the contrary, only deterioration*." Another resident stated, "*There were great promises that the situation could be improved, but not only is there no improvement, but it is worse than before*."

Regarding this area, a citizen says, "*There are very few houses here now. If they were better than before in terms of economy, people would not empty the village*." Another citizen says, "*Compared to before?! Regardless of what they say, you can only escape here if you left a minute ago. There is not even a normal centre in this area; there is nothing left. Everything that was said would change for a better life; they were frauds*."

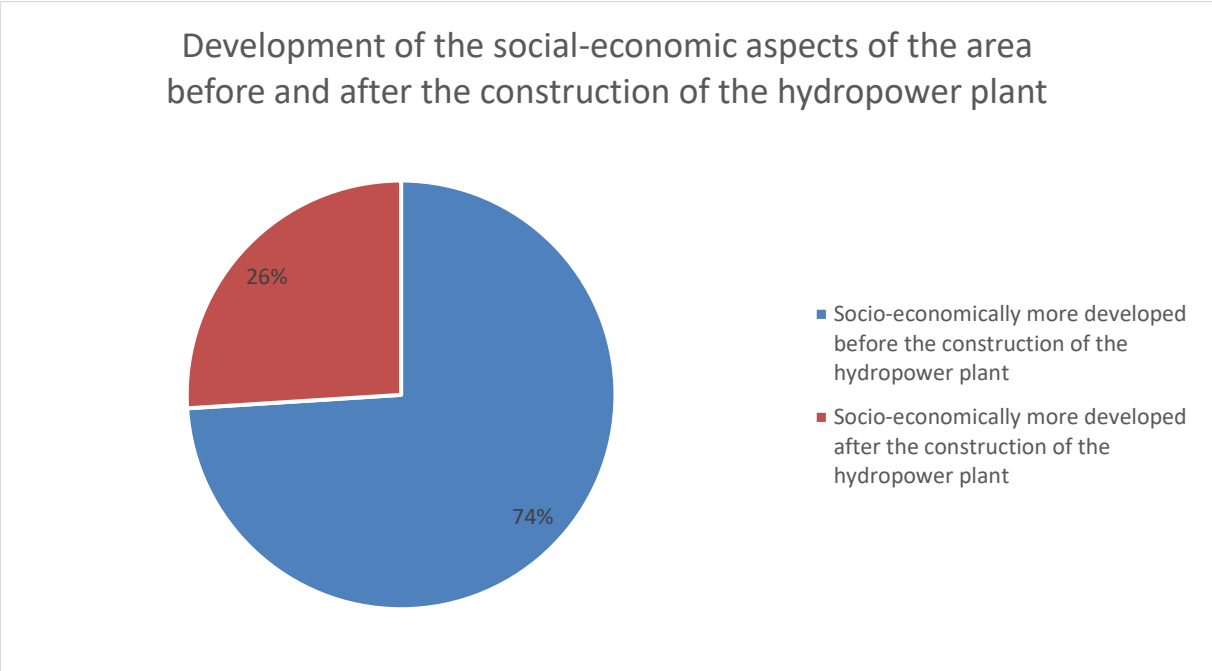
Regarding question number 3 presented above, the residents' responses are all negative

regarding the improvement of the socio-economic aspects of the hydropower plant.

Contrary to the answers above, some citizens look positively at the socio-economic developments compared to the time before the hydropower plant was built. So many citizens say, "*I think that now we are better than before. At least for my family. The business I own near the area has more customers*." Another says, "*The hydropower plant has brought development to the workplaces more than before and has made this area known and visited by engineers and researchers from Albania*." Also, a citizen adds that: "*the possibility to go to the city faster through the paving of the road helps in the development of the area*."

The perception of citizens regarding the socio-economic aspect of the current residents compared to before:

Socio-economically more developed **before** the construction of the hydropower plant	Socio-economically more developed **after** the construction of the hydropower plant
74% of citizens	26% of citizens



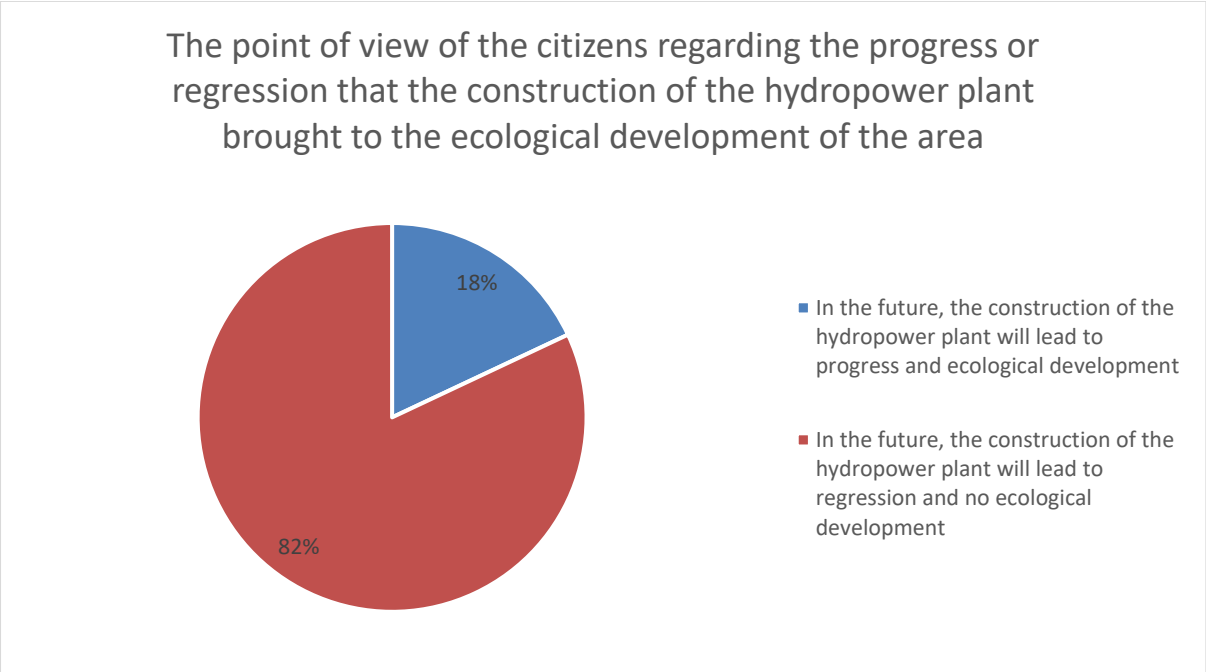
Despite the difference in opinion regarding the development of the social-economic aspects that the construction of the Hydropower Plant has brought to the residents, most of them express themselves instead concerning the regression the area has had rather than the progress. The situation of migratory and immigrant movements has affected everyone in recent years, including Albania, the big cities, and not only the towns and remote villages.

However, according to the citizens' perception, it was evident that there was a lack of economic and social stability, which, unlike the promises made, the hydropower plant did not bring.

Regarding question number 4, "*How do you think this hydropower plant will affect the socio-ecological development of the area in the future?*", citizens have expressed themselves differently, showing why they think it is in regression or progress or even without arguing whether they look at it positively or negatively.

Thus, if referring to the answers to the citizens' comments, we will make a graphic division if the citizens look at it positively (progress) and negatively (regressive); this would be:

In the future, the construction of the hydropower plant will lead to progress and ecological development	In the future, the construction of the hydropower plant will lead to regression and no ecological development
18% of citizens	82% of citizens



Some of the reasons that the citizens consider the country's ecological development to be in decline with the construction of the hydropower plant are cutting down forests, destroying soils, not irrigating them, not planting new forests, destroying vegetation, uncontrolled interventions in the soil layers, lack of nature protection, and non-rehabilitation of the area.

Most citizens who have expressed that the hydropower plant will bring ecological

development to the area have yet to give a reasoned answer as to why they think so. At the same time, some have complained that over the years, the natural environment will improve, and this will also lead to an increase in the number of tourists, which the citizens associated with economic development rather than ecological development. So, tourism and tourist values are seen not as part of ecological development but as an opportunity for increased economic income.

Regarding question number 5, "*If you were in front of the leader of the local/central government, what would you ask for regarding the development of the area where the hydropower plant was built?*", it was addressed to see and identify their current needs concerning social-economic and ecological development and how they would address their most immediate needs or how they perceive themselves as active citizens concerning the environmental development of the area.

One citizen expressed "*transparency on the impact that the hydropower plant will have.*" Another states "*accountability in relation to unemployment*."

Also, if a citizen were in front of a local government representative, he would ask them: "*Why haven't you protected our lands from the lack of irrigation*?" Another says: "*Why haven't you taken measures to plant trees in the area.*"

A vital problem raised by a citizen is: "*How can you have problems with drinking water in 2023, and these problems will increase with the construction of the Rapuni Hydropower Plant?*"

Another adds, "*Why didn't you ask us before the trial? I know you won't ask us now either because you remember us only when we must pay taxes or vote*."

Someone else says, with irony: "*There is so much social and economic development that you promised, so much so that people are leaving more and more every day. Without people, there is no economy, environment, or life*."

It is noted that through the answers to this question, the citizens have addressed many social problems, such as poverty and the removal of people from the area, and this is not necessarily related to the construction of the hydropower plant. However, they also see it as an opportunity to express themselves regarding their problems. It is also noted that a dominant part of the citizens is also concerned about the adverse effects that can bring to nature, the environment, and ecological development by not taking measures to resize the area's

vegetation through planting trees or about the daily problems with drinking water.

In this questionnaire, the problems of a political nature in relation to the social issues that affect the area's residents are generally highlighted, and this is inevitable now that sustainable development is a complex of aspects that preserve environmental, social, economic, and cultural stability.

In question number 6, the citizens were asked a hypothetical condition question: "*And if you could go back in time, what would be your attitude as a resident of the Rapuni area toward the hydropower plant?*"

This question has been addressed on purpose as it is essential to know the reaction of the citizens regarding the effects of the construction of the hydropower plant and how they would react if they knew these effects beforehand.

A notable aspect of the responses to this question is that citizens were indifferent in most of them, answering with responses like "*I would not do anything,*" and "*who cares what we say?*", "w*hat can I do when no one reacts*?" or "*there is no one to react here.*"

It is noticed that citizens always connect their reactions with others and do not start from themselves, which does not help the community's feeling for protecting the environment. In general, 30% of the citizens are indifferent and do not react.

Some citizens have given answers like: "*I would ask that we all gather, and I would not allow this devastation to take place in the environment where we grew up, and our children grow up.*" Referring to this answer, it is worth noting that the citizens are sensitive about the importance of the environment in their lives and their future, but it also means that they were not together as a community or as active citizens and were not involved in decision-making or were uninformed or misinformed about the effects of hydropower construction.

Another citizen says that the situation where he is, from the social and economic point of view, does not exist; it suffers from instability with or without the construction of the hydropower plant: "*I do not think that the hydropower plant has ruined our work more than politics in general. Here, the standard way of living has been and continues to be very low*."

Another citizen says: "*If I were as aware as I am now to protect, I would appear in the media and call on the environmental activists to stop its construction until the written assurance that they will take measures to protect nature*." From this answer, we notice that according to the citizens, the construction of this hydropower plant has harmed the environment, and

seeing himself without support, he thinks that this opportunity for reaction would only be strengthened by going public in the media, also expressing their faith in the government.

5. Findings

Experts point out that HPPs' environmental and socio-economic impacts are still unknown, although some studies reveal important data on their negative environmental and socio-economic impacts.

Several studies and assessment reports have consolidated data on the negative impact on ecosystems and biodiversity. While the focus of these reports was on the impact of HPPs within protected areas, where it becomes clear that the impact on the ecosystem, such as the quality and quantity of water, the loss of biodiversity, and species of economic value, have direct negative impacts on local communities and their well-being and living standards.

Assessments of the impact on the environment of the Rapuni Hydropower Plant consist of favorable or unfavorable conditions for development. This shows that it is essential to discuss the social and ecological context of the construction and operation of this hydropower plant in the city of Librazhd. Rapuni, a river in less than 20 km, is a branch of the Shkumbin River, which has four hydropower plants directly above the Rapuni and three in one of its branches, thus bringing about the multiplication of consequences with the utilization of 98% of the water. The fact that residents can only use 2% is one of the main consequences for residents who cannot function in their daily lives. The consequences of the hydropower plant have been communicated only by Non-Profit Civil Society Organizations.

Thus, natural impact includes hydrology, sedimentary effects, and especially factors such as temperature and water quality, noise, air pollution, climate change, and the main aspects of ecology, geology, and archaeology.

In the social context, they directly affect the well-being of the residents, the economic development that will result from the built infrastructure, etc.

Since water is vital for our planet, we must manage the costs and benefits related to this matter from this hydropower plant by specifying the positive and negative sides of this source.

Referring to the communication interviews with eco-experts during this study on the ecological situation in which we find ourselves, we can conclude that all people should be involved in the defense of our common home, united in the search for environmentally sustainable development, because the situation may change.

In the sphere of environmental awareness and ecological culture, according to them, the

search also included permanent ecological solutions where every possible ecological risk will be taken seriously and responsibly through the assessment and verification of the impact of ecological political projects, informing the public about the progress of ecological activities such as and energy-producing processes, including the construction of the Rapuni Hydropower Plant or others in the future, go parallel and in harmony with innovation, new scientific and technical achievements with technological possibilities in order to achieve ecological goals.

Mass media, including printed and electronic media and the Internet, are the primary sources of information on environmental issues. Therefore, these should be used more intensively to facilitate environmental information transmission and promote more positive environmental attitudes. Ecological measures, goals, and standards should be included in every political action and initiative; realization of activities and eco-experts must be heard and have the last word regarding ecological awareness, policies for the protection of the environment where the Rapuni Hydropower Plant is a part, reasonable use of energy resources.

6. Discussions

1. Four hydropower plants are built on the Rapuni River, and three more on the Qarrishte River, a branch of the Rapuni River, so there are seven hydropower plants in a small basin. What does this do? It has an irreversible impact on the environment and local communities. The diversion of the Rapuni River, where practically 98% of the water is diverted, creates drought and what is called disconnection in a longitudinal connection of a river ecosystem.
2. The natural bed of the river remains dry, and this does not allow the species to continue their everyday life, as it destroys the habitats for them to feed and obstructs the migration routes. Water is a migration path that enables fish, mammals, and birds to continue their lives after that. Of course, inert materials are transported at the speed of water, and if these are not transported as sediments, it creates erosion.
3. In the planning phase, information was not given to the local communities, but later. In the later phase, there was clarification only when the dams were placed, and the construction started. Naturally, a conflict was created between the two water users: the traditional ones and the new residents who were doing the construction and who wanted to use the water for energy production.
    - As a result, we have two actors, two parties, and one person to mediate the conflict. In these scenarios, the state must intervene to avoid conflict. Nevertheless, the state has no access to the matter at all.
    - According to the environmental biologist and expert on the biological assessment of water quality, Mr. Olsi Nika, it is estimated that two problems are encountered in connection with HPPs. "*First, their construction is not based on any nationwide master plan, which means that their distribution is so chaotic that it is difficult to judge whether they are built for energy purposes or are simply 'business orientation' of companies with more decision-making access. Second, although chaotic and unplanned, most of these HPPs do not respect the environmental standards defined in the relevant environmental permits,*" says Mr. Nika.
4. Albania holds the dubious distinction of being the Balkans' leader in dam density. However, this rapid development has come at a cost. The state's involvement in this process is limited to signing concession contracts, after which it seemingly absolves

itself of any responsibility, leaving the affected parties to fend for themselves without adequate information or support.

- Across the Balkans, including Albania, the construction of hydropower plants has been marred by conflicts and a need for more transparency. A 2020 assessment by Eco-Albania revealed that nearly a quarter of these plants, still under construction, have led to disputes, injuries, protests, lawsuits, and even loss of life among residents. The root of these conflicts often lies in the allocation of water resources, with companies taking a disproportionate share and leaving residents needing an adequate supply for irrigation, drinking, and other essential needs.
- Despite their extremely low energy production, their ecological footprint, and their negative effect on the social and economic aspects of the local population, they are unfairly high.
- These projects have already had major negative impacts in these environmentally sensitive areas by increasing the disturbance of flora and fauna and the socio-economic status of the local population.

5. In the group discussions of Albanian experts with the foreign expert Prof. Dr. Manfred Miosga, who is a professor of urban and regional development at the University of Bayreuth in Germany, discussions and concrete measures were taken concerning Social-Ecological Transformation at local Youth Action Plans on Fair Cities, Green Polica and Employment. From 2021, they were directly included in the areas where hydropower plants were built, including Rapuni, intending to strengthen long-term youth policies that would improve policies with broad social impact locally. During these actions, the focus has been on hydropower plants, climate change, the local government's role in the ecological transformation of a country, energy transformation, mobility transformation, heating transformation, and sustainable housing policies.
    - Moreover, the construction process of HPPs in Albania is usually not carried out according to the laws and regulations established for public consultation.
    - Thus, the lost transparency has led to many conflicting cases throughout the country and to disrespecting the needs and demands of the population affected by these acts, which were maximally affected by their construction.

6. The network of environmental groups in Central and Eastern Europe, which oversees bank funding for environmental projects (Bankwatch) has published a statement revealing its correspondence with the European Bank for Reconstruction and Development (EBRD) and discussions about the negative impact of Rapuni Hydropower Plant in Librazhd and not only to the Albanian population. The EBRD findings confirm many of the observations made in this study.

    - More precisely, Bankwatch says that EBRD has confirmed that the lack of water in the Rapuni River 1&2 hydropower plants is causing, among other things, a lack of water for wheat mill used by 200 people in the area. The EBRD also states that the citizens of the Rapuni 3&4 hydropower plants connected say that the construction without ecological flow and passage for fish is unacceptable and shows a deficit of control by the Albanian authorities.

    - The mechanism of the lack of filing complaints was one of the discoveries of the EBRD, which is directly correlated with the findings of this study based on the interviews conducted for this work with the residents of the area. The unchanged concerns for both of us and the EBRD as a common denominator for the residents remains the lack of water for irrigation. We emphasize that the situation remains unchanged and without any transparency regarding the ecological problems of the hydropower plant and taking any measures so that the company avoids violations. From all the interviews, it is noted that active citizenship is not involved and has yet to be made aware of the procedure or even the consequences of the changes that he will bring into the lives of citizens to be able to control or react to their consequences.

7. If the cost is too high for the population, investing in renewable solar energy instead of hydropower plants should also be considered. According to the interviewees, people's first reaction to new energy sources is skepticism and distrust towards these solutions, and they need to know their benefits and efficiency.

    - The high number of requests to the Ministry of Infrastructure and Energy cannot be considered a potential ongoing risk of increasing the chaos in every river and stream of this country, affecting the ecosystem even more negatively, or even having other chain consequences.

    - The final decision on whether a hydropower plant should be built is based on a

cost-benefit analysis. The project should not only be successful from the technical side but also from the economic side. The purpose of its construction is economic. This report should be on the project's first pages to clarify all the objectives to be achieved and how.

8. The economic impact is based on the environmental one. It can be built if this project does not damage the environment and has a meager ecological cost. Otherwise, we would start a war against different habitats, flora, fauna, and many environmental goods that bring economic benefits after a particular time and indirectly. It is also necessary to consider the maintenance and depreciation over time, the number of workers, and the price that this maintenance requires. All of these should be taken into consideration in advance.
9. The media also plays an essential role in the ecological protection of our system. Positive and negative examples from the field of ecology are requested to become part of the media and mass media daily through documentaries and scientific publications because one cannot expect only negative impacts on the ground to be discussed concerning this topic. The thoughtless use of some natural resources by society puts society at risk. Therefore, no matter how significant scientific developments, technological inventions, or economic growth, the backlash is inevitable if they do not lead to real social progress.

7. Conclusion

The freshwater ecosystem is threatened by the indiscriminate construction of hydropower plants in Albania and throughout the Balkans.

Even though most of the results from the structured and unstructured interviews of citizens highlight the adverse effects of the construction of the hydropower plant for the area, such as problems of drinking water and destruction of forest and fauna, one of the positive effects that is mentioned is the employment of a large number of civil workers of Librazhd for several years until construction and recently for maintenance with salaries that meet their expectations.

During the study, professionals and experts said that diversifying energy production is a slow and long process that brings new factors to the country's attention. This can inevitably delay the process or prevent the adoption of new technologies. Therefore, preliminary, and collective consultations must always be present.

Before granting each river a concession, a clear plan of the resources, the construction of energy production plants, their spatial placement, and the cost calculation plan are required.

Rapuni, a river in less than 20 km, is a branch of the Shkumbin River, which has four hydropower plants directly above the Rapuni and three in one of its branches, thus bringing about the multiplication of consequences with the utilization of 98% of the water. The fact that residents can only use 2% is one of the main consequences for residents who cannot function in their daily lives. The consequences of the hydropower plant have been communicated only by Non-Profit Civil Society Organizations.

The Albanian reality does not support the idea that small hydropower plants do not harm nature because they are built in protected areas. Also, several hydropower plants can be found in a river, as in Rapuni, which has seven hydropower plants.

The negative impacts of hydropower plants can be minimized by planning and designing in a way that includes public engagement from the beginning of the process.

Due to inaccurate and insufficient information, there still needs to be more awareness of the interconnected nature of all human activities and the environment. Developing countries need more relevant technologies and expertise.

As the environment has progressed rapidly, environmental education has a strategic role and is essential in preparing people to solve global environmental problems. Environmental

issues should be included in the foundations of national education to have well-educated people concerned about environmental issues. Integrating ecological education in current classes and programs is necessary, helpful, and mandatory.

Politicians, managers, administrators, and all other entrepreneurs must also be educated about the environment. One fundamental feature of environmental education is the need for a close relationship between interdisciplinarity and interprofessional.

As stated above, in response to the research questions, the effects of the construction of the hydropower plant have been more negative than positive for the residents. Also, according to professionals, environmental damage is significant and irreparable. The construction of the hydropower plant was not based on a preliminary study for evaluating the risk and impact on Rapun, which showed a lack of transparency but also neglected the local government's duties to consider the citizens' interests.

8. Recommendations

The recommendations are necessary to address critical issues in the local government and consider them in decision-making regarding any environmental intervention. They will also be helpful to all those interested in initiating other studies in this field.

1. Environmental issues have a cross-border and global impact; as such, well-designed global policies and strategies for each country's environmental legislation and initiatives are needed that cover as many individuals and interest groups as possible. Environmental interventions require increased civic awareness and knowledge of how to advocate and lobby in the context of environmental protection.
2. It is required to have more transparency not only from the construction company of HPPs of Rapuni but also from the local and central government towards the citizens and even making them an active part of the decision-making, which essentially affects the well-being of the citizens.
3. The most significant investment should be in the direction of solar and renewable energy rather than the construction of hydropower plants that brought many adverse effects to the population of Librazhd.
4. The area in which the hydropower plant is built needs reforestation as its construction has destroyed its fauna and flora as part of the rehabilitation measures after the construction of the Rapuni Hydropower Plant.
5. The undertaking of such initiatives with a high socio-ecological impact should be accompanied by a preliminary assessment, confirmation of the citizens about the nature of this project, and an assessment for intervention to improve their lives.
6. Greater access for citizens is required to obtain information, sensibility, and media campaigns highlighting problems and long-term impacts on the social point of view for projects that are applied to the environment.
7. Special attention should be paid to the requirements for hygienic and sanitary environments according to the legal requirements of the project. To improve the environment around the Rapuni Hydropower Plant on a case-by-case basis by accompanying it with appropriate greenery according to a contemporary model of the program rehabilitation.
8. By implementing legal requirements and recommendations, Rapuni Hydropower

Plant manages to carry out the correct activity following the requirements for the environment, where, in addition to the impact on the improvement of the energy situation of social effects, it provides a suitable environment for the residents.

9. It is requested that the studies related to the social and ecological impact be more numerous in Albania and more concrete on the specifics of the areas, as was the case of Rapuni. This would not only precede the appearance of problems but also have a greater impact on the relationship with community awareness.
10. In Albania, the topic of social-ecological transformation has not yet started to be discussed massively. The participants in the study emphasized the need to start discussing this issue and sensitize institutions and public opinion on issues related to green cities and their impact on sustainable development.
11. During this study, more cooperation and communication between all relevant actors and the public-private partnership are needed to strengthen it further to ensure the exchange of updated information and take responsibility regarding the risk of potential problems.
12. It is necessary to increase public sensitivity to environmental and development problems and involvement in solving them, as well as a sense of personal environmental responsibility, motivation, and commitment to sustainable development.
13. Local administrations should educate residents by providing tools (such as books, brochures, and seminars) to help them understand the importance of environmental problems.

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Appendix

Questionnaires

Questionnaire for the professionals (experts, researcher, academics of social, economic, ecological, and environmental activists).

Question 1 (Closed): Has the construction of the Rapuni Hydropower Plant been accompanied by studies regarding the socio-ecological aspects?

- Yes
- No

Question 1.1 (Open): If so, what were the socio-ecological impacts for the area?

Question 1.2 (Open): To whom have they (the indicators) been made known at the level of local government and civil society?

Question 2 (Open): In your opinion, what are the advantages of the construction of the hydropower plant for the area?

Question 3 (Open): What are the disadvantages of hydropower construction for the area?

Question 4 (Open): How do you think the outlook for the residents of the area could change with the hydropower plants?

Question 5 (Open): How can the situation be improved according to your professional point of view (as a biologist, geological engineer, environmental activist or an expert in social, environmental, or economic policies)?

Questionnaire with citizens of the area where the Rapuni Hydropower Plant was built.

Data:

Gender:

Age:

What is your profession?

How long have you been a resident of this area?

Question 1 (Closed): Before the hydropower plant was built, was your opinion taken into consideration?

- Yes
- No

Question 1.1. (Open): If your answer was yes to the previous question, how clear and detailed was this information?

Question 1.1.1 (Closed): If some of you had questions about the project, did the architects clarify?

- Yes
- No
- I do not know

Question 1.2 (Open): Whether your answer is no (your opinion was not considered), why do you think that information was not provided?

Question 2 (Closed): Do you think that the construction of this hydropower plant has brought benefits to you and other residents?

- Yes
- No
- I do not know

Question 2.1 (Open): If yes, what are they?

Question 2.2 (Open): If not, why do you think so?

Question 3 (Open): How do you see the socio-economic situation in your area after the construction of the hydropower plant compared to before?

Question 4 (Open): How do you think this hydropower plant will affect the socio-ecological development of the area in the future?

Question 5 (Open): If you were in front of the leader of the local/central government, what would you ask for regarding the development of the area where the hydropower plant was built?

Question 6 (Open): And if you could go back in time, what would be your attitude as a resident of the Rapuni area toward the hydropower plant?

The Rapuni Hydropower Plant (HPP) is a 9.0M D&B small hydro scheme built along the Rapuni River near the town of Librazhd, Albania. This project consists of a hybrid dam (clay core dam, 246m long, 10m high and 4 spillways), a hydraulic tunnel 2.3km long, a power plant and electromechanical installations (including 3 Francis turbines (3M each) with generators and valves their control). The budget of the project was €25,250,000 and its construction took 3 years (August 2013 – August 2016).

- Technical data of Rapuni Hydropower Plant
- Installed power 9.9 M.
- Flows 27 m3 of water per second.
- Annual energy production 42.94 GWh
- The water intake dam is 246 meters long, over the Rapuni River, and has 4 gates.
- Earthen dam with a height of 10 m and a volume of 60 thousand m3.
- Partition wall 1300 m2.
- Works of taking water from the Qarrishte river.
- Water collection tunnel 4.8x4.95 m, with length 2.4 kilometers.
- Water pipes 2x3.5 x2.5, 140 m.
- The production station building, measuring 18.70x48.50x13.00 meters.
- 3 turbines, with a maximum power of 3.3 M.
- 3 generators, with FORCE 3,780 KěA-6.3 KV-429 rpm each.
- Step- up transformer 6.3/115 KV AND FORCE 12 MVA.
- External high voltage substation 110 KV.

For the construction of the work, the following were done:

- 411,850 thousand m3 of excavation and soil filling. 61,900 m3 of concrete were poured. 6,600 tons of iron armor were used. 2250 m2 reinforced concrete walls (1800 m3 concrete). 55 tons of metal building for the production station.