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## Romania's Water Crisis: Solutions to Improve Citizens' Poor Access to Quality Water

It's hard to imagine being plagued by problems you will hopefully never have to encounter in your lifetime. Yet, millions of people face these challenges as a part of their normal. They can't go a day without issues like poverty, hygiene, and unsafe food afflicting them. While these people who are struggling are our best bet to find solutions, their voice often goes unheard because they don't have the equal opportunities that are provided to first-world countries. It is up to individuals to hear those voices and find sustainable solutions. That starts with understanding the problems they're facing. Because of this, I chose Romania's problems in water and sanitation to delve further into.

Like every nation, this second-world country has a great amount of issues its citizens deal with. But, its water and sanitation complications are some of the biggest afflicting Romanian citizens. They have struggled with a third of their population not being connected to a clean, piped water supply which is made worse by the little protection they have against flooding. This issue severely impacts food security.

Sitting in the south-eastern corner of Europe, Romania is a developing, second-world country. Ukraine, Hungary, Serbia, Bulgaria, Moldova, and the Black Sea border it. This nation makes up 4.8% of Europe's surface. Romania boasts many different geographical features: scaling mountains, volcano chains, a hundred-plus mile coast, and rolling hills (*Romania* 2024). They have a colder climate with an average temp being around 37 degrees F in the mountains and 53 degrees F in the plains (CCKP 2020). 41 counties divide the country, and as of 2022, 21.9 million people are living in Romania. 12.3 million live in urban areas whereas 9.6 million live in rural areas. Bucharest is the capital with an estimated population of 1.7 million (World Population Review 2024). Romania holds a constitutional republic with a democratic, multi-parliamentary system (U.S. Department of State 2018). Their government holds one Prime Minister and Ministers who are appointed by the President (Guvernul Romaniei 2024).

Currently, 56.85% of the land's surface is cultivated and their major crops are grains like wheat and barley, poultry, eggs, dairy, and pork. The average individual farm size is 4.42 hectares which is equal to about 10.9 acres. They export their biggest industry which is cars and their parts/accessories, insulated wire, and electrical control boards. The average family size in the country is about 3 to 4 people per household. Typically, grandparents and other extended family members live close by (Evason 2024). In urban areas, most families live in block apartments. These apartment buildings differ slightly as they are one single building divided into apartments instead of a complex with multiple buildings (*Housing in Romania* n.d.). Women typically work in finance and engineering whereas men work in construction, security, and manufacturing. On average, women lose about EUR 4,256 to men annually (Romanian Insider 2023). Men's average monthly wage is 5,000 lei NET or EUR 1,000 (Calin 2024). A family diet consists of mostly pork, trout, dairy products, polenta, soups, and pickled vegetables. Many families home-grow their ingredients and buy from markets (Long 2024). Most homes are connected to public gas and electricity but families in rural areas still use wood stoves.

Romanian healthcare is primarily owned by the public sector and nearly every citizen living in urban areas has it provided to them. Unfortunately, those in rural areas did not have affordable or easy access to healthcare. Beginning education is free in the nation and closely resembles France's system. Early is 0-6 years old, primary, and secondary education are free to families but higher education like university does have a tuition. Recently, private education has been gaining popularity (International Trade Association 2023). 82.1% of Romania has access to basic water services, but that means 3.6 million

people do not have this necessity (World Economics n.d.). 41%, 8.5 million, do not have access to bathrooms with running water. As mentioned, 93% of households have electricity in urban areas and 80% of homes in rural areas are still dependent on wood heating (Tomac 2022). A fifth of citizens have internet access as of 2022 (*Mobile Communications and Internet in Romania* 2022). As for transportation, buses are quite common but petty theft has been increasing. Trains are inexpensive but very outdated. In rural areas, cars are the most common. However, most roads everywhere are in poor condition (Expat Arrivals n.d.).

As introduced, there are two main causes of Romania's water and sanitation problem. The first is that a third of the nation does not have access to piped water. This third makes up most of the rural population. Instead, they use groundwater sourcing from caves, wells, or springs. Due to the nature of the sources, there cannot be a proper evaluation of the water quality, which is not safe for these citizens. Right now, only 12% of urban wastewater is treated and discharged back to urban areas (European Environment Agency 2020). This means that the majority of citizens in cities do not have clean and treated water. Without proper sanitation, Romanian citizens are being exposed to animal feces, fertilizers from farms, and other pollutants. Yet, because of a continuous decrease in rainfall in the past century, people are collecting whatever water they can access (Moldovan 2019). Because Romania lies in the Danube River Basin, it accounts for 44% of the country's freshwater supply. However, it contains a high amount of pollution and distributes that into Romania's water system and it flows down into the Black Sea, the only body of water bordering Romania. They have been urged to fix their country's access to piped water to comply with the EU's Urban Waste Water Treatment Directive, they have been primarily relying on EU grant funding. Because of how vulnerable Romania is to flooding, it directly affects its clean water supply. About 13% of the nation lies in floodplains and 39% of the population would be affected if Romania experienced floods. They have made great progress in strengthening embankments and storage areas. Funds have increased to continue the maintenance of existing flood prevention structures (OECD n.d.). However, the biggest challenges that remain are slowing climate change which makes flooding more frequent and severe, and keeping a steady stream of funds. Romania does not have a national funding stream for flooding prevention.

The lack of clean water and sanitation structures in Romania greatly negatively impacts the nation's food security. Without clean water, families cannot safely cook their meals like pasta and soup. Some can't grab a drink of water without having to boil it. Boiling their tap or groundwater makes it microbiologically safe by killing off bacteria and viruses. However, as some rural families only have access to wood to heat their homes, it is a waste of resources to have to boil their water before they can drink it rather than focusing on keeping their appliances and homes warm. In the winter, by using wood to keep their house warm 24/7, one home could go through 2 cords of wood a season as temperatures drop down to 23 degrees Fahrenheit. For reference, one cord of wood is 8 feet long, 4 feet high, and wide of stacked, seasoned firewood. This severely limits families to the foods they have access to as they have to prioritize foods that don't need water in the cooking process which could mean less nutritious and possibly more expensive.

Also, because almost half the population does not have bathrooms with running water. Most use plastic buckets to bathe or to use the bathroom. Being unhygienic, this can lead to problems, especially in rural areas. Most families grow some foods at home; if runoff from the dumping of those buckets gets mixed with the farm soil, it can lead to unsafe bacteria and viruses festering and contaminating the food. This same problem does have the ability to affect those in urban areas as well if the runoff is a large area enough to reach the water and farmland that supplies the cities. A national program was introduced to give families a grant of EUR 200 to install proper bathrooms, but information regarding the result is unclear. (Bucureasa 2016).

Flooding exacerbates the poor quality of water reaching citizens. The water runoff gets contaminated by things like sewage and pesticides when it cannot be controlled. The runoff then travels to farmland and wells where citizens get their water, similar to how water gets contaminated by the poor bathroom situation. This contaminates the food grown and can cause harmful diseases and illnesses for people. Things like cholera, typhoid fever, and hepatitis A are all waterborne illnesses spread by consuming contaminated water (WHO16 n.d.). For example, floods in 2020 left thousands of hectares of common crops like rye, wheat, corn, and more contaminated (Apostu & Sili 2020). Also, a flood in 2000 affected about 2 million people's drinking water as it was contaminated by a gold mining company near the river (*Romania* 2024). While it impacts water quality it can also impact food production as it damages crops, ruins farm structures, and kills livestock. Heavy flooding in 2014 caused 20-30% of the nation's southern grain crops to be destroyed and 40-60% of its vegetable crops (Romanian Insider 2014). In the June 2008 flood, over 3000 animals were killed, and more than 8000 hectares of agricultural land were ruined (Ionita 2021). While 3000 livestock might not be the worst number, every animal counts as their livestock production has been heavily fluctuating since 2001. That's when Romania saw the biggest drop which was from 670,000 MT liveweight to 608,000 (Cionga 2002).

While this problem is understandably daunting, some solutions can be made to improve the situation. Because Romania already doesn't have enough funding to provide their country with introduced solutions, it wouldn't be feasible to just connect the Danube, Mures, Prut, and other rivers to large underground pipes underneath the towns and cities that don't have safe water supply. Instead, we must go slow; we need to introduce small solutions to save enough funding, resources, and people to, in time, do the unfeasible. One of these solutions could be to implement a water treatment process on a smaller scale. The other is to build blue roofs and bioretention areas to help with the flooding, which would help increase the water quality naturally.

In overview, there would be a centralized location in each town where there would be a natural aquifer connected to a treatment plant. Then people could come to get clean water from a public pickup location. If an aquifer is not found close to the town then piping would have to connect it to the treatment plant with about an eight-inch pipe connecting them in the 60 counties of Romania that have less than 6,000 people. Then, once the water is treated it will be available for citizens to pick up. To start, this water would be mostly used for safe drinking water and water needed to cook with. This would help eliminate the need for their wood supply to be used for anything besides heating their homes. People could pick up the water in 15-gallon intervals. To keep the water price as low as possible, we could incorporate it into their property taxes. This would raise the taxes but is offset by less money spent on wood.

Because Romania is still struggling to get enough funds to make its urban water supply meet the directives of the EU, getting the money to fund this will not be easy (OECD 2018). There are local nonprofits in Romania that could help bring in the resources needed and the Romanian United Foundation is a larger non-profit organization that helps fund projects and solutions like this. They do this by finding volunteers and donors from all over the world and collecting NGOs. They have had over 2 million donations with over 37 thousand donors across 61 countries (RUF n.d.). Getting a grant from this organization would be a huge step in the right direction.

A solution for the flooding aspect of the water quality problem is to build new, safe infrastructure with more eco-friendly options. Romania is experiencing climate change; precipitation has been increasingly unpredictable and floods are getting more severe (Climate Adapt 2023). To limit the amount of new infrastructure needed, the roofs of houses can be replaced with "blue roofs." Blue roofs are designed to hold up to 8 inches of precipitation. After a storm is over, water will be discharged at a slow rate to limit flooding. While the water is discharged, the roof allows for some to be evaporated as well. Some of the water collected by the blue roofs could be used directly by homeowners as drinking water, but the majority will drain out to bioretention areas. The main issue with these roofs is what to do when

the roof eventually wears out due to the repeated weight of water (Environmental Resilience Institute n.d.). However, while areas in the mountains of Romania can see about 27 inches of rain per year which is comparable to northwestern Iowa, these blue roofs should last for around 15 years before the integrity of the structure should be examined (*Iowa Weather and Climate* 2016) & (LABC 2021). As mentioned, these roofs drain out excess water that can connect to a bioretention area. This area in a landscape provides storage for stormwater runoff. Bioretentions are coupled with water-tolerant plants and as the water accumulates it will turn into a small pond. Again as the storms die, the water will begin to drain through a filter into the ground or an underground pipe (Environmental Resilience Institute n.d.). Connecting this to the sanitation solution, the water from these bioretentions could travel to an aquifer and treatment plant in towns to recycle the excess water. The Romanian United Foundation would be a great resource for these projects, as well as Greenpeace and Earthjustice. Greenpeace has made changes in climate and energy, biodiversity, and social and economic issues (Greenpeace). Earthjustice focuses on tackling the legal side of climate change with its 500 lawyers and has huge environmental wins in countries such as Indonesia, Australia, Africa, the USA, and Latin America (Earthjustice n.d.)

In Haiti, recent projects focusing on their water sanitation problems have made great improvements to the lives of their citizens. They built new infrastructure in neighborhoods such as reservoirs, standposts, and spring catchments. A standpost is connected to a piped water supply and acts as a hydrant for the local community (Public Standpost 2014). Spring catchments are areas of land that allow for water buildup. They are typically used for feeding rivers in times of low rainfall (Clemens 2023). Existing supply systems in Haiti were extended and new ones were built. A sedimentation pool, source-capture system, collection pool, 600 residential branches, and posts for public water collection were also included in the project. Overall, access to drinking water was given to over 560,000 citizens. Another 31,000 also had new access to sanitation facilities. These improvements were run by the Sustainable Rural and Small Towns Water and Sanitation Project, which was funded by the World Bank's International Development Association (The World Bank 2023). The Netherlands has constantly faced devastating storms from the North Sea which has led to massive flooding. The government started the Delta Works- a series of construction projects for dams, dikes, and others all over the country. They also reduced their coastline and drained low-lying areas. Once these areas were drained, they built pumps to continuously keep water out. However, the country did not have enough funds to make these improvements right away. Romania needs smaller solutions now, and to over time make these kinds of improvements as they can gather funds (Taurus Flood).

In conclusion, Romania stands as a developing country dealing with devastating problems. Their combined water and sanitation issues affect over 80% of their country and without help, it's going to get worse. New systems of clean water works need to be implemented in rural areas as a starting point for hygienic living. Environmentally conscious adaptations need to be made to existing and future buildings as a way to store and recycle stormwater from flooding. As introduced, it is difficult to put yourself in the shoes of a person living in conditions you may never encounter. But all it takes is a step.

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