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Rural aqueducts or water supply systems

Acueductos rurales o sistemas de suministro de agua

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Abstract

This article presents a reflexive analysis on the concepts of rural aqueduct and a water supply system, with the aim of identifying the differences between the two concepts in Colombia, through documentary research. The documentary review was carried out validating its relevance, timeliness and completeness, focusing on those documents related to concepts, standards, technical and statistical aspects. The importance of access to drinking water for the population and the proper management of water resources, as set out in Objective 6 of the ODS, is also considered.

Among the significant results it is highlighted that these two concepts are very different in terms of the technical aspects for its design, since only one contemplates a water purification system, and the most used in Colombia in rural areas is oriented only to the supply of water, which does not guarantee the quality of the liquid and therefore cannot ensure that it is suitable for human consumption.

Keywords: Quality of life, sustainable development, rural population, rural environment, water quality

Resumen

Este artículo presenta un análisis reflexivo sobre los conceptos de acueducto rural y un sistema de suministro de agua, con el objetivo de identificar las diferencias entre los dos conceptos en Colombia, a través de una investigación documental. Se realizó la revisión documental validando su pertinencia, actualidad y exhaustividad, centrando el interés en aquellos documentos relacionados con los conceptos, la normatividad, aspectos técnicos y estadísticas. También se profundiza desde la importancia del acceso al agua potable para la población y la gestión adecuada del recurso hídrico, como se plantea en el objetivo 6 de los ODS. Entre los resultados significativos se resalta que estos dos conceptos son muy diferentes en cuanto a los aspectos técnicos para su diseño, ya que solo uno contempla un sistema de potabilización de agua, y el más usado en Colombia en las zonas rurales está orientado solo al suministro de agua, lo cual no garantiza la calidad del líquido y por lo tanto no se puede asegurar que sea apta para el consumo humano.

Palabras clave: Calidad de vida, desarrollo sostenible, población rural, medio rural, calidad del agua

Introduction

Water is a fundamental resource for life, that is why it is considered a fundamental right, therefore, the population's access to this precious liquid is vital for the survival of humanity. Unfortunately not all people in the world have access to water, according to the World Water Assessment Programme -WWAP of UNESCO (2019) more than 2 billion people live in countries suffering from severe water scarcity, and approximately 4 billion people suffer from severe water scarcity for at least one month a year, similarly UNICEF and WHO (2019), mention that about 2.200 million people worldwide do not have safely managed drinking water services and 144 million drink untreated surface water, Aldana & López, (2017) also reports data in the rural sector showing that 8 out of 10 people living in these areas lacked access to these services and for Colombia 37.2% of the rural population does not have aqueduct service coverage (DANE, 2018 as cited Minvivienda, 2020). (Aldana & López, 2017) important to clarify that in the rural area water is indispensable not only for personal and domestic use, but also for agricultural production; water for these uses mainly comes from surface water sources. Thus, it is essential to guarantee for the rural population the availability, accessibility, affordability and quality of water, so that it does not constitute a threat to a person's health. In Colombia, in rural areas, households in rural areas do not have adequate water supply or treatment systems, they resort to alternatives such as connections directly from rivers, lakes or deep wells (Delgado-García. et al, 2017, p. 64). From this panorama, it is essential to establish adequate technical processes to ensure proper water resource management, protection of water sources and quality of drinking water for domestic and personal use as established in Goal 6 of the SDGs, for Loboguerrero et al., (2018) and López-Bravo et al., (2021) clean water and sanitation it is important to identify the differences between rural aqueduct and water supply system contests in Colombia, which will allow improvements in the levels of planning, capacity

and financing at national and local levels, not only of the infrastructure project but also influences the protection of the environment.

To provide the rural population with adequate drinking water service Turbay et al., (2014) and Guerrero-Velasco & Apráez-Ippolito (2021) indicate that the following aspects must be considered: availability, (water source and quantity of water available), accessibility (delivery to the population) and water treatment (safe water free of agents harmful to health) (WWAP - UNESCO, 2019). Water supply systems in the rural area can be approached from two points of view, a community supply system or by conventional water supply and treatment systems (WWAP - UNESCO, 2019), being the most used the first of the systems; this system starts from the community management of water and the hydrological basin where the population lives, it is also related to the knowledge and cultural traditions of the community, the infrastructure in this case is common property and the water is distributed equitably (Delgado-Garcia, et al). According to Fernandez, et al (2013) in Colombia, rural communities in Colombia provide water in an artisanal manner, using natural water sources or with incipient community aqueduct infrastructures that collect water from surface or groundwater sources, and then conduct it to the users' properties through a conventional hose or using other rudimentary methods.

Materials and methods

This informative documentary research consists of a reflective analysis of the concepts of rural aqueduct and a water supply system, with the objective of identifying the differences between the two concepts in Colombia.

A documentary review was conducted to validate its relevance, timeliness and completeness, focusing on those documents related to concepts, regulations, technical aspects and statistics. Likewise, taking into account the considerations established in Goal 6 of the SDGs "Clean water and sanitation".

Three steps were developed:

- Sources were defined as UN Water, ODS in Colombia, United Nations Development Program, Hancar Ingeniería S.A.S. and databases, taking into account the relevance and timeliness of the documents.
- A record was kept of the sources consulted based on the APA 6 standard.
- Finally, the information obtained from the documentary sources was organized and analyzed.

Result

From the documentary review and the business experience of Hancar Ingeniería S.A.S., it is identified that in Colombia it is common to develop community supply systems in rural areas.

These water supply systems in rural areas are based on a water concession, which are regulated by the regional autonomous corporations, who monitor, regulate and authorize the intervention of water sources; for this it is essential to have a census of the beneficiary population, identify

the type of land use and the agricultural process in the region, this request can be made by a natural or legal person, associations and community action boards. Likewise, the costs involved in the development of the project must be established (design costs, paperwork, construction, etc.) and the design parameters must be validated according to the context and the water source. Due to the dispersion of houses in rural areas in Colombia, it is quite complex and costly for the communities to have adequate technical designs of the system supported by an expert. Another important aspect to consider is the quality of the water, but unfortunately this is little considered in the design, since there is no evaluation or analysis of the pathogens, heavy metals, among others that it may contain; therefore, the optimal conditions of the water and its suitability for human consumption are not guaranteed, (2020) For this water supply system to be optimal, community organization and empowerment of the territory is essential, because this way they can access resources to improve the conditions of the system such as the acquisition of the water treatment plant and routine maintenance.

The water supply systems in the rural area present a series of difficulties with the supply, among which are emphasized: access to the intervention area (due to topographic complexities), water use (separating the different water uses, human consumption and agricultural activities), continuity due to poor infrastructure management and maintenance, easement ownership (procedures, permits or ownership of the land), dispersion of dwellings (distance between the catchment and the dwellings increases the cost of the infrastructure), infrastructure sustainability (maintenance, contingency and improvement costs), cost of consumption (establish tariffs according to consumption) and specific public policy for rural aqueducts. These difficulties are also elements that must be addressed through research processes that allow the rural population to have access to an optimal and safe drinking water service, thus guaranteeing the universal right to water.

Conclusions

The difference between the concept of a rural aqueduct and a water supply system lies in the fact that the former includes a treatment plant and the latter does not, the latter being more commonly used in rural areas, in which community management and organization is fundamental, based on the certainty that the infrastructure is common property and the water is distributed equitably among the beneficiaries, in addition to being related to the community's knowledge and cultural traditions.

The water supply system in the rural area consists mainly of a catchment (intake, desander) and distribution, which is a very simple system, but complex to build due to the dispersion of houses in the rural area, in addition to increasing the cost of the work. It can also be mentioned that it fully complies with the first two aspects that must be considered in the design of a drinking water supply system (availability, accessibility and water treatment).

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