
La valoración de los recursos hídricos desde la perspectiva de universitarios

The valuation of water resources from the perspective of university students.

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Abstract: Applying the importance of the Peruvian Amazon in the environmental field, the objective of the research was to explore the knowledge that students of the National Agrarian University of La Selva have about water resources. The research was qualitative in approach and a semi-structured interview was applied to seven key informants, composed of two professionals and five university students. The findings show that the students contacted have knowledge and some experience on the subject, as well as the need to integrate efforts at the institutional, student and community levels to obtain better results in the management of water resources in the area.

Key words: Water resources; Peruvian Amazon; Environmental public policies; Student knowledge.

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Keywords: Water resources; Peruvian Amazon; Public policies in the environmental area; Student knowledge.

Introduction

Latin America is a paradoxical region, since it presents a great singularity in its actions. It is an area where the deterioration of the environment is progressing rapidly, demonstrating with this situation a lack of knowledge in the efficient application of its water preservation purposes. Four basic aspects are linked: collection, treatment, distribution and recovery. As a sign of its progress, the region has professional, technological and technical training programs.

In this regard, Esteban and Mayorga (2022) highlight the importance of considering the evolution of population growth and the use of resources in order to know their impact and

be in a position to establish management strategies, especially at the level of river basins. This observation derives from the dependence between the state of conservation of these spaces and the dynamics that develop in them, reflected in diverse ecological and environmental interactions, where the urban factor also converges, with its consequent socioeconomic, cultural and geopolitical effect.

In this way, water pollution or deterioration can be controlled through good management of wastewater and waste produced by economic activities directly related to the use of soils (e.g., farms and plantations).

Efforts must be joined to achieve a general awareness to change the consideration of water as a resource that renews itself in an unlimited way, since reality has shown that it is a scarce resource, vulnerable both to its use and to climate changes, thus meriting an effective management to guarantee its health, availability and sustainability, as expressed by Morales-Pérez et al. (2020), who also add that

Water resource management seeks to guide the development of public policies in matters of hydrocarbon resources, in order to maximize social, economic and social welfare and the protection of ecosystems. Water, land and related natural resources are used in a coordinated manner (p. 189).

In relation to the above expressed, Martinez and Villalejo (2018) Academically, it is required to train professionals in the area of integrated water resources management (IWRM). Through principles based on environmental education, it has even come to speak of water awareness, defined as a set of values, belief, attitudes and common behaviors (Marlés-Betancout et al., 2021).

IWRM is linked to an awareness process that seeks to correct the effects of human interaction with nature, with emphasis on the protection of water. In this sense, the purpose is to achieve that the collective internalizes a sense of appropriation and belonging directed towards actions for the protection of water spaces in their environment. IWRM is linked to an awareness process that seeks to correct the effects of human interaction with nature, with emphasis on the protection of water. In this sense, the purpose is to achieve that the

collective internalizes a sense of appropriation and belonging directed towards actions for the protection of the surrounding water spaces. IWRM is linked to an awareness process that seeks to correct the effects of human interaction with nature, with emphasis on the protection of water. In this sense, the purpose is to achieve that the collective internalizes a sense of appropriation and belonging directed towards actions for the protection of the surrounding water spaces.

This IWRM construct is linked to an awareness process that seeks to correct the effects of human interaction with nature (Isaziga et al., 2019). It is thus necessary to develop work aimed at curbing, reversing or confronting the damage done to the environment. This leads to rethink the relationship established with the environment.

The fragility and vulnerability of the Latin American geography and its biodiversity is also affected by elements such as climate change and the socioeconomic aspects of each of the countries that comprise it, which increases the risk index in the conservation of its natural resources (Ordóñez-Díaz et al., 2018).

Peru and the educational field of water resources is a scenario that is replicated in the region and Peru does not escape from it, and this situation is perceived as an invitation to investigate the problem of valuation offered by UNAS students. UNAS is the National Agrarian University of La Selva (UNAS) taking into account the concept of Integrated Water Resource Management (IWRM).

Development

Water challenges

The water problem is not limited to delimited spaces; on the contrary, it constitutes a matter of global interest due to the fact that the population increase, with its respective socioeconomic development and the modalities of consumption of this resource show signs of its growing demand and, as a consequence, of situations of scarcity. In this regard, both the United Nations Organization (2018) and WWAP (2019) show impact figures; according to their research, about two million people live in territorial areas where water presents high levels of scarcity, to which are added about four million who do not have the water service

at least once a month, while 22 countries have been diagnosed, given their water possibilities, in a situation of high severity.

To further complicate this picture, projections estimate an increase in water demand by 2050 of 20 to 30% more worldwide, as a result of the growth of the domestic and industrial sectors, compared to current rates, which correspond, according to WWAP (2019), as follows: 69% for the agricultural sector, 19% for the industrial sector and 12% for the domestic sector; to this is added that the World Health Organization (WHO, 2017) estimates a consumption of fifty liters per day of the water resource per person to cover their basic requirements.

A look at Latin America's reality

Eight nations in the Amazon region cover about 7.4 million square kilometers and constitute a vast hydrographic basin worldwide. The Amazon is a territorial extension shared by eight nations, with an impact on water and climate cycles (Marlés et al., 2020), part of which belongs to the Peruvian geography. Assume that the water resource of flora and fauna or any alteration on that area may cause in an area that had been considered as natural, economic and socio-cultural heritage. Perceiving it with a sense of greater sensitivity allows detecting its vulnerability, given the influence or seriousness of damage. In this sense, it is necessary to recognize and assume that the water resource must be treated with care and avoid thinking that its abundance cannot affect humans.

Similarly, and in line with Sustainable Development Goal No. 6 proposed by the United Nations (2018), Peru has the Water Resources Law, known as Law 29338 (2019), which establishes the regulation of the use and management of surface, ground, continental, maritime and atmospheric water for the efficiency and sustainability of these resources. Water is a basic factor for life and, consequently, for the development of humanity, in addition to the fact that it is scarce in various community sectors for which controlling its consumption has become an element of permanence or migration. It points out the role of the actors involved, both governmental and private, with the purpose of promoting a water culture.

This scenario allows understanding the need to have an adequate administration of the resource so that it can be used by as many people as possible, an aspect that involves giving way to an efficient administrative management, where responsibilities are shared and adopted according to the accounting, conservationist and optimized use factors required (Anampi et al., 2018; Martínez and Villalejo, 2018). At the same time, it should allow overcoming what is considered the root of the problem: the lack of knowledge and awareness of people of the value of water to guarantee life (Marlés et al., 2020).

University training in the environmental area

The construct environmental education emerged in Belgrade from the International Colloquium on Environmental Education and was established in Tbilisi. Initiatives are known to include the element in the design of their curricular programs. Several of them respond to public policies established in their countries of origin.

It should be noted that the mentioned public policies are currently linked to the Sustainable Development Goal N°6 proposed by the United Nations Organization (UN, 2018), which highlights the benefits of investment and education on water resources, extrapolating its fulfillment in the insertion of environmentalist topics in the curriculum of the various educational levels. In this context, the creation of internal and external spaces is expected to put into practice pedagogical tasks that are transformed into individual and group pro-environmental actions capable of producing changes in the communities (Isaziga et al., 2018).

It is a society concerned about ecology and environmental sustainability, instructing students in the responsibility of caring for the environment. It is aspired to have professionals capable of projecting feasible actions to be implemented through community and institutional projects (De los Angeles, 2018).

Environmental training is a process that allows teachers and students an awareness of the conservation of resources obtained from nature. Pulido and Olivera (2018) express that the approach with the pedagogy adopted in university institutions, given that an effective model is required.

The presence of traditional approaches represents an obstacle to the achievement of the objectives proposed by international organizations. This situation does not detract from the contributions of the strategies that have been implemented in the region. In addition to providing changes at the public policy level, they have facilitated formative adjustments. WHO (2017), UN (2018) and WWAP (2019).

Water information helps us to change attitudes and cultural changes that benefit responsible water use, which, in turn, will optimize its availability. Similarly, inquiry will allow us to determine whether it is considered a priority issue for university students because it is possible that the position of the educational limitations in this regard is reflected in a lack of citizen awareness in the ways of using it.

Environmental information is a vital liquid for the development of an environmental culture that makes it possible to reduce the impact on water resources, tasks that should be supported by governmental entities, as is the case of the ministries of the environment (Orgaz-Agüera, 2018).

Methodology

To develop the study, carried out from a qualitative approach, a semi-structured interview was designed and applied to university graduates and students related to UNAS, to learn how they value water resources, the results of which were reviewed and analyzed with the support of the Atlas.ti program. A total of seven contacts were made (with prior informed consent), two at the professional level (one UNAS professor and one ALA functionary) and five at the student level.

Through the interview, aspects related to water, its use, the problems that affect its availability, quality and quantity, as well as the actions that they consider are implemented by the universities to improve this situation and, if not, what actions should be taken and put into practice by these institutions. In this way, it was possible to know what importance they give to water resources, what problems occur in their region and what they know about how they should be managed and who should be in charge of this administrative process.

Findings and discussion

The perspective of university students with respect to the valuation of water resources is illustrated in Figure 1, which shows the categorization of the findings derived from the interviews with a UNAS professor and an ALA functionary.



Figure 1: Categorization of the findings derived from the interviews with a UNAS professor and an ALA functionary.

Professional perspective

Regarding the institutional and academic contribution in the Tingo Maria region, this collaboration is active. The interviews conducted corroborated that there is a joint effort to raise awareness among all stakeholders that the preservation of water resources requires joint work, as stated by Morales-Pérez et al. (2020). According to the university teacher interviewed, "...from the academic point of view, there are careers, professional schools that consider in their curriculum courses related to water resources management, especially the professional career of soil and water conservation...".

The environmental aspect is considered and included in the curricula of the careers offered by the National Agrarian University of La Selva. The development of these curricula considers the incorporation of student groups, even from different careers, in order to have different topics or lines of research. Thus allowing an integral vision of the analyzed problematic.

For the ALA functionary, it is important to highlight that the university "...has signed an agreement with the National Water Authority (ANA) in the aspect of interns or graduates, in the sense that they can carry out their internships, knowledge...", so that the university institution can also provide them with some guidance regarding the quality of resource management. Through the agreement, "...the trainees have... facility with the water center

theory. There they come, let's say the students come on Saturdays and learn about the quality of water resources, the quantity, what are the functions of the National Water Institution".

On this occasion, governmental entities and volunteers from the university itself participate in environmental care activities with calls for participation from all over the country.

Esteban and Mayorga (2022), who emphasize the importance of establishing joint management strategies. Where students, teachers, personnel of governmental institutions and communities can converge. Emphasizing the execution of actions in river basin areas.

Water Day is a day in which awareness campaigns are organized on our line for the valuation and importance of water resources, physical, soil, flora, fauna, the environment of nature in its integrity. While from the institution he represents is organized anniversary with students and the same community, taking as an example the activities that are developed for the Water Day.

Contributions of Pulido and Olivera (2018), Isaziga et al. (2018) in reference to the training provided in educational institutions and the need to have internal and external spaces to put into practice what is learned at the institutional level.

Subjects on water resources management at the National Agrarian University of La Selva are part of a 100% interest, according to the university teacher. "You see the potentialities, you see indications and you see how to manage them," the professor added.

"When they go out to the field...in the theses themselves, there is experience that has considered the integrated management of water resources as a basis, as a line necessarily for any line of research area. Understanding that effectively, the location of UNAS, its geographical location, is a privileged location...where we have a potential in water resources".

For the representative of the public institution, the interaction with the students has allowed him to notice that they know a lot about the subject, as well as about the institution (ALA), its functions, and the dates dedicated to environmental issues, adding that

"...there are students who are already promoting the issue of integrated water resource management...", which is also manifested in their presentations to the community, adding that "...they have become quite integrated...there is an environmental volunteering for water...in the surroundings, for example, there are always students who are there..., they are almost 100% of the La Selva University, we interact with them...".

Regarding the aspects to improve from the university, although there are some inter-institutional agreements, it is perceived that it is necessary to strengthen actions considering the different actors involved to strengthen the actions carried out, as expressed in the Peruvian Water Resources Law, known as Law 29338 (2019), in order to raise awareness in the communities about the need to preserve this resource, as stipulated in the objectives set out by organizations such as the WHO (2017), UN (2018) and WWAP (2019).

As well as strengthening the agreements so that there are options for internships and exchanges between teachers and students from other universities, the teacher said that the product that the university institution has should be valued.

Continuing with the presentation of the findings, the students' perspective regarding the valuation of water resources is shown in Figure 2, which shows the categorization of the information collected from the interviews.

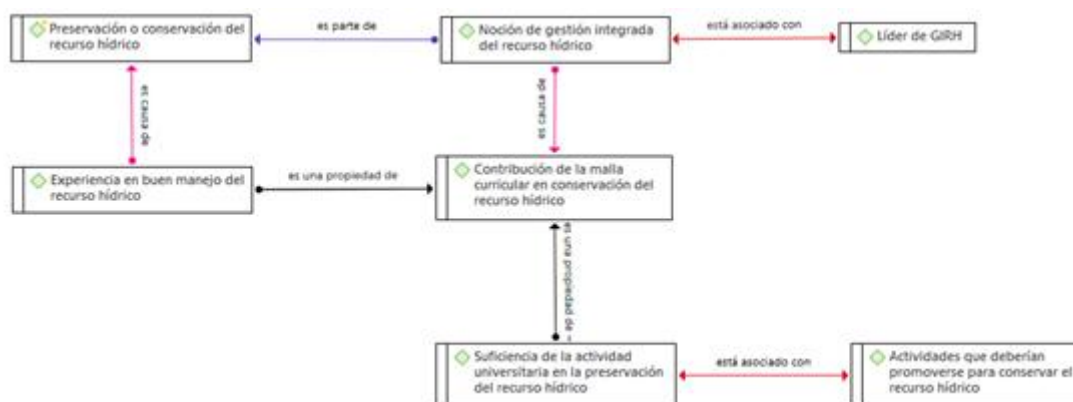


Figure 2: Categorization of the information collected from the interviews.

Student perspective

In reference to the notion of integrated water resource management, the answers provided by the students are presented in Table 1, highlighting that, as expressed by the professionals interviewed, they have knowledge about IWRM, the need for joint work and notion of the existence of a Peruvian legislation (Law 29338 of 2019) covered by the agreements of the United Nations Organization (2018) and WWAP (2019).

Tabla 1: Noción de gestión integrada del recurso hídrico.

Estudiantes	Respuestas
EstAR	"Creo que es un programa para poder implementar y monitorear claramente con leyes, con políticas que preserven este recurso".
EstBM	"...un manejo sostenible del recurso hídrico, ya que si bien se ha limitado para que pueda ...este... abordar una gran demanda en caso de población, sobre todo tipo de agua. Y tenemos que, no sé, darle a una población de 400 - 500 personas, y eso es apenas un ojo de agua pequeño".
EstGJ	"...yo entiendo un conjunto. Como un conjunto para poder conservar...los recursos naturales, como en este caso es el agua, que es muy importante para muchos".
EstJV	"Al respecto, tengo un conocimiento básico, que la gestión del recurso hídrico se orienta a garantizar la sostenibilidad de este recurso a través del tiempo. Es solo, en términos generales. Ese es mi información".
EstOA	"Gestión... a ver...No se estaría equivocando, pero va más o menos sobre la sostenibilidad con que se puede extraer el agua buscando el bienestar ambiental, social y económico... Integrada sería como hacer un trabajo en conjunto. Hacer un trabajo coordinado con las autoridades correspondientes con la población".

Student concern highlights the possibility of training professionals capable of implementing community and institutional actions to improve the quality of life (Table 2). De los Ángeles (2018) exposes of conforming a society that advocates in an interdisciplinary way for the environment.

Table 2: Preservation or conservation of water resources

Estudiantes	Respuestas
EstAR	"...según el conocimiento que tengo, no hay un manejo de conservación del agua...Hay algunas comunidades dentro de Leoncio Prado...que no cuentan con un recurso de agua potable..., es difícil, incluso porque allí no tenemos una conservación correcta de lo que es el agua".
EstBM	"No hay mucha conciencia ambiental de parte de la gente, porque no hace mayor cosa. La gente no llega a entender el problema, no la magnitud en este caso, afirmaron."
EstGJ	"... "No sé, para que pase el camión recolector y retire lo orgánico", señalaron los del río Guayaba en Tingo María. "Habrá una pequeña fila única que pasa y también prohíben botar la basura".
EstJV	Mayor: "Hay un uso indiscriminado, diría yo, no de la forma en que he visto en las ciudades, donde si se ahorra, cuidan, porque le afecta directamente al bolsillo".
EstOA	No se busca una medida para al menos mitigar el impacto. Creo que eso no se está previendo todavía. "Toda el agua desemboca en la misma quebrada".

From the student perspective on IWRM leadership, whose result is presented in Table 3, the approaches of Anampi et al. (2018), Martínez and Villalejo (2018), Marlés et al. (2020) are confirmed, referring to the need to have an adequate management of the resource that is characterized by an assignment and adoption of roles that allow adapting water use to sustainability guidelines and community awareness.

Table 3: IWRM Leadership.

Estudiantes	Respuestas
EstAR	"...por lo que sé, el que libera, es una institución nacional del agua. Tenemos el ALA. Yo pienso que debería también integrarse a las municipalidades a lo que es el sector agrario, precisamente porque tiene mucha influencia en lo que es el uso del agua también, sobre el manejo de gestión de lo que es el recurso".
EstBM	"...la verdad, no estoy muy al tanto. Pero mayormente he visto que entra el ANA y que está el ALA, he escuchado. No tengo mucho conocimiento. Del ANA he escuchado más en temas de recursos hídricos y cuando encuentran pozos acá de pequeñas fuentes de agua o de afluencia de agua lo que es ANA entra a ver esa parte".
EstGJ	"...todos, porque con todos podemos hacer que las áreas naturales puedan ser conservadas, pero en este caso del agua, creo que se da para las empresas, que es donde pueden dar a conocer como es el ambiente mediante charlas o la importancia que tiene, para así poder nosotros también ayudar a conservar".
EstJV	Creo que los gobiernos locales deberían ser los responsables o debería partir de allí. Porque, ANA me parece que, desde mi óptica, está un poquito concentrada en la capital o en las principales ciudades.
EstOA	el mayor responsable del agua en Tingo Maríadebería haber una participación también de las municipalidades y de la universidad, así como ente de enseñanza, para poder hacer algún tipo de explotación con recursos hídricos.

The curriculum in water resource conservation can help you by achieving water awareness through the satisfaction of these requirements. Martínez and Villalejo (2018), as well as Marlés-Betancout et al. (2021), highlight the need to train professionals in the area of integrated management of these conciliatory actions between development and environmental preservation.

Conclusions

The findings highlighted the need to further relate the university curriculum to local issues, so that it extends to each of the careers offered by UNAS. The request for the inclusion of these aspects can expand the opportunity to have professionals trained to implement an integrated management and make it possible to achieve the objectives related to water care.

Bibliographic References

- Anampí, C.; Aguilar, E.; Costilla, P. y Bohórquez, M. (2018). Gestión ambiental en las organizaciones: análisis desde los costos ambientales. *Revista Venezolana de Gerencia*, 23 (84), pp.928-939.
- Autoridad Nacional del Agua (ANA). (2019). *Ley de los Recursos Hídricos: Ley N° 29338*. <https://repositorio.ana.gob.pe/handle/20.500.12543/4791>
- De los Ángeles, R. (2018). La educación ambiental basada en un enfoque por competencias. *Con-Ciencia Boletín Científico de la Escuela Preparatoria*, 5(9). <https://www.uaeh.edu.mx/scige/boletin/prepa3/n9/e2.html>
- Esteban, J. y Mayorga, J. (2022). Crecimiento poblacional, cambio de uso de suelo y su impacto en los recursos hídricos en la cuenca del río Ica, Perú. *Revista Científica Multidisciplinar*, 6(3), pp.1485-1502.
- Isaziga, L.; López, M. y Huertas, L. (2019). *Pedagogía de la tierra como elemento dinamizador de la conciencia ambiental* (Tesis de maestría). Universidad Cooperativa de Colombia.
- Marlés, C.; Rojas, G. y Correa, L. (2020). Actitudes ambientales hacia la gestión hídrica: estudio de percepción en la Universidad de la Amazonia – Colombia. *Espacios*, 41(35), pp.213-228.
- Marlés-Betancourt, C.; Hermosa-Guzmán, D. y Correa-Cruz, L. (2021). Fomento de la conciencia hídrica en estudiantes universitarios mediante un juego como estrategia didáctica. *Revista de Investigación, Desarrollo e Innovación*, 11(2), pp.361-372.
- Martínez, Y. y Villalejo, V. (2018). La gestión integrada de los recursos hídricos: una necesidad de estos tiempos. *Ingeniería Hidráulica y Ambiental*, 39(1), pp.58-72.
- Morales-Pérez, D.; Mancheno-Saá, M. y Gamboa-Salinas, J. (2020). Administración hídrica eco sustentable: Una perspectiva necesaria en la gestión de recursos no renovables. *Revista Científica FIPCAEC (Fomento de la investigación y publicación en Ciencias Administrativas, Económicas y Contables). Polo de Capacitación, Investigación y Publicación (POCAIP)*, 5(5), pp.182-198.

- Ordóñez-Díaz, M., Montes-Arias, L. y Garzón-Cortés, G. (2018). Importancia de la educación ambiental en la gestión del riesgo socio-natural en cinco países de América Latina y el Caribe. *Educare*, 22(1), pp.1-19.
- Organización Mundial de la Salud (OMS). (2017). *Progresos en materia de agua potable, saneamiento e higiene: informe de actualización de 2017 y línea de base de los ODS*. washdata.org/sites/default/files/documents/reports/2018-01/JMP-2017-report-final.pdf
- Organización de las Naciones Unidas (ONU). (2018). Sustainable Development Goal 6 Synthesis Report 2018 on Water and Sanitation. <http://www.unwater.org/publications/sdg-6-public-dialogue-report/>
- Orgaz-Agüera, F. (2018). *Educación ambiental: concepto, origen e importancia. El caso de República Dominicana*”. *Revista DELOS Desarrollo Local Sostenible n. 31*. <https://www.eumed.net/rev/delos/31/francisco-orgaz.html>
[//hdl.handle.net/20.500.11763/delos31francisco-orgaz](http://hdl.handle.net/20.500.11763/delos31francisco-orgaz)
- Programa Mundial de Evaluación de los Recursos Hídricos (WWAP). (2019). *Informe Mundial de las Naciones Unidas sobre el Desarrollo de los Recursos Hídricos 2019: No dejar a nadie atrás*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000367304>
- Pulido, V. y Olivera, E. (2018). Aportes pedagógicos a la educación ambiental: una perspectiva teórica. *Revista de Investigaciones Altoandinas*, 20(3), pp.333-346.