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Public policy guidelines on multiple water uses for the Andean rural area Colombian

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Abstract: In rural Andean areas of Colombia, peasant families carry out productive subsistence activities that facilitate their survival, but also contribute to the country's food security and sovereignty. Families, in order to carry out these activities, require water supply systems that meet all their water needs. This chapter includes public policy guidelines for the planning of what is known as multiple-use water services, which should be considered as a State action to support and demand peasant activities. The guidelines include principles, objectives, and their respective strategic lines for the strengthening of peasant activities.

Keywords: Colombian Andean rural areas, food security and sovereignty, Multiples uses services, productive subsistence activities, public policies.

1. INTRODUCTION

Public policies are responses to the demands and requests of society, and their implementation is the way in which government actions are oriented in all aspects that concern the welfare of the population (Dye, 2008 [1], Kraft et al., 2006 [2]). Public policies, being the object of study and action, are a field of interdisciplinary approach, where the meeting of professionals from different disciplines takes place in order to analyze, design, plan, evaluate, and implement government actions. In addition, it is essential to start from the needs of the same social groups to whom these public policies are going to be directed, in order to carry out the implementation of real, viable and sustainable projects.

Colombia is a social State of law and in this sense, public policies refer to different sectors or subjects: education, social development, health, public safety, infrastructure, communications, energy, agriculture, environment, etc. According to the Colombian National Political Constitution, the decisions, framed in public policies, must be taken in order to serve the community, promote prosperity in general, and consequently, to favor all Colombians and to reduce inequalities. It is remarkable that public policies tend to advance towards equity, understanding it as equal opportunities, as the possibility that each person has the ability to achieve the life they want, such as access to resources that each individual requires to reach its goals not in equal amounts but in proportion to what it requires (Anand et al.[3], 2000; Sen, 1973 [4]). Through public policies, all human activities are regulated, including those related to the environment, whose main criteria for its formulation are: ecological sustainability; caution; human rights; equity; effectiveness and legitimacy; stability, dynamism and adaptability; participation; economic efficiency; right to development; economic sustainability; interdisciplinarity, complexity and transversality; and ecoregional specificity (Pérez et al., 2010 [5]).

However, although public policies are a response to the needs of the population, subjectivities are also presented in their formulation. This is the case of public water policies in Colombia that are designed according to the needs of the water resources of the people who live in urban areas, ignoring the specific needs of peasant families in rural areas. These families, in addition to domestic activities, carry out productive subsistence activities on which their livelihood and food sovereignty and security depends, since they are the ones who produce the food of the entire population of the country (Restrepo, 2010 [6]). To do this, they require that rural water supply systems provide them with water to supply all their needs (Restrepo et al., 2010 [7]). In this sense, this chapter includes guidelines that promote the planning of multiple-use water systems for the Colombian Andean rural area.

In Colombia, public policies are constructed following a structure that includes principles, objectives and lines of action (MAVDT, 2010 [8]). The principles are the guiding basis of public policies and contain the general guidelines that are promoted with the policy. The objectives are those achievements that are expected to be achieved with the application of the policy and the strategic lines mention the practical way how the objectives will be achieved. Once a public policy has been formulated, it is regulated for its practical application by the corresponding organizations. The public policy guidelines for multiple uses of water proposed in this chapter are oriented in the same didactic way in which public policies are constructed in Colombia, for which they include principles, objectives and lines of action for the promotion of activities productive subsistence through the use of domestic water supply systems.

2. METHODOLOGY

The formulation of public policy guidelines for multiple uses of water considered a characterization of productive subsistence activities of rural families in the Colombian Andean rural area (Fig. 1), for which information was obtained through household surveys of families of municipalities in the departments of Valle del Cauca, Cauca, Risaralda and Cundinamarca. 9585 data were obtained with information on the planting areas of the farms and the number of animals that the families have, socioeconomic aspects, uses, and water sources.

Figure 1. Departments of the Colombian Andean zone from which information was obtained for policy guidelines for multiple uses of water

Additionally, experts were consulted on the management of water supply systems that supply the liquid for productive subsistence activities. For consultation with experts, we had the database of the members of the MUS Group, an international group, with professionals from all parts of the world using the supply systems for productive subsistence activities. This group is made up of 320 people of different professions and jobs and was created for the continuous interaction and generation of information on the subject. The group maintains continuous contact through virtual information networks and its developments are presented on the website www.musgroup.net. The people who participated more and who have shown more leadership in the dynamics of the group were invited.

Additionally, experts in Colombia that have an impact on the subject were invited to participate, either because of their work in entities that work in water supply, regulation, control or public policies, among others, as in communities solving the daily problems that arise by the lack of regulation around multiple uses. In addition, there was the participation of community leaders, through a representative of an association of organizations that provide services to families with multiple activities.

Once the experts were selected, the query was made using the Delphi Method. This is a structured method to collect systematic information from expert judgments about a problem. It allows to process information through statistical resources and to build a general consensus of the group and to transform the individual assessments of researchers into a higher collective judgment (García y Suárez., 2013 [9]). This method is based on some basic principles: the process is iterative in different rounds of consultations; it requires feedback from the experts; it requires the anonymity of the answers and has the purpose of building a consensus. In the consultation with experts, we inquired about the conditions that characterize a multiple use system, as well as the different aspects to be taken into account in a public policy on this topic. It is estimated that the group for application of the Delphi Method must be made up of a minimum of 7 people and a maximum of 30 experts in order not to lose the statistical reliability of the results (Landeta, 1999 [10]).

For the consultation by the Delphi Method, forms were constructed with the questions (versions in Spanish and English) using the Google platform, which allowed easy access to participants and a free service for research. The application of the consultation to experts was done in two rounds of questions and answers by sending the form via email. In the first round, general characterization questions of the multiple use systems

were asked, and in the second round, in addition to feedback on the dynamics with a summary of the answers from the first round, the questions were asked in which there was no consensus and the structural conditions that a public policy of multiple uses of water should integrate. In the application of the Delphi Method, 15 experts from different institutions and communities of Colombia and the world participated anonymously.

Consequently, the public policy guidelines shown in this chapter are a combination of the results of the characterization of the activities for the Colombian Andean zone and the suggestions by the experts. This combination was made based on the result that, according to the investigative experience in the subject, is closer to the reality of rural Andean peasant families in Colombia. In this sense, there are guidelines (mainly those that delimit the magnitudes of subsistence activities) that are based on the results of the characterization and others on the comments by the experts.

3. RESULTS

The policy guidelines for multiple uses of water contribute to the vindication of the traditions of rural peasant families that base their way of life on the work of the land and their intra familial relations and with their territory. However, they emphasize the acceptable magnitude of productive activities carried out by families to guarantee their support. In this sense, these guidelines particularly promote the use of water as a fundamental input for the productive subsistence activities by the families and contribute to the acceptance of the use of systems of domestic supply systems for such activities.

The policy guidelines for multipurpose activities involve the confluence of diverse actors and agents with a diversity of expertise. The application of these guidelines should be based on inter institutionality and inter disciplinarity at its maximum expression. It is necessary the participation of entities of all levels and to attend technical, social, economic-productive and family aspects to achieve the strengthening of rural peasant families.

The guidelines promote the virtue of recognizing models of production that do not go in the line of maximum production, but contribute to the support of rural peasant families through the application of sustainable production methods that have transcended from generation to generation. Additionally, they move away from monocultures by planting and breeding a wide variety of foods and animals. This promotes the country's food security and sovereignty. In this same sense, supply systems are promoted for multiple uses, but without ignoring the importance of the efficiency of the systems. Artisanal and novel systems that promote the use of alternative sources, as well as the reuse of water, when necessary to complete the demand for water for the various uses of rural peasant families, are admitted.

The public policy guidelines are focused on principles, objectives and strategic lines. The principles are the fundamental basis on which the guidelines are based and all have the same hierarchy. The objectives indicate the great goals to achieve with public policy and the strategic lines indicate the direction towards which the actions to be developed should be pointed. Fig. 2 shows graphically the principles, objectives and strategic lines that make up these policy guidelines.

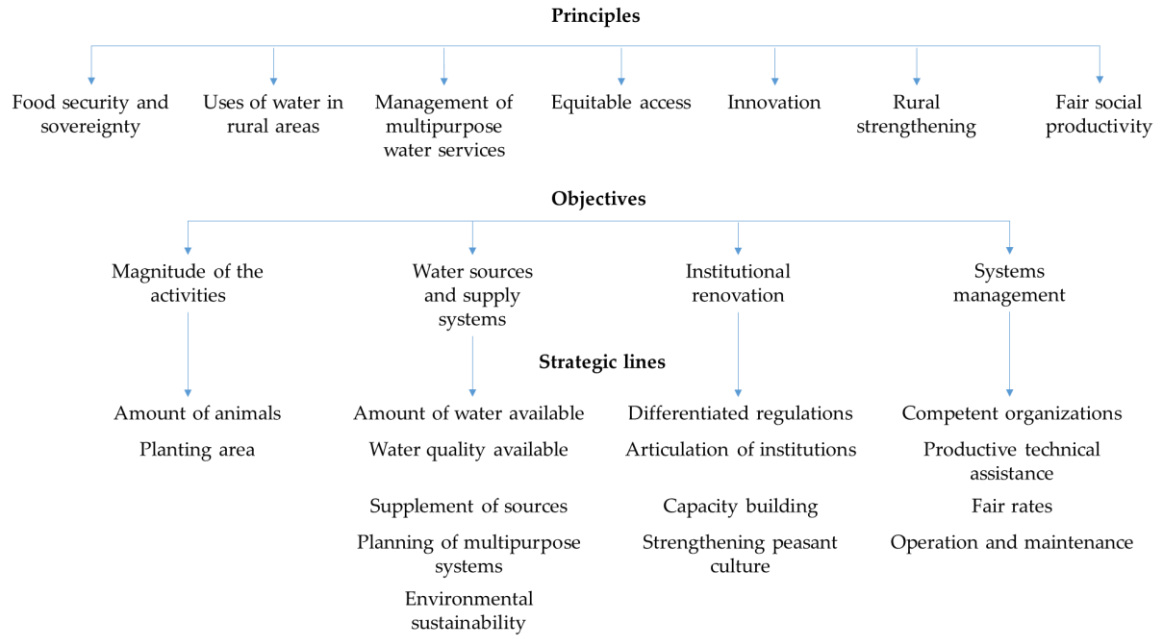

Figure 2. Outline of public policy guidelines for multiple uses of water

3.1. PRINCIPLES

The public policy guidelines are composed of some fundamental principles to guarantee access to water for domestic and subsistence activities in rural areas. These principles are the essential characteristics that must be met for multiple use systems to exist.

Food security and sovereignty

The sum of the production of food in the national territory must be in sufficient quantity and variety to satisfy the nutrition and nutritional needs of the entire population, without relying on international commercial activities. The availability of land and water in the country allows guaranteeing the food production for the Colombian population, in addition to helping to promote the skills and knowledge of Colombian peasants with respect to food production and promotes personal skills from generation to generation. The production of food in the country should also contribute to the conservation of ancestral knowledge in relation to the usefulness and benefits of the agricultural products that are harvested, both for the feeding of the population, and for use as medicinal alternatives. Additionally, the production of a great variety of foods is necessary in order to ensure good nutrition of the population by accessing and ingesting the products that meet the caloric, energy, and vitamin needs of each person. This is how the National Constitution (1991) in its Article 65 states that priority will be given to the integral development of agricultural, livestock, fishing and forestry activities, as well as the construction of physical infrastructure works and land adaptation for meet the requirements of food production; but without forgetting that the production of food completely depends on access to water.

There must be joint work between the institutions of the sector that deals with agriculture and animal husbandry, housing, and care of the environment; in addition to a joint work between the different professionals of the sectors and the communities, to reach the objective of guaranteeing food security and sovereignty for the population.

Uses of water in rural areas

The domestic and productive subsistence activities that rural inhabitants have must be supplied with the water they need to make them. Supply systems must have the capacity to supply water to all activities, for which all available sources and technologies must be used, and considering the water quality required for each use.The uses of water accepted in the rural area are: human use, domestic use and use for subsistence agricultural and livestock activities. These uses should not be considered as commercial or industrial uses.

Management of multipurpose water services

The provision of water services for multiple uses must be supported by an organization with the installed capacity to meet the needs of the population, both domestic and productive subsistence. These capabilities must include the possibility of managing resources for investment in new systems, extensions, repairs and / or advisory services. This is how organizations should be made up of the right people and committed to carry out their work.

Equitable access

The entire rural population of the country should have the possibility of accessing water systems for multiple uses according to their domestic and subsistence activities and their needs. The supply systems must guarantee access to water for each member of the community, this implies having knowledge of the particular activities carried out by men, women, and children. The systems must be designed considering the physical characteristics that differentiate each gender and its capabilities.

Innovation

The multiple-use water services must be constantly evolving around actions that promote greater efficiency in the provision of services, from the points of view of the technical, organizational, productive, and social aspects, and its relationship with other natural resources. The technical designs of the systems must consider the necessary adjustments for the efficient use of water. Community organizations must be made up of suitable personnel for their purpose, and be in constant strengthening of their capacities.

Rural strengthening

Rural communities must be able to understand the management of the multiple-use systems that serve them, both from a technical and organizational point of view, as well as their relationship and influence on natural resources. It is necessary to permanently sensitize the communities about the use of water, environmental sustainability, and the functioning of the supply systems. In addition, the communities must

comply their obligations in relation to the systems, as well as have the right to know the details of their management.

Fair social productivity

The greater productivity of community subsistence productive systems should be promoted through better agricultural practices, but promoting peasant practices related to multicultures and food sovereignty and security. The increase in productivity cannot lead to the deterioration of cultural traditions and natural resources and, in cases where it is necessary, peasant wisdom must be recovered.

3.2. OBJECTIVES OF THE POLICY GUIDELINES

General objective

Promote the welfare of peasant families by claiming their right to perform productive subsistence activities through the use of domestic water supply systems.

Specific objectives

Define the magnitude of subsistence activities supported by the community water supply system.

The size of the productive activities of the rural communities must be of subsistence, that is to say, activities that allow to guarantee the family feeding and income to acquire the products of the family basket that are not produced in the properties. It should be taken into account that the magnitude of these activities varies in the different areas of the Andean region.

Define water sources and supply systems

The definition of water sources and types of supply systems to achieve multipurpose services are the technical component of the policy guidelines. Multipurpose water systems can be supplied by various water sources, such as surface water, groundwater, rain and treated wastewater, among others. Each supply system can have more than one water source and technical studies must be done to design systems capable of supplying water from several sources. It must be taken into account that water storage systems, both collective and individual, are very important for the operation of multiple use systems. In addition, the treatment of water must be differential depending on the quality required for each use, ranging from raw water supply for activities that allow this quality to even disinfection at the household level for water for direct human consumption. The definition of the treatment necessary for each use and the way this treatment would be done must consider the health risks of both humans and ecosystems and must deliver the quality required for each type of water use.

Promote institutional renewal

The institutions responsible for water supply for domestic and productive activities must work jointly to meet the needs of both sectors in a joint manner. If necessary, the necessary restructuring that leads to joint work should be made, and the officials should be able to converge on domestic and productive issues. The need for training at all levels on the subject of multiple uses of water is highlighted.

Strengthen the management of systems

Multi-use water systems must be managed by organizations structured to provide domestic water service and to accompany users in the use of water for their productive subsistence activities. Organizations must be able to provide efficient services for all activities.

3.3. STRATEGIC LINES

The strategic lines are those actions that are proposed to achieve the proposed objectives. Each objective has its corresponding strategic lines.

Objective: Magnitude of the activities

Domestic activities are established as those that take place inside dwellings such as cleaning and human consumption. However, it is necessary to define productive subsistence activities. For the purposes of water uses, the definition is directly related to the magnitude of the activities, since the services of multiple uses of water do not contemplate activities of a commercial or industrial nature. Any activity that exceeds the magnitudes specified below should not be classified as subsistence productive activities or multiple uses, which should be governed by the rules for large producers.

Planting area

The sowing of crops considered subsistence is related to the area of the land used for this purpose. It is considered that the size of the acceptable area for planting crops as a subsistence productive activity is a maximum of 9,798 m^2, approximately 10,000 m^2 (1 ha.) To provide water as multiple uses for subsistence activities, any size of area is accepted below this limit.

Amount of animals

The number of animals that is considered as subsistence activity varies depending on the type of animals. With respect to the breeding of animals, it is acceptable to deliver water as multiple uses for subsistence activities to any number of animals that does not exceed 1.43 livestock units.For both the planting area and the number of animals, a variation factor that depends on the area of the Andean region where the guidelines apply may be applied. This factor must consider the availability of water, the availability of land, the climate, the type of productive activities, and culture. Its effect is to allow larger areas or more animals than those established in this document or, on the contrary, make a greater restriction of these magnitudes according to local conditions.

Objective: Water sources and supply systems

Amount of water available

Water supply for multiple uses of water must recognize the differences in water availability of the watersheds. Then, it is necessary to make analysis of availability of each available source for the supply of multiple uses of water in the rural area.It is estimated that the provision for multiple-use water systems that allows the realization of productive subsistence activities should reach 5.68 m^3 in addition to the allocation of 130 liters per person per day (15 m^3 per family per month) for domestic use for each family. This additional allocation must be considered in the designs of the water supply systems.

Water quality available

In addition to quantity, the availability of water is also related to its quality. In this sense, it is necessary to consider water quality studies that allow to determine the availability according to the quality specifications for each use and considering the health risks. If the supply system has only one distribution system, the quality of the water that reaches each sector of the land must be adequate for the use to be given. This implies that the water that reaches the place where the food is cooked must be of potable quality, while the water that reaches the crops must have the quality required to cultivate. In this sense, the water treatment can be done at the place where the supply is made. If in situ treatment is not possible, it is necessary that the quality of the water be the most restrictive use.

Supplement of sources

The water supply for multiple uses must be made through the use of water from all available sources in the localities. Water supply can be done by adding the various available sources and the use of each must be in accordance with the quality required by each water use. Usable sources are surface water, groundwater, rainwater, mist water, and treated wastewater. In addition, the reuse of water within the anthropic cycle of housing should be considered. The use of each water source must not exceed, as far as possible, the limits of the minimum flows that preserve the ecosystems.

Planning of multipurpose systems

Multi-purpose water supply systems must be planned to meet the demands of water for domestic and subsistence uses, including in the design the various available water sources, and contemplating the quality of water that is required for each use. The designs may consider reusing the water consumed and treatment in situ according to the quality requirements of each activity. It is suggested that the treatment systems reach the level of low risk according to the IRCA (Colombian Index) and include domiciliary treatment for direct drinking water. Health elements must also be considered in accordance with the needs of multiple use systems. They have to allow the reuse of water within the anthropic cycle of the resource.

Environmental sustainability

The implementation of systems of multiple uses of water must converge towards environmental sustainability understanding it as the exercise of conserving and protecting the environment indefinitely even with the realization of anthropic activities. In this sense, a supply system must not be detrimental to the environment, so that the use of water, the amount used, and the quality returned to the environment must

conserve the ecosystems that surround it, considering that in such ecosystems living beings are fundamental for the conservation of human life.

Objective: Institutional renovation

Differentiated regulations

The norms related to water supply for human, domestic, and productive subsistence consumption in rural areas must be reformed in order to achieve the guidelines according to the multiple uses of water. Regulatory reforms should consider technical, administrative, and institutional aspects and, if necessary, should integrate all relevant institutions.Additionally, it is necessary to consider actions that promote equity in access to water, taking into account the socioeconomic differences of the beneficiaries. Priority must be given to access to water for those traditional activities by the peasant families of each place.

Articulation of institutions

In order to contribute to the proper functioning of multipurpose systems, there must be a strong articulation between the institutions of the water and sanitation sectors and agriculture and rural development. It is essential the articulated work of institutions and, therefore, of its officials, for the subjects that are related to water supply for domestic and subsistence activities.Intra and inter institutional work should be promoted so that water supply systems be considered for multiple use. The coordinated work between the Ministry of Environment and Sustainable Development; the Ministry of Housing, City and Territory; the Ministry of Agriculture and Rural Development; and the Ministry of Health in necessary, in addition to the linkage to the territorial environmental entities and the control entities of the public services and health sector. Everyone must work hand in hand with public service providers. Joint work strategies must be created, which, in turn, requires changes in the regulation of the institutional responsibility of each of the entities, taking into account the avoidance of duplication of activities.

Capacity building

To put into operation multiple-use supply systems, the capacities of those actors who are related to them must be strengthened. It is necessary to link the strengthening of capacities to officials of institutions related to the subject (including officials of support and control entities), to the organizations that provide public services and to the community that makes use of the systems. The strengthening of capacities should be oriented on several fronts: system design, operation and maintenance, systems administration, conformation of organizations providing services of multiple uses, legislation around multiple uses, recognition of previous experiences, and, in general, to the topics that guarantee the sustainability of the systems and the activities of rural people over time. There must be a process of participation of educational entities - especially those of higher education - so that the training of professionals working in the sector goes hand in hand with the conceptualization of multiple uses of water. This participation of educational entities should be extended to the training of the communities around the issue.

Strengthening the peasant culture

The activities around the multiple-use supply systems must incorporate the cultural traditions of the benefited population, so that the peasant communities will be strengthened in their way of life. The aspects to be taken into account are those related to the harvest time, the schedules of their activities, the times when they schedule the payments, and in general, all those particular traditions of each culture. Systems must adapt to cultural forms and not cultures adapt to the rigid structures of systems.

Objective: Management of systems

Competent organizations

In Colombia, the provision of domiciliary public services in rural areas is usually carried out by community organizations that have been set up for this purpose. However, there are also public and private companies that provide public services delegated by the municipal administrations that are responsible for this activity. The public service provider organizations should be strengthened to meet the needs of rural communities, such as the provision of water for human and domestic activities, but also to be able to accommodate productive subsistence activities in the functioning of water supply systems. In this sense, the regulation of the provision of home public services must include complementary methodologies for accompanying users in their various productive activities, as well as inculcating the efficient use and saving of water, and the principles of cleaner production.

Productive technical assistance

The realization of subsistence activities requires the technical support of experts in agricultural activities. The organizations that provide multipurpose services must include agricultural technicians in their staff (the amount will vary depending on the size of the system) to accompany the users in the process of sowing and harvesting crops, as well as in the breeding of animals, and in water management for these activities. This technical support must be covered by the tariff collection of the system, but in turn, the cost can be compensated with an increase in the productivity of productive subsistence activities. The technical assistance must be accompanied by the State entities that exist for this purpose, such as the UMATA, the ICA, and other institutions with this function.

Fair rates

The pricing methodology of water supply systems must consider the multiple uses of water, in addition to including the differential scheme that the regulations contemplate for the conditions of rural areas.The rates of multiple use systems can be coupled to the tariff methodology that involves a payment for administrative charges of the systems and a charge for consumption that depends on the measurement of water consumption in homes. However, community organizations can define their rates according to the size of families, family farms, and the magnitudes of productive activities. Alternative pricing models can be designed to calculate rates as long as they reflect fair payments for all users. Alternative pricing models must be accepted by the communities in which they are to be applied, and they have to be accepted and regulated by the corresponding entity. Whatever the method of calculating the rates, this must include all costs related to the provision of the service that influence the sustainability of each system.The tariffs of the multipurpose systems must include the costs of administering, operating, and maintaining the elements concerning the water supply for the productive activities, such as, technical assistance, operation and maintenance of plantation irrigation networks, and holding of animals in the magnitudes indicated in this document.

Operation and maintenance

The operation and maintenance of multiple use systems must consider the technical management of the implements of the system that, for this type, includes elements for the supply of water for human and domestic consumption, but also for subsistence activities. The organization providing the service must assume the operation and maintenance of all elements of the system. In this sense, personnel must be trained to handle it.The operation and maintenance of the systems of multiple uses must include actions in water distribution networks inside the houses for the supply of subsistence activities such as systems of irrigation of the houses and holding of animals. The limits of the provision of this service must be established in the statutes of the organization that provides the water supply service. Surveillance and support for the maintenance of intra-domiciliary networks must be part of the functions of the providers of home services of rural water supply.

4. CONCLUSION

In Colombia, the management of natural resources, and in general, of the nation's assets, is sectored in various Ministries. Each institution is responsible for its activities and an incursion in the activities of other entities is considered an affront to the civil and administrative responsibility of the officials. In this sense, in order to promote activities of multiple uses, it is necessary that there be a public policy that contributes to unite the efforts of all those organizations to achieve supplying water to communities to satisfy both their domestic and subsistence activities.

Public policies around the world tend to focus on general aspects such as water ownership, priority uses and the way in which water is distributed. There is a tendency for water, in any of its states, to be owned by the States, which can assign their administration to different entities, be it local, community or private. There is also a tendency for human and domestic consumption to be the priority use for water allocation; however, there are cases in which the allocation (and overexploitation) of water reflects economic interests and not the welfare of most of the population.

Little by little, governments understand that the overexploitation of natural resources is causing alterations in Earth that can have devastating consequences in the sustainability of the human beings. This overexploitation has been due to the imperious desire for the accumulation of material goods, whose industrialized production implies accelerated use of the non-renewable resources of the planet, as well as generating variation in climate and changes in land cover. The admission of these consequences has begun to generate movements in favor of environmental care and sustainable consumption. Among these actions, the recovery of knowledge, customs, and ancestral traditions is promulgated, whose practice is now recognized in rural peasant families, who have tried to preserve and replicate the knowledge of those who used the resources without exhausting them.

This proposal of policy guidelines calls for the conservation of productive subsistence activities that, for generations and intuitively, have been developed in a sustainable manner by peasant families. The proposal invites inter institutional and intra disciplinary work, the study of the activities carried out by the population and the investigation of water supply alternatives to meet all the needs of the people, in order to advance the purposes of equity and social welfare that promotes the National Constitution.

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