GROUNDWATER INTERNATIONAL COOPERATION
AND THE GUARANI AQUIFER

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ABSTRACT

This paper aims to analyze the process of cooperation over the Guarani Aquifer, that extends through Argentina, Brazil, Paraguay and Uruguay. Guarani Aquifer is the only transboundary aquifer in South America that mobilized international efforts to promote its management and has an international agreement signed by the four countries. Different actors promote international projects in the area with different objectives and scopes of action. Groundwater international cooperation in South-Cone started in the sphere of the epistemic communities and has motivated the insertion of international organizations and States in the process of managing the Guarani Aquifer. There are no conflicts over the use of the aquifer which shows a cooperation process based on preventive diplomacy, which is not usual due to the difficulties of mobilizing actors and resources. However, little progress has been made since the Guarani Aquifer Project ended and the Agreement on the Guarani Aquifer was signed. This raises the question of the real impact of this cooperation process and if all the efforts made to build this cooperation process will continue even thought the risk of transboundary conflicts is very rare.

Keywords: International cooperation, Groundwater, Guarani Aquifer
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1. Introduction

Groundwater represents the greatest source of freshwater available to humanity (Shiklomanov and Rodda 2003) and transboundary aquifers can be found in almost all parts of the world, including arid and semi-arid regions (Puri and Struckmeier 2010). According IGRAC (2012) there are 445 transboundary aquifers and groundwater bodies, however there are few examples of cooperation between countries over transboundary aquifers (Burchi and Mechlem 2004).

The increased use of this resource in several parts of the world has drawn attention to the lack of policies and regulations both at international and national levels which have focused on surface water. This phenomenon was termed ‘hydroschizophrenia’ by Jarvis et al. (2005, p. 765) and highlights the “need for guidelines to assist nations in the management and allocation of groundwater resources”.

Gradually, groundwater cooperation has been stimulated by international organizations, such as United Nations and its agencies like UNESCO, United Nations Development Program (UNDP) and United Nations Environmental Program (UNEP); World Bank; Global Environmental Facility (GEF); Global Water Partnership (GWP) and International Atomic Energy Agency (AIEA), who have conducted a series of debates, studies and projects around groundwater. Many projects have been conducted at local and regional level on transboundary aquifers, and besides this, specific organs were created to promote groundwater knowledge and management, such as the Internationally Shared Aquifer Resources Management Initiative (ISARM), the International Groundwater Resources Assessment Centre (IGRAC) and the Groundwater Management Advisory Team (GW-MATE).

On the field of international law, groundwater was not considered a priority in the last century despite some efforts to include it (Mechlem 2003). Surface water has been prioritized on water regulations and management, nevertheless, the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, promoted by the United Nations General Assembly, has face great deals to be consolidate on international level. This Convention represents the first and only legitimate instrument for countries in the management of shared freshwater (Eckstein and Eckstein 2003), however only in May, 2014, came the thirty-fifth state ratification,

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2 The worldwide ISARM Initiative is an UNESCO and IAH led multi-agency effort aimed at improving the understanding of scientific, socio-economic, legal, institutional and environmental issues related to the management of transboundary aquifers.
3 IGRAC operates under the auspices of World Meteorological Organization (WMO) and UNESCO. This center seeks to promote and to share knowledge and experience on groundwater matters on a world-wide scale as a way to promote optimal approaches to the assessment, development and management of groundwater resources.
4 GW-MATE is a multi-disciplinary expert team who works as an advisory group to the World Bank and the Global Water Partnership. Its provides support globally for development of knowledge, capacity and management of groundwater.
number required for the Convention entry into force on 17 August 2014, ninety days after that ratification as provided by Article 36(1) of the Convention.

As the name indicates, the Watercourse Convention focuses on surface waters and did not considered the specific characteristics and vulnerabilities of groundwater, although “ground waters” were included in the concept of watercourse (Eckstein and Eckstein 2003). Notwithstanding the long process to gain international acceptance and the focus on superficial water, the entrance into force of this convention represents a great step to transboundary water management and allows international community to amplify its scope to groundwater. This process has already begun with the approval of the Resolution 63/124 - The law of transboundary aquifers, by the U.N. General Assembly, on December 11, 2008.

In this context, if the challenge of last century was to regulate and manage the use of superficial waters, in the present one it is to consolidate this management to avoid a water crisis and include the slower and more hidden hydrologic-cycle dimension: groundwater and aquifers.

The literature points out that only five initiatives around groundwater evolved to specific interstate agreements, and not all of them were ratified or implemented: a) Convention on the Protection, Utilization, Recharge and Monitoring of Franco-Swiss Genevese Aquifer signed between France (the Community of the Annemassienne Region, the Community of the Genevois Rural Districts, and the Rural District of Viry) and Switzerland (the Republic and Canton of Geneva), on 18 December 2007, as a substitute of a convention signed in 1977. It entered into force on 1 January 2008 (De Los Cobos 2010); b) Mali, Niger and Nigeria signed in Bamako, Mali, on June 20th, 2009, the Bamako Declaration of the Ministers in Charge of Water Resources of the Countries Sharing the Iullemeden Aquifer System, but has not evolved to further actions; c) The Agreement on the Guarani Aquifer signed on August, 2nd, 2010, which has not entered into force yet; d) On a meeting held at the Headquarters of the Food and Agriculture Organization of the United Nations (FAO) in Rome, Italy, on December, 19th and 20th, 2002, Algeria, Libya and Tunisia agreed to the “Establishment of a Consultation Mechanism for the Northwestern Sahara Aquifer System. On 2006, it was signed a second declaration named “Mécanisme de Concertation Permanent pour le Système Aquifère du Sahara Septentrional”, which started its operation on July, 1st, 2008 (Stephan 2013); d) the Regional Strategic Action Program for the Nubian Aquifer System signed on September, 18th 2013, by Chad, Egypt, Libya & Sudan.

Conti (2013) states that even though those experiences are pointed out as the key instances of cooperation over transboundary aquifer, there are other experiences going for transboundary aquifers which did not reach formal agreements between countries. According to her, there are eight enabling factors to promote transboundary aquifer cooperation: a) existing legal mechanisms; b) existing regional institutions, c) funding mechanisms, d) high institutional capacity; e) previous water cooperation; f) scientific research; g) strong political will, and h) third-party involvement.

Despite the need for further investigation to support her conclusions, the analysis of the three phases of the Guarani Aquifer cooperation process shows the major role of these enabling factors, the role of international players and projects to mobilize

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stakeholders and resources and how difficult is to continue this process when international players and funding go out the scene. Groundwater international cooperation in South-Cone started in the sphere of the epistemic communities and evolved to gather international organizations and States. This paper aims to analyze the process of cooperation over the Guarani Aquifer, that extends through Argentina, Brazil, Paraguay and Uruguay. For this reason this article is divided in four sections, the first one characterizes the Guarani aquifer, the second describes the impact of the development of the Guarani Aquifer System Project, then the focus goes to the State actions with the signature of the Agreement on the Guarani Aquifer, finally the conclusion is presented.

2. Guarani Aquifer System: shared resource with reservations

The knowledge about the Paraná Sedimentary Basin aquifers has increased proportionally to the advance of the cooperation process. Defining aquifer limits requires science, research and monitoring which were fundamental to the discovery that the geological formations of Misiones (Argentina and Paraguay), Botucatu and Pirambóia (Brazil), and Tacuarembó (Uruguay) in fact were hydraulically connected and formed a single transboundary aquifer system (OAS 2009). The perception that those different stratigraphic and aquifer units formed a single aquifer shared by four countries culminated in the adoption of a common denomination: Guarani Aquifer System. This choice suggest by the geologist Danilo Alton was intended to made a tribute to the Guarani tribe who were the first habitants of the area (Borghetti, Borghetti and Rosa 2011).

Guarani Aquifer extends for Argentina, Brazil, Paraguay and Uruguay as is shown on figure 1. It is formed predominantly by “sandy sedimentary rocks of the Paraná Basin (Brazil and Paraguay), the Chaco-Paranaense Basin (Argentina) and the Northern Basin (Uruguay)” (OAS, 2009). GWMATE (2009, p. 4) describes the aquifer as a sequence of sandstone beds of Triassic-Jurassic age, “formed by the processes of continental deposition on a Permo-Triassic regional erosion surface […] and are overlain by Cretaceous basalt flows […], which are almost equally-extensive and exceed 1,000m in thickness in some areas”.

Most of the aquifer is confined (90%) and the recharge area has only 124,650 km² (LEBAC/UNESP, 2008). Due to the hydrogeological particularities of the GAS, OAS (2009, p. 98-99) and GWMATE (2009) propose five areas of management exposed on figure 1: I – non-confined recharge and discharge zone; II – recharge zone covered by basalt; III – intermediate non-confined zone; IV – deep confined zone; and V – confined zone with saline groundwater.

Zones I and II are the most vulnerable areas to pollution mainly responsible for the recharge which occurs by the “direct infiltration […] and stream flow along the length of the aquifer outcrop area […] and in adjacent zones with a limited thickness of well-fractured basalt and via ‘windows’ in the basalt from overlying local groundwater bodies in Tertiary sedimentary formations” (GWMATE 2009, p. 5). Contrasting with the initial finds, most of the recharge do not replenishes the central area, but “infiltrates forming local flow cells which discharge nearby as base flow to rivers crossing the SAG outcrop” (GWMATE 2009, p. 5)
Zones III, IV and V are the confined areas of the aquifer. There is not significant recharge and the water abstraction has the effect of minin...the areas located closely to the international boundaries. The studies pointed that “current and potential transboundary effects of the GAS are restricted to a narrow strip of territory of no more than a few dozen kilometers, depending upon locally specific hydrodynamic conditions” (OAS, 2009, p. 18). The areas with the greatest conflict risk coincide with the recharge areas located in the borders (zone 1 and 1). Meanwhile the zones III, IV and V are less likely to face transboundary conflicts due to the natural protection to anthropogenic contamination, costs of wells perforation and the high risk of presenting chemical anomalies. Despite the extension of GAS, the eminence of transboundary conflicts is very limited. So, if states really want to promote...
transboundary management of the aquifer, recharge border areas are the ones to be prioritized on international cooperation and joint management. In addition, cooperation can help clarify the obscure points concerning the aquifer geology and vulnerability.

3. The role of the Epistemic Community to International Cooperation and the Guarani Aquifer System

The epistemic community discovered the transboundary nature of regional aquifers and was responsible for the naming of the Guarani Aquifer System. In the late eighties the studies promoted by universities in the Conesul area showed evidence that Botucatu, Tacuarembó and Misiones aquifer formations were, in fact, a single aquifer system. In 1992, during the 1st Latin American Congress on Groundwater Hydrology, Merida, Venezuela, the researchers had the idea to develop a joint project between national universities to study the hydraulic connection between those units. In 1993, during the celebration of the X Brazilian Symposium of Water Resources and the First South Cone Water Resources Symposium (Gramado, Brazil), the researchers formed a work group to deep knowledge about these aquifer formations (Campos 2000).

In 1994, in Curitiba, Brazil, they carried out the 1st. Scientific Technical Journey on the Sustainable Management of the International Aquifer Botucatu which had counted with the support of Federal University of Parana -UFPR (Brazil); University of the Republic –UDELAR (Uruguay), Brazilian Groundwater Association (ABAS) and the International Development Research Center IDRC (Canada) (Campos 2000).

Those events created the conditions to develop the first international project in the area, called the Sustainable Project of the Botucatu Aquifer (Proyecto Sostenible del Acuífero Botucatu) (1995), which was financed by the IDRC and count with the participation of the following universities UFPR, UDELAR and Argentinean universities (Universidad del Litoral, Universidad de la Plata e Universidad de Buenos Aires). The main goal of this project was to promote the integration between public and private institutions from the four countries and to develop regulations and management actions to the sustainable use of the aquifer (Borghetti, Borghetti and Rosa Filho 2011).

Since 1995 academic events included this newborn transboundary aquifer and promoted knowledge about it. For example, the release of the Giant Aquifer of Mercosul Map (Araujo, França and Potter, 1995); the Workshop of the Giant Aquifer of Mercosul (Curitiba, 1996), and an academic cooperation between Universidad Nacional del Litoral, Universidad de Buenos Aires and UDELAR to publish the book Acuíferos Regionales en America Latina: Sistema Acuífero Guarani (Montaño et. al. 1998).

On the 2nd. Scientific Technical Journey on the Sustainable Management of the Guarani Aquifer System (Paysandú, Uruguay), researchers exposed the need of funds to continue research on the aquifer. Since funds didn’t come from the governments, they sought international venues like European Union, UNESCO and the World Bank.

In 1999, on Foz do Iguaçu, the International Bank for Reconstruction and Development and south cone researchers reached an agreement to adapt the proposal to the Global Environmental Facility (GEF) guideline. On Foz do Iguaçu, February, 1st, 2000, representants of the four countries, Organization of American States (OAS) and researchers approved the Concept Paper to implement a common project on govern level, which would be Project for Environmental Protection and Sustainable Development of the Guarani Aquifer System (PGAS) (Borghetti, Borghetti and Rosa Filho 2011).

Epistemic community was the main responsible for the awareness about the aquifer as well raising funds and gathering partners to develop projects in the area.
However, with the entrance of governments and international organizations, epistemic community lost its leading role and has been sidelined. On the other hand the entrance of those authors gave a visibility to groundwater that has never been experience before in South America and start a new phase of cooperation.

4. Guarani Aquifer System Project (PGAS): the expansion of cooperation

The PGAS was released on May, 23, 2003 by Argentina, Brazil, Paraguay and Uruguay and counted with the support of different international organizations. This six years project (2003-2009) was funded mainly by the Global Environmental Facility and carried out with the World Bank, acting as implementing agency, and the OAS as executing agency. This project was also included in the study cases of the ISARM Americas Project on 2003 (OAS, 2009). Its objectives were: to enhance and enlarge knowledge on the aquifer; to implement a Well Monitoring Network and an Information System; to elaborate a Strategic Action Plan (SAP) and a Transboundary Diagnostic Analysis (TDA) (World Bank, 2001, p.1). By doing so the long term objective was incentivized countries “to elaborate and implement a shared institutional, legal and technical framework to preserve and manage the GAS for the current and future generations” (World Bank, 2001, p.1).

The project costs were estimated in US$ 26.76 million, which were supported by the four countries, GEF and other organizations such International Atomic Energy Agency (IAEA), the Federal Institute for Geosciences and Natural Resources (BGR) and the Bank Netherlands Water Partnership Program (BNWPP) (OAS, 2009, p. 30). In addition to those partners, its execution involved the OAS, the Intergovernmental Coordinator Committee of the Plata Basin and demand the creation of a specific institutional infrastructure to the project.

This project infrastructure was formed by a General Secretariat, located in Montevideo (Uruguay), a Coordination Group (“CG”), consisting of a National Technical Coordinator from each country, the National Project Executing Units (“NPEU”) and the local offices to the four pilot projects developed in Concórdia (Argentina) / Salto (Uruguay); Rivera (Uruguay)/Santana do Livramento (Brazil); Itapúa (Paraguay); and Ribeirão Preto (Brazil). Those pilot projects represented critical zones because of their geological characteristics, conflict risks or management problems. In addition, water or environmental national agencies of the four countries were involved in each country: Subsecretariat for Water Resources (Argentina); National Water Agency (Argentina); Secretariat for the Environment (Paraguay); National Directorate for Hydrography (Uruguay). Brazil also created execution units on each state that shares the Guarani Aquifer (OAS, 2009).

Those joint efforts promoted by the Guarani Aquifer Project reverberated also in MERCOSUR, in which instruments dedicated to environmental issues were used to broaden the debate on the management of the Guarani Aquifer. The first MERCOSUR initiative to formulate a shared management model to Guarani was the establishment of an Ad-Hoc High Level Group in 2004. The main objective of this group was to formulate a draft Agreement between the Parties concerning the Guarani Aquifer (GMC Decision nº 25/04 and nº 48/04). Moreover, the MERCOSUR Parliament also proposed: (i) the formation of a commission to study, analyze and compare each country’s water-resource legislation; (ii) an agreement for the common management of the GAS and a transitional project assuring the continuity of the GAS Project structure; and, (iii) the establishment of a regional Research and Development Institute for the Guarani aquifer.
and other aquifers shared by the states. Unfortunately, none of the MERCOSUR proposals turned into reality (Villar and Ribeiro, 2013).

PGAS made it possible to better understand the aquifer and even refute the initial hypotheses such as the high risk of transboundary conflicts or the recharge of the central area by the outcrop zone the of Guarani Aquifer. Nevertheless, the main contribution of this project was the convergence created over groundwater, due to the mobilization of national and international organizations, the epistemic community, society and water related governmental and non-governmental organizations. The project also highlighted the importance of the local level to the management of groundwater.

The mobilization of all those actors, the parallel initiatives going on the Guarani Aquifer and the availability of data create a favorable environment for the execution of an international agreement between the Guarani Aquifer countries and the establishment of national policies in these countries.

5. The Agreement on the Guarani Aquifer and the cooperation between States

The celebration of an international agreement between Guarani Aquifer countries has been received by the international community as a great move towards the management of transboundary aquifers. The Agreement on the Guarani Aquifer was the first agreement for transboundary groundwater developed under the influence of the United Nations Resolution 63/124 – The Law of transboundary aquifers and the only one established without problems, tensions or conflicts for the aquifer use (Villar and Ribeiro, 2011).

The first article of the Guarani Agreement states:

“The Guarani Aquifer System is a transboundary water resource that integrates the sovereign territorial area of Argentina, the Federative Republic of Brazil, the Republic of Paraguay and the Eastern Republic of Uruguay, which are the only holders of this resource and will henceforth be called ‘Parties’.”

The Agreement reaffirmed the sovereignty of the overlaying states over the aquifer on several occasions. Sovereign territorial domain of the Guarani Aquifer is mentioned in arts.1º and 2º, while sovereign right over natural resources is set out in article 3º, which states:

The parties exercise, in their respective territories, the sovereign right to promote the management, monitoring, and sustainable use of water resources of the Guarani Aquifer System and will utilize these resources based on the criteria of rational and sustainable use, and respecting the obligation not to cause appreciable harm to the other Parties or the environment.

This article clearly provides that each country is responsible for managing their portion of the aquifer based on its own public policy, and sets standards for the use and protection of the aquifer. Some scholars argue that this principle merely restates the well-established principle of international law and ensures safeguards for the aquifers, thus preventing the aquifer from being considered as a “common good of mankind similar to the status of a common heritage of mankind” like the deep seabed, outer space, or Antarctica (Laborde 2010, p.3). Other authors view it with surprise and
suspicion, contending that the reaffirmation of the sovereignty principle is inconsistent with the spirit of cooperation and equitable use (McCaffrey 2009, McIntyre 2010). However, to improve cooperation it is necessary to promote a dialogue between sovereign states and an important starting point is for all parties to feel secure in their rights (Villar and Ribeiro, 2013).

The Agreement follows the main principles and obligations of international law, including Resolution 63/124 of the United Nations especially in relation to the principles expressed: sovereignty, the equitable use of water resources, the obligation not to cause harm and international cooperation, which includes the exchange of technical information about the aquifer, notification of activities that can cause harm to the parties, and obligation to mitigate negative impacts. In this sense article 5 states that the Parties to the Guarani Aquifer System should act in conformity with applicable international law principles and rules if there is a possibility that actions, studies, or works within their territory could have effects beyond the national borders (Villar and Ribeiro, 2011).

The principle of equitable use of water resources is affirmed in articles 3º and 4º and the obligation not to cause harm appears in articles 3º, 6º, and 7º. In relation to article 3º, it is noteworthy that these principles appear to limit the Parties sovereign rights related to the Guarani Aquifer System. Each State is responsible for promoting the management, monitoring, and sustainable use of the aquifer, but each also has to consider the rational and sustainable use of the aquifer and the obligation not to cause harm (Villar and Ribeiro, 2011).

Cooperation is one of the strong points of the Agreement and appears in many articles, such as 8º, 9º, 10, 12, 13, and 14. These statements of cooperation foresee the need for information exchange about the uses of water resources, the duty of prior notification, and the right to seek additional information. They also foresee the establishment and development of joint projects and cooperation programs for technical, scientific, and management aspects (Villar and Ribeiro, 2011).

One of the Agreement’s weaknesses is that there are no provisions in the document of a specific plan for the protection of recharge areas or for the extraction of non-renewable Guarani waters. Article 14 makes a vague allusion to "identify critical areas, particularly in border areas that require specific treatment measures." The recharge areas could fall into that category, however, the focus of Article 14 seems to be to identify areas that require measures to restrict or control rather than the design of a policy based on precaution and prevention.

Article 15 provides that the cooperation process will be under the responsibility of a Commission formed by the four parties and institutionalized in the mold of Article IV of the River Plate Basin Treaty, which states:

Notwithstanding the provisions within each country, there will be cooperation bodies and advisory committees of the Government, namely Commissions or National Secretariats, formed in accordance with the Joint Declaration of Buenos Aires. Commissions or Secretariats may establish bilateral contacts, always obeying the criteria and standards of the countries concerned and keeping it properly informed, when appropriate, the Intergovernmental Coordinating Committee.

Thus, Article 15 of the Agreement provides that:
A Commission composed of the four states party to the agreement will coordinate and cooperate amongst themselves to fulfill the principles and objectives of this Agreement. The committee will promulgate its own regulations.

When implemented, this Commission would be the first to address the issue of transboundary aquifers in the region and in Latin America. At present, it is still not possible to determine the future and scope of this commission. The countries have yet to institute it and endow it with its statutes, powers, membership, and budget. Although they already have several international bodies for the management of surface water resources, whose cooperation promotion scope varies, this Commission would be the first to deal specifically with groundwater, featuring a new form of cooperation in South America. The Commission is a key component to the cooperation process whose success depends on how it will be structured and how it will be supported by the member states (Villar and Ribeiro, 2011).

The resolution of disputes, under articles 16, 17, 18, and 19, will take place through direct negotiations of the countries, which are obligated to inform the Commission mentioned in Article 15. The role of this Commission is to recommend and give advice to the countries. In accordance with Article 17, if the states fail to reach an understanding, they can request the Commission's recommendations or refer the dispute to arbitration, which will be defined later in an Additional Protocol. The Agreement opted for a new arbitral procedure to be set and ignored the one provided by MERCOSUR through the Protocol of Olivos which has already structured an arbitration process.

The countries adopted an innovative posture when they signed an agreement within a precaution/prevention context; nevertheless, they simultaneously maintain a conservative position with regards to the content of the agreement. Besides, the analysis of the agreement reveals its fragility, since the cooperation mechanisms are limited and require regulation in the national and international spheres.

In face of the absence of conflicts over and degradation of the aquifer, there are no problems in accepting the philosophy defined by the UNDP (2006, p. 228), “cooperation [over transboundary waters] need not always be deep … Indeed, given the different strategic, political and economic contexts in international basins, it makes sense to promote and support cooperation of any sort, no matter how slight”. However the greatest problem is the lack of actions between the states to support the cooperation process over the Guarani aquifer and implement the Agreement.

Since the signature in August 2010, only Argentina and Uruguay ratified the Agreement and there is no perspective to the implementation of the Guarani Aquifer Commission. There are no joint projects to continue the research or monitoring of the aquifer and the institutional infrastructure produced to the PSAG was terminated. The Information System (SISAG) dedicated to the Guarani Aquifer is still unavailable, so all the data collect during the project cannot be analyzed by other researches that didn’t join the project or used to develop better policies. So the signature of the agreement seems to be considered by States the final point of cooperation process instead of the start of a new stage, when States assume the full responsibility for this aquifer and the cooperation.

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7 Binational Commission for the development of the Bermejo River Basin and Rio Grande de Tarija; Tri-National Commission for the Development of the Pilcomayo River Basin; Binational Commission Bridge Colonia Buenos Aires (COBAICO); Administrative Commission of the Río de la Plata (CARP); Intergovernmental Coordinating Committee Countries of the Plata Basin (CIC); Salto Grande Technical Mixed Commission (CTMSG); and the Administrative Commission of the River Uruguay (CARU).
6. Conclusions

The cooperation process on the Guarani Aquifer can be divided into three different stages. The first one happened in the nineties and was related with the epistemic community. The mobilization of small group of scientist related to the States universities allowed discovering the transboundary nature of the aquifer and the progressive inclusion of international actors.

Since the year 2000, the control of the cooperation process has transcended the epistemic community and started to be organized by international organizations and the States. The greatest concrete result of this alliance was the Project for Environmental Protection and Sustainable Development of the Guarani Aquifer System, also known as Project of the Guarani Aquifer System (PGAS). During the execution of this project, groundwater gained visibility between stakeholders.

With the end of the project in 2009, a new phase of cooperation has started with States as the main actors. In 2010, Argentina, Brazil, Paraguay and Uruguay signed the Agreement on the Guarani Aquifer, which has yet to be implemented by the States. However the Guarani Aquifer international cooperation scenario did not seem promising. Even though the countries created a great expectation with the signature of this agreement which has unique characteristics, almost nothing has happened since its signature. Brazil, which has the largest portion and is the main user of the aquifer, has still not ratified it. The Guarani commission, which is the greatest innovation, has not been implemented and the whole process of cooperation seems to be stagnant.

7. References


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