

Adapting Water Management to Climate Change in LAC countries: Transboundary Cooperation, considering the Guarani Aquifer System

*"Implementation of the Strategic Action Programme of the Guarani Aquifer System:
Enabling Regional Actions"*

6th International Conference - Global Network of Water Museums

Brasilia, 4-8 November 2025

Ricardo Burg

International Coordinator



Sistema
Acuífero
Guaraní

SAG



1 Project Presentation

Components: 3 years of implementation

1. CONSOLIDATION OF CROSS-BORDER TECHNICAL COOPERATION: COMMITTEES AND MECHANISMS

- Facilitates the coordinated management of the SAG and supports the implementation of the agreement

2. MULTIPURPOSE MONITORING NETWORK (DESIGN/PILOT TESTS) AND ITS PROTOCOLS

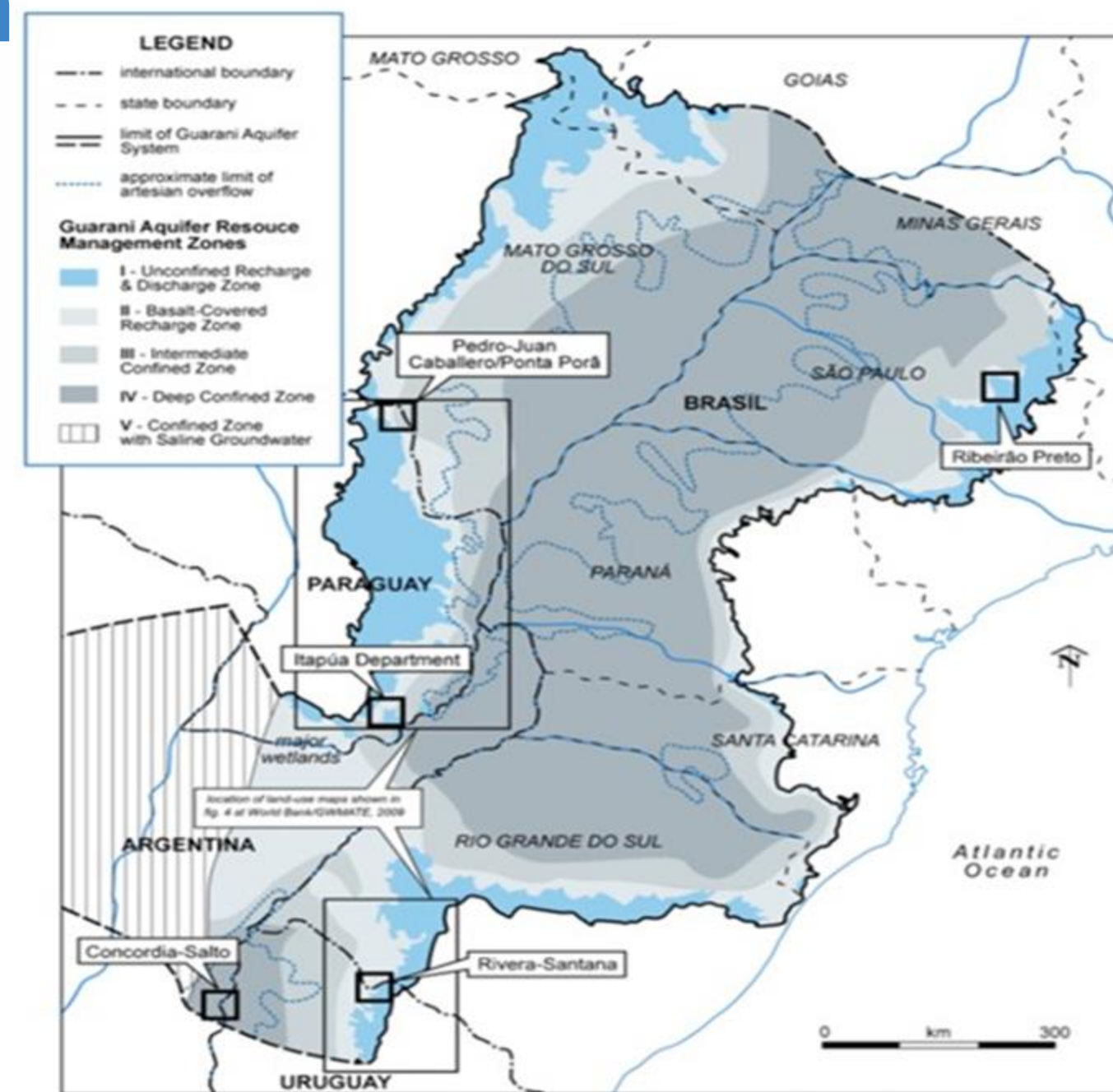
- Improves the sustainable management of the SAG and the likelihood of effective joint strategies for mitigating adverse transboundary impacts

3. STAKEHOLDER PARTICIPATION, DISSEMINATION, AND CAPACITY DEVELOPMENT

- Improvement of effectiveness, long-term sustainability, and replication of project results

=> Regional SAP: Start implementation and update

- GENDER, CLIMATE CHANGE, AND ECOSYSTEM SERVICES
- LEGISLATION, INSTRUMENTS, AND IMPLEMENTATION
- COMMUNICATION, PARTICIPATION
- TECHNICAL/SCIENTIFIC ASPECTS



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2 Project Outcomes

COMPONENT 1: CONSOLIDATION OF CROSS-BORDER TECHNICAL COOPERATION: COMMITTEES AND MECHANISMS

(execution: 100%)



(I) Outcome C1: Consolidation of cross-border technical cooperation

Outcome 1.1: The institutionalization of multinational subsidiary technical committees facilitates the cooperative management of the SAG (**execution: 100%**).

Output 1.1.1: The Monitoring and Modeling Committee and the Capacity Building and Dissemination Committee are responsible for the strategies and commitments established based on the agreed Terms of Reference (ToR).

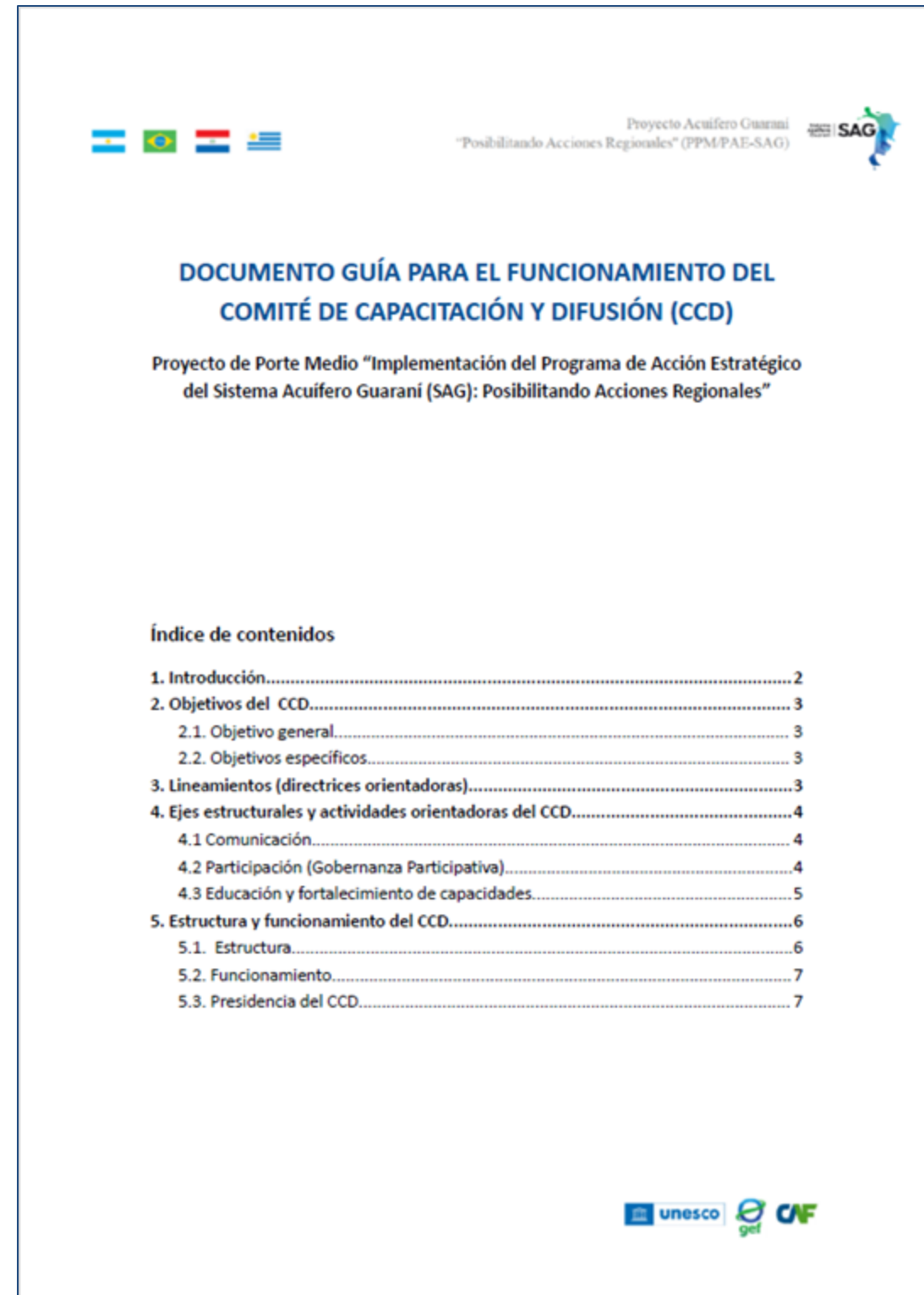


CCD Workshop (November, 2024)



CMM Workshop (August, 2024)

(II) Outcome C1



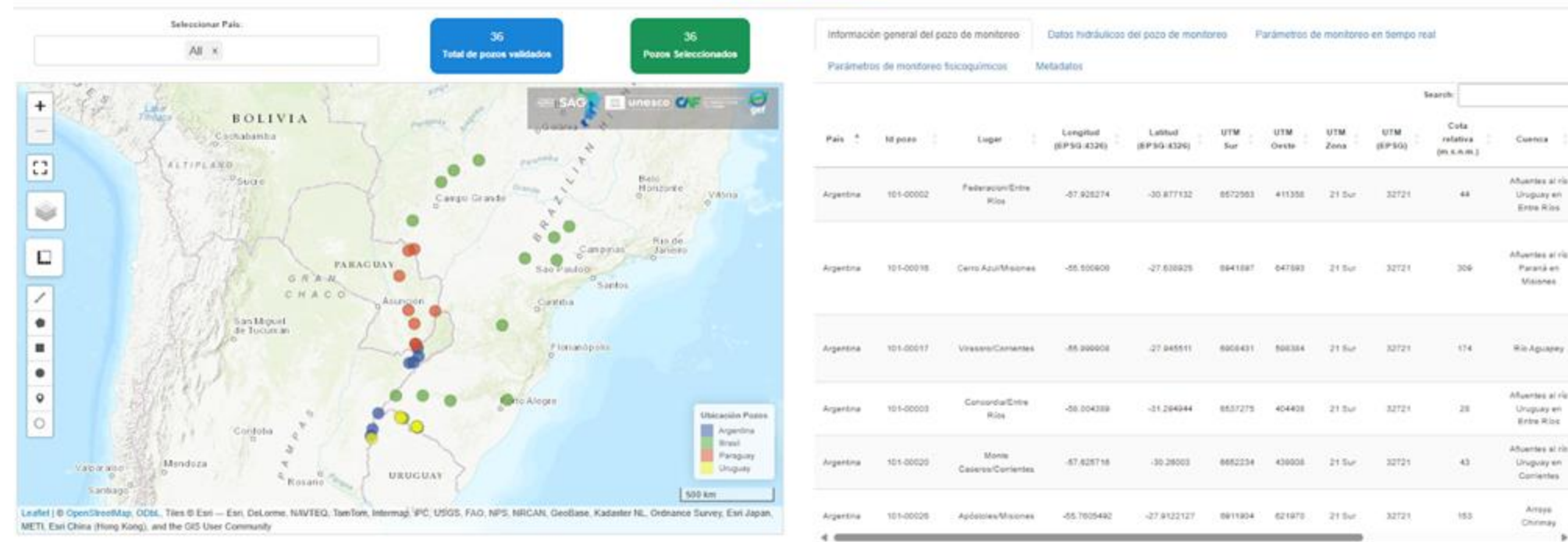


Pozos de monitoreo del Sistema Acuífero Guaraní



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COMPONENT 2: MULTIPURPOSE MONITORING NETWORK (DESIGN/PILOT TESTS) AND ITS PROTOCOLS (execution: 100%)

Monitoring Network

Pilot: 35 wells

- Design (location*, criteria, parameters)
- Drilling of 6 wells
- Laboratory analyses
- Purchase and installation of equipment
- Monitoring protocols
- Shared database

***Mirror wells**



(I) Outcome C2: Design and field pilot testing of monitoring networks and protocols ⇒ Sustainable Management of the GAS

Result 2.1: The sustainable management of the Guaraní Aquifer System (GAS) enabled through the joint design and field testing of a harmonized, regionally scaled multipurpose monitoring network and related protocols – a prerequisite for groundwater management (execution level: 100%)

Output 2.1.1: Review and update of the SAG Monitoring Network design defined during the PSAG, endorsed by the Monitoring and Modeling Committee, and pilot testing conducted in the field.

- Definition of priority areas of interest, including transboundary influence zones and observation wells.
- CMM Guide containing sampling and analysis procedures/protocols.
- Product and proposal for the Information Exchange System approved by the CDP.
- Monitoring equipment fully delivered to all four countries. As of today, countries are in the process of completing equipment installation.

(II) Outcome C2: Design and field pilot testing of monitoring network and protocols

Outcome 2.2: Agreement on monitoring data exchange protocols among countries improves the likelihood of effective joint strategies for mitigating adverse transboundary impacts. (execution level: 100%)

Output 2.2.1: Monitoring data exchange protocols developed by the Monitoring and Modeling Committee. Definition and delivery of the Information Exchange System.

- Definition of the data storage system, based on an updated version of the SISAG developed during the PSAG, and of the data sharing and reporting protocols.
- Product and proposal for the Information Exchange System (IES) approved by the CDP.
- Data Exchange System ready for use by the countries.
- Platform launched (March 18, 2025) and virtual training on the IES conducted (April 2025).

NOTE: There was no initial database from the first project to update a system as originally planned. The Project began by proposing a data storage system from the outset.

(III) Outcome C2

MANUAL DE USO RÁPIDO

MAQUETA FUNCIONAL: POZOS DE MONITOREO DEL SISTEMA ACUÍFERO GUARANÍ

Elaborado por: Dra. Nora Lucioni

Versión 7 de noviembre de 2024

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ii. Desde el sistema de búsqueda de un pozo específico:

TABLA 1	TABLA 2	TABLA 3	TABLA 4	TABLA 5
País	ID pozo	Longitud (WGS84)	Latitud (WGS84)	UTM
Brasil	3500028109	-48.50967	-19.232	18S

Mediante el ingreso de una cadena de caracteres, por ejemplo, ID de pozo igual a 3500028109; el sistema selecciona directamente el dato asociado al pozo y conectarlo directamente con su localización en el mapa:



Para volver a visualizar a todos los pozos de monitoreo, solo se debe hacer clic sobre el mapa para que la **Maqueta funcional** los pueda exhibir.

(IV) Outcome C2



Tutorial para el ingreso y actualización de datos

Sistema de Información sobre los Pozos de

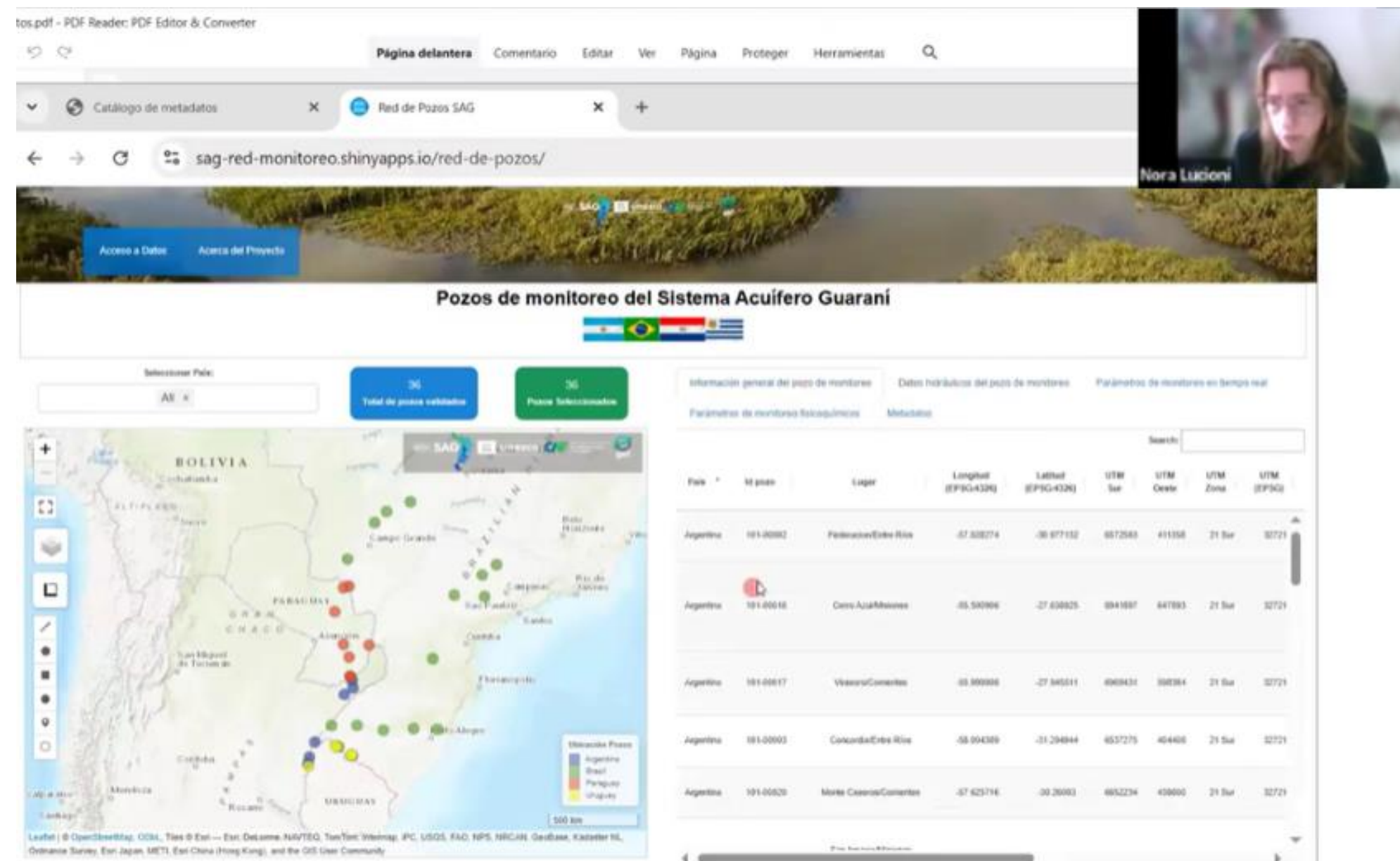
Monitoreo del Sistema Acuífero Guaraní

Elaborado por:

Dra. Nora Claudia Lucioni

Ciudad Autónoma de Buenos Aires, Argentina

31 de marzo de 2025



COMPONENT 3: STAKEHOLDER PARTICIPATION, SAP UPDATE, DISSEMINATION, AND CAPACITY DEVELOPMENT

(execution: 100%)

(I) Outcome C3: Stakeholder participation, PAE update, dissemination, and capacity development.

Output 3.1.1. Establishment of the Capacity Building and Dissemination Committee, implementation of the stakeholder participation plan, coordination of SAP update activities, public awareness and capacity-building initiatives, and regional events on groundwater management, environmental, and gender issues, with the participation of civil society organizations, Indigenous peoples, local committees, basin councils, the private sector, and other stakeholders. (execution: 100%)

- Definition of Terms of Reference (ToR) and establishment of the Capacity Building and Dissemination Committee.
- Workshops and meetings with key stakeholders, as well as participation in various international events, reaching a total of 2,000 people – surpassing the proposed target.

Output 3.1.2 / 3.1.3. SAP Update: Incorporation of the project's priority topics into the SAP (progress level: 100%).

- Inclusion of the new content in the 2025 PAE (approved by the CDP).

National Meetings in the participating countries

Uruguay:

Rivera, August 20, 2023

Brazil:

Natal (ENCOB), August 22–24, 2023

Argentina:

Posadas, November 1–2, 2023

Paraguay:

Itapúa, December 4–5, 2023



Specialists

- **Gender** (Mariana González)
- **Groundwater Management** (Ricardo Hirata)
- **Groundwater Management** (Gustavo Athayde)
- **Communication** (Matías Ponce)
- **Communication** (Sergio Mogliati)
- **Hydrogeological Knowledge** (Jorge Santa Cruz)
- **Legal and Institutional** (Pilar Villar)
- **Climate Change and Ecosystem Services** (Albano Araújo)
- **Stakeholder Participation** (Laura Palma)
- **Information Exchange System** (Nora Lucioni)

(II) Outcome C3



Workshop 'Assessment of Regional Cooperation Strategies to Promote the Resilience and Sustainability of the Guaraní Aquifer' (Montevideo, September 2024)



Workshop 'Regional Dialogues with Indigenous Peoples: Perspectives for the Management of the Guaraní Aquifer System' (Posadas, Argentina, June 2024)

(III) Outcome C3

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PLAN DE ACCIONES ESTRATÉGICAS

para el Sistema
Acuífero Guaraní



CAF
BANCO DE DESARROLLO
DE AMÉRICA LATINA
Y EL CARIBE



Proyecto Acuífero Guaraní
"Posibilitando Acciones Regionales" (PPM-PAE-SAG)



INFORME INTEGRADOR DE ACTIVIDADES

Proyecto: "Implementación del programa de acción estratégica del
Sistema Acuífero Guaraní: Posibilitando Acciones Regionales"



(IV) Outcome C3: Stakeholder participation, SAP update, dissemination, and capacity development

Output 3.1.4: Private sector participation through structured dialogues in the four countries (execution 100%)

- Regional Webinar with Users and Government, and other meetings with private sector participation.

Output 3.1.5. Participación plena en las actividades y eventos de IW LEARN (incluidos los IWC) y establecimiento del sitio web del Acuífero Guaraní de acuerdo con los estándares de IW LEARN. El 1% del total de la subvención del FMAM se destinará a apoyar las actividades relacionadas con IW LEARN (execution: 100%)

- Full participation in IW:LEARN activities and events (including the IWCs).
- Three experience notes published on the IW:LEARN website.
- Establishment of the Guaraní Aquifer website in accordance with IW:LEARN standards: website launched and link shared with the countries.



Strategic Action Plan (SAP) for the Guaraní Aquifer System 2025

SAP (Update)								
PROGRAMMES (8)	1. Coordin ation of regional and cross- border coopera tion of the GAS	2. Maintenanc e and expansion of the network of monitoring and developme nt of mathemati cal models for the manageme nt of the GAS information	3. Promotion of technical, scientific, environmen tal and socio- economic studies	4. Capacity- building and institutiona l coordinati on for the manageme nt of the GAS	5. Developme nt of participato ry manageme nt	6. Education, construction and development of technical capacities, communicati on and disseminatio n of knowledge for sustainable groundwater management	7. Strengthen and developmen t of local managemen t of the GAS in transbound ary areas or areas that are relevant to regional cooperation	8. Promotion of the definition and implementati on of guidelines and strategies for the sustainable use of the GAS in the context of climate impact
ACTIONS (25)	Action 1	Action 4	Action 7	Action 9	Action 12	Action 17	Action 19	Action 22
	Action 2	Action 5	Action 8	Action 10	Action 13	Action 18	Action 20	Action 23
	Action 3	Action 6		Action 11	Action 14		Action 21	Action 24
					Action 15			Action 25
					Action 16			
Activities								



Programme 1: Coordination of regional and cross-border cooperation of the GAS

- **Action 1: Management of regional cooperation of the GAS**
- **Action 2: Coordination and articulation for the implementation of the SAP**
- **Action 3: Monitoring and evaluation of the implementation of the SAP**

Programme 2: Maintenance and expansion of the network of monitoring and development of mathematical models for the management of the GAS information

- **Action 4: Expansion and maintenance of the GAS Monitoring Network**
- **Action 5: Implementation of mathematical models for decision-making**
- **Action 6: Development and maintenance of a GAS information system for decision-making**

Programme 3: Promotion of technical, scientific, environmental and socio-economic studies

- **Action 7: Promotion of research within the framework of the regional cooperation of the GAS**
- **Action 8: Funding for thematic research of the GAS**

Programme 4: Capacity-building and institutional coordination for the management of the GAS

- **Action 9: Promotion of the strengthening of the institutional management capacities of the GAS**
- **Action 10: Promotion of the strengthening of institutional capacities for the joint management of water resources**
- **Action 11: Promotion of regional and national institutional coordination**

Programme 5: Development of participatory management

- **Action 12: Promotion of the consolidation of spaces for citizen participation**
- **Action 13: Promotion of the effective participation of Indigenous Peoples and local and traditional communities involved**
- **Action 14: Promotion of equal participation of men and women involved in decision-making processes**
- **Action 15: Contribution to the diagnosis of situations of vulnerability regarding access to water**
- **Action 16: Promotion of the participation of user sectors in the management of the GAS**



Programme 6: Education, construction and development of technical capacities, communication and dissemination of knowledge for sustainable groundwater management

- **Action 17: Education, capacity-building and capacity-development**
- **Action 18: Communication and dissemination of information**

Programme 7: Strengthen and development of local management of the GAS in transboundary areas or areas that are relevant to regional cooperation

- **Action 19: Choose and characterise demonstration sites for local management with a focus on transboundary areas and areas of common interest**
- **Action 20: Development and implementation of national and/or cross-border local demonstration projects (LDPs), as instruments to improve local management and sustainability of the GAS**
- **Action 21: Support for the establishment and strengthening of local management committees**

Programme 8: Promotion of the definition and implementation of guidelines and strategies for the sustainable use of the GAS in the context of climate impact

Action 22: Updating of the zoning, monitoring and performance of territorial analysis for the environmental management of the GAS

Activities: Updating the delimitation of upwelling zones (UZ), confinement zones (CZ) and strong confinement zones (SCZ); Defining transboundary effects areas (TEAs); Obtaining and compiling current data on land use and multi-temporal variation trends.

Action 23: Generation of the socio-economic characterisation of the GAS and keeping it updated

Activities: Identifying and characterising water demands based on economic sectors and associated risks; Generating prospective scenarios on the evolution of the water demand of the GAS.

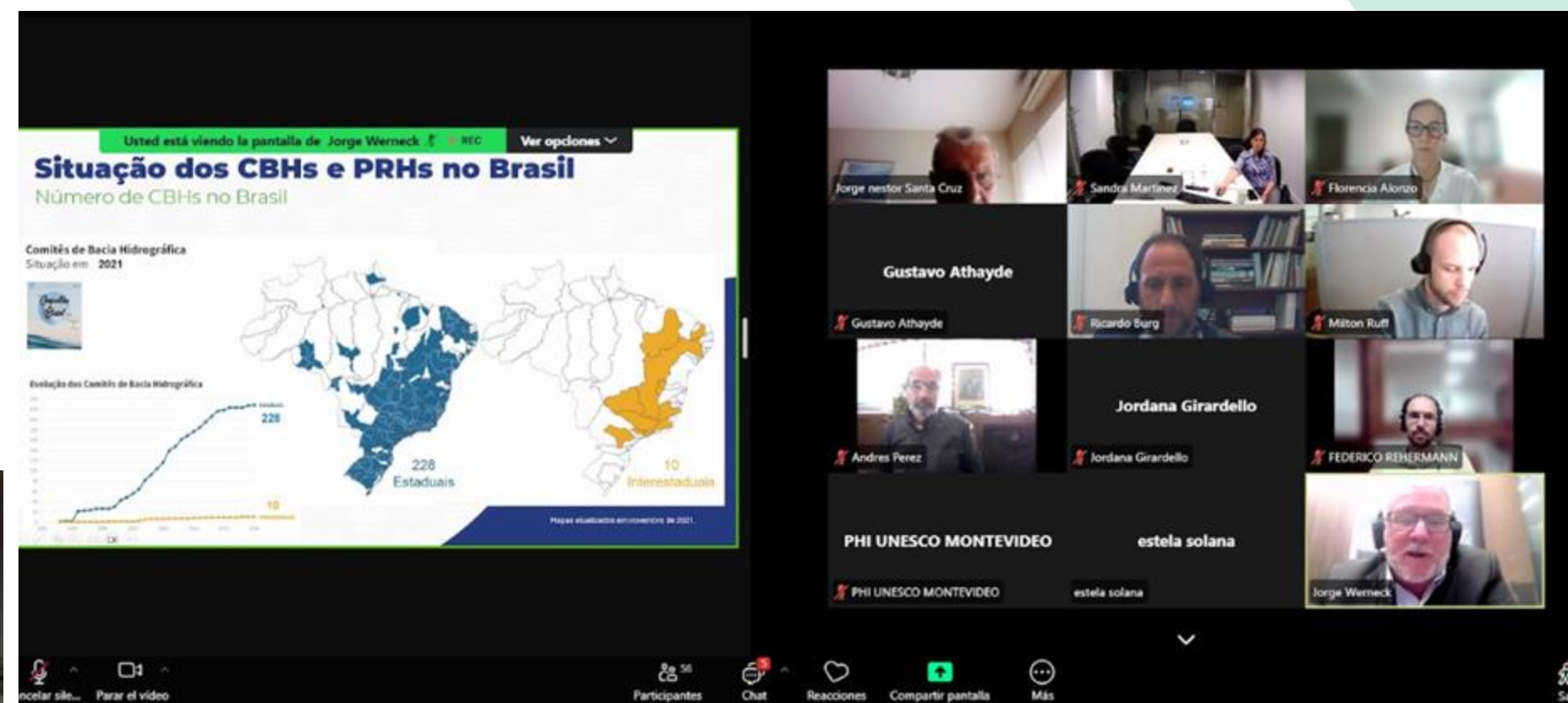
Action 24: Mapping and assessment of ecosystem services associated with the GAS

Activities: Identifying and mapping the integrity of ecosystem services; Assessing the ecosystem services provided and on which the GAS depends; Defining strategies for the protection of ecosystem services and biodiversity hotspots.

Action 25: Development and implementation of the climate impact adaptation strategy

Activities: Generating forecasts of climate impacts in the short- and medium-term; Integrating with each country's climate policies applicable to the GAS; Proposing sectoral actions to adapt to climate impact; Defining strategies for the protection of ecosystem and biodiversity hotspots services in the context of climate impact; Developing and implementing the climate impact adaptation plan.

(V) Outcome C3



(VI) Outcome C3



The screenshot shows the homepage of the Sistema Acuífero Guaraní (SAG) website. The browser address bar displays <https://acuiferguarani.org/pt/>. The website header includes the SAG logo with flags of Argentina, Brazil, Paraguay, and Uruguay, and a navigation menu with links: Projeto, Aquífero, Recursos, Novidades (with a dropdown arrow), Testimonios, and ES. The main content area has a green background with a map of the Guaraní aquifer system on the left. The text reads: "Para uma gestão sustentável e cooperativa do Sistema Aquífero Guaraní" and "Implementação do Programa de Ação Estratégica do Sistema Aquífero Guaraní: Facilitando Ações Regionais *Facilitando Acciones Regionales*". The footer states "UM PROJETO IMPULSIONADO POR" followed by logos for gef, unesco, and CAF.

← ↻ <https://acuiferguarani.org/pt/> aA ☆ ⚙️ ☆ 👤 ...

Sistema Acuífero Guaraní **SAG** 

Projeto Aquífero Recursos Novidades ▾ Testimonios ES

Para uma gestão sustentável e cooperativa do Sistema Aquífero Guaraní

Implementação do Programa de Ação Estratégica do Sistema Aquífero Guaraní:
Facilitando Ações Regionais *Facilitando Acciones Regionales*

UM PROJETO IMPULSIONADO POR

 global environment facility   BANCO DE DESARROLLO DE AMÉRICA LATINA Y EL CARIBE

Regional and transboundary cooperation



- Technical Committees strengthen agreements for the Implementation of Actions: Culture of Collaboration
- GAS Update: Present and Future of GAS Management in National Workshops
- Experts: Understanding the National Context, Building Indicators, and Supporting the Regional Level
- Institutional Learning (Capacity Development) through Workshops with Specialists

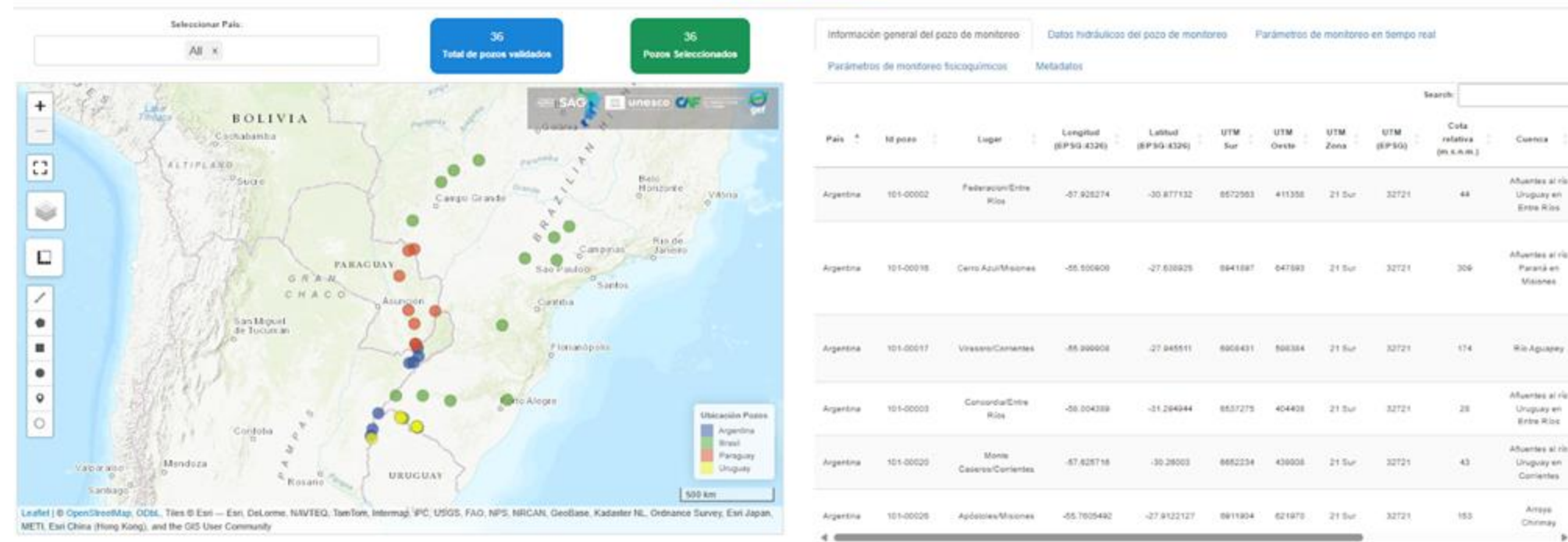


Pozos de monitoreo del Sistema Acuífero Guaraní



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Regional Cooperation – Focus: GAS

- **Regional Project:** A concrete experience that promotes implementation, exchange, and synergy among States, fostering identity and engagement around a shared water body.
- **Dialogue** with various institutions committed to the management of the SAG and Integrated Water Resources Management (IWRM).
- **Synergy among Policies:** Water, Environment, Regional Development, Climate Change, and Gender.
- **Cooperation** enhances management quality and helps prevent future problems and conflicts.





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THANK YOU

Ricardo Burg
International Coordinator

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Medium Size Project “Implementation of the Strategic Action Program of the Guaraní Aquifer System: Enabling Regional Actions”

