



# DEVELOPMENT OF THE ACTION PLAN FOR THE CONCORDIA – SALTO PILOT PROJECT (ARGENTINA – URUGUAY)

CODE 5011.1

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## EXECUTIVE EXTENDED SUMMARY

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## **1. INTRODUCTION**

It is presented the Executive Extended Summary prepared by the Consultancy for the development of the Action Plan for the Concordia - Salto Pilot Project (Argentina - Uruguay) within the frame of the Environmental Protection and Sustainable Development of the Guaraní Aquifer System Project, financed by the GEF - World Bank and whose management exerts the General Secretariat of OAS (GS/OAS).

## **2. CONCORDIA – SALTO PILOT AREA (COSAPA)**

### **2.1. Geographic location and scale of work.**

The Concordia – Salto pilot area is located in both sides of Uruguay River, which is an international limit between Argentina and Uruguay. The area comprises approximately 500 km<sup>2</sup> (figure 1) where Concordia in Argentina and Salto in Uruguay are the major cities. The proposed scale of work for the COSAPA is 1:50.000 on agreement with Dr. Lilián Techeira.

#### **2.1.1. Election of the area**

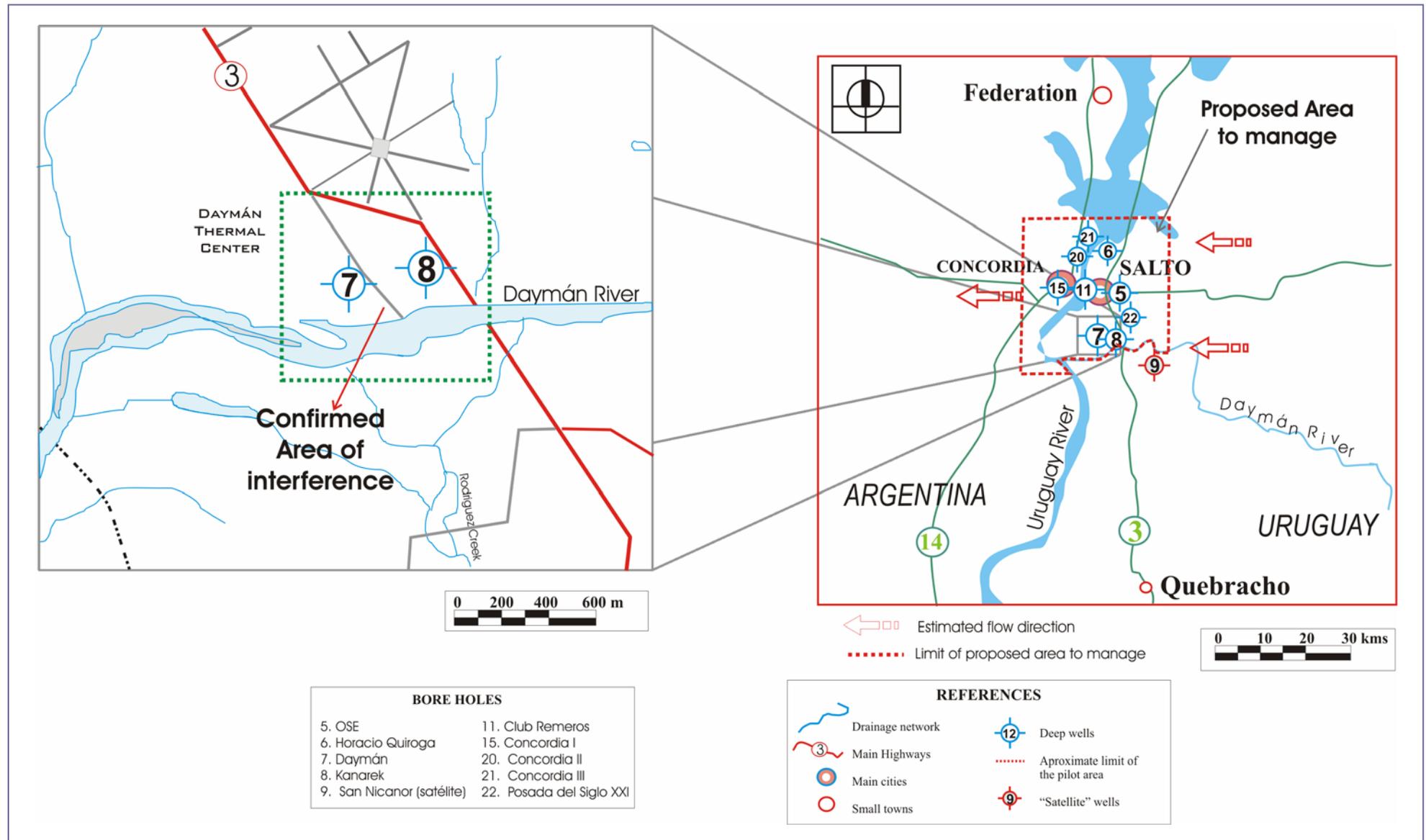
For the election of the area and its limit definitions, the following features were considered:

- It has the greatest density of population (approximately 200,000 inhabitants) in the Argentinean - Uruguayan coastal zone.
- They constitute the most important centers of thermal tourist activity on the GAS, foreseeing that it will become in medium-term into a Tourist Thermal Attraction of South America.
- It presents interference between wells that brings as a consequence, loss of flowing volumes. This situation can cause conflicts among neighboring wells at national and transnational level.
- It has the greatest density of wells in the thermal zone.
- It has a homogenous hydrogeologic behavior, being easy to implement the conceptual and numerical models.
- There are two wells working to a distance of 300m (Daymán and Kanarek), ideal to make the hydraulic test of interference.
- It is included San Nicanor well (Uruguay) as a "satellite" due to its strategic position as reference for the hydraulic studies (potentiometry, flow direction, etc).

## **3. ANALYSIS OF THE PRESENT MANAGEMENT - LEGAL AND INSTITUTIONAL FRAME**

The countries involved in the COSAPA show several similarities in legislation related to the thermal hydric resource. In table 1 are summarized the authorities and institutions responsible for the management in each country.

Figure 1. Location of the COSAPA



**Table 1. Analysis of the present management framework in both countries. Summary**

|                                     |                                 | ARGENTINA  |   | URUGUAY  |  |
|-------------------------------------|---------------------------------|--|---|--|--|
| TYPE OF MANAGEMENT                  |                                 | PROVINCIAL   |   | NATIONAL   |  |
| <b>CURRENT MANAGEMENT FRAMEWORK</b> | <b>INSTITUTIONAL FRAMEWORK</b>  | <b>ORGANIZATIONS IN CHARGE OF MANAGEMENT</b>   | Secretaría de Recursos Hídricos de Entre Ríos   | Dirección Nacional de Hidrografía  |  |
|                                     | <b>LEGAL FRAMEWORK</b>          | <b>LAW/ DECREE</b>   | <b>CONTENTS</b>   | <b>LAW/ DECREE</b>   | <b>CONTENTS</b>  |
|                                     |                                 | <b>POSSIBLE SIMILARITIES</b>   | Decree 3413/98  | <p><u>Name:</u> Reglamento de Estudio, Planificación y Preservación del Agua Termal en Entre Ríos</p> <p><u>Date:</u> august 21st, 1998</p> <p><u>Authorities concerned:</u> Council: Subsecretaría de Turismo; Dirección de Hidráulica y Recursos Hídricos; Subsecretaría de Obras y Servicios Públicos; Dirección General de Ciencias, Tecnología y Minería; Dirección General de Desarrollo, Ecología y Control Ambiental</p> <p><u>Contents:</u><br/> Exploration and drilling:<br/> Pre-feasibility request: Art. 12 to 18<br/> Exploitation authorization: concession Art. 16 to 34</p> <p>*Coincidences exist on many requisites prior to new undertakings realization, work monitoring and technical requirements, except for some aspects stated below.</p> | Decree 214/000   |
|                                     | <b>POSSIBLE DISSIMILARITIES</b> | Decree 3413/98   | <ul style="list-style-type: none"> <li>- Demand of environmental impact studies (art 22)</li> <li>- Well closing by competent authority in cases stated in art 31. (also see art 32 and 33)</li> <li>- It anticipates the therapeutic or nourishing use of thermal water (art 6)</li> </ul> | Decree 214/000   | <ul style="list-style-type: none"> <li>- It sets maximum drawdown to 150m from S.L. (art 1)</li> <li>- It sets maximum instant flow: 150m<sup>3</sup>/h (art 1)</li> <li>- It sets minimum distance between wells: 2000m (art 1)</li> <li>- It sets maximum exploitation rate: 16 h/day</li> </ul> |
|                                     |                                 | Possible categorization of thermal groundwaters as “geothermal resources”, bringing them under control of the present mining legislation, hence matching them to metalliferous minerals. It would be possible to make concessions to private entities for exploitation and profit, changing the organizations in charge of the thermal water management and control. |   |  |  |



#### 4. IDENTIFICATION OF PROBLEMS

The most important problems that affect the management of the thermal hydric resource are:

##### a. Possible differences between rules in each country

###### Solution:

- Analyzing the present rules in both countries (common points, near points and opposite points) and elaborating a uniform regulation.
- Proposed in: Terms of reference n° 2, 9 and 12 (CHAP 11 of the Complete Final Report).

##### b. Well interference

###### Solution:

- Establishing from hydraulic tests the radii of influence of wells and determining the optimal range of well location. Hence, an exploitation based on the appropriate use of the flowing and well pumping in a future scenery.
- Results should be included in future legislations.
- Proposed in: Terms of reference n° 6 and 12 (CHAP 11 of the Complete Final Report).

##### c. Differences in the projects and constructions of wells

###### Solution:

- Making regulation rules to project, to construct, to control and to monitor deep wells. These regulation rules should be accepted and agreed for their immediate application in the COSAPA.
- Proposed in: Terms of reference n° 9 and 12 (CHAP 11 of the Complete Final Report)

##### d. Lack of water usage planning - Management of water exceeding in the thermal resorts.

###### Solution:

- Studying the efficiency conditions of water distribution and use. Water reuse with or without heating, always considering the characteristics of the thermal resorts. The results of these works should be included in a plan of recommendations to save water.
- Evaluating the possible Environmental Impacts derived from the disposal of exceeding thermal water.
- Defining precisely the existing demand in the thermal resorts and recommending the use of cold water wells as supply sources for baths, motels, laundries and irrigation. In this way, an optimum use of the thermal resource will achieve.
- Proposed in: Terms of reference n° 7, 8 and 12 (CHAP 11 of the Complete Final Report).

##### e. Insufficient formal and non-formal education provoking a lack of qualified technical personnel

###### Solution:

- Courses: they must be created to satisfy the detected demand, generating two kind of courses: one for technical levels and the other one for professional levels.
- Communication: planning the introduction of different means of communication to cover the lack of “water culture”. This allows planting in people minds the “Resource Protection” concept as a desirable value.
- Proposed in: Terms of reference n° 10 and 11 (CHAP 11 of the Complete Final Report).

##### f. Water salinization risk of the aquifer in the area

###### Solution:

- The water gain of salts in the GAS has been verified during 10 years operation of thermal wells in Uruguay. In order to measure and to predict the evolution of this chemical change, a hydrogeochemical model has to be developed.
- Proposed in: Terms of reference n° 4 and 6 (CHAP 11 of the Complete Final Report).

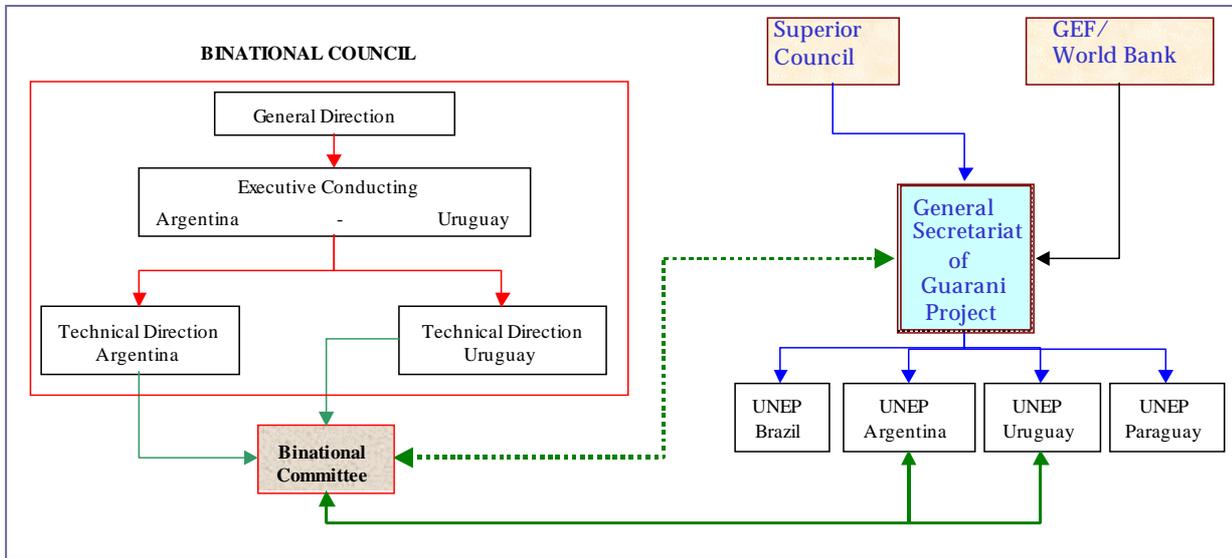
##### g. Territorial planning

###### Solution:

- A future territorial planning that will consider the thermal water sources protection is imperative.
- Proposed in: Terms of reference n° 6, 7 and 12 (CHAP 11 of the Complete Final Report).

**5. INSTITUTIONAL STRUCTURE PROPOSAL**

The Institutional Structure scheme proposed by the consultancy is showed in figure 2.



**Figure 2. Institutional Structure Proposal**

At first stage, as an initial structure within the COSAPA management strategy, it is proposed the creation of a Bi-national Committee. As a long-term structure, it is proposed the creation of a Bi-national Council, composed of a General Direction, Executive Conducting and Technical Direction in each country. Table 2 summarizes the integrants and functions of each institution created.

Table 2. Proposed structure for short and medium-term.

|                           | INSTITUTION  | INTEGRANTS   | FUNCTION  |
|---------------------------|--|--|---|
| INITIAL STAGE             | <b>CONCORDIA SALTO PILOT AREA BINATIONAL COMMITTEE</b> | <ul style="list-style-type: none"> <li>- Intendencia Municipal de Salto</li> <li>- Municipalidad de Concordia</li> <li>- Politic Representatives (ediles)</li> <li>- Public and private users</li> <li>- Universities</li> <li>- NGO from each country located on the area</li> <li>- Junta de aguas de Uruguay</li> <li>- Secretaría de Recursos de Entre Ríos.</li> </ul>  | To coordinate and articulate activities to develop in the COSAPA, due to its strategic location on the area, its integration based on multiple actors and to the local knowledge for quick implementation of tasks.   |
|                           | <b>COSAPA BINATIONAL COMMITTEE SECRETARIAT</b>         | <ul style="list-style-type: none"> <li>- Concordia representative</li> <li>- Salto representative</li> </ul>   | To generate a reasonable continuity in the coordination and implementation of tasks to be carried out by the Binational Committee   |
| MEDIUM TO LONG-TERM STAGE | <b>COSAPA BINATIONAL COUNCIL</b>                       | <ul style="list-style-type: none"> <li>- <b>General Direction</b></li> <li>- <b>Executive Conducting</b></li> <li>- <b>Technical Direction</b></li> </ul>  |   |
|                           | <b>GENERAL DIRECTION COSAPA BINATIONAL COUNCIL</b>     | <ul style="list-style-type: none"> <li>- Ministerio de RREE Argentina</li> <li>- Ministerio de RREE Uruguay</li> <li>- Subsecretaría de Recursos Hídricos (SSRH - Argentina)</li> <li>- Secretaría de Recursos Hídricos (SSRH – Entre Ríos)</li> <li>- Secretaría de Desarrollo Sustentable y Medio Ambiente (SDSMA - Argentina)</li> <li>- Dirección Nacional de Hidrografía (DNH - MTOP - Uruguay)</li> <li>- Dirección Nacional de Medio Ambiente (DINAMA – MVOTMA - Uruguay).</li> </ul>               | <ul style="list-style-type: none"> <li>- To agree at international level on a policy for the COSAPA</li> <li>- To intercede on conflicts that may arise and to try to conciliate interests of both countries.</li> </ul>  |
|                           | <b>COSAPA BINATIONAL COUNCIL EXECUTIVE CONDUCTING</b>  | <ul style="list-style-type: none"> <li>- Subsecretaría de Recursos Hídricos de Entre Ríos (in Argentina)</li> <li>- Dirección Nacional de Hidrografía (in Uruguay)</li> </ul>  | <ul style="list-style-type: none"> <li>• COSAPA management organism. It participates in the elaboration of management plan. Also, it carries out the execution and evaluation of such plans</li> <li>• To rule and regulate</li> <li>• To participate in planning processes, pursuing and in the evolution of the SAG management in the pilot area</li> <li>• To organize monitoring tasks, database and future prosecution authority for the resource</li> </ul> |
|                           | <b>COSAPA BINATIONAL COUNCIL TECHNICAL DIRECTION</b>   | <p><u>In Argentina:</u> “ad hoc” committee composed of: a representative and its alternate from SSRH, SDSMA de la Nación, la SSRH de Entre Ríos and from Municipalidad de Concordia (in Argentina), with SSRH-ER acting as Executive Secretariat. It is suggested the inclusion of user’s representatives within the structure.</p> <p><u>In Uruguay:</u> “ad hoc” committee composed of: DNH and Junta Asesora del Acuífero Infrabásáltico, acting DNH as the Executive Secretariat of this committee</p> | <ul style="list-style-type: none"> <li>• To give advise and technical support to the management organism.</li> <li>• To make suggestions for ruling, monitoring, databases, and analysis of the aquifer evolution.</li> <li>• To create management indicators allowing to establish the evolution and the impact of the management actions in the COSAPA.</li> <li>• To stimulate participation mechanisms with the different social actors.</li> </ul>           |

## 6, PRELIMINARY PROGRAM OF ACTIONS

### 6.1. Action Plan Proposal

Every management plan has to be realistic, socially accepted, executable, and flexible enough to be adapted to each local and temporary circumstance. And it also must be integrated into the set of resources the community requires.

Based on the mentioned above, it is proposed the following components that should be developed in the Terms of Reference that will be implemented in the Concordia – Salto pilot area. The actions or activities for short, medium and long-term are summarized in table 3.

Table 3. Summary of Proposed Activities

|                            | Short-Term                                    | Medium and Long-Term  |  |
|----------------------------|---|---|--|
|                            | INITIAL STAGE<br>(6 months)                   | DEVELOPMENT<br>(2 years)  | CLOSING<br>(6 months to 1 year)                                    |
| <b>Proposed activities</b> | • Data Bank Elaboration                       | • Numeric and Hidrogeologic Conceptual Model and Environmental Impact Evaluations | • Monitoring of Activities   |
|                            |   | • In common project and thermal wells construction regulations                    | • Results Communications   |
|                            | • Immediate Actions of Coordinated Management | • Social Communication  | • Final report and action proposal beyond project's temporal scope |
|                            |   | • Institutional strengthening, formal and non-formal education                    |  |

## 7: ACTION PLAN

In table 4 is summarized the Action Plan that would be carried out for short-term. This schedule is tentative and will be adapted at the beginning of the actions of the Binational Committee and to the Guaraní Aquifer Project schedule.

Table 4. Short-term Activities

| Activities   | dec-03 | jan-04 | feb-04 | mar-04 | apr-04 | may-04 | jun-04 |
|--|--------|--------|--------|--------|--------|--------|--------|
| Information compilation, Database elaboration and GIS implementation               |        |        |        | █      | █      | █      | █      |
| Interaction between Concordia and Salto communities and the UNEP of both countries |        |        | █      | █      | █      | █      | █      |
| Dialogue with the groundwater resource authorities of both countries               |        | █      | █      | █      | █      | █      | █      |
| Creation of the Pilot Area Concordia-Salto Binational Committee Secretariat        |        |        |        | █      | █      | █      | █      |
| New well fulfillment communication   |        |        |        |        | █      | █      | █      |
| Analysis of economic and social info in a whole, related to thermal water use      |        |        |        |        | █      | █      | █      |
| Communication events organization about the aquifer management                     |        |        | █      | █      | █      | █      | █      |
| Measure instruments installation in termal wells                                   |        |        |        |        |        | █      | █      |

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EXECUTIVE COMMITTEE

### 7.1. Immediate coordinated-management actions

A framework for co-management in a transnational area must have the capability of establishing common attributes to different social and institutional entities, from different legal scopes (as in the case of the COSAPA). Care must be taken of not changing or violating the different identities previously created in each country.

In a first approach for the management frame constitution, it is possible to start identifying spontaneous interactions based on the analysis of the similarities on legislation of each country. This activity will be included within the Term of Reference N° 2 (Chapter 11 of the Complete Final Report).

It is proposed the following short-term actions as well:

1. Interaction between Concordia and Salto communities and the UNEP of each country it is proposed to create a monthly meeting mechanism, coordinated by the Project-GAS Secretariat, who convokes local Commissions, grouped within the Bi-national Committee and the UNEP of each country. These meetings will try to reach three basic objectives: First, to narrow the bonds between the institutions. Second, to bring forward the updated advances. Third, to deepen in future actions making the necessary adjustments to take ahead the schedule.

2. To gather the involved authorities of each country related to the groundwater resources to begin a dialogue forum where common points can be identified in the hydric resources legislation. And to agree on the beginning of an immediate transnational management built up on coincidences.

3. Accomplishment of new wells communication. One of the basic tasks to cover by this Bi-national Committee is to receive the information about new well projects that will be constructed in the pilot area. So, during the November 2003 - April 2004 period, the committee will try to know in advance about the future well projects in the pilot area.

4. Analysis of economic and social information with respect to the thermal water use. It is very important to be able to know the economic and social impact on the pilot area caused by the thermal water use. With this in mind, it is proposed the creation of a Commission in charge of the compilation and processing of the information, in the scope of the Binational Committee.

5. Organization of communication events about the aquifer management. The idea is to spread the aquifer topics among local people. This will allow keeping a constant presence in the community, taking advantage of the synergy effect of combining the interest that already exists by local people and the planning of communication mechanisms. It is proposed to carry out three communication events in this first stage.

**A first event:** at school level, to be carried out in the beginning of the new school year in March 04. The event will consist in a one-day activity about the aquifer in Concordia and Salto as well. Participation and promotion of school authorities and municipalities in each country have to be asked for.

**A second event:** radio broadcast campaign, for which it is considered advisable to look for local sponsors –institutional referents and companies- that support the concept to spread. The bi-national range of the local radio broadcaster will allow covering the whole pilot area. The development of this campaign would last three months, starting on March 04, being necessary to define its frequency and characteristics.

**A third event:** corresponding to a technical speech that will be held in March 04. The idea is to communicate all the advances achieved until the management integration time. Also, to insist on the aquifer knowledge and its potential, gathering interest and ideas for a future. These must be kept in

mind as main point, looking forward the interest, motivation and commitment of people in the different scopes of society.

6. Measuring instrument installation: it is proposed to install measurement instruments -temperature, pressure and volume-, as well as the construction of well stream gauging in the thermal wells that do not have it yet. This will allow unified and standardized data in each well.

7. Thermal Center Administrators visits to important international Thermal Centers (for instance Portugal, Italy)

8. Managing Organism Members visits to countries that share transnational aquifers (for instance Switzerland and France)

9. Fulfilment of rules and regulation in force in both countries

## **7.2. Information compilation, database elaboration and GIS implementation**

All technical-scientific, legal, administrative, economic and social data will have to be successfully compiled. This information will have to be stored in a database and under a Geographic Information System (GIS) for better visualization.

## **8. MEDIUM TO LONG TERM PLAN OF ACTION**

This second stage has the objective to obtain a detailed knowledge on geologic and hydrogeologic aspects that are tied to specific data that will be used for the integrated management and they were not covered in the short-term stage. For example: exploitable reserves, well interference, protection perimeter, radius of influence, evolution of chemical and thermal characteristics. All these elements will contribute in a hydrogeologic conceptual model and a mathematical model to simulate the present situation and future scenes of the aquifer use, together with social aspects of communication and institutional strengthening. The results will be added to the management frame coordinated by COSAPA. The medium to long-term plan of action includes the following points:

### **8.1. Conceptual and Numerical Hydrogeologic Model and Evaluation of Environmental Impact**

- a. Geology
- b. Geophysics
- c. Hydrogeology
- d. Hydrochemistry
- e. Isotopes
- f. Hydrothermalism - Optimization of water supply to thermal resorts
- g. Monitoring Network implementation during the COSAPA period
- h. Numerical models
- i. Vulnerability
- j. Environmental Impacts

### **8.2. Rules and Regulations in common for Thermal Well Project and Construction**

### **8.3. Social Communication**

### **8.4. Institutional Strengthening, formal and non-formal Education**

### **8.5. Development of the Management Model**

## **9. FINAL STAGE**

The final stage will consider the closing of the Project, in which three activities will be developed:

- Monitoring Plan
- Communication of Results
- Action proposals beyond the period of the Project