

ETH Seminar: Science and Politics of International Freshwater Management 2003/04

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case study

Plata/Parana River Basin



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Introduction

The following case study has been elaborated within the ETH seminar “*Science and Politics of International Freshwater Management*”. This seminar addresses mainly PhD students with the goal to extend their knowledge on

- a) water resources management,
- b) international water resources conflicts and
- c) international relations and conflict resolution.

Background & Organisation

Freshwater is crucial to all societies and ecosystems. Most of the world’s large rivers and lakes, which are the principal sources of freshwater, are shared by two or several countries. Consequently, sustainable use of freshwater often hinges on successful international cooperation that integrates scientific knowledge into political action. In the first part of this research seminar the participants familiarized themselves with key issues in international freshwater management and the research methodology to be used. In the second part they analyzed specific transboundary river and lake management cases in a comparative perspective.

Topic and General Goals

This seminar addresses the following questions: What strategies can be or are in fact used to reduce or avoid chemical contamination of rivers and lakes, to protect, in an ecologically sensible manner, against flooding, and to use hydropower without damaging the environment? Under what conditions are riparian countries able to initiate cooperative processes for preserving or sustainably managing vital water resources? Under what conditions is international cooperation effective, efficient or successful in terms to be defined?

In teams of two to three students ecological, social and policy data on specific international river and lake management cases were collected. Based on this data process-oriented case studies were written. In addition the river management was coded according to a more formal scheme.

The case studies were developed along the following structure:

- general background information to the river/lake basin;
- identification of conflict issues for which an international management effort exists;
- assessment of success/failure of this effort in reducing the conflict situation;
- explaining the outcome of the international effort along a set of non-regime and regime variables.

Information on the seminar and further case studies can be found under:

http://www.eawag.ch/research_e/apec/seminars.

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1. Background

The Plata River basin comprises the Paraná-Paraguay Rivers system and the Uruguay River system; it includes territory in Argentina, Bolivia, Brazil, Paraguay, and Uruguay. It encompasses some of the major rivers of the continent - the Paraná, the Paraguay, and the Uruguay - and the largest wetlands in the world - the Pantanal. The Paraná rises in southeast central Brazil and flows generally southward. The Paraná's major tributary is the Paraguay River, which rises in the Mato Grosso region of Brazil and flows into the Paraná near the northern border of Argentina. The Uruguay River rises in the coastal range of southern Brazil and flows generally southward until its conjunction with the Paraná. The Paraná and the Uruguay meet at the mouth of the Rio de la Plata, which forms the estuary of these two river systems.



Figure 1: map of the Plata River Basin

The Plata River basin drains about 1/4 of the South American continent or about three million km². The distribution of the basin area on the different countries can be seen in table 1.

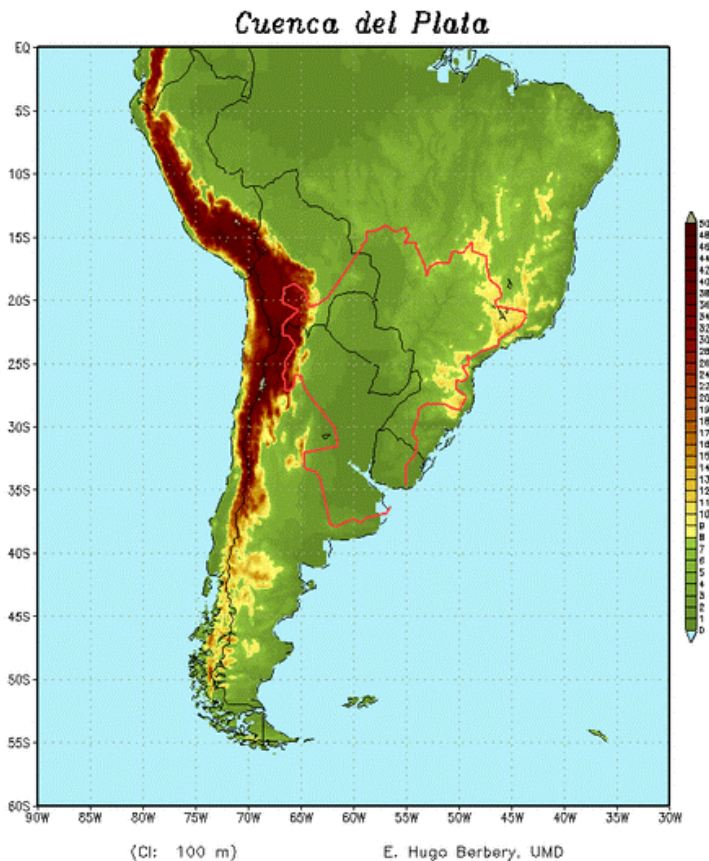
<i>Area of Basin</i>	<i>Country</i>	<i>Area per country</i>	<i>Percent</i>
2'966'900	Brazil	1'366'700	46.06
	Argentina	817'900	27.57
	Paraguay	400'100	13.49
	Bolivia	270'200	9.11
	Uruguay	111'600	3.76

Table 1: Distribution of the Plata River basin area on countries

The Pantanal is a key hydrologic resource in South America. It sustains flows in the Paraguay River throughout both the wet and dry seasons, which has a major impact on both the ecology and economics of the region between the Pantanal and the Atlantic Ocean. It is also an integral part of the hydrologic cycle of South America, due to its size and the quantity of water it temporarily stores annually [Ponce, 1995]. The seasonal flooding regime supports a

productive and diverse fauna, including some of Brazil's most endangered species. The Pantanal has one of the most diverse avian communities on the planet with more than 650 species of birds identified. In addition, more than 400 species of fish have already been listed for only a portion of the Pantanal [Alho, C. J. R., and L. M. Vieira. 1997]. The diversity of interacting habitat types and the direct connection with neighboring South American phyto-geographic regions also produce a remarkable, albeit poorly known, plant diversity. In spite of this extraordinary productivity and diversity, the Pantanal is an unknown tropical wetland [Bucher et al. 1993] and our understanding of the forces that control the composition and functioning of its communities is meager at best.

Figure 2: Localization of the Plata river basin



The major ecological and economical problems in the Plata-Paraná River Basin include projects of large dams as the Yacyretá and the Itaipu Dam, water pollution from big urban areas and conflicts between interests as navigation versus use for hydropower. The states of the basin have traditionally been willing to cooperate with management of the watershed, and have stressed the river's binding them to each other. A 1969 umbrella treaty, to which all of the riparian are signatories, provides a framework for joint management of the basin. The basin nations adopted it to 'make possible the harmonious and balanced development, as well as the optimum utilization, of the great natural resources of the [Tratado de la Cuenca del Plata, 1969].

This framework is being tested with a current river transportation proposal to dredge and straighten major portions of the Paraná and the Paraguay, including through the Pantanal wetlands. The initial backers of the proposal, dubbed "Hydrovia" ("waterway" in Spanish and Portuguese), were the governments of the La Plata basin states. The project would allow year-round barge transportation - current conditions only allow for barges during the three dry months - and open up a major transport thoroughfare for land-locked sections of the riparian states. Environmentalists and those whose livelihoods depend on traditional economies have expressed trepidation at the project.

A cooperative management body has been in place on the La Plata basin since 1969. While a generally successful and productive body, the "Hydrovia" project for barge transportation is the largest project for river development proposed to date. Its size and possible impacts on the economies and environments of the basin states are beginning to strain the cooperative nature of basin management. The case is a good example of inter-sectoral disputes taking precedent over those which are between nations.



The La Plata Basin Treaty of 1969 provides an umbrella framework for several bilateral treaties between the riparian, and a direction for joint development of the basin. The treaty requires open transportation and communication along the river and its tributaries, and prescribes cooperation in education, health, and management of 'non-water' resources (e.g., soil, forest, flora, and fauna). The foreign ministers of the riparian states provide the policy direction, and a standing Inter-Governmental Coordinating Committee is responsible for ongoing administration.

The Basin states agree to identify and prioritize cooperative projects, and to provide the technical and legal structure to see to their implementation. The treaty also has some limitations, notably the lack of a supra-legal body to manage the treaty's provisions. The necessity to go through each country's legal system for individual projects has resulted in some time lag and lack of implementation.

The treaty's success has been in the area of transportation, so it is not altogether surprising that the "Hydrovia" project has been forwarded. The first meeting of the backers of the project was in April 1988, out of which the Intergovernmental Commission on the Paraná-Paraguay Hydrovia was formed. As positions between supporters and opponents of the project have sharpened, these positions are based on very little information. The Inter-American Development Bank has only recently helped to finance a technical and environmental feasibility study.

2. Particular conflict situations and river/lake management efforts (sub-efforts) where performance can be assessed

2.1 Introduction

There are several hydro electrical projects going on in the Plata/Paraná region. The Itaipu dam is situated on the border between Brazil and Paraguay at the site of the Guaira Falls. A second dam named Yacyretá has been built on the border between Argentina and Paraguay. A third project, a channel called Hidrovia, is in the planning phase and would be giving ocean access to currently landlocked areas in Paraguay and Bolivia.

2.2 Chronology

Year	Countries	Project	Description	Source
1926	Argentina, Paraguay	Yacyretá	First protocol about the utilization of the Apipé falls.	5
1958	Argentina, Paraguay	Yacyretá treaty	Creation of joint Argentina-Paraguayan technical commission to study possibilities of obtaining hydro-electric energy from the rapids in the River Paraná at the islands of Yacyretá and Apipé.	1 , 5
1962	Brazil, Paraguay	Itaipu	Negotiations between Brazil and Paraguay over the development of the Paraná River are interrupted by a unilateral show of military force by Brazil in 1962, which invades the area and claims control over the Guaira Falls site.	3 , Sabadell 1986
1966, 1967	Brazil, Paraguay	Itaipu	Military forces were withdrawn in 1967 following an agreement for a joint commission to examine development in the region and to develop the water resources of both countries.	2 , 3
1969	Paraguay, Argentina, Bolivia, Brazil, Uruguay	treaty	An umbrella treaty, to which all of the riparians are signatories, provides a framework for joint management of the basin.	
1973	Brazil, Paraguay	Itaipu treaty	Brazil and Paraguay announce plans to construct a dam at Itaipu on the Paraná River, causing environmental repercussions and the efficacy of their own planned dam project downstream. Argentina demands to be consulted during the planning of Itaipu but Brazil refuses.	Wallenstein & Swain 1997, 1 , 2
1973	Argentina, Paraguay	Yacyretá treaty	Promise that the two countries will continue together the hydro electrical use of the Paraná at the height of the Yacyretá island, considering its navigability and reducing the negative effects caused by inundating. A binational organization, called Yacyretá is created.	5
1975		Itaipu	Start of construction on the Itaipu dam.	2
1978		Itaipu	In 1978 Argentina, Brazil and Paraguay signed a treaty to use the water from the Paraná River in the Itaipu Project. This is the river where the Itaipu Dam is built.	2
1979	Argentina, Brazil, Paraguay	Yacyretá treaty	An international agreement is reached that provides for the construction of both Brazil and Paraguay's dam at Itaipu and Argentina's Yacyretá dam.	
1980's		Itaipu	In 1982 the Itaipu land behind the dam was flooded and within 14 days the reservoir was created. In 1984 Itaipu started generating electricity. In 1991 the 18th generating unit started producing electricity.	2

1989	Yacyretá treaty	Definition of scheme for the protection of the valleys.	5
1994	Yacyretá	First turbine is starting production of electrical power.	5
1995	Hidrovia	The Southern Cone Common Market or Mercosur' was officially implemented joining the economies of Brazil, Argentina, Uruguay and Paraguay. The idea of an international waterway navigable from the Atlantic to presently landlocked Bolivia has now moved into the planning stages with a project called Hidrovia. If and when it is completed Hidrovia will allow ocean going vessels to make the 2,000 mile trip from Argentina and Uruguayan ports of the Atlantic to currently landlocked areas in Paraguay and Bolivia.	4
1998	Yacyretá	Last turbine is starting production.	5

Sources:

- 1) http://www.internationalwaterlaw.org/RegionalDocs/apipe_falls.htm
- 2) <http://www.kented.org.uk/ngfl/rivers/River%20Articles/itaipudam.htm>
- 3) <http://www.worldwater.org/conflict.htm>
- 4) <http://www.american.edu/TED/HIDROVIA.htm>
- 5) <http://www.eby.org.ar/html/entidad.html>

2.3 Introduction to projects (mainly taken out of trade and environment database)

2.3.1 Itaipu Dam

Facts

- Construction started in January 1975 and finished in 1982.
- It took 30,000 people 7 years to build the Itaipu Dam.
- It cost \$20 billion to build.
- The dam supplies electricity to Brazil and Paraguay.
- The dam is 7.76 kilometers long and 196 meters high.
- The reservoir behind the dam has an area of 1350 square kilometers.
- It is a hollow gravity type [dam](#).
- The Itaipu Dam generates 75 billion kilowatts of electricity per year.
- One of the world's largest [hydro-electric power stations](#).

Source <http://www.kented.org.uk/ngfl/rivers/River%20Articles/itaipudam.htm>

The Itaipu Hydroelectric Power Plant is located on the Paraná River and straddles the countries of Brazil and Paraguay. Aside from numerous superlatives due to its size and capacity, Itaipu represents an interesting political and environmental case. The political dimension is due to the dual ownership of the river and the economic might of Brazil compared to Paraguay. The environmental dimensions of the project revolve around resettlement issues, compensation payments, and the Brazilian response to these issues. Among the environmental consequences, the impact on the natural vegetation, including rare fruit tree, brush, and orchid species, were enormous. Much species endangerment and deforestation took place in the initial stages of the projects construction.

However, with bi-national efforts, many of the endangered plant species and a number of the doomed forests were salvaged. Today, over 50 percent of what could have been lost in the region remains. Given the precautions and environmental planning performed by the Paraguayan and Brazilian governments, once the impacts on the vegetation were realized after construction begun, further damage was monitored and controlled.

Further information at: <http://www.american.edu/TED/ITAIPU.HTM>

2.3.2 Yacyretá

Since its beginning in 1973 the Yacyretá Dam project has increasingly come under the scrutiny of the local communities in Argentina and Paraguay. The project has been characterized as a "monument to corruption" and has shown costly overruns over the last two decades. The project is unable to fill the dam to planned levels, and even if all turbines are put into operation, they each can attain only two-thirds of the installed capacity, due to the consequences that the full operation of the system could imply to the environment and to the local communities. This is the result of the lack of accurate assessment of needs and environmental damage, something that should have been attended since the beginning of the project.

Further information at: <http://www.american.edu/TED/YACYRETA.HTM>

2.3.3 Hydrovia Canal Plan and Environment (HIDROVIA Case)

A waterway that will link the heart of South America with the Atlantic Ocean could grant an outlet to the sea to landlocked Paraguay and Bolivia, a financial boost to Brazil's poor western region, increased export for Argentina, and a renovated, international port for Uruguay. The project will expand Brazil, Argentina, Uruguay, Bolivia and Paraguay's navigation possibilities on the Paraná and Paraguay rivers, which is considered South America's second most important river-way system. The world's largest wetland, the Pantanal, could be ruined by the construction of the water link. Sprawling over 53,760 square miles in Brazil, Paraguay and Bolivia, the Pantanal is home to 650 species of birds, 240 varieties of fish and more than 90,000 types of plants.

Further information at <http://www.american.edu/TED/HIDROVIA.htm>

2.3.4 Treaty of the River Plata Basin - 1969

Multilateral (Argentina, Bolivia, Brazil, Paraguay, Uruguay)

Objective:

Enable the harmonic and balanced development, as well as the optimum use of the great natural resources of the region, and ensure their preservation for future generations through the rational utilization of these resources.

Provisions of the Agreement:

The Parties undertake to: Join efforts with the objective of promoting the harmonious development and the physical integration of the River Plata Basin and its areas of direct and appreciable influence;

Promote, within the Basin, the identification of areas of common interest and carrying out of studies, programs and works, as well as the formulation of operative understandings or legal instruments that are considered necessary and that lead to:

- a) The facilitation and assistance in the area of navigation;
- b) The rational utilization of water resources, especially by regulating water courses and its multiple and equitable use;
- c) The preservation and fostering of animal and vegetable life;
- d) The improvement of road, rail, river, air electrical and telecommunications interconnections;
- e) Regional complementation through the promotion and establishment of industries that are of interest to the development of the Basin;
- f) The economic complementation of bordering areas;
- g) Mutual cooperation in the fields of education, health and fighting diseases;
- h) The promotion of other projects of common interest, in particular those related to the inventory, assessment and use of the natural resources of the area;

i) The integrated knowledge of the River Plata Basin.

Further information at: <http://www.mma.gov.br/ingles/gab/asin/inter29i.html>

3. Definition and measurement of success-failure in regard to particular efforts/sub-efforts

3.1 Main effort: treaty 1969

The 1969 Plata Basin Treaty provided the first framework for integrated development. The treaty has to be seen as the first success in the attempt to reach cooperative agreements between the Basin states. This is because of the huge international distrust which existed between the Basin states and can be explained by its historical roots. The success and failure of the Treaty can only be analyzed by understanding the historical conflicts and the influence of geopolitical interests on the national policies.

The system established under the treaty includes an annual meeting of foreign affairs ministers (FAM) which sets the policies and guides the actions. A permanent intergovernmental coordination committee (ICC) composed of representatives of each country has a secretariat with responsibility for coordination promotion, and control of the multinational efforts. The scheme includes a financial institution, FONPLATA, which finances programs consistent with the treaty objectives.

No defined or obvious collective optimum could have been found in the literature. The purpose of the Treaty nevertheless is to 'make possible the harmonious and balanced development, as well as the optimum utilization, of the great natural resources of the region'. As financial resources in developing countries are scarce, economical development is hard to achieve without any compromises especially in regard to the ecological health of one region. The value of 8 for the collective optimum has been chosen in order to consider these aspects.

Now, what would the outcome have been, if international efforts were absent? Without the establishment of an international treaty, the Basin states would have had three possibilities of acting. First, to do nothing, this means conserving the status quo, second, to go a national way, this means to develop a national plan without international agreement or third, to seek the international agreement. In the first two cases, economic development and the chance to get a lot of benefits from cooperation among the states would have been smaller. Even worse, this kind of acting may have provoked a lot of more distrust between the considered states. The la Plata Basin Treaty represents a first framework to overcome the historical distrust between the Basin states. Therefore without it, the political environment would be less fruitful to fulfill further joint international action.

The present situation with its favorable political environment enables the treaty as a structure already in place to reopen the possibility of further rapid integrative steps. Therefore even having produced few concrete results until this moment, the treaty can be taken as a necessary framework for joint management, relieving given historical circumstances and geographical realities.

3.2 Sub-effort: ITAIPU – 1973

A dam project is always an ambiguous undertaking. On one hand energy production leads to a degree of economical independence and builds the foundation for economic development, on the other hand, the ecological and social impacts are high, as described above and explained below. The collective optimum therefore cannot be chosen very high. Here we gave a value of 6 to it.

Without international efforts, the risk of further political disputes and military interventions would have increased. Brazil as a militarily seen powerful upstream country and geographically favored by high elevation differences, greater depth and narrow channel sections would have had no problems to get through its interests. This would have been the nourishment of further distrust and rivalries between the Basin states.

One negative aspect of the treaty is the fact that Brazil refused Argentina to join the treaty, but following the spirit of the 1969 treaty a common treaty was reached in 1979.

For the present situation one can say, that the net economic benefits of the Upper Paraná projects have not been maximized because of a lack of productive cooperation. But for the special case of the Itaipu treaty, the ecological compensation actions have been forwarded to a quite good extent.

4. Influence of non-regime variables on success-failure in regard to particular efforts/sub-efforts

4.1 Main effort: treaty 1969

The huge differences in the economic situation and thus interests of the five involved countries Brazil, Paraguay, Uruguay, Argentina and Bolivia are probably one reason for vague formulation of the 1969 umbrella treaty. Only declarations of the good will to enhance navigation and development, but still to preserve nature were made. But this treaty was a beginning building a basis for further agreements.

Today big changes are taking place. Due to the formation of the common market “Mercosur” in 1995 (Bolivia isn't member), today the economic interests seem to have gained against environmental aspects and are bringing big projects like “Hidrovia” with an enormous environmental impact into the planning stage.

4.2 Sub-effort: ITAIPU – 1973

In the ITAIPU case three countries are involved – Brazil, Paraguay and Argentina. The Paraná is situated on the borderline of Brazil and Paraguay. These two countries are the upstream part and are in favor of the ITAIPU dam. Argentina is the downstream part and the dam is mostly causing disadvantages.

The two upstream countries are very different concerning their size and their military and economic power. The huge Brazil is possessing an area of the river basin, which is 3.4 times as big as the area Paraguay possesses (resp. 3 times and 1.7 time compared to Argentina). In 2000 the GDP of Brazil has been 595.5 compared to 7.5 billion US\$ in Paraguay.

The big differences in military power had a big impact on the case. There had been negotiations between Brazil and Paraguay over the development of the Paraná River before, which were interrupted by a unilateral show of military force by Brazil in 1962. Paraguay had no chance to compete militarily. The military expenses of Brazil are about hundred times higher. Brazil invaded the area and claimed control over the Guaira Falls site. Military forces were withdrawn in 1967 following an agreement for a joint commission to examine development in the region and to develop the water resources of both countries. Somehow

this big difference seems to have had in the end a positive influence on the outcome of the case. Paraguay didn't want to cooperate in the beginning but after it had been forced to, it had – given a fair chance - an at least economic advantage.

A possible no regime counterfactual is the situation that without a will to an international management, Brazil had only used its military power by annexing the river basin and suppressing Paraguay.

The regulations were in a way that both countries were allowed to have an equal share and number of turbines operating. Brazil had in 2000 a GDP of 595.5 and Paraguay of 7.5 billion US\$. But the thus much richer Brazil was helping the poor Paraguay with the financing. Further the amount of produced electrical power is too much for the small and low developed country of Paraguay, but it is – following the regulations – allowed to first offer the overshot of electrical power to Brazil and then to sell it on the free market.

The social and ecological effects had been greatest in the area which has been over flooded by the dam; therefore the impact in the countries themselves had been highest.

As described in section 2.3.1, from an environmental point of view over 50 percent of the flora which could have been lost in the region remains.

Now we are going to come back to the consideration of the upstream-downstream situation by taking the position of Argentina into account. Due to its size and economic and military power Argentina is situated between Brazil and Paraguay, being much closer to the mightier Brazil but too weak to militarily impose its interests. Due to the downstream situation Argentina is most influenced by effects of the dam, concerning the amount of water let through and the variations in water level strongly influencing navigation.

Though Argentina and Paraguay had a common treaty in 1973 concerning a different dam, Argentina was not involved in the planning of the Itaipu project. This is certainly also due to a lack of military and political influence. First in 1978 a common agreement and treaty was reached.

5. Influence of regime design on success-failure in regard to particular efforts/sub-efforts

5.1 Main effort: treaty 1969

The 1969 treaty has been a quite diffuse treaty. Its issues are spreading from navigation, the rational use of water, the preservation of fauna and flora, the amelioration of the infra structure to the fight against diseases. It is remarkable that the environment is included, but due to the vague formulation and number of issues is more a declaration of good will and the treaty is less successful. Considering that there have been long-standing rivalries between the states, already the realization of a treaty is a kind of success. The fact, that no legally binding formulations are included, fits to the vague formulation of the treaty.

Because of the military dictatorships there was hardly any involvement of non governmental organizations. The federal government planed annual meetings. Funding was not really necessary, because there weren't any actual projects planned.

According to international law and diplomacy, ratified international agreements supersede domestic laws and arrangements. These international conventions consider nations to be unitary actors-whether or not the parties involved have strong federal systems. Consequently, using the United States as an example, international agreements often reflect the viewpoint of just a few federal agencies. The interests of state and local governments, as well as of nongovernmental actors, tend to be downplayed or ignored. Implementation is therefore seriously flawed: local agents lack the capacity and motivation to be effective, and local informal arrangements that might have become the basis of formal cooperation are largely ignored. Top-down decisions made in national capitals rarely account for the needs, desires, and aspirations of the borderlands' inhabitants. One example is the 1969 Plata Basin Treaty. Five South American nations (Argentina, Bolivia, Brazil, Paraguay, and Uruguay) share the Rio del Plata basin and its international and transnational rivers. The Treaty established a Coordinating Committee and provided the first framework for integrated development among the basin nations. However, implementation is hampered by centuries of mutual distrust.

The Treaty is an agreement to cooperate in several areas, not a point-by-point directive. This indicates the five nations' unwillingness to undertake more substantive obligations. The Treaty's system is a classic top-down approach: an annual meeting of foreign-affairs ministers (FAM) sets policies and guides action, and a permanent intergovernmental coordinating committee (ICC) maintains a secretariat that coordinates, promotes, and controls multinational efforts. FAM and ICC decisions must be unanimous. The Treaty also set up a financial institution (FONPLATA) to finance programs. Nevertheless, the Treaty remains institutionally weak, with only a poor capacity to regulate or enforce its decisions. This weakness may be deliberate, given the signatories' history of mistrust. In such cases, top-down designs tend to replicate and even fortify existing suspicions and misgivings. Resultant institutions become extensions of diplomatic mechanisms that failed to halt previous conflicts in other arenas. The top-down emphasis provides no obvious role for either public or local government participation. <http://ag.arizona.edu/OALS/ALN/aln44/varady-milich2.html>

5.2 Sub-effort: ITAIPU – 1973

The 1973 treaty contains in comparison to the 1969 treaty a concrete project, the Itaipu dam. Also the topics covered by the treaty are less numerous. Only economics and electricity are included. Environmental issues are not taken into account. Both countries had designs on the great energy potential of the Parana, which separates their territories, but given the impossibility of deciding ownership, they split it. A 1966 agreement divided the energy in half. Seven years later, a treaty outlined the arrangements for the creation of Itaipu. It incorporated ANDE and ELECTROBRAS, Brazil's national electricity company, in an entity called Itaipu Binational, designed to administer the construction and operation of the dam. It also spelled out rights to the energy produced - each country will be entitled to one half, with 9 of the dam's 18 turbine-generators compatible with each country's electrical cycle.

Later on, the Itaipu Binational also took environmental considerations. But still hardly any non governmental organizations (NGO) were involved.

Both countries were funding this organization with an equal amount of money, but Brazil gave credit to Paraguay for its share. Third party funding took place for some environmental subprojects.

6. Conclusions

6.1 Main effort: treaty 1969

Implementing international cooperation requires as an early step the establishment of an agreement which should specify objectives and the means of joint action. In the Plata Basin case, the Plata Basin Treaty is that instrument. Its goal is the promotion of the balanced development and physical integration of the Plata Basin and the areas under its direct and measurable influence. The treaty also enumerates a list of partial objectives, and establishes an institutional framework to coordinate future cooperation.

While the few concrete achievements up to 1990 indicate that the broad objectives of the treaty were not accomplished, the institutional framework has been implemented, and no party has denounced the validity of the treaty provisions. The institutional framework and the agreement in principle to integrated river basin development are concrete instruments of cooperation whose importance cannot be denied on the basis of failures in subsequent integrating actions.

The effectiveness score of a value from 0.2 express these findings. The treaty doesn't seem to have been highly successful up to this moment.

The failure of the treaty on one hand can probably be explained by its broadly formulated goals, which leave a too broad scope to the actors. The treaty specifies the purpose of the international agreement, but doesn't show the way to go. Even if a framework for further agreements has been established, the success of the treaty is limited by this fact. Where no strict guidelines are provided, actors can search the most comfortable way to get through their interests.

Another fact, which contributes to the limited success of the treaty, may have been the historical origin of long-standing rivalries between the states. This provided a political environment not able to catalyze the difficulties, which the introduction of a concept of integrated river basin planning and management encountered. This situation was even more challenging as Brazil was a much bigger military force than the other states in the Basin and would have been able to set them under pressure.

With the introduction of new democratic governments in the mid eighties in Bolivia, Argentina, Brazil, and Uruguay and later on of Paraguay, the political situation became more stable, further on, the introduction of the FAM (Foreign Affairs Ministers) meeting gave a significant increase in value to the management authority of the treaty.

There is certainly a huge lack of input in regard to environmental aspects that there hasn't been NGO's involved in the project. The governments of the different states mostly just see economic factors and favor projects promising economical growth and advantages. Even if the will to preserve ecological richness was pronounced in the treaty of 1969, as no NGO does further point out these special interests only the minimum is done. The project 'Hydrovia', entailing a threat to the ecology of the region, is in the moment highly promoted.

6.2 Sub-effort: ITAIPU – 1973

In the meantime, the Itaipu treaty from 1973 is much more concrete and provided actors with very technical demands, here the success in reaching treaty-given goals is higher. The effectiveness score is calculated to value of 0.5. The problems, which constricted the treaty even to be more successful, were on one hand, the net economic benefits of the Upper Parana projects have not been maximized because of a lack of productive cooperation and on the other hand, that the problem certainly remained, that Argentina has not been accepted

as contractual partner by Brazil. This mistake has been corrected with the establishment of the 1978 treaty.

In the 1973 treaty the disequilibrium in economic and military matters between the involved countries may have had a much higher impact on the success and failure of the treaty as in the first case 1969. As Brazil was the mightier and richer country, it was able to get its way. First it was forcing Paraguay towards an agreement, but nevertheless it also gave the necessary financial support which made it possible for Paraguay to finally benefit of the situation.

The difficulty of dam construction lies in its nature to be an upstream-downstream problem when including Argentina. The scientific knowledge of the impact of such a dam is rather precisely known. The collective optimum has been chosen rather low because of these known impacts. Therefore, in such a case it is probably much easier to bring up solutions to solve the upcoming problems. In contrary the 1969 treaty has more been a diffused source problem. There the difficulty first remains to evaluate and understand the problem, and afterwards coming up with solutions in order to solve the problem.

The higher success of the 1973 treaty compared to the 1969 treaty could also be seen as a consequence of the formulated legally binding action program of the 1973 treaty. The founded binational organization ITAIPU as a river management authority does have more influence on the case as the yearly meeting of the foreign ministers in the 1969 treaty.

Therefore, we can see that the problems international freshwater management is encountering are of rather complex nature, reaching from economic to historical, geographical, social and ecologic causes. And all of them have to be considered in order to get the right collective optimum.

To solve the perceived problems, the different stakeholders must formulate their interests and must be considered in the process of finding and formulating legally binding regulations. However, it is not yet said, that the treaty goals have to be necessarily reached with fulfilling these conditions, even more lots of organizational and institutional expenses seem to be requested to make a treaty successful.

7. Additional Links & Literature

Treaties

http://mgd.nacse.org/cgi-bin/qml2.0/watertreaty/intl_treaties.qml (main data base)
http://www.internationalwaterlaw.org/RegionalDocs/apipe_falls.htm (treaty 1958)
<http://www.iadb.org/intal/tratados/cuencaplata1.htm> (treaty 1969 in spanish)
<http://www.mma.gov.br/ingles/gab/asin/inter29i.html>
<http://www.internationalwaterlaw.org/RegionalDocs/Parana2.htm> (treaty 1973)
<http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/TREATIES/URY-ARG1973MB.PDF> (treaty 1973) link
<http://www.internationalwaterlaw.org/RegionalDocs/Parana1.htm> (treaty 1979)

Dams/Power Plants

http://www.kented.org.uk/ngfl/rivers/River_Articles/itaipudam.htm (short summary about dam)
<http://www.american.edu/TED/ITAIPU.HTM> (description of Trade and environment Database)
<http://www.solar.coppe.ufrj.br/itaipu.html> (some technical data)
<http://www.irn.org/programs/latamerica/yacireta.subm.html> (world commission on dams, introduction)
<http://www.american.edu/TED/YACYRETA.HTM> (description of Trade and environment Database)
<http://www.eby.org.ar/html/entidad.html> Yacyreta homepage
<http://www.american.edu/TED/HIDROVIA.htm> (canal - no dam, long description out of Trade and environment Database)

Projects/descriptions

<http://www.pantanal.org/gottgens.htm> (description - The Paraguay-Parana Hidrovia: Large-scale Channelization or a "Tyranny of Small Decision")
<http://www.chasque.net/rmartine/hidrovia/Envxtrad.html> (description: Environment vs. Trade?)
<http://www.oieau.fr/anglais/international/bresil.htm> (short, IOW wants to improve freshwater management, contact?)
<http://www.dams.org/kbase/submissions/showsub.php?rec=env074>
(world commission on dams, about water resource management, contact?)
<http://www.gefweb.org/wprogram/july96/bermejo/object.htm>
(Strategic Action Program for the Integrated Water Resources Management)
<http://www.damsreport.org-docs-kbase-contrib-opt183.pdf>
(ex-post evaluation of dams and related water projects)
<http://ag.arizona.edu/OALS/ALN/aln44/varady-milich2.html>
(theoretical: Regulatory, closed and top-down paradigms of river basin management)
<http://www.whirledbank.org/environment/dams.html> (world bank)

Other specific literature

Trevin, J.O. and J.C. Day. 1990. Risk perception in international river basin management: The Plata basin example. *Natural Resources Journal* 30(1): 87-105.
Ponce, V. M. 1995. Hydrologic and Environmental Impact of the Paraná-Paraguay Waterway on the Pantanal of Mato Grosso, Brazil: A Reference Study. San Diego, CA: San Diego State University Report.
Alho, C. J. R., and L. M. Vieira. 1997. Fish and wildlife resources in the Pantanal wetlands of Brazil and potential disturbances from the release of environmental contaminants. *Environ. Toxic. Chemistry* 16(1): 71-74.
Bucher, E.H., Bonetto, A., Boyle, T., Canevari, P., Castro, G., Huszar, P. and Stone, T. (1993) Hidrovia. Un examen ambiental inicial de la vía fluvial Paraguay-Paraná. Humedales para las Américas. Buenos Aires.
<http://www.pantanal.org>

General information/ Maps

<http://www.worldwater.org/conflict.htm> (chronological overview)

RIVER/LAKE: PLATA PARANA

main effort

sub-effort
TREATY 1973 + related
ITAIPU projects

TREATY 1969

OUTCOMES-SUCCESS-FAILURE

	coding	comments	sources	coding	comments	sources	VARIABLE DEFINITION	SOURCE FOR DATA
REGULATORY OUTPUT								
International treaty	yes	none	http://www.transboundarywaters.orst.edu/treaties	yes	none	http://www.transboundarywaters.orst.edu/treaties	yes, no	http://www.transboundarywaters.orst.edu/treaties
Are treaty provisions specific in terms of goals and implementation?		2 very vague	tratado de la cuenca del Plata		5 very technical	http://www.internationalwaterlaw.org/RegionalDocs/Parana2.htm	1 (vague) - 5 (very specific) scale	http://www.transboundarywaters.orst.edu/treaties
Is there a dedicated international organization	no	only an intergovernmental coordinating committee?		probably			yes, no	http://www.transboundarywaters.orst.edu/treaties
IMPLEMENTATION								
To what extent have riparian governments enacted legislation or other domestic measures to implement international commitments?		3 ICC with the responsibility of coordination and promotion and control of multinational efforts		N/A	binational organization ITAIPU has been founded, having the necessary rights and funds		1 (none) - 5 (very much) scale	internet sources; interviews
PROBLEM SOLVING								
What is the collective optimum (CO)?	8	overcoming historically founded distrust between the nations			6 ecological and social impacts of dam construction are always high!		1-10 scale	internet sources; interviews
What would the outcome have been in the absence of international efforts (NR)?	3	long-standing rivalries would have been harder to overcome			2 singular national economic interests would have led to less optimal output		1-10 scale	internet sources; interviews
What is the present situation (actual performance, AP)?	4	There is still development requested. Which is the way to go? Hydrovia transport project is promoted even if this means great impact for ecology			4 Net economic benefits of the Upper Parana projects have not been maximized because of a lack of productive cooperation	J.O. Trevin and J.C. Day, Risk perception in International River Basin Managment: The Plata Basin Example. Natural Resources Journal. 30, 1990.	1-10 scale	internet sources; interviews
Effectiveness score = (AP-NR)/(CO-NR)	0.2				0.5			
Sensitivity score = 1/(CO-NR) = d(effectiveness score)/dAP	0.2				0.25			

EXPLANATORY VARIABLES

NON-REGIME INFLUENCES								
<i>Geographical/hydrological:</i>								
Number of countries involved	5	Brazil Paraguay Argentina Uruguay Bolivia	http://www.transboundarywaters.orst.edu/treaties	3	Brazil Paraguay Argentina	http://www.transboundarywaters.orst.edu/treaties	1-?? Scale	http://www.transboundarywaters.orst.edu/treaties
Area of river/lake basin	2'966'900	all countries	http://www.terra.geo.orst.edu	2'584'700	only listed countries	http://www.terra.geo.orst.edu	km2	http://www.transboundarywaters.orst.edu/treaties
Asymmetry in terms of riparian land area in river/lake basin	0.08	46% towards 3.76 %	http://www.terra.geo.orst.edu	0.29	46% towards 13.5 %	http://www.terra.geo.orst.edu	% of largest riparian country in river basin / % of smallest riparian country in river basin (0-1 scale)	http://www.transboundarywaters.orst.edu/treaties
<i>Issue-characteristics:</i>								
Extent to which damage caused by individual riparian countries is exported to other riparians (average)	3	very variabel, depends on the strenght of ecological/hydrological/social disturbance of the river system			3 the social, economic and ecological effects had been greatest in the area which have been overflowed by the dam, therefore the impact in the country itself had been highest		1-5 scale	internet sources; interviews
Is the problem an upstream-downstream negative externality problem?	2	the treaty has an overall view on economic, ecological and social issues and therefore all part			5 Dam project		1-5 scale	internet sources; interviews
Is the environmental problem scientifically well-understood?	4	Pantanal as a key hydrological resource and habitat for a rich fauna and flora			5		1-5 scale	expert interviews
How easy/hard is monitoring of compliance with international commitments?	4				2 more specific points in treaty which are easier to get through		1-5 scale	expert interviews
Is the environmental problem predominantly a point-source or a diffused-sources problem?		diffused-sources			point-source		yes, no	expert interviews
<i>Economic and political conditions:</i>								
Average level of development of riparian countries	183 billion US\$	2000 [billion US\$]: Arg:285, Uru: 19.7, Bol: 8.3, Par:7.5, Bra: 595.5	http://first.sipri.org/index.php	296.266667	2000 [billion US\$]: Arg:285, Uru: 19.7, Bol: 8.3, Par:7.5, Bra: 595.5	http://first.sipri.org/index.php	mean of GDP	http://first.sipri.org/index.php
Economic development gap between riparian countries	0.015		http://first.sipri.org/index.php	0.015		http://first.sipri.org/index.php	GDP of poorest / GDP of richest riparian country	http://first.sipri.org/index.php
What is the level of economic integration among the riparian countries?	17.9%	[% of GDP]: Arg: 15.1, Uru:21.5 Bol: 14.2, Par: 27.3, Bra: 11.5			18%	[% of GDP]: Arg: 15.1, Par: 27.3, Bra: 11.5	average trade among riparian countries as % of their GDP (1-100%)	http://first.sipri.org/index.php
What is the level of political integration among the riparian countries?	today: 4	Mercosur (Bolivia isn't member)		today: 5	Mercosur		1(very bad) - 5 (very good) scale	http://first.sipri.org/index.php

How closely are the riparian countries affiliated in foreign policy?		data has not been provided			data has not been provided		correlation of voting in UN General Assembly	data to be provided by Berr
General environmental awareness in the riparian countries	2			2			1-5 scale	to be provided
Is the riparian country that suffers most from the problem economically/militarily more or less powerful than the country(ies) primarily responsible for damages?	N/A				1.057855923 (Bra +Par)/Arg.GDP+Mill exp[%GNP.1995]*GDP[2000]		average GDP+MilExp polluter country(ies) / average victim country (0-1 scale)	http://first.sipri.org/index.ph http://projects.sipri.se/milex http://www.cia.gov/cia/publi ROM in CIS library (Seilerg
REGIME DESIGN								
Single-issue management or integrated river management?		economics/hydro electricity/environment/navigation		2 resp. 3	only economics and hydro electricity resp. Not in treaty included environmental measures by ITAIPU existing		1 (clear-cut single issue m.) - 5 (clear-cut integrated m.) scale	internet sources, expert int
Extent of third party funding (e.g. World Bank...)	2	inter-american development bank	contact with Aaron Wolf		Brazilian+U.S./Italian fundings		1 (no 3 party funding) - 5 (full 3 party funding) scale	internet sources, expert int
Extent of NGO involvement	1			1			1 (none) - 5 (extensive) scale	internet sources, expert int
Are federal or local/regional government primarily responsible for implementation and funding?	federal			federal			federal, regional/local	internet sources, expert int
Are liability rules or other legal instruments used in implementation?	no		no				yes, no	internet sources, expert int
Is the respective river management authority well organized and funded?		financing by FONPLATA and FAM and ICC as management authorities			binational organization ITAIPU has been founded. The richer Brazil is giving a credit to the poorer Paraguay.		1 (bad) - 5 (good)	internet sources, expert int
Legally binding agreement or politically binding action program approach (hard vs. soft law)?	2	annual meeting			5 regulations described in treaty => hard law		leg. Binding, action program	internet sources, expert int
How are the management costs and benefits allocated?	N/A				Brazil helps Paraguay with financing, but both countries have the benefits		1=concentrated costs, diffused benefits; 2= concentrated costs and benefits; 3=diffused costs and benefits; 4=diffused costs and concentrated benefits	internet sources, expert int