

**Dissension on the Shores of the Uruguay River:
Adjusted Winner, and the Pulp Mill Conflict Between
Argentina and Uruguay**

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1. Introduction

The relative homogeneity of South American countries is not unnoticed in current inter-Latin American international relations. While it is true that the post-independence period was exemplified by a series of border wars and generally sour relations, today's climate in South America is characterized by mutual cooperation. With a common bond in language and culture,¹ South American countries have made a strong push towards political integration. This integration most recently manifested itself in the formation of Mercosur in 1991, which is a regional trade agreement designed to promote free trade and fluid movement of goods, peoples and currency, in an effort to balance against worldly economic powers such as the United States and the European Union². In fact Mercosur, coupled with the less economically developed Andean Community, comprises ten out of thirteen South American continental countries.

However, despite this recent push towards integration, a newly formed international conflict between Argentina and Uruguay is threatening to destabilize recent advancements in South American integration. The conflict, euphemistically called *las papeleras* (the pulp mills), has its roots in 2003 and continues to this day. Specifically, Argentina is objecting to Uruguay's proposed plan to partner with the Finnish company Botnia in an effort to build a pulp mill along the Uruguay margin of the shared Uruguay River. The stakes are high for the two southern cone countries. On the one hand, Argentina believes that the pulp mills will irreparably harm the Uruguay River ecosystem, which will negatively affect Argentine industries that depend on or are situated in close proximity to the river. This environmental harm, Argentina believes, is

¹ Perhaps a better way to put this, in light of Brazil, is to say a common bond in an Iberian colonizer.

² Mercosur. "Antecedentes del Mercosur," (Mercosur, 2007),
<http://www.Mercosur.int/msweb/principal/contenido.asp> (Accessed February 12, 2007).

in direct conflict with the mutual goals of both Argentina and Uruguay to protect the Uruguay River ecosystem promulgated in the 1975 Uruguay River Statute.³ On the other hand, the two projects represent tremendous developmental opportunities for the Uruguayan economy. Representing the biggest economic inversion in Uruguay's history, the pulp mills stand to add much needed jobs to the Uruguayan economy.⁴ To this date, efforts by both Argentina and Uruguay, such as a bi-national committee and Mercosur arbitration have failed to bring about a settlement that both countries can agree to. Currently, Argentina and Uruguay have submitted arguments before the International Court of Justice (ICJ), but the ICJ is unlikely to deliver a verdict for several years.

It is in the best interest of not only Argentina and Uruguay, but also South America as a whole to see a prompt and fair end to the conflict at hand. The fair division procedure of Adjusted Winner (AW) developed by Steven J. Brams and Alan D. Taylor (1999, 1996) can provide a fair settlement to the dispute, filling the void that past dispute resolution mechanisms employed so far have left, and thus leaving both parties satisfied.

AW works with contested, divisible goods or issues (in this case issues), in which each party allots 100 points across a spectrum of pre-chosen issues based on their individual weight and preference. AW is a fair procedure in that it satisfies the properties of envy freeness (each side is ensured of receiving at least 50 percent of their preferences, and because each side has the same percentage of their preferences, each side will not trade allocations and therefore each side does not envy the other), equitability (each side

³ Estatuto del Río Uruguay, 1975. (Instituto de Relaciones Internacionales, 2007), <http://www.iri.edu.ar/articulo.php?idarticulo=607> (accessed April 13, 2007).

⁴ Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay. "Informe sobre la instalacion de dos plantas de celulosa en el río Uruguay." (Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, 2005), http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm (accessed April 6, 2007) p. 3.

is awarded the same amount of points over 50) and efficiency (there is no other outcome in which both actors can simultaneously improve their respective allocations)⁵.

The purpose of this thesis, then, is to apply the AW procedure to the current conflict between Argentina and Uruguay in order to derive several settlements to illustrate to both states that AW represents a viable option to the settlement of the pulp mill conflict. For the field of international relations, pursuing the application of AW to a real live two-party dispute is important to address because it not only represents an opportunity to further test the applicability of AW in international disputes, but it also offers the opportunity to expand upon the validity of alternative dispute resolution mechanisms pertaining to international conflicts. Conflicts among states are likely to always be present due to inherent competing interests between them. Therefore, the ability to develop and test mechanisms that ensure fairness is worth pursuing in order to mitigate any potential impacts conflicts may bring about.

1.2 Methodology

In the section dedicated to the AW application to the pulp mill conflict, the reader will discover that, packaged in its entirety, the AW procedure is relatively simple and easy to apply once the necessary steps of selecting contested and divisible issues, defining what constitutes winning and losing for each particular issue, and specific point allocations are taken care of. With this said, this thesis will be structured accordingly, placing more emphasis on the selection of issues and point allocations. The thesis will, from beginning to end, provide the necessary tools for successful AW implementation.

⁵ Brams, Steven J., and Jeffrey M. Togman. Camp David: Was the Agreement Fair? *C.V. Starr Center For Applied Economics* (1996): 1.

In order to apply AW to the pulp mill conflict, a detailed understanding of the AW procedure and the issues surrounding the conflict is crucial. Section two will provide a thorough explanation of the AW procedure, including a hypothetical application, as well as a discussion of challenges and limitations to AW, by drawing on the works of Brams and Taylor as well as the multitude of international conflicts that either Brams or other authors have applied AW to.⁶ With a working knowledge of AW, it is then possible to apply AW to the pulp mill conflict between Argentina and Uruguay.

Section three will provide an in-depth analysis of the five issues in the pulp mill conflict, as well as define what constitutes winning and losing for each issue. Naturally satisfying the above requirements is difficult in the sense that it has to be completed from the vantage point of a spectator who is not directly involved in the conflict. While the estimates can be close, they cannot possibly represent the exact allocations. With a conflict as fresh and as nuanced as this one, there is considerable complexity involved in identifying contestable and divisible issues between the two states. However, through a thorough examination of the major documents that express the viewpoints of both Argentina and Uruguay, it is possible to arrive at a firm set of issues. Such documents include: reunions of the High Level Technical Group (GTAN by its Spanish acronym), the bi-national group initially entrusted with arriving at a settlement to the conflict; relevant ICJ documents; the Mercosur “Ad Hoc” tribunal decision; official statements, speeches, and policy papers by both foreign ministries; and independent environmental impact assessments of the effects of the pulp mills on the Uruguay River ecosystem. These documents will help clarify the issues and their importance to each state.

⁶ For applications of this procedure, see Massoud (2000), Brams and Taylor (1999), Brams and Togman (1998), Brams and Denoon (1997), and Brams and Taylor (1996).

Based on the documents analyzed, and the information presented in section three, section four will provide justifiable point allocation scenarios for both Argentina and Uruguay, so that AW can be applied to the pulp mill conflict. Once AW has been applied to all of the combinations of scenarios suggested, section four will describe the settlements produced based on the definitions of winning and losing for each particular issue.

Section five will assess the viability of the settlements produced in section four, as well as propose any limitations to the application of AW to the pulp mill conflict by drawing on the information presented in section three.

2. Overview of the AW procedure

AW is a fair division procedure first developed by Steven J. Brams and Alan D. Taylor in 1996 and 1999. The following section will serve to explain AW by first demonstrating the appropriate setting for its use, and then addressing the criteria of fairness that AW satisfies. This section will further provide an overview of other fair division procedures and their limitations, apply AW to a hypothetical dispute, and discuss and address the difficulties and limitations of AW.

Brams and Taylor place much emphasis on the ideas of fair division and the AW procedure as demonstrated by the extensive literature they have produced on the subject. Through numerous applications of AW, the two have determined that AW works best with two party disputes. Most important conflicts, they claim, are two party disputes, and three or more parties adds cleavages and multiple dimensions that prove difficult to

address and reconcile.⁷ For AW to be applied appropriately and effectively, the dispute must be centered on issues that can be split or shared without losing their value.⁸ Issues are separable if a party's value of winning on any particular issue is independent of it winning on any other issue.⁹ Finally, voluntary submission is necessary to apply the AW procedure to disputes because settlements can never be imposed if the parties do not offer consent in the first place.¹⁰

It is often difficult to get disputing parties to consent to a relatively new procedure such as AW, as unfamiliarity breeds apprehension. For this reason Brams and Taylor propose the role of a third party mediator who serves to ease communication among disputants, elucidate procedure, and enforce rules without knowledge of any party's preferences.¹¹ In *The Art and Science of Negotiation*, Howard Raiffa further illustrates the role of a mediator as an impartial outsider who tries to aid negotiations in an attempt to find a compromise agreement. The mediator does not have the authority to dictate a solution; rather their goal is to enforce rules.¹² The role of a mediator as an unbiased referee present solely to enforce rules cannot be stressed enough in AW. In fact, one of the many benefits of AW is that it demonstrates fairness without the need for a potentially arbitrary and biased third party.

Brams and Taylor identify three criteria to determine if a settlement is fair: envy-freeness; equitability; and efficiency.

⁷ Steven J. Brams and Alan D. Taylor, *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*, 9.

⁸ *Ibid.*, 9.

⁹ *Ibid.*, 98.

¹⁰ *Ibid.*, 10.

¹¹ *Ibid.*, 16.

¹² Howard Raiffa, *The Art and Science of Negotiation* (Cambridge, MA: Belknap, 1982), 23.

1. *Envy- Freeness*: The settlement is such that no party is willing to trade their final allocations with the other. In essence, no party envies the award that the other party received.¹³
2. *Equitability*: Both parties believe they received the same percentage of the total. Put together with envy- freeness, equitability means both parties not only received more than 50% of their preferences, but both exceeded 50% by the same amount.¹⁴
3. *Efficiency*: A settlement is efficient if there is no other possible allocation that is better for one party without being worse for the other party.¹⁵

Efficiency by itself, however, does not guarantee a fair settlement. Rather, a fair settlement is reached when all three measures of fairness work together. In addition, for the properties of fairness to be met, two assumptions must be made: linearity and additivity. Linearity means that the added value of obtaining more of a good is constant, instead of diminishing as is usually assumed.¹⁶ Additivity means that points can be added across issues to derive a total, suggesting that winning on one issue is separate from winning on another.¹⁷

In an effort to demonstrate the usefulness of the AW procedure, Brams and Taylor compare AW with other procedures commonly used in fair division dispute resolution. Of these, they focus on strict and balanced alternation, and the divide and choose methods. Strict alternation is simply taking turns. (A) chooses first, (B) chooses second

¹³ Steven J. Brams and Alan D. Taylor, *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*, 13.

¹⁴ *Ibid.*, 14.

¹⁵ *Ibid.*, 15.

¹⁶ Steven J. Brams and Jeffrey M. Togman. "Camp David: Was the Agreement Fair?" *C.V. Starr Center For Applied Economics* (1996): 8.

¹⁷ Tansa George Massoud, "Fair Division, Adjusted Winner Procedure (AW), and the Israeli- Palestinian Conflict," (2000): 335.

etc...¹⁸ How does strict alternation stack up when compared to the criteria for fairness mentioned above? Strict alternation is not envy-free because in the mind of the second chooser (B), the first chooser (A) is advantaged. The procedure is efficient in an item-by-item comparison, but when one looks at the overall bundle of goods awarded, it is not.¹⁹ Finally, equitability is difficult to assess because with strict alternation, we are not sure of the fraction of the total value that each party places on their respective goods.²⁰

Balanced alternation attempts to compensate for a potentially disadvantageous selection order. In this example, (A) chooses first, but (B) chooses second and third or in some compensatory order. In terms of envy-freeness, balanced alternation is better than strict, but still one cannot say that it is completely envy-free. Again item-by-item comparisons appear efficient, but when one compares overall bundles it is not. Equitability is again difficult to determine just as in strict alternation, but the argument can be made that with the compensatory picks, balanced alternation is more equitable than strict alternation.²¹

The other common method discussed by Brams and Taylor is divide and choose, where one party divides and the other chooses. The more optimal role, divider or chooser, depends on what each party knows about the other party. In terms of envy-freeness, each party will have a strategy that guarantees that it will not envy the other, but slight miscalculations, say due to spite, might lead to envy.²² The procedure is generally efficient, but in terms of equitability, one must compare collections, and the divider or

¹⁸Steven J. Brams and Alan D. Taylor, *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*, 11.

¹⁹ *Ibid.*, 34-35.

²⁰ *Ibid.*, 26.

²¹ *Ibid.*, 44-45.

²² *Ibid.*, 61.

chooser is favored depending on information possessed by parties, thus divide and choose is generally not equitable.²³

AW on the other hand satisfies all three criteria of fairness. AW is a procedure in which two parties independently distribute 100 points across all issues to be divided depending on the relative value that each party places on each specific issue. Each party is temporarily awarded the issues to which they attached more points. If the total points that each party placed on the items they were awarded matches, the procedure is over. If not, an adjustment process takes place in which items are taken from the party with the higher score and transferred to the party with the lower score until the point values are equalized.²⁴ On first glance this procedure might appear a bit confusing, but the following hypothetical example will serve to demonstrate that AW is easy and straightforward to carry out.

Consider an example in which there are two states (labeled State 1 and State 2), who are engaged in a dispute regarding separate, contestable issues (Issues 1-3). The states are instructed to allocate 100 points across each issue, with each issue receiving at least 1 point. Point allocations reflect the relative weight and importance each state associates with each particular issue. Table 1 illustrates hypothetical point allocations for each state. The greater point allocation for each issue is underlined.

Table 1.

	Issue 1	Issue 2	Issue 3	Total Points
State 1	<u>50</u>	30	20	100
State 2	40	30	<u>30</u>	100

²³ Ibid., 62.

²⁴ Steven J. Brams and Alan D. Taylor, *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*, 10-11.

In the winner phase, issues are allocated to the state that puts more points on that particular issue.²⁵ Tied issues are initially given to the state with more points.

In this example, State 1 wins on issue 1 (50-40), and State 2 wins on issue 3 (30-20). Both states give equal points to issue 2 (30), so issue 2 is awarded to the state with more points, in this case State 1 which has 50 points compared to State 2's 30 points. After the winner phase, State 1 has a total of 80 points (50 on issue 1 + 30 on issue 2), and State 2 has a total of 30 points (issue 3). If, after the winner phase, point distributions are unequal, State 1 (initial winner) must transfer points to State 2 (initial loser) until both sides have an equal number of points. This next phase is called the adjusted phase.²⁶

The order of transfer in the adjustment phase is determined by looking at the ratio of initial points that the winner assigned to an issue, to the number of points that the loser assigned to an issue.

$$\frac{\text{Number of points initial winner assigned to issue}}{\text{Number of points initial loser assigned to issue}}$$

The transfer begins with the smallest ratio, and continues until the overall points are equal, or until a particular item would tip the scale, in which case it must be divided.

In this case the ratio of issue 1 is 1.25 (50/40) and the ratio of issue 2 is 1 (30/30). The ratio of issue 3 is not calculated because it was initially assigned to the state with a lower amount of aggregate points (loser). Therefore, the adjusted phase begins with issue 2 being transferred from State 1 to State 2. This is called an equability adjustment.²⁷

However, transferring all of issue 2 from State 1 to State 2 would place State 2 ahead of

²⁵ Ibid., 72.

²⁶ Ibid.

²⁷ Ibid., 75.

State 1. In this case issue 2 must be divided so that each state has an equal number of points. Let X denote the fraction of issue 2 that State 1 will keep, and $(1-X)$ the fraction of issue 2 that State 2 will receive. To equalize the points for both sides, we set State 1's points (left side of equation) equal to State 2's points (right side of equation):

$$50+30X=30+30(1-X),$$

which yields $X=1/6$. State 1 keeps $1/6$ of issue 2 and State 2 is awarded $5/6$ of issue 2, bringing each state's total amount of points to 55. State 1 receives issue 1 and $1/6$ of issue 2, and State 2 receives issue 3 and $5/6$ of issue 2.

When separating issues such as with issue 2, a mediator would tell each state that issue 2 is to be divided $5/6-1/6$, without telling each state who will maintain which share. The states are tasked with coming up with an agreement that would divide issue 2 $5/6-1/6$, not knowing what share they will get. Therefore, it is in each state's best interest to determine a fair allocation.²⁸

Lets examine the above settlement as it pertains to the three criteria of fairness established by Brams and Taylor. The settlement is envy-free in the sense that each state receives at least 50 (in this case 55) of its own points. Because each state receives 55 percent of their preferences, and because each state has the same percentage of their preferences, no state will want to trade allocations, and thus no state envies the other. The settlement is efficient because there is no other allocation of issues that can give both states more points. Because the procedure starts with an efficient distribution (giving each state all the goods that it values most) and then an equability adjustment in the prescribed order of lowest ratio, it is impossible to help both states with a different

²⁸ Steven J. Brams and Alan D. Taylor, *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*, 86.

allocation.²⁹ Finally, the settlement's equitability is guaranteed by the equability adjustment as each side ends up with the same amount of points in the end. AW is an excellent procedure for fair division because it is equitable, efficient, and envy-free. By taking the third party out of the decision making process, AW also insures there will be no bias or arbitrariness as a result of intervention by a mediator.

Is there any strategy for actors to follow when applying AW? Brams and Taylor spend significant time altering point allocations to try to account for strategy. Their conclusion is that if knowledge is roughly equal, then attempts by either or both disputants to be strategic can lead to disaster, similar to prisoner's dilemma games.³⁰ Thus, disputants have an incentive to be truthful.³¹

While the above example is clear and straightforward, there are potential difficulties in applying AW to international disputes and conflicts. Brams and Taylor discern several difficulties in applying AW in a wide context, such as defining issues, making appropriate point assignments, and issues of timing.

The first major difficulty is defining the issues of the dispute. Of importance here, is not only finding issues that are mutually contestable, but that are also separable.³² In order to render the addition of points on different issues meaningful, separability is key. If winning on issue 1 affects winning on issue 2, then the points a disputant receives on the value of issue 2 cannot be added to the points it wins on other issues.³³ In the conflict between Argentina and Uruguay, as will be demonstrated in the subsequent

²⁹ Steven J. Brams and Alan D. Taylor, *Fair Division: From Cake Cutting to Dispute Resolution* (Cambridge, UK: Cambridge University Press, 1996), 71.

³⁰ Steven J. Brams and Alan D. Taylor, *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*, 80.

³¹ Steven J. Brams and Alan D. Taylor, *Fair Division: From Cake Cutting to Dispute Resolution*, 67.

³² Steven J. Brams and Alan D. Taylor, *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*, 104.

³³ *Ibid.*, 102.

issues section, there are several issues pertinent to each side. However, some issues are not mutually contestable, while others are difficult to separate. The key here is not only identifying the main contestable issues, but also devising several different applications to counter the separability issue. For instance, if there are five issues to the conflict, but winning on issue three affects winning on issue four, then perhaps two different applications should be considered, one in which issue three is omitted, and the other in which issue four is omitted. Or, Argentina and Uruguay need simply combine issues three and four into one issue. The key is defining what that combination is. This brings us to the second potential problem for the definition of issues, which is determining what constitutes winning and losing for each issue. While this proposes a potential roadblock for both Argentina and Uruguay, it is not unreasonable that with an effective mediator, the two countries can come to a reasonable agreement of what winning and losing means for each issue.³⁴

Of equal importance is making appropriate point assignments. The point allocation phase is perhaps one of the most important steps in the sense that the number of points a disputant places on each respective issue determines what the disputant receives in the end settlement. While a disputant may know what they value the most, how do they go about assigning a numerical value? There is no clear-cut answer. However, several steps can be taken to perhaps clarify the issue. Disputants can start by creating a list of rough rankings of issues based on their relative importance to the disputant.³⁵ Then the disputant can weigh how much they would be willing to give up

³⁴ Ibid., 104.

³⁵ Ibid., 101.

one issue in order to gain on another.³⁶ Perhaps a simpler method is to play out a series of trial scenarios to help point postulations.³⁷ Raiffa offers a different perspective, in which he brings up the idea of determining a reservation price, which is the minimum of what one will accept in a settlement.³⁸ Establishing reservation prices can serve as a starting point from which to work up from. This thesis will attempt to mimic Argentina and Uruguay's point assignments, and will make up for the fact that there is a considerable amount of distance between this work and policy makers by proposing several different scenarios for point assignments and applying AW accordingly.

Another difficulty is optimizing timing. When is the appropriate time to commence the AW procedure? Usually the best time is when negotiations have failed and the disputants are in a stalemate.³⁹ However, disputants must be wary of delays, as delays might be beneficial for one side, but detrimental to the other.⁴⁰ In the Argentina-Uruguay conflict, construction is taking place as the conflict unfolds, creating an incentive for Uruguay to drag the conflict out as long as possible.

While there are difficulties in carrying out the AW procedure, there are also limitations to its effectiveness. Most of the criticism of AW can be placed on the lack of emphasis Brams and Taylor place on human nature. For instance, Brams and Taylor assume that a disputant's valuations will not change during or after the distribution process, but many times they do.⁴¹ The distributive process may often shed more light on a disputant's preference, which may cause them to want to shift point allocations to

³⁶ Ibid., 102.

³⁷ Ibid., 134.

³⁸ Howard Raiffa, *The Art and Science of Negotiation*, 38, 40.

³⁹ Steven J. Brams and Alan D. Taylor, *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*, 103.

⁴⁰ Howard Raiffa, *The Art and Science of Negotiation*, 16.

⁴¹ J. Keith Murnighan, "Review Essay" *Social Justice Research* Vol. 12, No. 3 (1999): 156.

compensate. Likewise, emotions and motivations are likely to change during the procedure.⁴²

Attention must also be placed on power differentials and envy-freeness. Weak parties are often liable to accept an outcome because it is unavoidable.⁴³ This is also demonstrated in the ratification process. Most international disputants are held accountable domestically. An actor might be led to shift point allocations from what is really preferable if they are experiencing inward domestic pressure to do so. This, in turn, may lead to skewed outcomes.⁴⁴

Lastly, J. Keith Murnighan points out that most people not only do not like these types of procedures, but will also actively resist them if they are proposed. The procedure is relatively unfamiliar and often requires many machinations to accomplish a final outcome. Simply stated, people are more comfortable with coin flips and divide and choose methods,⁴⁵ or in the case of international disputants, ICJ adjudication or third party arbitration.

To date, AW has been applied to several international conflicts including the Spratly Island controversy in Asia⁴⁶, the Israeli- Palestinian conflict⁴⁷, the Panama Canal treaty negotiations⁴⁸, and the Camp David Accords.⁴⁹ The application of AW to both the Panama Canal treaty negotiations and the Camp David Accords was conducted after both agreements, and therefore allowed the AW settlements produced to be compared with the

⁴² Ibid., 157.

⁴³ Ibid.

⁴⁴ Howard Raiffa, *The Art and Science of Negotiation*, 15.

⁴⁵ J. Keith Murnighan, "Review Essay," 153.

⁴⁶ Steven J. Brams and David B.H. Denoon, "Fair Division: A New Approach to the Spratly Islands," *International Negotiation* 2 (1997).

⁴⁷ Tansa George Massoud, "Fair Division, Adjusted Winner Procedure (AW), and the Israeli- Palestinian Conflict," (2000).

⁴⁸ Steven J. Brams and Alan D. Taylor, *Fair Division: From Cake Cutting to Dispute Resolution*.

⁴⁹ Steven J. Brams and Alan D. Taylor, *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*.

hypothetical AW results. The Spratly Island and Israeli- Palestinian applications represented attempts to solve issues that, to this date, remain unsolved. Perhaps a secondary reason for applying AW to the current dispute between Argentina and Uruguay (second to the desire to produce a fair settlement), is to add to the current literature on AW in an effort to dispel the belief, noted earlier, that AW unfamiliarity is a negative. The more opportunities where AW can be applied to international conflicts from an academic perspective, the greater the literature surrounding AW, and thus the greater the familiarity. Subsequently, states may turn to AW to solve two party disputes because they recognize its effectiveness. This thesis now turns to a live application of AW, illustrating the issues at play in the pulp mill conflict between Argentina and Uruguay.

3. Definition of Issues

Currently, both Argentina and Uruguay are waiting for the International Court of Justice to reach a decision regarding the conflict. Even though the case in front of the ICJ was initiated in June of 2006, ICJ decisions generally take several years to materialize. Past failed bilateral negotiations, and the inability of Mercosur dispute resolution mechanisms to reach a settlement only underline the sense of urgency to reach a settlement, and the need for AW to fulfill this requirement.

With a thorough knowledge of the AW procedure, attained in the previous section, it is now possible to move forward with the specific application of AW to the conflict between Argentina and Uruguay. Perhaps the most challenging aspect of AW is coming up with mutually contestable, separable issues, and furthermore, defining what constitutes winning and losing for each issue. By conducting extensive research with

primary sources including diplomatic notes, Mercosur arguments and decisions, reports by the high-level technical group (GTAN by its Spanish acronym), ICJ arguments, and environmental impact assessments, it is possible to come up with a set of issues that are not only mutually contestable but separable as well. The following set of issues (roadblocks, the technology used in the pulp production process, environmental impact assessment (EIA), liquid emissions, and atmospheric emissions) represent a hypothetical set of issues at best. Because the actual definition of issues, and what constitutes winning and losing for those issues can only be determined by Argentina and Uruguay themselves, issues might be amended, added, or omitted in a real application of AW. The issues involved in this conflict are highly technical by nature. While the following section discusses each issue in detail, it avoids confusing technical discussions wherever possible. After all, the purpose of the section is to identify the issues of contention between the two states so that they can be applied effectively to the actual AW procedure.

Some may point out that key issues such as location are left out, and possible compensation and monitorization of the Uruguay River are linked with other issues. While moving the pulp mill to another site within Uruguay would seem like the most logical solution to the conflict, it does not fit in an application of AW for two reasons. One is that because the Botnia plant is currently under construction, movement of the plant is not a viable option. In fact, one of the reasons why the other plant (ENCE) moved is because it had not started construction, so a move to a different location was not that much of an issue from a cost standpoint. Secondly, location would not be viable as an issue in AW because it is not separable from the other issues. If Argentina was awarded the location issue, all other issues would be rendered obsolete. If the Botnia

plant moved to a location different from the Uruguay River, the citizens of Gualeguaychú, and Argentina for that matter would have no reason to object to it.

On the other hand, the reader will find that issues such as possible compensation and monitorization are intricately tied to the environmental issues (liquid emissions and atmospheric emissions), and therefore, it is best to treat compensation and monitorization as part of each specific environmental issue. Finally, the third environmental issue (residual solids) was coupled with the EIA section in order to ensure separability. While residual solids have the potential to cause serious environmental harm, because procedural plans to handle the residual solids have not yet been submitted to Uruguay, the main Argentine concern is the lack of information regarding the plans. Since Argentina has issue with a lack of information, rather than recommendations for an existing plan, the issue clearly fits under the EIA.

The following set of issues will address the background of the issue as it pertains to the conflict, the respective sides of Argentina and Uruguay, and what it means to win and lose on each particular issue for both states.

3.1 Roadblocks

The roadblocks, conducted by the environmental assembly of Gualeguaychú, which are used to prevent traffic from passing over two of the three international bridges that span the Uruguay River, is one of the most important issues to Uruguay. From the Argentine perspective, the roadblocks represent an attempt to force the Uruguayan government to halt construction. The assembly believes that the pulp mill, which will be constructed thirty-five kilometers from Gualeguaychú on the Uruguayan margin of the

river, will cause irreparable environmental harm to the river. The environmental harm, they claim, will not only affect the ecosystem, but also the vital industries that rely on the river, including but not limited to, tourism, agriculture, fisheries, real estate, and the overall health of the citizens of Gualeguaychú.⁵⁰ The roadblocks have occurred intermittently from April 30, 2005 through the present, at times numbering as many as 40,000 people. On July 3, 2006, after several requests went unheeded by the Argentine government, Uruguay finally requested that the issue be resolved under Mercosur's dispute resolution mechanism.⁵¹

Central to Uruguay's claim is that Argentina failed to adopt appropriate measures in order to end or prevent the roadblocks,⁵² which constitutes a direct violation of article one of the treaty of Asunción, establishing Mercosur. The treaty of Asunción calls for the free circulation of goods, services, and factors of production between all Mercosur states.⁵³ Furthermore, Uruguay claims that the roadblocks brought substantial harm to not only to Uruguayan economies dependent on the usage of the bridges, but also those of Argentina, and to a lesser extent, Bolivia, Chile, Paraguay, and Peru.⁵⁴ Uruguay cites that trade between Argentina and Uruguay represents forty percent of Uruguay's total trade, and that seventy percent of Uruguayan shipping uses the bridges that cross the Uruguay River. In Uruguay's estimation approximately 900,000 tons of goods, worth 513,000,000 U.S. dollars, passes over the Fray Bentos- Puerto Unzué Bridge annually, not to mention

⁵⁰ Sergio Ciancaglini "Humo sobre el agua," *RollingStone Argentina*, May 2006, 46.

⁵¹ Mercosur. "Laudo de Tribunal Arbitral "Ad Hoc" de Mercosur." (Mercosur, 2006), <http://www.mercosur.int/msweb/portal%20intermediario/es/index.htm> (accessed April 6, 2007). art. 1.

⁵² *Ibid.*, art. 17.

⁵³ Mercosur. "Tratado de Asunción." (Mercosur, 1991), <http://www.mercosur.int/msweb/portal%20intermediario/es/index.htm> (accessed April 6, 2007).

⁵⁴ Mercosur, "Laudo de Tribunal Arbitral "Ad Hoc" de Mercosur," art. 21.

the other two bridges.⁵⁵ The roadblocks, at their height in the summer season of 2006, paralyzed ninety percent of the Uruguayan shipping that uses the bridges, and resulted in wide ranging effects not only to the Uruguayan economy, but to other southern cone economies as well.⁵⁶

On the other hand, the Argentine government supports the roadblocks, and maintains that the economic harm Uruguay claims it suffered is exaggerated. Because the roadblocks were always announced, it allowed parts of the Uruguayan economy dependent on the bridges to find alternative means across the river.⁵⁷ Furthermore, in regards to the violation of the treaty of Asunción, Argentina claims that the right to free speech and reunion, as they view the roadblocks, has constitutional standing, which trumps the legal standing that the Mercosur norms of integration have in Argentina.⁵⁸ Perhaps also, Argentina's reluctance to intercede stems from past attempts to break up protests that have resulted in death and widespread criticism of the Kirchner administration. More importantly the Argentine government views the roadblocks as a viable means to put pressure on the Uruguayan government.⁵⁹

The final decision of the Mercosur tribunal was ambiguous and inconclusive. While the decision represented a moral victory for Uruguay in that it ruled that Argentina was neglecting its commitment to the treaty of Asunción by failing to break up the

⁵⁵ This bridge is where the bulk of the roadblocks have taken place. Puerto Unzué is situated closest to Gualaguaychú.

⁵⁶ Ministerio de Relaciones Exteriores- Republica Oriental del Uruguay. "Cortas de las rutas y Daños." (Ministerio de Relaciones Exteriores- Republica Oriental del Uruguay, 2006), http://www.mrree.gub.uy/mrree/Asuntos_Politicos/paginalcelulosa.htm (accessed March 17, 2007).

⁵⁷ Mercosur, "Laudo de Tribunal Arbitral "Ad Hoc" de Mercosur," art. 42.

⁵⁸ *Ibid.*, art. 44.

⁵⁹ Jorge Enrique Taiana. "Asamblea ambiental ciudadana de Gualaguaychú." (Ministerio de Relaciones Exteriores Comercio Internacional y Culto – República Argentina, 2006), <http://www.mrecic.gov.ar/> (accessed February 11, 2007).

roadblocks, the tribunal did not order Argentina to pay damages, and did not fix a penalty in the event of future roadblocks.⁶⁰ Since the decision, the roadblocks have continued, and show no signs of stopping. After Mercosur failed to intervene favorably, the Uruguayan government requested that the ICJ grant provisional measures in the on going case in order to stop the roadblocks, but the ICJ declined to intercede citing that the roadblocks, at present, did not pose an immediate risk of irreparable prejudice to the rights of Uruguay.⁶¹

Both Argentina's argument for the rights of its citizens to freedom of speech and reunion, and Uruguay's argument that the roadblocks represent a violation of the treaty of Asunción, represent valid legal propositions. Because of the validity on each side, judicial resolutions in decisions such as this one would be difficult to reach and enforce. Therefore, this difficulty only undermines the necessity to apply AW to the resolution of the roadblock issue for an overall settlement to the dispute at hand.

While the roadblocks satisfy the AW criteria of being a mutually contested issue, it is important to define what constitutes winning and losing on the roadblock issue for each state. Quite simply, for Uruguay, winning on the roadblock issue would constitute the Argentine government intervening to stop the roadblocks and resuming the free circulation of goods, services, and factors of production between Argentina and Uruguay on all three international bridges that span the Uruguay River. Thus, losing for Argentina would constitute the adoption of specific enforcement mechanisms designed to prevent the environmental assembly of Gualaguaychú from conducting roadblocks in the future.

⁶⁰ "Mercosur tribunal rules on paper mills," *Latin News Daily*, September 6, 2006. Available: Lexis Nexis database. (accessed February 20, 2007).

⁶¹ International Court of Justice. "Press Release 2007/2 (January 23, 2007)." (icjci.org, 2007), <http://www.icjci.org/icjwww/idocket/iau/iauframe.htm> (Accessed March 20, 2007).

On the other hand, winning for Argentina and losing for Uruguay would constitute the continuance of the roadblocks. In assessing the above solution, it is important to note that it does not represent any agreement between Argentina and Uruguay, but rather a hypothetical scenario. For AW to be successful, the two governments will have to come to their own terms on what constitutes winning and losing for each specific issue.

3.2 The use of technology in the pulp production process

The type of technology used in the pulp production process is one of the most important issues for both Argentina and Uruguay. Producing pulp is a two-part process: producing pulp from wood and bleaching the pulp.⁶² The contested process in the technology issue is the type of bleaching process employed alongside the production of pulp process. The most popular process, and largely the only process used for producing pulp from wood, is the “Kraft” process, whereby sulfates are used to extract lignin from wood chips, creating pulp consistency. For pulp producers, the Kraft process is the most desirable of all processes because it produces the highest-grade paper, it can be used with various different species of wood, and it generates pulp with more resistance to degradation.⁶³ The alternative to the Kraft process is a mechanical and semi-chemical process for producing pulp. However, this process is undesirable because the pulp produced contains a higher percentage of non-cellulose compounds and therefore can only be used for lower quality, newsprint-type paper.⁶⁴

⁶² Universidad de la Republica de Uruguay. “Síntesis de los efectos ambientales de las plantas de celulosa y del modelo forestal en Uruguay.” (cedha.org, 2006)
<http://www.cedha.org.ar/es/iniciativas/celulosa/> (accessed April 6, 2007) p. 3.

⁶³ Ibid., 22.

⁶⁴ Ibid., 22.

There are three different processes for bleaching pulp: elemental chlorine pulp, elemental chlorine free pulp (ECF), and totally chlorine free pulp (TCF).⁶⁵ Regardless of the process, the more chlorine used, the whiter the end paper product. Therefore, processes such as elemental chlorine pulp produce the whitest paper, whereas TCF pulp produces the least white paper out of all three methods. The elemental chlorine pulp process is the oldest and most obsolete process of all three and is only used in the oldest pulp mills. ECF pulp, on the other hand, is the bleaching process most used throughout the world. Therefore, most mills use a process denominated Kraft-ECF pulp. In contrast to the elemental chlorine pulp process, ECF pulp uses chlorine dioxide with a combination of ozone, peroxide, and hydrogen to bleach the pulp.⁶⁶ While the ECF pulp process does produce fewer effluents than the elemental chlorine process, it is less resistant to degradation, and it produces a lower grade of colorization.⁶⁷ ECF pulp also produces a range of compounds whose chemical structure negatively affects fish, elevated levels of solids in suspension in water, and increased levels of nitrogen and phosphorus.⁶⁸

Conversely, TCF pulp is considered to be the most environmentally friendly bleaching process. Unlike ECF pulp, TCF pulp only uses a combination of ozone, peroxide, and hydrogen, and completely omits chlorine from the process. TCF pulp not only does not produce the chemical compounds that affect fish that are produced by ECF

⁶⁵ Ibid., 3.

⁶⁶ Ibid., 23.

⁶⁷ Ibid., 24.

⁶⁸ Ibid., 21.

pulp, but it also reduces the amount of effluents released from the pulp plants.⁶⁹ The Botnia pulp mill intends to use the Kraft-ECF pulp method.

The essence of the technology issue is that Argentina is opposed to the Kraft-ECF pulp technology that will be employed in the Botnia pulp mill, while Uruguay is strongly in favor of maintaining it. Uruguay's argument lies on two claims. The first claim is that the Kraft-ECF pulp process is not the worst method, but is rather an environmentally safe process used today in principle production methods.⁷⁰ In fact, ninety-one percent of the world's non-obsolete pulp mills use the Kraft-ECF pulp method.⁷¹ Uruguay maintains that all technical studies reinforce that there will be no irreparable harm to the environment with this technology,⁷² and that the Kraft- ECF pulp method is indicated as one of the Best Available Techniques (BAT) in the 2001 European Union report on the pulp mill industry.⁷³

Secondly, Uruguay is in favor of using the Kraft-ECF pulp process because of TCF pulp's inability to reach market brightness. In a January 26, 2006 press conference, Uruguayan Foreign Minister Reinaldo Gargano stated that Uruguay would like to eventually install paper mills next to the pulp plants. Since Uruguay would already have the pulp plants and over 700 thousand hectares of tree farms, the addition of a paper mill

⁶⁹ Ibid., 24.

⁷⁰ Actas de las reuniones de grupo técnico de alto nivel binacional. "I reunion grupo tecnico uruguayo-argentino." (Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, 2005), http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm (accessed April 6, 2007) p. 4.

⁷¹ Actas de las reuniones de grupo técnico de alto nivel binacional. "Acta resumen de la III reunion del grupo tecnico de alto nivel." (Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, 2005), http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm (accessed April 6, 2007) p. 4.

⁷² Reinaldo Gargano. "Notas enviadas por el gobierno uruguayo 27/12/2005." (Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, 2005), http://www.mrree.gub.uy/mrree/Asuntos_Politicos/Plantascelu.htm (accessed April 6, 2007).

⁷³ Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, "Informe sobre la instalacion de dos plantas de celulosa en el río Uruguay," p. 3.

would make Uruguay a natural economic region for the production of paper. However, in order to become a successful entrant into the international paper market, Uruguay would have to place a premium on quality, which TCF pulp simply does not allow.⁷⁴

While Uruguay maintains that the Kraft-ECF pulp technology is widely used, not irreparably harmful, and produces a superior product, Argentina believes that the two technologies are inherently contaminant, and worry about their impact on not only the river itself, but on the various Argentine industries that use the river. Therefore, Argentina is demanding that Uruguay adopt the TCF pulp method as a less harmful method than ECF pulp. Argentina claims TCF, unlike ECF, essentially eliminates the production of dioxins, which results in the reduction of effluents to undetectable levels.⁷⁵ Furthermore, Argentina points out that the area of the Uruguay River where the proposed pulp mill is to operate contains ninety percent of the entire river's fishing production, producing 4500 tons annually, and that this particular area of the river is also a breeding ground for migratory fish.⁷⁶ Because of the harmful effluents ECF pulp produces, Argentina fears the effects ECF pulp might have on the tourism and fishing industries that use the river. Finally, in addressing Uruguay's claim that the EU mentions the Kraft-ECF pulp method as a BAT, Argentina asserts that while this is true, the 2001 report does

⁷⁴ Presidencia-Repubblica Oriental Del Uruguay. "Las plantas se construyen más allá de la postura argentina." (Ministerio de Relaciones Exteriores-Repubblica Oriental del Uruguay, 2006), http://www.mrree.gub.uy/mrree/Asuntos_Politicos/paginalcelulosa.htm (accessed April 6, 2007).

⁷⁵ Actas de las reuniones de grupo técnico de alto nivel binacional. "Proyecto de acta de la novena reunion del grupo tecnico de alto nivel sobre proyectos del plantas de celulosa en el río uruguay." (Ministerio de Relaciones Exteriores-Repubblica Oriental del Uruguay, 2005), http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm (accessed April 6, 2007) p. 3.

⁷⁶ La delegación argentina al grupo de trabajo de alto nivel. "Informe de la delegación argentina al grupo tecnico de trabajo de alto nivel." (Cedha.org, 2006), <http://www.cedha.org.ar/es/iniciativas/celulosa/> (accessed April 6, 2007) p. 2.

not account for new technologies, and applies to European ecosystems, which are different than the Uruguay River.⁷⁷

Defining what constitutes winning and losing for each side in regards to the issue of technology is less difficult than other issues because of the black and white nature of the issue. Winning for Uruguay and losing for Argentina would entail maintenance of the status quo and acceptance of the Kraft-ECF pulp technology. Conversely, winning for Argentina and losing for Uruguay would mean that the Botnia pulp mill adopts the TCF pulp method instead of the ECF pulp method as a bleaching process.

3.3 Environmental Impact Assessment

Uruguay law and the International Finance Corporation's (IFC) investment procedures require that a full environmental impact assessment (EIA) be conducted prior to approval of major projects.⁷⁸ Botnia has already conducted its own EIA for its Orion project on the Uruguay River, and so to has the IFC under Pacific Consultants International. The Botnia EIA was accepted and approved by the Uruguayan environmental department (DINAMA), and the IFC's environmental impact assessment was approved by its board members on November 21, 2006.⁷⁹ While both the Uruguayan government and the IFC approved the Botnia pulp mill based on what they believe is a full and comprehensive EIA, Argentina maintains that both of the environmental impact assessments, in particular the IFC's, were done improperly and lack critical information to fully determine the effects the pulp mill will have on the Uruguay River ecosystem.

⁷⁷ Ibid., 11.

⁷⁸ The International Finance Corporation, subsidiary of the World Bank, is investing 170 million dollars in the Botnia pulp mill.

⁷⁹ International Finance Corporation. "Uruguayan Pulp Mills." (IFC.org, 2006), http://www.ifc.org/ifcext/lac.nsf/content/Uruguay_Pulp_Mills (accessed April 6, 2007).

Therefore, Argentina is demanding a new EIA that is more comprehensive and addresses its key concerns.

Argentina's criticism of the EIA can be broadly placed into three categories: issues with data and calculations used, poor execution of the EIA, and key emissions and lack of specificity, including the location and types of dumps for hazardous residual solids. In analyzing the IFC's environmental impact assessment, Argentina cites that the document consists of faulty meteorological data, errors in geographical distance, and widespread calculation errors. From Argentina's perspective, the wind data used to calculate emissions dispersal should have used meteorological data from the last ten years instead of just one year of data from the year 2000. As a result, Argentina claims that this lack of data has led decision makers to believe that the plants emissions will have no ill effect on Argentina, even though it is quite possible they will.⁸⁰ The EIA, according to Argentina, also contains errors in geographical distance. For instance, the Argentine town of Gualeguaychú is calculated as forty kilometers from the pulp mill, where in reality the distance is nearly half that.⁸¹

In terms of the overall poor execution of the IFC's environmental impact assessment, Argentina claims that the group that was contracted to complete the EIA, Pacific Consultants International, lacked prior experience in analysis of pulp mills.⁸² This inexperience manifested itself in a lack of technical language and poor experimental

⁸⁰ Actas de las reuniones de grupo técnico de alto nivel binacional. "Proyecto de acta de la decima reunion del grupos tecnico de alto nivel sobre plantas de celulosa." (Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, 2005), http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm (accessed April 6, 2007) p. 5.

⁸¹ La delegación argentina al grupo de trabajo de alto nivel, "Informe de la delegación argentina al grupo tecnico de trabajo de alto nivel," P. 3.

⁸² Ministerio de Relaciones Exteriores, Comercio Internacional y Culto de Argentina. "Informe de Ministerio de Relaciones Exteriores, Comercio Internacional y Culto." (Cedha.org, 2006), <http://www.cedha.org.ar/es/iniciativas/celulosa/> (accessed April 6, 2007) p. 2.

design. According to Argentina, the study, conducted for only three months, did not allow for sufficient time to analyze all of the pulp mill's possible effects.⁸³

As for key emissions and questions left unanswered, Argentina has issues with the EIA's quality of information, and lack of explanation and specificity for several key sections, most importantly the hazardous residual solid dumps. In the eyes of Argentina, the EIA fails to adequately address such questions as why the specific location and technology for the plant were chosen, and lacks adequate analysis of both location and technology chosen.⁸⁴ Argentina also has issues with the lack of detail given to the characterization, quantification, and destination of hazardous residual solids generated, and the location of the dumps in which they will be deposited.⁸⁵ Even though the issue of dumps has not yet been addressed by DINAMA, Argentina believes that it is important and crucial to know where and how the dumps will be constructed in order to minimize potential contamination of the ecosystem.⁸⁶ Furthermore, the EIA lacks concrete and specific explanations of mechanisms to combat the ill effects of the technology chosen, information regarding design and operation of the plant, and a discussion of mitigation, compensation, and restoration for any potential impacts the plant may have.⁸⁷

Uruguay maintains that the environmental impact assessments conducted were all done in an intricate manner, and that Uruguay has demonstrated total transparency and

⁸³ Actas de las reuniones de grupo técnico de alto nivel binacional, "Proyecto de acta de la decima reunion del grupos tecnico de alto nivel sobre plantas de celulosa," p. 5.

⁸⁴ La delegación argentina al grupo de trabajo de alto nivel, "Informe de la delegación argentina al grupo tecnico de trabajo de alto nivel," P. 3.

⁸⁵ Ibid.

⁸⁶ Actas de las reuniones de grupo técnico de alto nivel binacional. "Actas de las reuniones sexta y septima del grupo tecnico de alto nivel sobre plantas de celulosa." (Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, 2005), http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm (accessed April 6, 2007) p. 6.

⁸⁷ La delegación argentina al grupo de trabajo de alto nivel, "Informe de la delegación argentina al grupo tecnico de trabajo de alto nivel," pp. 2, 10-11, 29.

voluntary cooperation for any questions that Argentina has had or any information that Argentina has requested. Furthermore, Uruguay asserts that all environmental studies undertaken reinforce Uruguay's claim that there will be no irreparable harm to the environment.⁸⁸ Uruguay maintains that both the Botnia pulp mill proposal and the IFC's environmental impact assessments were subject to intense scrutiny.⁸⁹ When the Board of Directors of the IFC (and IFC's parent organization, the World Bank) approved the Botnia project, they did so only after thoroughly assessing the original review of the EIA. The assessment consisted of public hearings and a subsequent review of the EIA undertaken by independent experts. In the end, the decision to proceed was based on the conclusion that the EIA followed extensive due diligence, and concluded positive findings in reference to the environmental impacts of the pulp mill.⁹⁰ While DINAMA has not yet approved procedural plans for the hazardous residual solids generated, Uruguay does not expect that the forthcoming plan will cause any environmental harm or impact.⁹¹

Uruguay also successfully collaborated with Argentina in regard to any questions Argentina had through GTAN. Uruguay claims that it made available any relevant information Argentina requested, and responded to all of Argentina's anxieties and uneasiness.⁹²

⁸⁸ Gargano, "Notas enviadas por el gobierno uruguayo 27/12/2005.", Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, "Informe sobre la instalacion de dos plantas de celulosa en el río Uruguay."

⁸⁹ Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, "Informe sobre la instalacion de dos plantas de celulosa en el río Uruguay."

⁹⁰ International Finance Corporation, "Uruguayan Pulp Mills."

⁹¹ Actas de las reuniones de grupo técnico de alto nivel binacional, "Actas de las reuniones sexta y septima del grupo tecnico de alto nivel sobre plantas de celulosa," p. 6.

⁹² Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, "Informe sobre la instalacion de dos plantas de celulosa en el río Uruguay."

Argentina's claim that the EIA is insufficient, and Uruguay's denial of the EIA insufficiency make for a relatively simple definition of winning and losing. Winning for Uruguay, and losing for Argentina would constitute acceptance of the EIA by both states. On the other hand, winning for Argentina, and losing for Uruguay would constitute conducting a new EIA. In the event that the EIA issue is awarded to Argentina, a compromise could involve the selection of an independent environmental consulting firm subject to approval by both states, to undertake a new EIA. Under this plan, mechanisms could be put into place where both Uruguay and Argentina could review the research design and offer any amendments subject to both state's approval.

3.4 Atmospheric Emissions

The unfortunate negative externalities of pulp mills lie in their potential for environmental harm. Placed into three broad categories of atmospheric emissions, liquid emissions, and residual solids (liquid emissions will be discussed in the subsequent section, residual solids has been incorporated into the EIA section for reasons mentioned previously), all in one way or another introduce foreign elements into an ecosystem and have the potential to disrupt the delicate environmental equilibrium. Atmospheric emissions, for example, form from complex interactions involved in the production of bleached pulp. In addition to the multitude of gasses that are emitted into the atmosphere from the production process, pulp mills are also known for malodorous emissions caused by reduced sulfur compounds. In order to reduce wood into pulp, the wood has to go through a complex boiling procedure involving sulfates. The sulfates are burned off and eventually make their way into the atmosphere, but not before passing through a series of

mechanisms designed to mitigate their potential harm. The sulfur odor that is so common in pulp mills comes from the sulfur emissions contact with the direct contact evaporator, which is designed as a preventative mechanism to mitigate the impact of the emissions.⁹³ Another cause for concern lies in the fact that a few times a year the pulp mill must stop production to be cleaned. This abrupt stop leads to a discharge of atmospheric and water emissions.⁹⁴

Argentina believes Uruguay has approved a pulp mill with faulty monitorization and prevention measures that will cause negative effects on not only the general health of its citizens but on the tourism and agriculture industries, as well as on the Uruguay River ecosystem. Argentina claims that sixty-six percent of all contamination from the plants will be released into the atmosphere. These contaminants include methane, chloride compounds, sulfuric acid, and organically volatile compounds, yet Uruguay has approved control and monitorization mechanisms that will not meet the challenge.⁹⁵ According to Argentina, the pulp mill plans on using devices that will eliminate large sized emissions particles, but not emissions particles capable of entering the respiratory tract. These contaminants, therefore, have the ability to enter into the blood stream causing extensive ill- health effects. These macro-sized contaminants will also limit visibility and interfere with solar rays, an interaction that might interrupt the photosynthetic process of plants.⁹⁶ Argentina further states that the initial contaminants released into the atmosphere will interact with preexisting atmospheric conditions, forming secondary contaminants such

⁹³ Environmental Protection Agency. "Pulp, Paper, and Paperboard Industry: Background Information for Promulgated Air Emissions Standards." (EPA.gov, 1997), <http://www.epa.gov/ttncaaal/t3/reports/pandpbid.pdf> (Accessed April 8, 2007) p. 136.

⁹⁴ La delegación argentina al grupo de trabajo de alto nivel, "Informe de la delegación argentina al grupo tecnico de trabajo de alto nivel," p. 6.

⁹⁵ Actas de las reuniones de grupo técnico de alto nivel binacional, "Actas de las reuniones sexta y septima del grupo tecnico de alto nivel sobre plantas de celulosa," p. 9.

⁹⁶ Ibid.

as ozone, the effects of which will be noticeable some 250 kilometers from the pulp mill.⁹⁷ These primary and secondary contaminants all have the potential to cause acid rain.⁹⁸ In addition to contaminants created during normal operation of the pulp mills, Argentina cites that abrupt stoppages, due to necessary cleaning, will result in a huge discharge of atmospheric emissions and effluents, causing a malodorous sulfuric smell that will reach Argentina.⁹⁹ As for monitorization, Argentina believes the monitorization systems in place are not fine tuned for the lower levels of emissions that the pulp mill will emit, and therefore the systems will not pick up fluctuations in emissions output.

As a result of contaminants, abrupt stoppages, and faulty monitorization, the air in the region will be negatively affected.¹⁰⁰ The effects of the sulfuric smell and poor air quality will have the potential of limiting the flow of tourists who come to enjoy the beach resorts along the Uruguay River. Furthermore, Argentina believes that contaminated air and acid rain will have noticeably negative effects on agriculture in the region as well.

While Argentina believes that the air in the region will be affected negatively, Uruguay strongly disagrees, citing in-depth studies that have been conducted, and prevention measures that have been put in place to ensure that the air quality in the region will be well above required laws. As for the bad odors from abrupt stoppages, Uruguay insists that they will be minimal and thus barely noticeable. Uruguay has made every effort to ensure that prevention measures, such as 100-120 meter chimneys, electrostatic

⁹⁷ Ibid., 10.

⁹⁸ La delegación argentina al grupo de trabajo de alto nivel, "Informe de la delegación argentina al grupo tecnico de trabajo de alto nivel," p. 30.

⁹⁹ Ibid., 6.

¹⁰⁰ Actas de las reuniones de grupo técnico de alto nivel binacional, "Actas de las reuniones sexta y septima del grupo tecnico de alto nivel sobre plantas de celulosa," p. 10.

precipitators, gas washing machines, mud and quicklime filters, and a system of gas collection and incineration will be in place to ensure that air quality in all sensible measurements, will meet adopted norms and standards.¹⁰¹

Uruguay claims that meteorological studies indicate that atmospheric dispersion of contaminants will lead to concentrations of contaminants in soil always inferior to the adopted standards.¹⁰² While Uruguay does admit that periodic stoppages will result in emission levels above the adopted norms, these levels will always be lower than the norms established by the World Health Organization, and since the stoppages will only occur three times per year, six hours total, they will result in minimal effects.¹⁰³

As mentioned in the introduction to chapter three, the issues of monitorization and compensation are inextricably linked to the environmental issues of atmospheric and liquid emissions. For the definition of winning and losing on the atmospheric and liquid emission issue, a compromise could be adopted, such that regardless of whom the issue is awarded to, a comprehensive system of monitorization and compensation would be created. Developed through the Administrative Commission of the Uruguay River (CARU by its Spanish acronym) which is in charge of enforcing the 1975 Uruguay River Statute, an agreed upon monitorization plan with agreed upon emission levels not to be exceeded could be initiated. If emissions ever rose above these pre-determined levels, compensation would be awarded to Argentina to compensate for losses experienced in affected industries. This compromise is win-win for both parties. Since Uruguay is

¹⁰¹ Ibid., 11.

¹⁰² Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, "Informe sobre la instalacion de dos plantas de celulosa en el río Uruguay."

¹⁰³ Actas de las reuniones de grupo técnico de alto nivel binacional, "Actas de las reuniones sexta y septima del grupo tecnico de alto nivel sobre plantas de celulosa," p. 12. , Ministro de Relaciones Exteriores-Republica Oriental del Uruguay, "Informe sobre la instalacion de dos plantas de celulosa en el río Uruguay."

convinced emission levels will not rise above adopted norms, it is unlikely to ever have to award compensation. For Argentina, such an agreement would mollify any fears that there will be unacceptable high-level emissions.

Winning for Uruguay, and losing for Argentina would entail maintenance of the status quo, with CARU being in charge of monitorization and enforcement of penalties. On the other hand, losing for Uruguay and winning for Argentina would constitute a series of simple design and operational changes to ensure that the impact of the atmospheric emissions are as low as possible for Argentina. Such changes might include chimney extenders, which help to disperse emissions, or indirect contact evaporators instead of direct contact evaporators, which would reduce the strong sulfuric smell.¹⁰⁴ As for necessary stoppages, Argentina could work with Uruguay to plan a schedule for when such stoppages would occur in order to mitigate potential impacts on Argentine citizens and tourism. For example, stoppages could be planned at night and during the winter in order to avoid potential conflicts with the high number of tourists that flock to beach resorts along the Uruguay River during the summer.

3.5 Liquid Emissions

Pulp mills are built on waterways, generally with high flow, because of the integral role that waterways play in the pulp production process. The relationship between the waterway and the plant is that of a cycle in which water is extracted from the waterway into the plant for use in key processes, and then coupled with by-products from the production process, is returned back into the waterway. The volume and chemical

¹⁰⁴ EPA, "Pulp, Paper, and Paperbound Industry: Background Information for Promulgated Air Emissions Standards."

composition of the liquid effluents produced by the pulp mill depend on the wood type, pulp type, and bleaching process.¹⁰⁵ Liquid emissions are taken from the pulp and bleaching production processes, put through a treatment system, and then discharged back into the waterway by means of an effluent disposer.¹⁰⁶ Similar to atmospheric emissions, liquid emissions also occur from temporary stops in the form of reverse discharge.¹⁰⁷ However, because of the huge amount of liquid that is released (the Botnia mill plans on releasing 73,000 cubic meters per day),¹⁰⁸ and its potential for environmental harm, three treatment steps can be taken. The primary treatment method removes solids and particulate material. The secondary treatment method reduces loads of organic material, toxicity, and the amount of suspended solids by approximately thirty percent. The third treatment method, which is often times not employed, serves to lower the content of nitrogen and phosphorus, and thereby avoids eutrophication, which is caused by the increase of chemical nutrients in an ecosystem and leads to excessive plant growth such as algae blooms. This third level treatment mechanism is not planned for the Botnia plant because of the pre-existing low levels of phosphorus and nitrogen in the river.¹⁰⁹ Argentina is primarily concerned that because the Botnia plant lacks a third level treatment method, appropriate temperature control mechanisms, and poorly placed effluent disposer, and that Botnia monitorization plans do not coincide with CARU's,

¹⁰⁵ Universidad de la Republica de Uruguay, "Síntesis de los efectos ambientales de las plantas de celulosa y del modelo forestal en Uruguay," p. 5.

¹⁰⁶ Oy Metsä Botnia Ab. "The Pulp Production Process." (Metsabotnia.com, 2004), <http://www.botnia.com/en/default.asp?path=204,214,251,1653> (accessed April 9, 2007).

¹⁰⁷ Ministerio de Relaciones Exteriores, Comercio Internacional y Culto de Argentina, "Informe de Ministerio de Relaciones Exteriores, Comercio Internacional y Culto," p. 22.

¹⁰⁸ Universidad de la Republica de Uruguay, "Síntesis de los efectos ambientales de las plantas de celulosa y del modelo forestal en Uruguay," p. 24.

¹⁰⁹ Ibid.

liquid contaminants emanating from the pulp mill will have a negative effect on the environment and the Argentine fishing and tourism industries that use the ecosystem

As mentioned previously, the span of the Uruguay River on which the Botnia plant will be located represents ninety percent of the River's fishing production, and is a breeding ground for migratory fish. The area is home to more than 125 species, including endangered species, and it is a zone of incredible biomass and productivity.¹¹⁰ In addition to rich bio-life, the area is also home to several Argentine beach resorts, whose usage of the river's water is integral to operation and success.

Argentina claims that the pulp mill will increase nitrogen and phosphorus levels as if it were a 65,000-person city. Citing a study undertaken in Canada, Argentina points out that even with the use of BAT's, eutrophication was increased significantly.¹¹¹ The difference in temperature of the river and the discharged effluents is likely to cause a flotation of effluents because of their different densities, and in turn, the effluents will not properly mix with the river water.¹¹² Therefore, lack of temperature control, a poorly designed effluent dispenser, and reverse discharge caused by temporary cleaning stops will all serve to increase the amount of suspended contaminants in the water and will result in deposits on the Argentine side of the river.

Since Botnia's monitorization plans do not coincide with those of CARU, if levels of contaminants exceed acceptable levels, it will be difficult to rectify the situation.¹¹³

The results of liquid emissions from the plants such as increased phosphorus and nitrogen

¹¹⁰ La delegación argentina al grupo de trabajo de alto nivel, "Informe de la delegación argentina al grupo tecnico de trabajo de alto nivel," pp. 2, 13.

¹¹¹ Actas de las reuniones de grupo técnico de alto nivel binacional, "Actas de las reuniones sexta y septima del grupo tecnico de alto nivel sobre plantas de celulosa," p. 4.

¹¹² La delegación argentina al grupo de trabajo de alto nivel, "Informe de la delegación argentina al grupo tecnico de trabajo de alto nivel," p. 17.

¹¹³ Ibid., 29.

levels, leading to eutrophication, and increased amounts of suspended solids in the river will have a negative effect on bio-life and water quality.

Contrary to Argentina, Uruguay argues that the quality of water will be well within the established national and bi-national norms, and that the effect of liquid emissions on the Argentine side of the river will be undetectable.¹¹⁴ The increase in emissions is not that much greater than what already exists, and therefore will not have any impact.¹¹⁵ Uruguay insists the Botnia plants will use special technology to discharge at appropriate temperatures, and since the primary and secondary treatment mechanisms will be so successful in mitigating the impact of liquid emissions, third level treatment is neither necessary nor recommended.¹¹⁶ Finally, Uruguay claims, just as it did with respect to the atmospheric emissions issue, that because the reverse discharge caused by temporary stoppage will only last a few hours at a time, it will have minimal impact.¹¹⁷

Just as the issue of compensation and monitorization is tied to the atmospheric emissions compromise, it can likewise be applied to the liquid emissions issue. Again, it is a win-win solution for both sides; the key issue is providing CARU with enough enforcement capabilities to successfully carry out the solution. Winning for Uruguay and losing for Argentina would constitute no new technology or preventative measures, but rather maintenance of the status quo. Winning for Argentina and losing for Uruguay would constitute new mitigation measures such as a third level treatment method, technology to ensure that the temperature of liquid emissions is the same as the

¹¹⁴ Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay, "Informe sobre la instalacion de dos plantas de celulosa en el río Uruguay."

¹¹⁵ Actas de las reuniones de grupo técnico de alto nivel binacional, "Actas de las reuniones sexta y septima del grupo tecnico de alto nivel sobre plantas de celulosa," p. 4.

¹¹⁶ Ibid.

¹¹⁷ Ibid.

temperature of the surrounding body of water, and an improved location for the effluent disposer to ensure proper mixing with the surrounding body of water. Also, in regard to the reverse discharge during temporary cleaning stops, a schedule of proposed stops could be created to ensure minimum impact on the ecosystem. Just as it was with the atmospheric emissions issue, this schedule could take into account seasonal variations in temperature to ensure that the increased effluents mix in with the Uruguay River.

4. Application of AW to the pulp mill conflict between Argentina and Uruguay

How Argentina and Uruguay plan to allocate points across the five issues rests on the specific goals they each wish to maximize. The following sub-sections highlight three alternative goals for Argentina and one constant goal for Uruguay.

4.1 Scenarios for Uruguay based on goals it may wish to maximize

For Uruguay, unlike Argentina, it is much easier to assign probable point allocations across the five issues. Based on what it means for Uruguay to win and lose on all five issues, it is very difficult to imagine a scenario where Uruguay would not heavily favor the technology and roadblock issues. Accordingly, Uruguay places 50 points on technology, 40 points on the roadblocks, 4 points on liquid emissions, and 3 each on the atmospheric emissions and EIA issues. The potential losses to Uruguay on the technology and roadblock issues, in comparison to losing on the other three issues, justify assigning a high number of points to these issues. The ten-point difference between the technology and roadblock issues can be explained by looking at the potential long-term economic effects of switching from Kraft-ECF pulp to Kraft-TCF pulp technology.

Since Uruguay has expressed strong interest in becoming a global leader in the paper production process by combining forestation, pulp, and paper production in one central area, the fact that TCF pulp does not meet the required market brightness would seriously undermine this possibility, potentially making the Botnia pulp mill obsolete in the not so distant future.¹¹⁸ While the roadblock issue is indeed detrimental to the Uruguayan economy, it is much more amendable than the technology issue is. Once the Botnia plant begins production, it would not be feasible to change bleaching processes. However, because Uruguay allocates a considerable number of points (40) to the roadblock issue, it runs very little risk of losing the entirety of this issue.

On the other hand, while Uruguay has repeatedly stated the EIA was done correctly, and there will be no irreparable harm to the environment caused by the liquid and atmospheric emission issues, the cost of Argentina winning these issues (in comparison to technology and roadblocks) would be minimal to Uruguay for two reasons. The first is that winning for Argentina on these three issues would entail improvements in operational design, and a new EIA that would cost little to implement in comparison with the economic loss suffered from continued roadblocks and a switch to the Kraft-TCF pulp production method. Secondly, since Uruguay is convinced that the waste produced by the plants is neither harmful nor will go over already strict limits, it has little to lose in not contesting issues that would entail compensation if set limits are exceeded. The one point differential between liquid and atmospheric emissions, which is negligible, can be explained by looking at how the citizens of Fray Bentos and the

¹¹⁸ Presidencia-Repubblica Oriental Del Uruguay. “Las plantas se construyen más allá de la postura Argentina.”

surrounding areas are more likely to be negatively affected by potential water contamination than atmospheric contamination.

4.2 Scenarios for Argentina based on goals it may wish to maximize

Isolating particular issues that stand out for Argentina is considerably more difficult than it is for Uruguay. Because all five issues remain very important to Argentina, three possible scenarios have been developed that while not fool proof, highlight a wide set of preferences for Argentina. The three scenarios for Argentina based on goals it may wish to maximize are:

A_{Safe} *Play it safe.* Argentina seeks to play it safe by allocating an even number of points (20) across all five issues. This goal emphasizes the equal importance of all five issues, and the inability to justify favoring one issue over the other.

A_{Mitigate} *Mitigate environmental impacts.* Argentina seeks to mitigate environmental impacts by allocating a majority of points to technology, liquid emissions, and atmospheric emissions (30 each), and minimal points to the roadblock and EIA issues (5 each). With this goal, Argentina realizes that the best possible solution is to concede a small number of points on the EIA and roadblock issues, and concentrate on the issues that have the greatest ability to minimize the potential impact of the plants on Argentina. By allocating a relatively large number of points across all issues that affect the Uruguay River ecosystem in one way or another, Argentina puts itself in a good position to seriously influence the operational design of the plant.

$A_{\text{technology}}$ *Heavily favor technology.* Argentina allocates an overwhelming number of points to the technology issue (50) at the expense of all others, hoping to be

awarded the technology issue over Uruguay. Subsequently, Argentina places 20 points each on liquid emissions and atmospheric emissions, and 5 points each on the roadblock and EIA issues. In this scenario, while still allocating a fair number of points (20) to the liquid emissions and atmospheric emissions issues, Argentina is willing to concede the liquid and atmospheric issues in favor of winning on the technology issue.

While it is difficult to come up with a firm preference order for Argentina to follow for each scenario, several trends do emerge. The first is that the technology issue consistently receives the most points. As illustrated in the technology issue section, the technology the Botnia pulp mill uses is very important to Argentina. Citing the inherently contaminant nature of the Kraft-ECF pulp process, winning on the technology issue and potentially evoking a change to Kraft-TCF pulp would be a huge victory because of TCF pulp's perceived benefits to the environment. However, the other trend that emerges is that while consistently ranking technology high, Argentina is not willing to concede many points on atmospheric and liquid emissions. This emphasizes the importance Argentina places on all issues that have the ability to mitigate the pulp mill's environmental impact. Conversely, it is difficult to imagine Argentina sacrificing the ability to influence operational design over conducting a new EIA or allowing its citizens to continue to protest. While it is clear that Argentina has placed high importance on allowing its citizens to protest, as evident in Argentina persistently ignoring requests by Uruguay to intercede, we assume that the decision makers in the Argentine government are rational actors and that they recognize the importance of reaching a settlement that minimally affects Argentina as a whole.

These scenarios for Argentina and Uruguay are summarized in Table 2. Pairing each of Argentina's three scenarios with Uruguay's only scenario yields three combinations. AW is applied to each.

4.3 Application of AW

Instead of tediously going through calculations for each combination of scenarios, AW is demonstrated by applying it to the (A_{Safe} , U) combination (Table 2 in bold).

However, the three applications of AW are summarized in Table 3

Table 2. Point Allocations for all scenarios

	<u>Argentina</u>	<u>Argentina</u>	<u>Argentina</u>	<u>Uruguay</u>
Goal:	Play It Safe (A_{Safe})	Mitigate Environmental Impacts (A_{Mitigate})	Heavily Favor Technology ($A_{\text{Technology}}$)	Heavily Favor Technology and Roadblocks (U)
Technology	20	30	50	50
Roadblocks	20	5	5	40
Liquid	20	30	20	4
Atmosphere	20	30	20	3
EIA	20	5	5	3
TOTAL	100	100	100	100

AW begins by awarding each issue to the state that allocates the most points to it.

The issue that each state initially wins on is underlined. Uruguay initially wins on the issue of technology (50-20), and the roadblock issue (40-20) for a total of 90 points.

Argentina wins on liquid emissions (20-4), Atmospheric emissions (20-3), and the EIA (20-3) for a total of 60 points.

To ensure equitability, AW has the state that initially receives the most points give back to the state with the lower total. Therefore, Uruguay must give back to Argentina. Issues are transferred starting with the issue that has the lowest winner-to-

loser ratio. Out of the two issues that Uruguay could give back, the roadblock issue (40/20) has a lower ratio than the technology issue (50/20). However, if all of the roadblock points are given back to Argentina, Argentina would have $60+20=80$ total points and Uruguay would have $90-40=50$ total points, which is unequal. Therefore, the roadblock issue must be split between the two states to ensure equitability. This is called an equability adjustment.¹¹⁹

Let X equal the fraction of the roadblock issue Uruguay keeps, and $(1-X)$ equal the fraction Argentina is awarded. To equalize the points for both states, we set Uruguay's point total (left side) equal to Argentina's point total (right side).

$$50+40X=60+20(1-X),$$

which yields $X=1/2$. Therefore, Argentina receives $1/2$ of the points it allocated to the roadblock issue (10 out of 20) and Uruguay keeps $1/2$ of the points it allocated to the roadblock issue (20 out of 40), equalizing both states at 70 points. Below is a summary of the results for all three combinations.

Table 3. Summary of results for all three combinations

	(A _{Safe} , U)	(A _{Mitigate} , U)	(A _{Technology} , U)
Technology	U	5/16A, 11/16U	9/20A, 11/20U
Roadblock	1/2A, 1/2A	U	U
Liquid	A	A	A
Atmosphere	A	A	A
EIA	A	A	A
Total Points Awarded	70	74.375	67.5

¹¹⁹ Steven J. Brams and David D.H. Denoon, "Fair Division: A new approach to the Spratly islands controversy," 322.

4.4 Description of Settlements

By referring back to section three, we can determine what these three settlements will look like based on the definition of winning and losing for each issue. For the (A_{Safe}, U) settlement, Uruguay is awarded the entirety of the technology issue, which means the Botnia pulp mill keeps the Kraft-ECF pulp process in place.

Argentina is awarded all of the liquid emissions, atmospheric emissions, and EIA issues. Winning on the EIA issue constitutes conducting a new EIA by an independent environmental consultant who is subject to the approval of both Argentina and Uruguay. Under this plan, Argentina could review the research design and offer any amendments subject to Uruguay's approval. Because Argentina won on the liquid and atmospheric emissions issues, the Botnia pulp mill would have to add: a third level treatment mechanism; a better located liquid effluent disposer; technology to ensure that the temperature of the liquid emissions is the same as the temperature of the surrounding body of water; chimney extenders; and an indirect contact evaporator. In addition, a jointly decided schedule for temporary stoppages and a compensation plan detailing what would be awarded to Argentina if jointly determined atmospheric and liquid emissions levels were ever exceeded would be enacted.

Both Argentina and Uruguay split 50-50 on the roadblock issue. As with all splits, both sides are asked to come up with a compromise, in which they are not aware of the fraction of the issue they will receive. Because each state does not know what fraction of the issue it will receive, it is in each state's best interest to determine a fair allocation. In this case since no party receives the majority of the roadblock issue, both Argentina and Uruguay could establish a compromise that would permit Argentina to

allow its citizens to participate in constructive protests on weekends, and subject to only one of the three bridges that spans the Uruguay River. This compromise would have to ensure that pre-approved protests would be announced well ahead of time, allowing anyone who would plan on using the bridge to make appropriate adjustments. This compromise ensures that the Argentine citizens are able to continue to exert influence, while simultaneously easing Uruguayan economic losses by not only maintaining constant access across the river but also restricting protests to the weekends.

For the (A_{Mitigate} , U) settlement, Argentina is also awarded the atmospheric emissions, liquid emissions, and EIA issues. For these three issues, the same definitions apply as the last settlement. Uruguay is awarded the entirety of the roadblock issue, which would constitute Argentina intervening to ensure that all three bridges spanning the Uruguay River are kept constantly open, and thereby ensuring the free circulation of goods, services, and factors of production that is guaranteed under the treaty of Asunción.¹²⁰

Both Argentina and Uruguay split on the technology issue. Again, both states are told to come up with a compromise, in which neither state knows the fraction of the issue they will receive. $5/16^{\text{th}}$ of the issue is awarded to Argentina, and $11/16^{\text{th}}$ of the issue is awarded to Uruguay. Unlike the roadblock issue, the technology issue is considerably more difficult to split because the bleaching process that the plant uses is either or. For simplicity, we can assume that whoever wins a majority of the issue gets their preferred technology. Since Uruguay retains $11/16^{\text{th}}$ of the issue, the Botnia plant would retain the Kraft-ECF pulp process. However, compensation in some form would have to be awarded to Argentina to cover the $5/16^{\text{th}}$ share that it won. There is no easy way to come

¹²⁰ Mercosur, “Tratado de Asunción,” art. 1.

up with a compromise for potential compensation, but in whatever way the compensation manifests itself, it would have to reconcile Uruguay's perceived economic benefit from the Kraft-ECF pulp technology, and the increased harm suffered on behalf of Argentina.

For the (A_{Technology}, U) settlement, Argentina is again awarded the entirety of the atmospheric emissions, liquid emissions, and EIA issues. Uruguay is awarded the entirety of the roadblock issue. Again, both Argentina and Uruguay split on the issue of technology. Considering that Uruguay receives a majority of the issue (11/20th), the Kraft-ECF pulp process is employed, but a more serious compensation package is awarded to Argentina than it was for the last settlement in order to make up for the greater percentage (9/20th) that Argentina is awarded.

5. Assessment of the settlements produced and limitations.

The settlements produced by applying AW to the pulp mill conflict between Argentina and Uruguay are purely hypothetical. While the discussion of the contested issues and proposed point allocations are built on a thorough knowledge of the conflict, they are educated guesses at best. There is no way to fully know what paths each state's decision makers would take if they decided to use AW. In this sense contested issues and point allocations would be liable to change. Many past applications of AW to international conflicts were able to draw on literature on the specific conflict, and compare past settlements.¹²¹ However, because the conflict between Argentina and Uruguay is on going, settlements proposed by AW are difficult to assess and analyze. Despite the limitations, it is still possible to assess the viability of the AW settlements

¹²¹ For the Panama Canal Treaty see Brams and Taylor (1996), for the Spratly Island controversy see Brams and Denoon (1997), for the Camp David Accords see Brams and Taylor (1998), and for the Israeli-Palestinian conflict see Massoud (2000).

proposed for the pulp mill conflict. By looking at the settlements within the context of AW, and then in the context of what is known about preferences and positions of both Argentina and Uruguay, we can more clearly determine the potential success that AW might have in a real-life application to the pulp mill conflict.

From section two, which provided an in-depth analysis of the AW procedure, we know that based on each states preferences as expressed in their point allocations, AW produces fair settlements because the three criteria of efficiency, equitability, and envy-freeness are satisfied.¹²² All three settlements produced by applying AW to the pulp mill conflict are not an exception to this rule. All settlements are envy-free in the sense that neither Argentina nor Uruguay would be willing to trade their final allocations with the other. All of the settlements are equitable in the sense that both Argentina and Uruguay not only received more than 50% of their preferences, but both exceeded 50% by the same amount. All three settlements are efficient because there is no other possible allocation that is better for one state without being worse for the other. The winners and partial winners in Table 3 show that both Argentina and Uruguay realize between 67.5 and 74.375 percent of their objectives. Even in the worst case ($A_{\text{Technology}}, U$), both states receive more than 2/3 of the issues as they value them.

Despite the settlement's success within the framework of AW, the question remains as to whether the proposed settlements are viable in the context of the stated preferences, opinions, and positions of both Argentina and Uruguay. It would be difficult to imagine Argentina accepting any settlement that did not mitigate environmental impacts or give compensation in some form. Therefore, from Argentina's perspective, the fact that it is fully awarded the liquid emissions, atmospheric emissions, and the EIA

¹²² Steven J. Brams and Alan D. Taylor, *The win-win solution*, 13-15.

issues by all three settlements is very positive. This means that no matter what happens with the technology issue, Argentina is guaranteed to not only know the full environmental effects of the pulp mill, but also to be able to approve adequate prevention measures to mitigate environmental impacts. In the event that emissions do go above predetermined levels, Argentina would be awarded some type of compensation, which would assuage Argentine fears of possible environmental harm.

For the (A_{Safe} , U) settlement, while Argentina loses on the technology issue, the government is able to save face with constituents by splitting the roadblock issue 50-50. In terms of the (A_{Mitigate} , U) settlement, while Argentina loses on the roadblock issue, because it is awarded a fraction of the technology issue ($5/16$), it has the ability to not only mitigate impacts, but to also receive a substantial compensation package, which appears to be an acceptable tradeoff. The same is true with the ($A_{\text{Technology}}$, U) settlement. Only in this case, Argentina receives slightly more of the technology issue ($9/20-5/16$), further justifying the loss of the roadblock issue. In most respects, the three settlements proposed are very viable for Argentina especially because all three settlements address the often-repeated complaints and fears of the environmental impacts the pulp mill will have on the Uruguay River ecosystem.

It is difficult to imagine Uruguay accepting any settlement in which it did not win on the roadblock and technology issues. While Uruguay consistently loses on the liquid emissions, atmospheric emissions, and EIA issues, all three losses are offset by Uruguay winning on or receiving at least a 50-50 split on the issues it values most. Furthermore, it is very possible that Uruguay would accept the definition of losing on the atmospheric emissions and liquid emissions issues because of its strong conviction that the pulp mill

will neither produce a lot of pollution nor irreparably harm the environment. In this respect, Uruguay stands to lose little by offering potential compensation that, as Uruguay believes, it will never have to pay.

In the (A_{Safe} , U) settlement, Uruguay wins on technology and is forced to split the roadblock issue 50-50. Even though Uruguay does not fully win on the roadblock issue, the 50-50 split ensures that the effects of the roadblocks will be somewhat mitigated. The (A_{Mitigate} , U) and the ($A_{\text{Technology}}$, U) settlements are similar settlements in that both settlements award the roadblock issue and a majority of the technology issue to Uruguay. Even though Uruguay is faced with the possibility of substantial compensation regarding the technology issue, winning on the roadblocks and retaining the Kraft-ECF pulp technology potentially offset this. If the point allocations for the three settlements are anywhere near accurate, then all three settlements would represent viable solutions to the conflict in the eyes of Uruguay.

Even if the settlements proposed by AW are viable, there are several limitations that could threaten the success of applying AW to the pulp mill conflict between Argentina and Uruguay. The first limitation is that the issues proposed, and the settlements reached, require large-scale cooperation and compromise from both Argentina and Uruguay. Here, an independent third party mediator would be invaluable,¹²³ but the role of the mediator can only go so far. Argentina and Uruguay must reach settlements on several key questions: the definition of the issues; what constitutes winning and losing for each issue; and what to do in the event that an issue is split. The compensation mechanisms for the technology, atmospheric emissions, and

¹²³ Steven J. Brams and David D.H. Denoon, "Fair division: A new approach to the Spratly Islands controversy," 323.

liquid emissions issues all pose cause for concern. So, too, does the possibility of schedules for proposed protests in the roadblock issue and temporary stoppages in the atmospheric and liquid emissions issues. The selection of an independent environmental consultant in the EIA issue only adds to the complication. Whether Argentina and Uruguay will be able to successfully come to terms on the compensation issues, protest and stoppages schedules, and an independent environmental consultant is an open question. While not insurmountable, the compromises necessary for successful application of AW to the pulp mill conflict between Argentina and Uruguay are daunting to say the least.

Secondly, the application of AW is limited in the sense of timing issues. Since the International Court of Justice is currently hearing the disagreement, it is conceivable that both states would want to wait for a settlement proposed by the court. However, because construction of the Botnia plant has already begun, and is on going, the longer both states wait, the greater difficulty there will be in making use of any of the three settlements proposed above. The further along construction goes, the more costly and more difficult structural changes to the plant become.

Finally, AW has limitations of being accepted by both Argentina and Uruguay for two key reasons. The first is what J Keith Murnighan alludes to as the problem of AW unfamiliarity.¹²⁴ Because AW is a relatively new dispute resolution mechanism and its application has been restricted thus far to scholarly articles, states such as Argentina and Uruguay might be inclined to stick to more familiar dispute resolution processes such as ICJ adjudication. The second reason Argentina and Uruguay might be unlikely to accept AW is that through several failed attempts at dispute resolution, they might have

¹²⁴ J Keith Murnighan, "Review Essay", 153.

exhausted their ability to compromise. Stated another way, both Argentina and Uruguay might be so stubborn in their positions that they would be unwilling to accept anything less than fully winning on all issues. It is possible that Argentina would only be willing to accept relocation of the Botnia pulp mill and that Uruguay would only be willing to accept complete termination of the roadblocks, and the existing operational plan for the Botnia pulp mill. In this case, it would be exceedingly difficult to reach middle ground.

The purpose of this thesis is to apply the AW procedure to the pulp mill conflict between Argentina and Uruguay in order to derive several settlements that demonstrate AW's effectiveness as a viable alternative to the conflict. In the most optimistic sense, both Argentina and Uruguay would see and agree to use AW as a beneficial dispute resolution mechanism to end the current conflict between them. At the very least, this thesis may contribute to the increasing quantity of work dedicated to demonstrating the positive effects of using AW to solve international conflict were applicable. It is hopeful that perhaps AW will become well known enough to be adopted by states to settle conflicts, because in the end, international conflicts only undermine and prohibit positive growth in other areas.

Works Cited

- Actas de las reuniones de grupo técnico de alto nivel binacional. "I reunion grupo tecnico uruguayo-argentino." *Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay*, (2005).
http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm
 (accessed April 6, 2007).
- Actas de las reuniones de grupo técnico de alto nivel binacional. "Acta resumen de la III reunion del grupo tecnico de alto nivel." *Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay*, (2005).
http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm
 (accessed April 6, 2007).
- Actas de las reuniones de grupo técnico de alto nivel binacional. "Actas de las reuniones sexta y septima del grupo tecnico de alto nivel sobre plantas de celulosa." *Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay*, (2005).
http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm
 (accessed April 6, 2007).
- Actas de las reuniones de grupo técnico de alto nivel binacional. "Proyecto de acta de la novena reunion del grupo tecnico de alto nivel sobre proyectos del plantas de celulosa en el río uruguay." *Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay*, (2005).
http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm
 (accessed April 6, 2007).
- Actas de las reuniones de grupo técnico de alto nivel binacional. "Proyecto de acta de la decima reunion del grupos tecnico de alto nivel sobre plantas de celulosa." *Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay*, (2005).
http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm
 (accessed April 6, 2007).
- Brams, Steven J., and David D.H. Denoon. "Fair Division: A New Approach to the Spratly Islands Controversy." *International Negotiation* 2 (1997): 303-329.
- Brams, Steven J., and Alan D. Taylor. *The Win-Win Solution; Guaranteeing Fair Shares to Everybody*. New York, NY: W.W. Norton and Company, 1999.
- Brams, Steven J., and Alan D. Taylor. *Fair Division: From cake-cutting to dispute resolution*. Cambridge, UK: Cambridge University Press, 1996.
- Brams, Steven J., and Jeffrey M. Togman. "Camp David: Was the agreement fair?" *C.V. Starr Center For Applied Economics* (1996): 1-22.
- Ciancaglini, Sergio. "Conflicto en el río Uruguay; humo sobre el agua," *RollingStone Argentina* 98 (2006).

- Environmental Protection Agency. "Pulp, Paper, and Paperboard Industry: Background Information for Promulgated Air Emissions Standards." *EPA*, (1997).
<http://www.epa.gov/ttncaaal/t3/reports/pandpbid.pdf> (Accessed April 8, 2007).
- "Estatuto del Río Uruguay, 1975." *Instituto de Relaciones Internacionales*, (2007).
<http://www.iri.edu.ar/articulo.php?idarticulo=607> (accessed April 13, 2007).
- Gargano, Reinaldo. "Notas enviadas por el gobierno uruguayo 27/12/2005." *Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay*, (2005).
http://www.mrree.gub.uy/mrree/Asuntos_Politicos/Plantascelu.htm (accessed April 6, 2007).
- International Court of Justice. "Press Release 2007/2 (January 23, 2007)." *International Court of Justice*, (2007). <http://www.icjci.org/icjwww/idocket/iau/iauframe.htm> (Accessed March 20, 2007).
- International Finance Corporation. "Uruguayan Pulp Mills." *IFC*, (2006).
http://www.ifc.org/ifcext/lac.nsf/content/Uruguay_Pulp_Mills (accessed April 6, 2007).
- La delegación argentina al grupo técnico de trabajo de alto nivel. "Informe de la delegación argentina al grupo técnico de trabajo de alto nivel." *CEDHA* (2006).
<http://www.cedha.org.ar/es/iniciativas/celulosa/> (accessed April 6, 2007).
- Latin News Daily. "Mercosur tribunal rules on paper mills," *Latin News Daily*, (September 6, 2006): www.lexisnexis.com (accessed February 20, 2007).
- Massoud, Tansa George. "Fair Division, Adjusted Winner Procedure (AW), and the Israeli-Palestinian Conflict." *The Journal of Conflict Resolution*, Vol. 44, No. 3. (2000): 333-358.
- Ministerio de Relaciones Exteriores, Comercio Internacional y Culto de Argentina. "Informe de Ministerio de Relaciones Exteriores, Comercio Internacional y Culto." *CEDHA*, (2006). <http://www.cedha.org.ar/es/iniciativas/celulosa/> (accessed April 6, 2007).
- Ministerio de Relaciones Exteriores- Republica Oriental del Uruguay. "Cortas de las rutas y Daños." *Ministerio de Relaciones Exteriores- Republica Oriental del Uruguay*, (2006).
http://www.mrree.gub.uy/mrree/Asuntos_Politicos/paginalcelulosa.htm (accessed March 17, 2007).

- Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay. "Informe sobre la instalacion de dos plantas de celulosa en el río Uruguay." *Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay*, (2006).
http://www.mrree.gub.uy/mrree/Asuntos_Politicos/PlantasceluActas.htm
 (accessed April 6, 2007).
- Mercosur. "Antecedentes del Mercosur." *Mercosur*, (2007).
<http://www.mercosur.int/msweb/porta1%20intermediario/es/index.htm> (accessed April 6, 2007).
- Mercosur. "Laudo de Tribunal Arbitral "Ad Hoc" de Mercosur." *Mercosur*, (2006).
<http://www.mercosur.int/msweb/porta1%20intermediario/es/index.htm> (accessed April 6, 2007).
- Mercosur. "Tratado de Asunción." *Mercosur*, (1991),
<http://www.mercosur.int/msweb/porta1%20intermediario/es/index.htm> (accessed April 6, 2007).
- Murnighan, J, Keith. "Review Essay." *Social Justice Research* Vol. 12, No. 3. (1999): 150-162.
- Oy Metsä Botnia Ab. "The Pulp Production Process." *Metsabotnia*, (2004).
<http://www.botnia.com/en/default.asp?path=204,214,251,1653> (accessed April 9, 2007).
- Presidencia-República Oriental Del Uruguay. "Las plantas se construyen más allá de la postura argentina." *Ministerio de Relaciones Exteriores-Republica Oriental del Uruguay*, (2006).
http://www.mrree.gub.uy/mrree/Asuntos_Politicos/paginalcelulosa.htm (accessed April 6, 2007).
- Raiffa, Howard. *The Art and Science of Negotiation*. Cambridge, MA: The Belknap Press of the Harvard University Press, 1982.
- Taiana, Jorge Enrique. "Asamblea ambiental ciudadana de Gualaguaychú." *Ministerio de Relaciones Exteriores Comercio Internacional y Culto – República Argentina*, (2006), <http://www.mrecic.gov.ar/> (accessed February 11, 2007).
- Universidad de la Republica de Uruguay. "Síntesis de los efectos ambientales de las plantas de celulosa y del modelo forestall en Uruguay." *CEDHA*, (2006).
<http://www.cedha.org.ar/es/iniciativas/celulosa/> (accessed April 6, 2007).