oikos sustainability case collection

oikos Sustainability Case Writing Competition 2003

2nd. Prize

Jari Cellulose S.A.

Mark Milstein
Kenan-Flagler Business School, University of North Carolina

Stuart Hart
Kenan-Flagler Business School, University of North Carolina

Bruno Sadinha
Booz Allen Hamilton, Sao Paulo

JARI CELULOSE S.A.

The year 2001 marked the beginning of a new and decisive phase in the extraordinary history of JarI Celulose (www.jari.com.br). In the prior year, Grupo Orsa, S.A. had wrapped up a deal to acquire the company – a heavily indebted pulp mill remotely located along the Jari River in the northeast section of the Amazon Basin in Brazil (see Exhibit 1).

In order to take over the company, Orsa had to negotiate with the pulp mill's bank creditors, who had agreed with their proposal to buy Jari for the symbolic amount of US$ 1.00. At the same time, Orsa also committed to repay bank loans amounting to US$ 415 million over the next 11 years as well as to make investments to modernize the pulp mill, construct a hydroelectric generator, and fund social initiatives in the region. Negotiations had been lead by Jari's largest creditor – the Brazilian state-owned bank National Bank of Social and Economic Development (BNDES). BNDES had accepted Orsa's offer over one made by the Canadian firm Tambec.

With the acquisition, Sr. Sergio A. G. Amoroso, Orsa's socially-minded founder, main shareholder, and Chairman of the Board of Directors appointed Sr. Jose Claudio Sardinha as the new CEO of the company. Amoroso would hold Sardinha responsible for the goal of transforming Jari into a sustainable model for the region. To do so, Sardinha would have to resolve the company's most persistent problem – Jari's inability to generate profits for over 20 years.

Sr. Sardinha had to transform one of the biggest business failures in the history of Brazil into a successful model of sustainable enterprise and development. Sr. Sardinha and his team were aware that the construction of a hydroelectric project and investments in plant and equipment were necessary to build the company's competitiveness. They were also aware of the profound impacts that the Jari project had caused in the region. Grupo Orsa and its stakeholders now wanted to see the project succeed on multiple dimensions. If Sr. Sardinha and his team failed, there probably wouldn't be another chance.

INDUSTRY OVERVIEW

Pulp Explained

Pulp is the raw material for the production of paper. Until the mid-1800s, most paper was made from either cotton or flax fibers and the bulk of that came from discarded rags. As rags became in short supply in the 1830s, research into new raw materials expanded. In 1840, a German inventor crushed wood with a wet grindstone to create wood-based pulp. The pulp consisted of the separated plant fibers. Within a few years, a Canadian was using wood pulp to manufacture paper.

To make pulp, wood is first stripped of its bark, often within enormous drums where logs are tumbled together. At some mills, the bark is recovered and used as fuel to run boilers which power the mill. Next, the wood must be processed to separate out the cellulose fibers that are cemented together with a substance called lignin. This separation can be done either mechanically or chemically, depending on the paper or paperboard characteristics desired. Mechanical pulp is manufactured by crushing the stripped logs with huge grinders (pulpers) and soaking them with water and then either treated with steam at high pressures and temperatures to produce Thermo-mechanical pulp or treated with some chemicals to produce Chemithermo-mechanical pulp. When produced mechanically, the fibers break and become shorter. These shorter fibers are weaker and are used to manufacture products requiring less strength, such as newsprint and paperboards.

Chemical pulp is manufactured by cooking wood chips in huge vats (digesters) with chemicals. The combined action of the heat and the chemicals dissolves the natural 'glue' – lignin – that holds the wood fibers together. When lignin dissolves, long fibers are released without breaking them. Thus, chemical pulp can be used to manufacture products requiring greater strength, like printing and writing papers. One type of chemical pulp, called kraft pulp, is brown but is often bleached white.

Pulp can also be produced by recycling pre-consumer or post-consumer waste paper and paperboard which is first ground, then sifted for contaminants, and de-inked if necessary. Recycled pulp fibers are broken into even shorter lengths in the manufacturing process and are typically used to make paperboard or sanitary paper. Typically, 15 % to 20 % of the secondary fibers are too short to be reused. Recycled pulp can also be mixed with virgin pulp for higher value products.

Some paper and paperboard products require white pulp which must be bleached. Chemicals used for bleaching dissolve even more lignin and produce a more resistant and absorbent pulp. Without bleaching, the paper that is produced will become brittle and yellow over time. Traditionally, the pulp industry has relied on chlorine as the main bleaching agent. Aside from the fact that chlorine is a very harsh chemical, its use yields a carcinogenic byproduct called dioxin. More recently, producers have been replacing chlorine with other agents, yielding three types of alternatively bleached pulps: 1) TCF (Totally Chlorine Free) – virgin pulp that has been bleached with oxygen-based, chlorine-free compounds such as oxygen, ozone, and hydrogen peroxide; 2) PCF (Process Chlorine Free) – recycled pulp that is produced using no chlorine compounds in the recycling process (though the original paper may or may not have been bleached with chlorine); and 3) ECF (Elemental Chlorine Free) – pulp bleached not with "elemental" chlorine gas, but with other chlorine compounds such as chlorine dioxide which reduce but do not eliminate the toxic by-products.

Once produced, pulp is over 99% water by content. Integrated pulp and paper mills will automatically send finished pulp into the paper manufacturing process where water is removed using combinations of gravity, air and heat until fibers form a sheet and the desired moisture content of the final paper product is reached. Mills that are not integrated will also use gravity, air and heat to remove the moisture from the pulp, and will package it into large bales for sale and export.

The characteristics of pulp fiber are dependent on the type of tree from which the pulp is produced. Softwoods (evergreens) produce long fibers while hardwoods (deciduous trees) produce short fibers. Before the 1980s, global market pulp producers offered only two alternatives to traditional North American mixed hardwoods and softwoods: Scandinavian birch and Iberian eucalypts. Throughout the 1970s and most of the 1980s, global customers accepted mixed hardwoods and softwoods because no major alternatives existed. Thus, market pulp producers traditionally made "one size fits all" pulp grades. Producers did not search out and uncover unique pulp properties that might make their pulps particularly suitable to specific customer needs. Nor did they divide monthly production runs into customer-oriented "specialties" with properties such as high brightness, low dirt, high tensile, and low ash/extractables.

In the 1980s, the pulp market began to change and mixed hardwood and softwood producers found themselves at a distinct disadvantage. Customers began to favor newer single-species pulps. Brazilian eucalyptus is the best example of a "new" pulp that offered papermakers outstanding advantages. This uniform, single-species pulp comes from plantation-grown trees grown from superior seedlings of "cloned" trees which produce harvestable fiber in 6-7 years.

Facial tissue producers liked Brazilian eucalyptus which had the unusual ability to produce tactile softness when layered on the surface. This quickly became the "outstanding attribute" of Brazilian eucalyptus, and it found a niche market with facial tissue producers. Today, facial tissue is this pulp's major end-use application.

North American mills began to move toward the selective harvesting of only maple trees so they could promote "high maple hardwoods." In the middle 1980s, these pulps were only 50%-60% maple. Mills then ratcheted up to 80% and later to 90% maple. Single species pulps continue to attract increased interest as producers and customers work to understand a pulp’s outstanding attributes, unusual properties and (if any) unique or distinctive characteristics.

The Global Pulp Market

The pulp and paper markets are highly interdependent in terms of demand and price structure. When paper consumption rises, the demand for pulp grows. Pulp producers attempt to forecast the future demand for pulp and paper products in order to optimize inventories and production capacities. When demand increases, prices for pulp typically rise, and manufactures tend to increase capacity globally. Then when demand slumps, excess capacity floods the market and pulp prices become depressed. Constant gaps between consumption (demand) and capacity (supply) makes the pulp and paper industry one of the most volatile markets in the business world.

Regardless of whether pulp producers are vertically integrated, most pulp companies will sell their production and/or surplus in international markets. Such production, which is known as "market pulp," is characterized by economies of scale and a high level of standardization. In 2000, world pulp production was 161 million tons, of which 75% was integrated with paper mills and 25% was market pulp. Of the 40 million tons of "market pulp" produced in 2000, 49% was softwood fiber, 18% was Eucalyptus, and the remaining 26% was other hardwood fiber.

The pulp industry is characterized by a high level of concentration both in terms of demand and supply, with the main producing countries representing 90% of the total output (see Exhibit 2). The U.S, Canada and Scandinavian countries, referred to as "Norscan," are responsible for 65% of the world pulp supply (see Exhibit 3). Competition in the pulp market is global, with manufactures in North America, Europe and South America chasing the same customers. However, pulp firms do not have a global presence in the same way as large multinationals. Instead, the firms tend to serve world markets from a well-defined base in one part of the world.[1]

Over the previous decade, the world economy experienced substantial growth. As a result, world shipments of market pulp increased 43% from 1990 to 2000. During that period, pulp producers, mainly in the Southern Hemisphere, increased their production capacity to accommodate the demand for pulp products. However, recent projections of slower world economic growth have negatively impacted the demand for pulp worldwide. In 2000, paper producers were once again facing excess capacity and increasing inventory levels (see Exhibits 4 and 5). Some analysts forecast that in 2001 market pulp consumption would be slightly lower than that of the previous year. Thus, it was expected that pulp prices would continue to fall in the short term despite the United Nations' forecast of 2.8% annual growth in world paper demand and 4.6% growth in the demand for short fiber pulp.[2] Demand for market pulp was then expected to recover in 2002, reaching 1999 levels, and then grow at just over 1% each year through 2005.

The Brazilian Pulp Market

During the 1980s, Brazil's pulp industry dramatically increased its participation in the world supply of fiber, planting more than one million hectares throughout the decade. The country's pulp industry had emerged as one of the lowest-cost producers worldwide, with an average production cost for hardwood pulp of US$165/ton, compared to US$169/ton in Indonesia or between US$272 and US$325/ton in North America and Europe. In 2001, Brazil has a commercial forest of approximately 1.5 million hectares, mainly planted with eucalyptus and pine. These non-native trees represented 68% and 31% of the commercial forest, respectively[3]. Because these trees have adapted well to the Brazilian climate and soil, the pulp industry enjoys a high growth rate and better return on investment for its forests and plantations. For example, eucalyptus in Brazil can be harvested after seven years while in Europe hardwoods take up to 40 years to mature.

[1] Forest L. Reinhart, *Down to Earth* (Boston: HBS Press, 2000), p. 208.
[2] Boris Tabacof, "Avaliação do Setor de Celulose e Papel." Online at http://www.bracelpa.com.br/portugues/aval2000.html. Accessed April 2001.
[3] Boris Tabacof, "Avaliação do Setor de Celulose e Papel." Online at http://www.bracelpa.com.br/portugues/aval2000.html. Accessed April 2001.

By 1998, Brazil already accounted for more than 20% of the global market for hardwood pulp sales, positioned as the 7th largest world pulp producer. The country's production volume increased by more than 5% on average over the previous four years and was expected to grow 4% in 2000, reaching a total of 7.6 million tons, of which 58% is sold in the domestic market with the rest being exported[4].

Brazil's pulp and paper producers were planning to invest US$ 6.6 billion from 2000 to 2005[5]. The objective was to increase the country's production capacity of wood pulp by 45% and paper by 17%, even with current indications of slowing international demand and concerns regarding over-supply and falling prices. Such investments would permit local producers to meet the domestic demand for pulp and increase their share in export markets. In 2000/1, the largest players in the Brazilian pulp market were: Aracruz, which was the world's largest eucalyptus pulp producer with 1.3 million tons/year, Cenibra, Suzano, Riocell, VCP, and Jari.

COMPANY HISTORY

Jari began in 1967, when Daniel K. Ludwig, an American shipping magnate, decided to buy 1.7 million hectares of inhabited Brazilian Amazon jungle with the goal of building a world-class industrial, mining and agricultural complex. Ludwig, who was one of the richest men in the U.S., paid US $3.1 million for what was known at the time as "the largest rural private property in the world."[6] Larger than Belgium, the piece of land was located in between the states of Amapá and Pará in the poor, northern region of Brazil.

In an attempt to expand the country's industrial base and, at the same time, colonize the "empty" Brazilian Amazon, the military government lured Ludwig to invest in the region with what could be a starting point for a new regional development model. Foreseeing the world's growing appetite for products like paper and aluminum and the shortage of cellulose globally, Ludwig made the bet that the complex would flourish. In the rhetoric of both the military regime and Ludwig, the Jari Project would make Brazil one of the largest pulp exporters while colonizing and developing a neglected portion of the country, without requiring any public investment.[7]

In 1968, the project was initiated by clearing several thousand hectares of native tropical forest and reforesting the area with non-native Caribbean *Pine* and Burmese *Gmelina*, which was being grown successfully in Southeast Asia. However, after much costly experimentation, Ludwig soon found out that *Gmelina* did not adapt to the soil and climate of the Amazon, and replaced it with eucalyptus. For over 10 years, more than 260,000 acres of eucalyptus were planted to be used as the raw material for the pulp mill, which was finally built in 1978. [8] Ludwig spent more than US$ 269 million to have the 17-story mill and a thermoelectric power plant constructed at his favorite shipyard in Japan. Both plants were

[4] Ibid.
[5] "Brazil goes ahead with $7 bn push," *Financial Times* (November 24, 2000). Online at http://www.FT.com. Accessed April 2001
[6] Roberto Monteiro, *Children and Youngsters in Laranjal do Jari, Amazon, Brazil: Risk and Hopes* (Juiz de Fora: Feme, 2001), p. 22.
[7] Ibid, p. 25.
[8] Larry Rohter, "A Mirage of Amazonian Size; Delusions of Economic Grandeur Deep in Brazil's Interior," *The New York Times* (November 9, 1999).

then towed 17,800 miles to Brazil across the Indian and Atlantic Oceans in a voyage that lasted three months.

In the Jari region, Ludwig also installed 3,000 miles of roads, 37 miles of railroads, a deep-water port and a company town, named Monte Dourado. He had planned to construct a hydroelectric project that would be used to supply energy at low cost to the pulp mill, as well as produce and export pork, beef, rice, aluminum and paper. By the end of 1970s, Jari was one of the largest industrial projects in the world. In 1979, Jari Celulose formally began operations, producing 120,000 tons of pulp in the first year and 220,000 tons in the second year.

Political Issues

Daniel Ludwig disliked politicians and avoided the press at all costs. He controlled every aspect of the project, and did not allow visits without his permission.[9] Such behavior did not help bring positive publicity to the project. In fact, this conduct started to raise suspicions about threats to Brazilian national security. The land was described as "Ludwig's private country," and press reports suggested he was creating his own army, smuggling gold and diamonds, destroying the jungle, and using slave labor.[10] The Brazilian government, which was the guarantor of Ludwig's foreign loans, feared that the project might lead to the American colonization of the Amazon region. The Jari Project soon became a national issue with increasing criticism from the press and the populous, compelling the military regime to take action regarding the foreign "enclave" in Brazilian territory.

In 1982, after investing US$ 1.3 billion, Ludwig finally abandoned the Jari Project as many nationalist groups had been calling for.[11] Acting as mediator, the government organized the transfer of the company's assets to a consortium of 23 private Brazilian organizations. The military government was "forced" to intervene in the negotiation due to strong political pressure and because it was afraid that the social problems in the region could worsen if the company went bankrupt. This assembled consortium, together with two government-owned banks, BNDES and Banco do Brasil, assumed the company's ownership as well as its US$ 200 million debt.

Financial Issues

Jari was located much closer to the equator than any of its global competitors. The region's unique micro-climate – stemming from the amount of sun and rain the trees received – produced trees with fiber that was uniform, bulky, more opaque, less porous, and quite strong. Its unique location also helped to speed growing cycles. In Norscan countries, cycle times for a harvestable tree ranged from 30-70 years, depending on the species being grown. In Brazil, most eucalyptus producers could harvest a tree for production within 7 years. At Jari, that figure was closer to 5. Furthermore, while in North America the average yield from a forest in 2000 was 3.0 m^3/ha/year, Jari's yield rate was closer to 29 m^3/ha/year (Brazilian competitor Aracruz led the eucalyptus market with 45 m^3/ha/year[12]).

[9] Monteiro, op. cit., p. 25.
[10] Rohter, op cit.
[11] Eduardo Ferraz, "Aventura na Selva," *Exame* (January 10, 2001): 731.
[12] Online at http://www.aracruz.com.br/histpap.htm. Accessed May 2001

Once grown and harvested, Jari enjoyed one of the best planted-forest logistics in the world. The average distance between harvest areas and the pulp mill was only 30 miles. In addition, because the mill and the port were right next to one another, Jari had the shortest forest to mill distance in the industry. Its private river port could also accommodate the kinds of large ships favored by shippers and exporters.

Despite these attributes, the pulp company faced financial difficulties from the beginning of its operations in 1979, first, with the fall of pulp prices in international markets, and then with the appreciation of the Japanese yen. With the rise of oil prices in the early 1980s, the company's energy costs skyrocketed, and mechanized rice production became economically infeasible. One of the solutions to the energy problem had always been a proposed hydroelectric project. However, the lack of government support, bureaucratic conflicts, and accumulating losses ultimately created barriers to its construction.

Under the private consortium's control the pulp company, renamed Companhia Jari, still required additional investment to build the hydroelectric project and improve its financial performance. Though the pulp production was slowly increasing, the new management faced the same issues that Ludwig had been struggling with: continued financial losses; a large and growing debt to banks (see Exhibit 6); a large and growing contingent of people in poverty around the area dependent on the company; and a pulp mill in serious need of modernization.

In response to some of these issues, the new owners decided to spin off activities associated with the project that were not generating desired results, but they kept control of the pulp company. Yet, the new management was also reluctant to invest more money in Jari, even if backed by government banks. These decisions forced the two national banks – BNDES and Banco do Brasil – to look for another investor who would be willing to face the financial and social challenges posed by Jari.

In 2000, Jari was finally sold to the Orsa Group, who renamed it Jari Celulose S.A. The new shareholders assumed ownership of the pulp company with sales of US$ 150 million/year (see Exhibit 7), a plant with a production capacity of 300,000 tons/year of bleached hardwood kraft pulp, a port, a company town, and 1,736,000 hectares of forests, of which 49,000 hectares were planted in eucalyptus (they were permitted to plant up to 160,000 ha.). The pulp mill was struggling with deficient and obsolescent technology, minimal levels of maintenance and unstable production. No investment had been made in the mill for many years, leaving the company technologically behind its main competitors (the Brazilian pulp sector renewed its technology every ten years or so). This situation made it difficult for Jari to compete against the larger and more efficient Brazilian pulp mills.

A key driver in operating costs for pulp mills is energy. Jari faced large cost disadvantages in energy compared to other Brazilian pulp producers. In Brazil, the pulp industry's energy costs were about US$ 15/ton of pulp. Jari paid US$ 54. As Sr. Sardinha explained, "We pay 260% more than our local competitors because in this region of the country there are no cheap sources of energy.,"

Grupo Orsa also assumed the US$ 415 million debt, which was restructured with creditor banks in February 2000. According to the agreement, Jari would pay to debt holders the so-called "presumed cash," or revenues minus operational costs and cash for investment. If the price of pulp fell below US$ 417/ton, the company would not be required to pay anything to

creditor banks. The debt term would expire in 2010, independent of the amount repaid by Jari. In exchange, the Grupo Orsa provided the creditors with a US$ 100 million warranty.

Social Issues

The Jari project had created tremendous social impacts in the region. Before Ludwig's arrival, the human presence in the area was very limited, with a few families and tribes living in semi-isolation, fishing and collecting forest products such as Brazil nuts.[13] However, the construction of the pulp mill attracted people from the poor northeast region of Brazil and other cities in the states of Pará and Amapá.

The people employed by the company were housed in Monte Dourado, a self-sufficient town with schools, hospitals, recreational facilities and markets. As Ludwig's project deteriorated, shantytowns grew to accommodate those unemployed by Jari's subcontractors and the mass of people who had migrated from neighboring regions. The shantytowns were constructed on stilts built over the river in a disorganized way, and lacked basic urban infrastructure, including clean water, sewage and electricity. Most people used the river water for sanitation, drinking, cleaning, and cooking[14]. The lack of infrastructure increases the risk of epidemics and other health problems.

By 2001, the company employed only about 3,500 people. Yet, more than 70,000 people lived in Monte Dourado and in ramshackle communities (called Beiradao) along the Jari River.[15] Laranjal do Jari, one such settlement, has the second largest population of Amapá state with 30,000 inhabitants. More than 50% of the population was under the age of sixteen as adults migrated to other cities and regions to look for work. Social problems were increasing, including child prostitution, drug traffic and violence.

Environmental Issues

When it began in the 1960s, Ludwig's agro-industrial complex in the Amazon forest did not generate serious controversy regarding the possible environmental impacts that it could bring to the region. However, to accomplish the initial objectives of the Jari Project, hundreds of thousands of hectares of native tropical forest were destroyed in order to plant pine and eucalyptus, and cultivate rice.

Since that time, research has shown that the Amazon forest is an extremely diverse and complex eco-system, but its richness is not the result of highly fertile soil, as many like Ludwig had imagined. Instead, the Amazon soil is composed of a very thin fertile layer that can be easily eroded by rain without the protection of the native vegetation. As knowledge of the ecosystem increased, the company took initiatives to redress past practices and began to plant eucalyptus in conjunction with the reforestation of native species, in order to conserve soils and maintain the forest's capacity to regenerate over time.

The company's commercial forest is replanted with their own proprietary seedlings nurtured in greenhouses. The eucalyptus growth cycle has been shortened by hybridizing, mechanized soil preparation, hand-planting of seedlings, and biological insecticides. From 1995 to 1999, the growth cycle was reduced to an average of 5 years, while doubling the processed yield of

[13] Monteiro, op cit., p. 35.
[14] Ibid, p. 45/48.
[15] Rohter, op cit.

the trees harvested. The plantations have continuously improved in productivity, outpacing the increases in output from the pulp mill.

Over the last few years, Jari has also taken measures related to the preservation of bio-diversity on their land. Working in partnership with a governmental research agency specialized in agricultural technologies, Jari began a Genetic Reservation Program creating a genetic data bank of all species found in the region – some 630 different species of trees have already been catalogued.

In the pulp mill, investments have been made to improve environmental control, such as reducing water and energy consumption. Jari also constructed a stabilization pool 12 km in diameter to treat liquid waste before it was returned to the Jari river. Air emissions were now treated with filters and gas-cleaning agents. The pulp mill also utilized the ECF process for bleaching its pulp.

The planned 100 megawatt hydroelectric power plant would cut Jari's electrical costs in half to about US$ 30/ton. The plant would allow Jari to become self-sufficient in energy. It would also bring benefits to the surrounding communities. Black-outs in the state of Amapá, which had a total budget equal to Jari's revenues, could be solved with the construction of the hydroelectric plant. The company could sell 70% of the total power generated to Amapá State. Currently dependent upon expensive sources of power generation, such as thermoelectricity, Amapá had the highest energy cost in the country. While in the southeast region the average energy cost was around US$ 30/Mwh, in Amapá it reached US$100/Mwh. Over the next ten years, US$ 200 million could be saved by reducing expenditures on fuels used to generate power as well as the pollution caused by burning diesel oil, BPF and fuel-wood.

The Brazilian government had already authorized the new management to build the project which would require investments of US$ 120 million. Scheduled to start up by the end of 2003, the hydroelectric project was based on the construction of a run-of-river power plant that would not dam the flow of the river or flood the valley for its reservoir. Approved by the Brazilian Institute for the Environment and Natural Resources (IBAMA), the hydroelectric project would not cause significant adverse effects on the Santo Antonio waterfalls, where the Jari river drops 90 feet. Nevertheless, the state government and some environmentalists were worried about the impact the new power plant might have on the waterfalls and surrounding areas.

GRUPO ORSA

Growing from a small family-owned cardboard factory in the state of São Paulo,Brazil, in 1981, the Grupo Orsa had become the 3rd largest producer of paper and corrugated boxes in the country, with revenues of US$ 170 million in 2000. Led by Sr. Amoroso, the company had been growing at a rate of 25% every year since 1987. This growth was mostly attributed to Amoroso's willingness to take risks, an aggressive acquisition strategy, and a track record of good relationships with clients and suppliers. "I'm not afraid of great challenges or debts and I still believe that debt financing, under control, is an important ingredient for growth" said Amoroso. In 2000, the Grupo Orsa's total debt was 40% of annual revenues.[16]

[16] Eduardo Ferraz, "Do Lixo ao Luxo," *Exame* (January 10, 2001): 731.

In 1987, Grupo Orsa was a pioneer in the implementation of a just-in-time process for corrugated boxes with multinational companies such as Nestlé. During the 1990's, Amoroso decided to acquire two struggling companies that recycled and manufactured paper. After heavy investments to modernize production and improve management performance, the two units were turned around. With 1,500 employees and a vertically integrated strategy that goes from tree plantations to finished product, Grupo Orsa consisted of:

- Three factories in São Paulo state with a total capacity of 486,000 tons/year of corrugated cardboard boxes and kraftliner. One of these units was the largest recycled paper plant mill in Latin America with an installed capacity of 132,000 tons/year.
- One paper mill in Amazonas state, opened in 1999, with an installed capacity of 24,000 tons/year of corrugated cardboard sheets and boxes.
- One new production plant of corrugated cardboard boxes opened in 2000 with a production capacity of 72,000 tons/year.
- A forest of *Pinus* in São Paulo state, acquired for US$ 19.5 million in 1993.

Orsa Foundation

With Brazil facing huge social problems, Sr. Amoroso decided to embrace a philosophy of social responsibility in running his business. In 1994, he created the Orsa Foundation to coordinate the group's social activities. The foundation runs programs in the areas of education, healthcare, social welfare, environment and volunteer work, targeted to the training and education of poor children.

To support the foundation and fulfill its mission, Grupo Orsa and its related companies donate at least 1% of their gross annual revenues to the foundation. By 2000, the Orsa Foundation provided education and outreach services to 20,000 children and adolescents each month and provided medical care to 60,000 youth.

The foundation had created partnerships with educational entities, non-profit organizations and government agencies to provide its services. The Orsa Foundation had established alliances with entities such as UNICEF, Banco do Brasil Foundation, Kellogg Foundation, the NBESD, and private and public universities.[17]

Some activities and programs developed and managed by the Orsa Foundation include:[18]

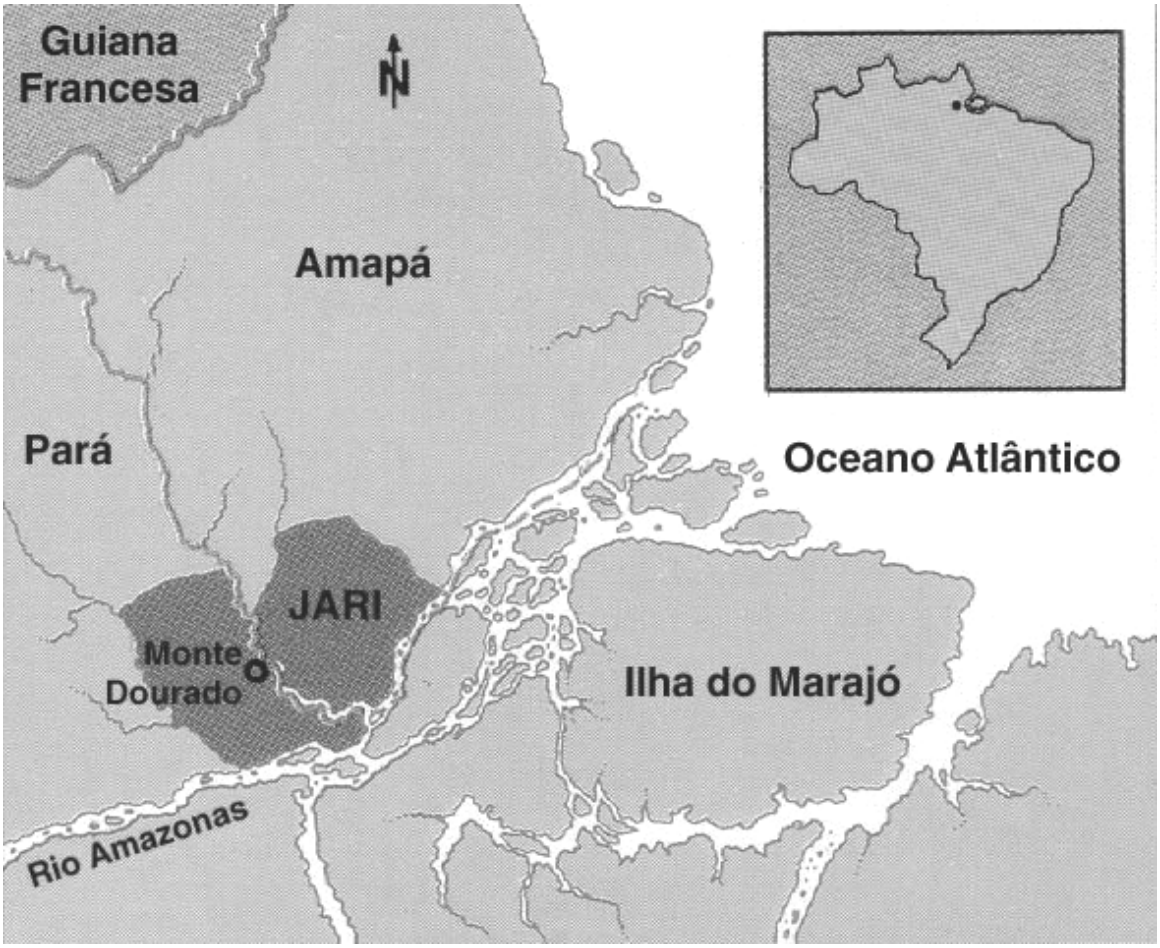
- **Training (Campinas, São Paulo):** A program of social inclusion and citizenship that rescued children living off of materials obtained from the Campinas city dump. A good example of this program was the "Tim Drum Band" (Banda Bate-Lata). This initiative used alternative musical instruments made of scrap metal to play fine music. In 2000, the program assisted more than 1000 children and adolescents nationwide between the ages of 7 and 17 years old.
- **Pediatric Cancer Institute:** As one of the major causes of mortality among children and adolescents in Brazil, cancer could be treated with timely diagnosis. The foundation, in partnership with a specialist in children's cancer, was contributing to the construction of a cancer institute, located in the State of São Paulo, to improve health care for thousands of needy children. Also, by creating alliances with local

[17] Monteiro, op cit., p. 151.
[18] Ibid, p. 154-155.

universities and the Children's Hospital in Los Angeles (CA), the hospital was in the forefront of research in children's cancer. Over a five-year period, donations by the Orsa foundation, the Department of Health, and Banco do Brasil Foundation to the program accounted for more than US $30 million.

- **Pioneer Program:** This initiative was developed to fight infant malnutrition, which kills more than 100,000 children per year under the age of one in Brazil. In an effort that incorporates information, assistance, and constant follow-up, the foundation had reduced the death rate from 72 per 1000 to 36 per 1000 in five years. This approach was now being copied by the World Bank in other regions of the world facing the same type of problem.
- **Education in Early Childhood (0 to 6 years of age):** Based on research conducted in 129 Brazilian municipalities, the foundation determined that there was a shortage of professionals to work with early childhood education. The foundation, together with other non-profit organizations and the public sector, created regional forums of discussion to create efforts and public policies for early childhood education. This program was a role model for other regions in Brazil, earning the highest honor possible for a non-profit organization in Brazil.
- **Mothers as Teachers:** In conjunction with an NGO, the foundation had invested in the training of mothers in one community in the state of Bahia to enable them to be agents of change through adequate care of children between the ages of 0 and 6 years. In 2000, fifty mothers were receiving training and looking after 300 children in day-care centers.

Exhibit 1
Jari's Location and Total Area



Source: Jari Celulose

Exhibit 2
Top 20 Pulp Producing Countries
(000 tons)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
1. USA	57,214	57,896	59,282	57,069	58,724	59,682	58,234	59,342	58,143	57,074
2. Canada	22,835	23,329	22,841	22,897	24,547	25,388	24,352	24,850	23,500	25,387
3. China	9,500	10,750	11,985	15,290	17,054	13,840	19,000	17,380	16,520	16,425
4. Finland	8,886	8,483	8,525	9,338	9,962	10,089	9,676	11,089	11,355	11,579
5. Japan	11,328	11,729	11,200	10,593	10,579	11,120	11,199	11,490	10,919	10,990
6. Sweden	9,914	9,769	9,589	9,953	10,867	10,187	9,779	10,497	10,541	10,694
7. Brazil	4,453	4,839	5,368	5,509	6,106	5,909	6,225	6,342	6,719	7,209
8. Russia	8,380	7,580	6,800	4,365	3,313	5,067	4,000	3,895	3,810	4,750
9. Indonesia	701	800	821	1,400	1,400	2,022	2,635	2,979	3,430	3,800
10. France	2,200	2,432	2,609	2,540	2,787	2,819	2,517	2,832	2,677	2,591
11. Chile	805	1,113	1,681	1,864	1,940	1,646	2,060	2,040	2,080	2,394
12. Norway	2,169	2,108	2,009	2,169	2,344	2,486	2,269	2,336	2,420	2,354
13. India	900	1,150	1,400	1,400	1,400	1,870	1,900	1,900	2,100	2,320
14. South Africa	1,865	57,750	2,320	2,320	2,165	2,210	1,848	2,315	2,238	2,118
15. Germany	2,339	2,361	2,240	2,042	1,934	1,950	1,816	1,958	1,950	1,912
16. Portugal	1,449	1,619	1,592	1,520	1,539	1,617	1,594	1,703	1,708	1,755
17. Austria	1,460	1,480	1,489	1,454	1,595	1,620	1,550	1,629	1,650	1,688
18. Spain	1,542	1,563	1,530	1,333	1,425	1,577	1,461	1,571	1,620	1,680
19. New Zealand	1,364	1,331	1,288	1,368	1,358	1,410	1,355	1,401	1,430	1,457
20. Australia	1,029	1,007	982	990	1,948	2,038	953	914	936	872

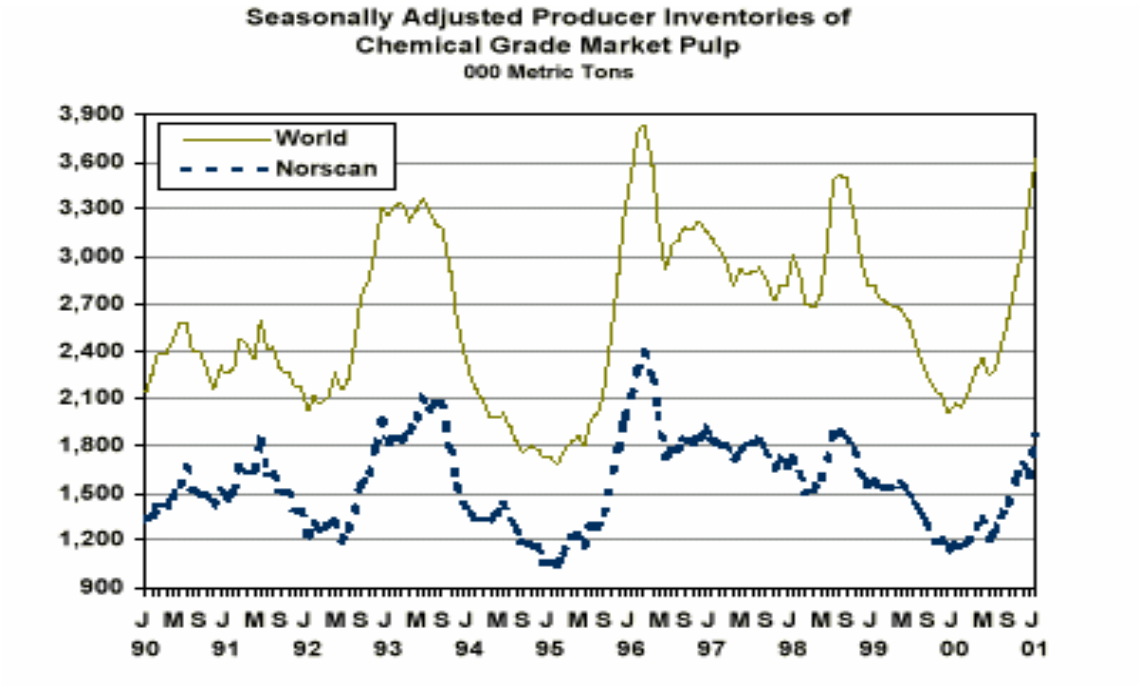
Source: PPI Annual Review, 2000

Exhibit 3
Top 100 Global Pulp & Paper Companies ('000 $US)

	Company	Country	Net Sales	Net Income		Company	Country	Net Sales	Net Income
1	International Paper	USA	28,180	142	**51**	CMPC	Chile	1,482	219
2	Georgia Pacific	USA	22,218	505	**52**	Carter Holt Harvey	New Zealand	1,467	92
3	Weyerhaeuser	USA	14,603	634	**53**	Rock-Tenn	USA	1,463	(83)
4	Kimberly-Clark	USA	13,982	1,800	**54**	Nexfor	Canada	1,437	99
5	Procter & Gamble	USA	12,044	853	**55**	Universal Forest Products	USA	1,389	30
6	Stora Enso	Finland	12,024	1,325	**56**	Suzano	Brazil	1,368	272
7	Oji Paper	Japan	11,188	54	**57**	Arauca	Chile	1,261	345
8	UPM – Kymmene	Finland	8,852	1,262	**58**	Myllykoski Corp.	Finland	1,252	96
9	Smurfit-Stone	USA	8,796	225	**59**	Hokuetsu Paper	Japan	1,232	19
10	Nippon Paper	Japan	8,409	95	**60**	Durango	Mexico	1,228	154
11	Boise Cascade	USA	7,807	179	**61**	Rayonier	USA	1,227	79
12	Svenska Cellulosa	Sweden	7,347	783	**62**	Södra	Sweden	1,224	205
13	Metsälitto	Finland	6,940	238	**63**	Tomoku	Japan	1,215	(21)
14	Worms	France	5,211	88	**64**	Hansol Paper	Korea	1,204	12
15	Sappi	South Africa	4,718	363	**65**	Gaylord	USA	1,168	1
16	Willamette Industries	USA	4,652	345	**66**	Riverwood	USA	1,129	25
17	Asia Pulp & Paper	Singapore	4,500	(900)	**67**	Klabin	Brazil	1,031	7
18	Mead	USA	4,368	161	**68**	Chuetsu	Japan	1.021	5
19	Jefferson Smurfit	Ireland	4,217	224	**69**	Mayr-Melnhof Karton	Austria	996	61
20	Abitibi Consolidated	Canada	3,823	247	**70**	Japan Paperboard	Japan	996	(1)
21	Westvaco	USA	3,663	246	**71**	Caraustar	USA	963	20
22	Daio paper	Japan	3,430	58	**72**	Wausau-Mosinee	USA	952	1
23	Anglo American (Mondi)	UK	3,388	308	**73**	Norske Skog Canada	Canada	948	110
24	Rengo	Japan	3,290	56	**74**	Tafisa	Spain	931	(11)
25	Norske Skog	Norway	3,031	223	**75**	Greif Bros.	USA	930	76
26	Sumitomo	Japan	2,976	99	**76**	Paperlinx	Australia	913	49
27	Daishowa Paper	Japan	2,954	18	**77**	Longview Fibre	USA	876	38
28	Louisiana-Pacific	USA	2,933	(13)	**78**	Crown Pacific	USA	787	13
29	Temple-Inland	USA	2,917	195	**79**	Votorantim	Brazil	786	16
30	Sonoco	USA	2,711	166	**80**	Torraspapel	Spain	753	83
31	AssiDoman	Sweden	2,696	272	**81**	Aracruz	Brazil	732	202
32	Amcor	Australia	2,660	118	**82**	Alliance	Canada	731	14
33	Bowater	USA	2,500	137	**83**	P.H. Glatfelter	USA	725	44
34	Domatar	Canada	2,423	185	**84**	Plum Creek Timber	USA	714	131
35	Mitsubishi Paper	Japan	2,264	(109)	**85**	Buckeye Technologies	USA	713	59
36	Ahlstrom	Finland	1,952	59	**86**	Yuen Foong Yu Paper	Taiwan	701	19
37	Cascades	Canada	1,930	50	**87**	Siam Pulp and Paper	Thailand	683	70
38	Packaging Corp. of America	USA	1,922	173	**88**	Munksjo	Sweden	663	47
39	Fletcher Challenge	New Zealand	1,882	21	**89**	APRIL	Singapore	652	50
40	David S. Smith	UK	1,846	55	**90**	Doman	Canada	643	(18)
41	Potlatch	USA	1,809	(33)	**91**	Slocan Forest Products	Canada	624	42
42	Daiken	Japan	1,788	(42)	**92**	Pack	Japan	622	9
43	Kimberly-Clark Mexico	Mexico	1,683	321	**93**	Pope & Talbot	USA	580	33
44	Cartiere Burgo	Italy	1,680	82	**94**	Pacifica Papers	Canada	578	15
45	Holmen	Sweden	1,658	435	**95**	Tokai	Japan	571	3
46	Tembec	Canada	1,563	142	**96**	Kinnevik (Korsnas)	Sweden	570	41
47	West Fraser Timber	Canada	1,555	88	**97**	ENCE	Spain	542	121
48	Haindl	Germany	1,545	193	**98**	Moelven	Norway	535	15
49	Kappa Packaging	Netherlands	1,531	(15)	**99**	Cheng Loong	Taiwan	534	31
50	Canfor	Canada	1,526	73	**100**	Nippon Kakoh Seishi	Japan	530	(32)

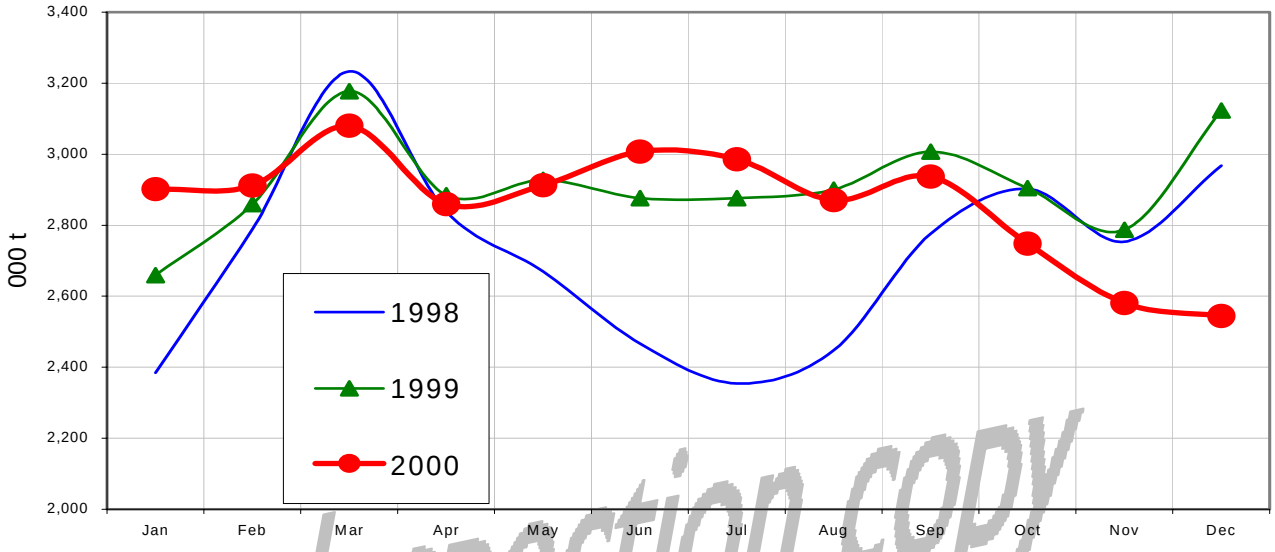
Source: PriceWaterhouseCoopers, Global Forest & Paper Industry Survey, 2001.

Exhibit 4
Market Pulp Producer Inventories, 1990-2001



Source: Resources Information Systems Inc., World Pulp Monthly, March 2001

Exhibit 5
World Monthly Sales of Bleached Pulp, 1998-2000



Source: Jari Celulose

Exhibit 6
Jari Consolidated Balance Sheet ('000 BRL*)

ASSETS	**1999**	**1998**
CURRENT ASSETS		
Cash and banks	5,300	1,011
Marketable securities	13,699	2,331
Trade accounts receivable	18,921	15,169
Accounts receivable from parent and associated companies	548	391
Taxes recoverable	2,129	11,940
Inventories	20,833	24,079
Prepaid expenses	1,340	1,570
Other account receivables	5,975	5,586
	68,747	62,077
LONG-TERM RECEIVABLES		
Taxes recoverable	8,469	15,910
Prepaid expenses		96
	8,469	16,006
PERMANENT ASSETS		
Investments	338	500
Property, Plant and Equipment	483,073	744,182
Deferred charges	57,512	41,372
	540,923	786,054
TOTAL ASSETS	618,139	864,136

LIABILITIES	**1999**	**1998**
CURRENT LIABILIITES		
Suppliers	7,061	7,884
Accounts payable	3,394	12,360
Accounts payable to parent and associated companies	29,075	30,788
Salaries and social charges	1,124	1,557
Taxes payable	3,231	4,759
Financing	316,981	278,438
Other accounts payable	4,842	6,764
	365,708	342,550
LONG-TERM LIABILITIES		
Financing	34,362	70,741
Social charges payable	9,691	12,585
Accounts payable	60	89
Provision for social contribution and income taxes	16,198	26,083
	60,311	109,498
MINORITY SHAREHOLDERS	463	685
SHAREHOLDERS EQUITY		
Capital	460,181	681,115
Revaluation reserve	43,613	67,015
Accumulated deficit	(312,138)	(336,727)
	191,656	411,403
TOTAL LIABILITIES	**618,139**	**864,136**

Source: Jari Celulose, 2000 Annual Report

*Brazilian Reais (BRL). exchange rates on Dec. 31, 1998 (R$ 1.2087) and Dec. 31 1999 (R$ 1.7890);

Exhibit 7
Jari Consolidated Income Statement ('000 BRL*)

	1999	1998
GROSS SALES REVENUES	**164,824**	**118,824**
Freight, insurance and warehousing	(18,119)	(15,006)
Taxes and contribution on sales	(3,249)	(3,301)
NET REVENUE	**143,456**	**100,517**
Cost of products sold	(110,319)	(108,988)
GROSS INCOME (LOSS)	**33,137**	**(8,471)**
OPERATING INCOME (EXPENSES)		
Sales	(1,969)	(2,084)
Administrative	(12,902)	(12,209)
Infra-structure	(3,380)	(5,987)
Director's fee	(1,080)	(722)
Other net operating income (expenses)	(14,865)	,399
EBIT	(34,196)	(15,602)
Financial income	10,005	6,250
Financial expenses	(114,496)	(87,936)
OPERATING LOSS	**(105,550)**	**(105,759)**
Non-operating income	817	114
NET INCOME BEFORE TAXES	**(104,733)**	**(105,645)**
Provision for income taxes	(5)	(24)
TOTAL NET LOSS	**(104,738)**	**(105,669)**
LOSS PER SHARE OF CAPITAL STOCK	(0.035)	(0.036)

Source: Jari Celulose, 2000 Annual Report

*Brazilian Reais (BRL). exchange rates for 1998 (R$ 1.1626) and 1999 (R$ 1.4984)