"LA ALTA CUENCA DEL BERMEJO: UNA INICIATIVA DE INTEGRACIÓN MULTISECTORIAL ORIENTADA A LA CONSERVACIÓN Y MANEJO SUSTENTABLE DE LOS RECURSOS NATURALES".

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Introducción ecoregional

Sobre la vertiente oriental de las cadenas montañosas de los Andes se extiende el sistema de los bosques nublados y selvas de montaña que pueden ser llamados globalmente como "Bosques Andinos Yungueños", definido principalmente por ocurrir en las laderas de las montañas en una franja altitudinal en donde el ambiente se caracteriza por una persistente o estacional cobertura por nubes y neblinas (Brown *et al*. 2006). Los bosques nublados se caracterizan por una enorme diversidad biológica (tan diversa quizás como la selva tropical lluviosa), pero también por regular los importantes caudales hídricos de los ríos que atraviesan el continente y, sobre todo, por compartir una historia de uso y de oferta de recursos en forma ininterrumpida con la humanidad durante por lo menos la última decena de miles de años. En la actualidad, los bosques nublados están considerados como uno de los sistemas naturales más frágiles a la intervención humana, ya que sobre ellos están actuando con inusual fuerza los procesos de degradación por sobre-utilización y conversión en sistemas agrícolas y campos de pastoreo. Al mismo tiempo, son muy pocas las experiencias de manejo de los recursos naturales que sobre la base de criterios de sustentabilidad encuentren un mercado atractivo para los productos del bosque y que redunden en un beneficio directo para las comunidades que los habitan (Brown y Kapelle 2001).
La preservación de un paisaje tan heterógeneo como en el que se encuentran los bosques nublados en la actualidad junto con la rica biodiversidad que albergan, sólo será posible si elaboramos una estrategia de conservación en la cual las áreas protegidas se complementen con el manejo sustentable del espacio circundante. Esta estrategia debe buscar la forma de trabajar sobre la matriz boscosa dominante del paisaje, sobre los corredores biológicos, particularmente sobre las tierras privadas y comunales. Para ello, es central la generación de conocimiento y la capacitación técnica y científica de quienes regulan y de quienes toman las decisiones de manejo a lo que debemos sumar el involucramiento activo del sector privado.

En el noroeste de Argentina y sur de Bolivia se encuentra el límite sur de la distribución de los bosques andinos yungueños en América del Sur. Conocidos localmente como "Selva tucumano-boliviana", "Selva tucumano-oranense" ó "Yungas", estos bosques húmedos subtropicales presentan precipitaciones concentradas en el período estival (Noviembre-Marzo). En conjunto con la Selva misionera (Figura 1), estos dos núcleos selváticos, de similar superficie, representan menos del 2% de Argentina continental, pero acumulan más del 50% de la biodiversidad del país (Brown *et al.* 1993). En Argentina, las Yungas ocupan una superficie estimada actual de 5.2 millones de hectáreas, extendiéndose desde la frontera con Bolivia (23°S) hasta el Norte de la Provincia de Catamarca (29°S), pasando por las Provincias de Salta, Jujuy y Tucumán. Presentan una longitud de 700 km en sentido Norte-Sur y menos de 100 km de ancho, en un rango altitudinal entre los 400 y 3000 m snm. Las Yungas de Argentina se extienden a Bolivia, en los departamentos de Tarija y Chuquisaca, conformando una sola unidad tanto desde punto de vista biogeográfico, como ecológico y social (Grau y Brown 2000; Brown *et al*. 2001). En Argentina, las áreas que tradicionalmente han sido ubicadas dentro de las selvas de montañas o Yungas han sido denominadas como

Yungas en sentido estricto y ocupan una superficie aproximada de 2.7 millones de hectáreas (Brown et al. 2002). A estos bosques, deben sumarse las *Yungas en transición*, otras 2.5 millones de hectáreas relativamente más secas, usualmente más simple estructuralmente y menos diversas, que comunmente aparecen formado ecotonos con ambientes de Chaco Semiárido y Chaco Serrano (Figura 2).

Las *Yungas en sentido estricto* se caracterizan por un fuerte gradiente altitudinal que tiene por correspondencia un importante gradiente en la composición específica de la vegetación. Dependiento del punto del gradiente altitudinal en que uno se encuentre, existen especies adaptadas a las más diversas condiciones ambientales (sequía, altas temperaturas, elevados niveles de humedad, heladas y nevadas invernales). Esta situación genera condiciones ambientales para la coexistencia de especies de diferentes orígenes biogeográficos a lo largo del gradiente altitudinal (especies andinas, holárticas, austral-gondwánicas, tropicales). Como respuesta al gradiente ambiental la vegetación de las Yungas se organiza en pisos o franjas de vegetación de características fisonómicas y florísticas bien diferenciables:

Selva Pedemontana. Ocupa los sectores entre los 400 y 700 m snm en el pedemonte y serranías de escasa altitud. En todo el Noroeste los distintos autores han reconocido a grandes rasgos dos unidades ambientales claramente diferenciables dentro de este piso de vegetación: la "selva de palo blanco y palo amarillo" (*Calycophyllum multiflorum y Phyllostylon rhamnoides*, respectivamente) en las áreas más septentrionales (Provincias de Salta y Jujuy) y la "selva de tipa y pacará" (*Tipuana tipu y Enterolobium contortisiliquum*, respectivamente) en las más meridionales (Provincia de Tucumán principalmente). La segunda comunidad vegetal ha sido completamente transformada en áreas de agricultura intensiva hacia fines del siglo XIX y principios del XX (principalmente para plantaciones de caña de azúcar), en tanto la primera aún persiste en una importante superficie superior al medio millón de hectáreas en la Alta Cuenca del Río Bermejo, en la región fronteriza con Bolivia, mayormente en situación de ladera (Brown y Malizia 2004). Esta selva de "palo blanco y palo amarillo" ha sido considerada como relicto de un bosque que se extendió por gran parte de las áreas tropicales y subtropicales de Sudamérica del cual quedan pocos fragmentos. Además del que nos ocupa, existen parches de este tipo de bosque en el centro de Argentina y Paraguay, SE de Bolivia, extremos NE de Brasil (Caatinga) y Norte de Venezuela y Colombia (Península de Guajira) (Prado 1995). Las especies dominantes son el palo blanco, palo amarillo, lapacho rosado (*Tabebuia impetiginosa*), cebil (*Anadenanthera colubrina)*, quina (*Myroxylon peruiferum)*, afata (*Cordia trichotoma), palo lanza (Patagonula americana)*, pacara y urundel (*Astronium urundeuva*) (Brown y Malizia 2004).

Selva Montana. Ocupa las laderas de las montañas entre los 700 y 1500 m snm y representa la franja altitudinal de máximas precipitaciones pluviales (mas de 2000 mm anuales). Las especies dominantes son de origen tropical y presentan en esta región su límite meridional de distribución geográfica. Entre ellas se puede señalar a la maroma (*Ficus maroma*), laureles (*Cinnamomum porphyrium*, *Nectandra pichurim* y *Ocotea puberula)*, pocoy (*Inga edulis, I. marginata, I. saltensis*), tipa blanca, y palo barroso (*Blepharocalix salicifolius*). En general, es un bosque con predominio de especies perennifolias y con estacionalidad hídrica menos marcada que la Selva Pedemontana. Los deslizamientos de laderas son los principales disturbios naturales de este nivel altitudinal, al cual responden un conjunto de especies que tienen en los mismos su principal situación de reclutamiento poblacional (*Trema micrantha, Mutingia calabura, A. colubrina, Parapiptadenia excelsa, T. tipu, Bocconia pearcei*) (Grau y Brown 1995).

Bosque Montano. Representa el piso ecológico de los "bosques nublados" propiamente dichos, entre los 1500 y 3000 m snm. Se encuentra lindante con los "pastizales de neblina" (ubicados altitudinalmente por encima) mostrando el paisaje con mayor heterogeneidad estructural. Esta heterogeneidad está dada por bosques en distintos estadíos sucesionales a

partir de la dinámica del fuego, elemento utilizado por las poblaciones locales para renovar las pasturas y controlar los procesos de sucesión secundaria (Brown 1995 b; Arturi *et al.* 1998; Grau y Veblen 2000). Las especies comunes son de clara distribución andina, encontrándose especies de origen austral (Gondwánico), como el pino del cerro (*Podocarpus parlatorei*), yoruma colorada (*Roupala meisneri*) y flor de la quebrada (*Fuchsia boliviana*), de origen boreal (Holártico) como el aliso del cerro (*Alnus acuminata*), nogal criollo (*Juglans australis)*, arbolillo (*Viburnum seemenii)*, sauco o molulo (*Sambucus peruviana*), palo yerba (*Ilex argentinum*).

En las Yungas en transición, además de las especies típicas de la vegetación chaqueña (por ejemplo, palo borracho, horco quebracho, quebracho blanco), se pueden encontrar cebil, palo blanco, palo amarillo, virarú (*Ruprechtia laxiflora)*, lapacho rosado características de las áreas bajas de Yungas.

Las Yungas en Argentina presentan también un gradiente latitudinal de diversidad biológica originado principalmente por discontinuidad de las masas de bosques que, a su vez, son producto de la irregular distribución de los cordones montañosos sobre los que las mismas se desarrollan. En tal sentido se reconocen tres sectores geográficos latitudinales (Norte, Centro y Sur) que coinciden con los grandes bloques orográficos y que se contactan entre sí a través de los bosques chaqueños serranos en las áreas intermedias (Brown et al. 2002). El sector Norte representa el área de mayor superficie, mayor biodiversidad y mas alta dinámica de transformación por lo que representa el sector donde invertimos gran parte de nuestro esfuerzo institucional.

La Reserva de la Biosfera de las Yungas

En Noviembre de 2002 se creó la Reserva de la Biosfera de las Yungas (RBYungas) en el marco del Programa del Hombre y la Biosfera (MAB) de la UNESCO. Las Reservas de la Biosfera (RB) contribuyen a la protección de paisajes, ecosistemas, especies y recursos genéticos, promueven el desarrollo económico y humano sustentable y generan acciones de investigación, educación y formación de recursos humanos (UNESCO 1996). La RBYungas cuenta con una superficie de aproximadamente 1.300.000 ha, siendo la más grande de nuestro país y la única que incluye territorio de dos provincias (Jujuy y Salta), cubriendo una amplia superficie continua de Yungas. El objetivo de esta reserva es la implementación de acciones para lograr la conservación y el manejo sustentable de la ecoregión de las Yungas (Figura 3).

El área ocupada por la RBYungas presenta un alto valor para inversionistas de los sectores agrícola, forestal y energético. Asimismo, representa un área crítica para las organizaciones ambientales por su acelerado proceso de degradación y transformación. En esta región del país habitan además miles de familias campesinas y aborígenes que viven de la agricultura de subsistencia y los recursos del bosque y que actualmente se encuentran en un proceso activo de lucha por la tenencia de la tierra y de reivindicación social. La RBYungas es el marco de discusión y consenso para la implementación de una estrategia regional de integración institucional orientada a la conservación de la biodiversidad y el desarrollo sustentable que incluye la participación del gobierno, comunidades locales, empresas privadas y organizaciones no gubernamentales. Dicha estrategia se basa en cuatro ejes: 1- institucionalización de las acciones de conservación y desarrollo, fortaleciendo el Comité de Gestión de la RBYungas; 2- manejo de áreas protegidas, tanto estatales como privadas; 3- desarrollo local del sector agricolo-ganadero y forestal y 4- relevamiento y monitoreo ambiental. Las acciones en cada uno de estos cuatro ejes intentan vincular la generación de información ecológica con la toma de decisiones en el contexto de una propuesta de ordenamiento territorial para la RBYungas y su área de influencia.

Históricamente, las selvas de montaña de Argentina han registrado un importante esfuerzo de conservación (Brown *et a*l 2002). Esto se ve reflejado en la estructura de la RBYungas, que contiene áreas protegidas de carácter nacional (Parques Nacionales Baritú y Calilegua, Reserva Nacional El Nogalar de Los Toldos) y provincial (Parque Provincial Laguna Pintascayo, Parque Provincial Potrero de Yala), totalizando aproximadamente 160.000 ha bajo algún régimen de protección legal. Estas áreas protegidas constituyen las zonas núcleo de la RBYungas. Los pisos altidudinales de las Yungas representados principalmente en estas reservas son la selva montana y los bosques montanos. Este patrón no es exclusivo de la RBYungas sino que se repite a lo largo de la franja de Yungas en Argentina (Brown et al 2002). En el límite superior del gradiente, los pastizales de neblina prácticamente carecen de áreas protegidas. En el límite inferior del gradiente, la Selva Pedemontana es el piso altitudinal que presenta mayor riesgo de transformación para actividades agrícolas por su topografía plana y profundidad de suelos (Brown y Malizia 2004), con una tasa anual de deforestación en el orden de la decena de miles de hectáreas por año para la última década, dependiendo de la zona (Gasparri y Menéndez 2004). Dentro de la RBYungas, este piso se encuentra representado principalmente en el Parque Provincial Laguna Pintascayo. Fuera de la RBYungas, cerca de la ciudad de Tartagal, se encuentran las áreas de selva pedemontana más extensas y en mejor estado de conservación de la ecoregión, albergadas en parte en la Reserva Provincial de Flora y Fauna Acambuco y en sus alrededores.

La heterogeneidad social y ambiental representada en la RBYungas constituye un gran desafío para su gestión. Como se mencionó anteriormente, la región se caracteriza por la diversidad de intereses en juego en relación con la conservación de los ecosistemas y el interés económico que sus recursos representan para el sector privado. Esta realidad, realzada desde la creación de la RBYungas, ha condicionado a los gobiernos locales a tomar un rol más activo para liderar la evolución de las discusiones y la generación de alternativas que compatibilicen los distintos intereses en juego. Dado el interés que ha despertado la región y los recursos que se están generando, estamos en un momento especial para la generación y ejecución de acciones que involucren a los distintos actores que participan de la dinámica ambiental y social de la región, constituyendo la RBYungas el escenario ideal para lograrlo.

En la actualidad, la gestión de la RBYungas está organizada en dos niveles. El primer nivel lo constituyen cuatro comités zonales que reúnen representantes de todos los sectores interesados de su área de influencia. Estos cuatro comités fueron establecidos siguiendo un criterio político y demográfico de organización a nivel municipal (municipios de Los Toldos, Orán, Calilegua y Palpalá). El segundo nivel de organización está compuesto por el Comité de Gestión, formado por tres representantes de cada uno de los comités zonales, más un representante de cada uno de los gobiernos de Salta y Jujuy, uno de la Administración de Parques Nacionales y uno de la Comisión Regional del Bermejo. Asimismo, el Comité de Gestión cuenta con dos órganos asesores, uno Jurídico Legal y otro Técnico Científico, de los cuales sólo el último muestra un proceso incipiente de implementación.

Una realidad común a muchas RB es que, una vez creadas, decrece el interés en generar acciones concretas en terreno convirtiéndose en reservas de papel, es decir en territorios en los cuales no existe una estrategia de planificación y ordenamiento territorial pero que poseen el título de RB. La RBYungas representa un caso diferente en el que, a través de proyectos administrados y coordinados por distintos sectores (ONGs, gobiernos provinciales y nacional, y APN), existen fuentes de financiamiento para la realización de actividades que han sido planteadas dentro del ámbito de implementación de la RBYungas. Esto genera la posibilidad de trabajar en la gestión de esta RB utilizando como eje la planificación y ejecución de estos proyectos.

A casi tres años de su creación, esta es una buena oportunidad para hacer un análisis crítico del estado de situación de esta RB. La RBYungas se ha convertido en la base sobre la cual se planifica el ordenamiento territorial del sector norte de las Yungas argentinas. Si bien incipiente, este proceso ha comenzado y avanza a través de la participación activa de las instituciones presentes en la ecoregión. En este sentido, es fundamental incluir en la planificación a territorios que, si bien se encuentran fuera de los límites de la RB, son fundamentales para definir la estrategia de acción ecoregional. Tal es el caso de las áreas de Selva Pedemontana situadas en las cercanías de Tartagal, a los que definimos como área de influencia de la RBYungas (Dpto. San Martín, Salta). Lo mismo ocurre con el sector de Yungas que continua hacia el norte en Bolivia. Es más redituable en términos de conservación planificar acciones en base a los límites ambientales y no políticos, y por ello se está evaluando la posibilidad de crear una RB Binacional para las Yungas argentinas y bolivianas a través de proyectos binacionales de conservación.

El sector privado juega un rol importante dentro de los objetivos y acciones de la RBYungas, y por ello es necesario incluir más activamente a los representantes de este sector en la implementación de acciones de conservación y desarrollo sustentable. Dos herramientas importantes en esta dirección son la figura de áreas protegidas privadas y el ordenamiento predial dentro de un marco de ordenamiento territorial regional. En la actualidad existen algunos emprendimientos en esta dirección, pero es necesario formalizar incentivos legales que promuevan estas acciones aisladas.

Para finalizar, es importante destacar que el mayor logro de la RBYungas es haber incorporado en su gestión la participación activa de diversos sectores. El gran desafío actual es mantener el interés de estos sectores en participar, para lo cual debemos continuar trabajando en la generación de acciones concretas que plasmen en el terreno los objetivos de conservación y desarrollo sustentable con los que se creó la RBYungas.

Los actores y las acciones

Diversos son los actores y los intereses de cada uno que conjugan en el ámbito de la RBYungas:

- **Ingenios azucareros**. Representan un sector importante tanto en superficie como en recursos que movilizan. En el área se encuentran el Ingenio Ledesma (Jujuy) con casi 40.000 ha de caña de azúcar sobre una superficie total de 150.000 ha. Este Ingenio en la década del '70 donó al Estado Nacional 76.000 ha para el Parque Nacional Calilegua. Además se encuentra el Ingenio Tabacal con 17.000 ha de caña de azúcar sobre una superficie total de 80.000 ha. Con ellos se está trabajando en el Ordenamiento Territorial de sus espacios en producción y silvestres, preservando los sitios de biodiversidad sobresaliente y las áreas de conectividad entre pisos ecológicos..
- **Productores agrícolas**. Representa un sector muy importante por la cantidad de familias involucradas y heterogeneidad productiva. En ellos incluimos productores de bananos, cítricos, hortalizas y sojeros. Con ellos se está trabajando en la evaluación del espacio territorial que ocupan, en el OT de sus predios y en la determinación del uso de agroquímicos con miras a su reducción.
- **Comunidades locales**. Incluimos comunidades aborígenes y campesinas que manejan un 20% de la superficie de la RBYungas. La ACRB representa el sector de mayor diversidad étnica de Argentina y en el ámbito de la RBYungas están representadas etnias de origen Colla, Guaraní, Wichí, Tobas, etc. Se está realizando un diagnóstico

regional y se han iniciado líneas de trabajo en producción y comercialización de artesanías, frutales, miel y turismo rural.

- **Empresas madereras**. Es un sector complejo porque esta representado por empresas, contratistas, propietarios y un importante componente de ilegalidad en la actividad regional. Se está trabajando en la mejora de los planes de manejo forestales, en capacitación y en la ubicación de mercados nacionales para aquellos productores interesados en mejorar su sistema productivo. También recientemente se han agregado empresas con capitales externos interesados en la certificación forestal que suman actualmente unas 150.000 ha certificadas o en vías de serlo.
- **Propietarios privados**. Alrededor del 70% de la RBYungas y su área de influencia pertenece a Privados. Incluye a algunos de los actores anteriormente señalados aunque la mayoría presentan tamaños prediales entre 1000 y 5000 ha. En forma incipiente se está generando un interés en el desarrollo de reservas privadas que involucren actividades productivas con conservación de la naturaleza vinculada esta última al desarrollo de opciones de ecoturismo.
- **Prestadores turísticos**. Es un espacio nuevo generado en la región existiendo una Cámara de Turismo de las Yungas y mas recientemente un Ente de promoción del turismo en las Yungas, ambos con sede en la Provincia de Jujuy, en vista del crecimiento del destino "Yungas" en la región. Por otra parte en el marco del turismo rural se han organizado dos asociaciones de prestadores turísticos en el ámbito rural para dos circuitos que vinculan la Quebrada de Humahuaca-Puna con las Yungas con los que se está trabajando en capacitación y apoyo técnico.
- **Estados provinciales y municipales.** Dos provincias y 18 municipios convergen en al ámbito de la RBYungas. Los primeros son los responsables del control del uso de los recursos y por ende se trabaja en capacitación y fortalecimiento del sector de aprobación y seguimiento de los planes de manejo forestales. Con los segundos se están iniciando acciones de diagnóstico y planificación territorial y un proceso incipiente de "intermunicipalidad" que les permita proyectarse conjuntamente.
- **Administración de Parques Nacionales**. Es la responsable territorial de casi el 10% del área de la RBYungas que representan las zonas núcleo de la misma. Actualmente se ha iniciado la elaboración de los planes de manejo de las respectivas reservas, los cuales se integrarán en su momento al Plan de Manejo de la RBYungas.
- **Empresas del sector energético**. Tienen presencia en la región un conjunto de empresas de producción y transporte de hidrocarburos que si bien no tienen propiedad sobre el espacio geográfico, con su presencia y actividades generan un conjunto de impactos tanto positivos como negativos. Las acciones están dirigidas a reducir los impactos sobre el medio ambiente, a generar acciones de largo plazo en el ámbito de la organización social y desarrollo de las comunidades locales involucradas directamente y a consolidar el esquema de protección de la biodiversidad regional.

Una visión sobre el futuro de la región y sus recursos naturales

El futuro de esta ecoregión dependerá de que tan hábiles seamos para lograr una zonificación y planificación estratégica que sustentada en un marco regulatorio legal, pueda dar las herramientas adecuadas y los incentivos económicos suficientes para desarrollar la ecoregión sin poner en riego la persistencia de la biodiversidad y para mejorar el actual esquema de protección sin reducir el enorme potencial productivo de esta diversa y valiosa región.
Para ello debemos lograr que la RBYungas signifique opciones de desarrollo para los distintos actores o sectores de interés que de alguna manera visualicen en este proceso un espacio de proyección tanto personal como institucional.

El desafio entonces será lograr que distintos productos, distintos sistemas de producción y los sectores de la conservación de la naturaleza reconozcamos un esquema común de proyección e integración multiinstitucional.

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Figura 1. Ecoregiones de Argentina (según Brown y Pacheco 2006).

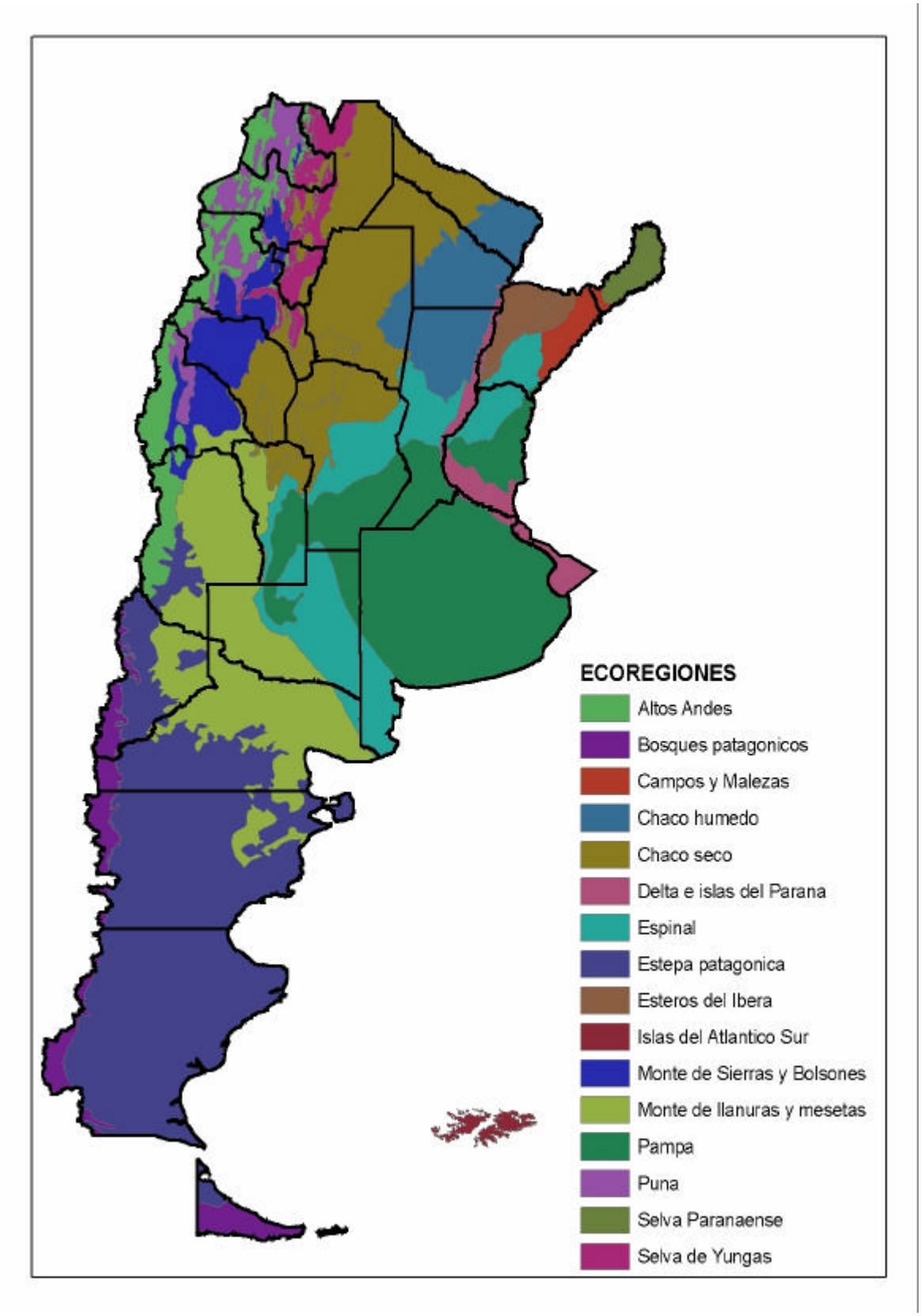


Figura 2. Distribución de la ecoregión Yungas en el noroeste de Argentina (según Brown et al.
2002).

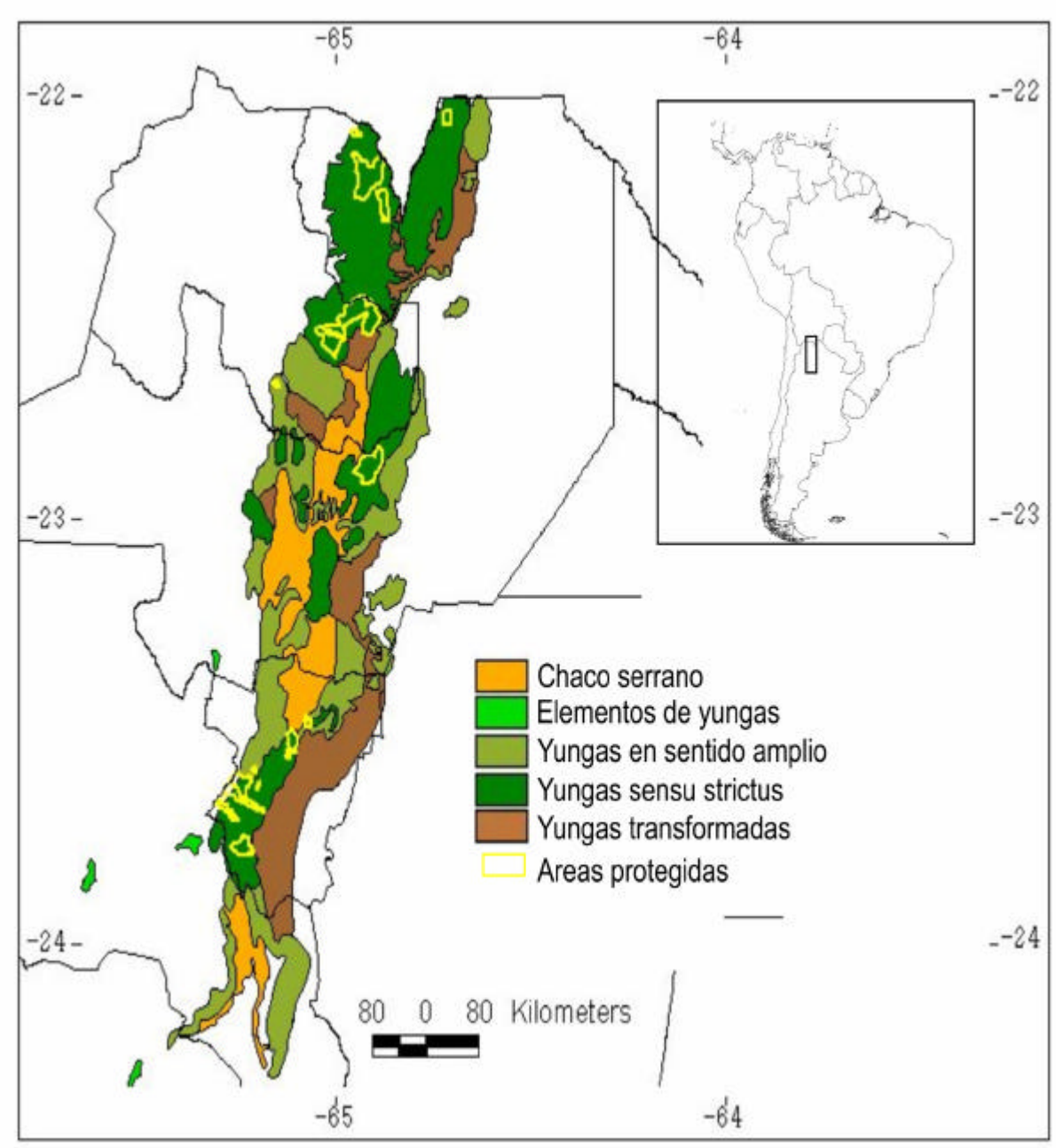
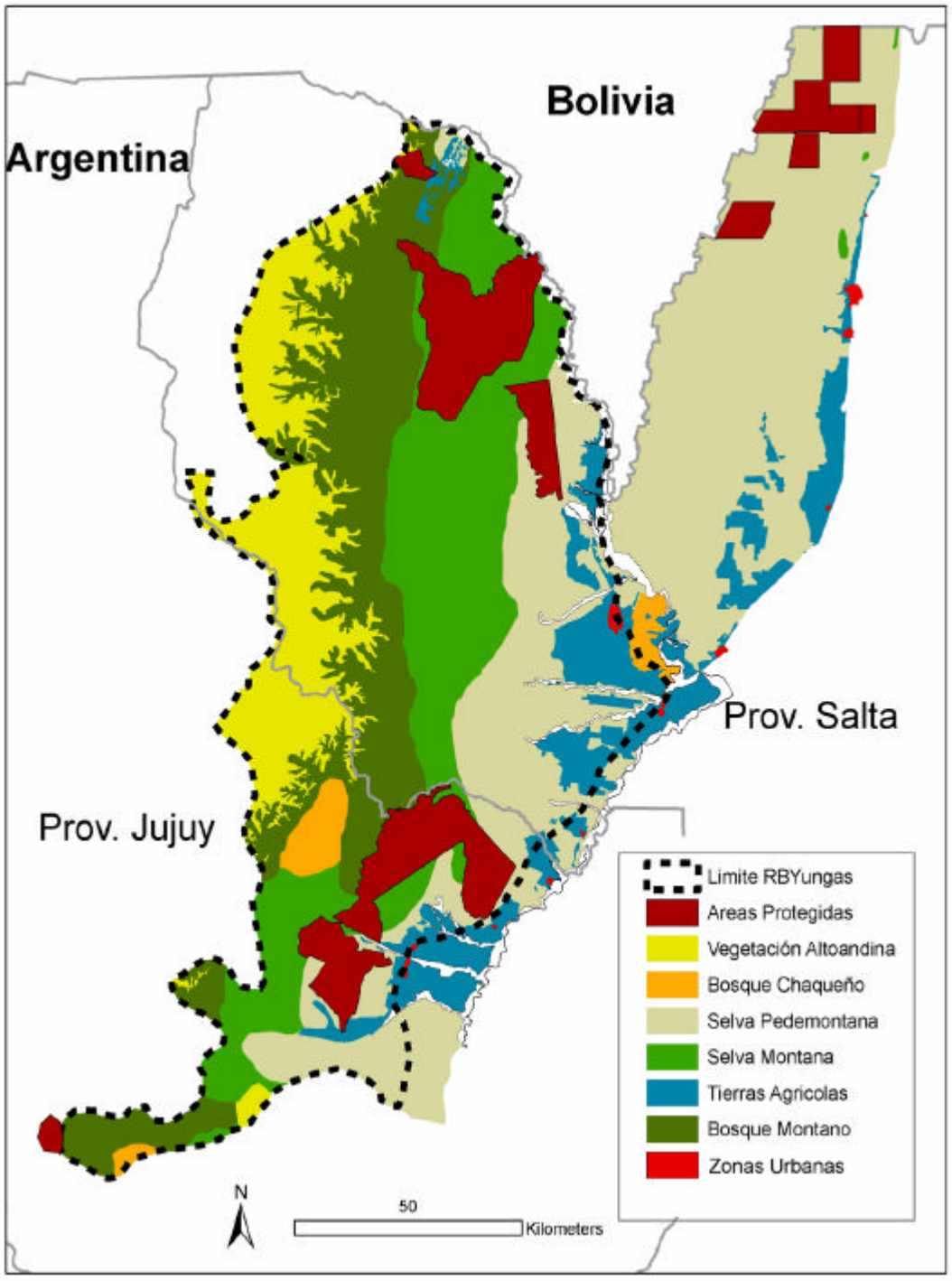


Figura 3. Pisos ecológicos y esfuerzo de conservación de la naturaleza en el área de la Reserva de la Biosfera de las Yungas.



APLICACIONES DE LA BIOTECNOLOGÍA AL MEJORAMIENTO GENÉTICO FORESTAL

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El mejoramiento genético ha sido una herramienta muy efectiva para aumentar la productividad de las plantaciones forestales y lo seguirá siendo en el futuro, pero en el último tiempo se han ido incorporando nuevas herramientas biotecnológicas que permiten optimizar las diferentes fases del ciclo de mejoramiento. Estas herramientas biotecnológicas deben ser incorporadas a los programas convencionales de mejoramiento, con la finalidad de aumentar la eficiencia y las expectativas de ganancia de los programas operacionales.

En esta presentación se describen las principales aplicaciones de la Biotecnología, que actualmente están siendo usadas o que tienen potencialidad para mejorar las diferentes fases del ciclo de mejoramiento genético forestal. Las principales herramientas incluyen técnicas de propagación in vitro, como lo son la Organogénesis y la embriogéseis, pasando por el uso de marcadores moleculares, hasta el estado actual y la potencialidad de uso de la ingeniería genética y árboles transgénicos en el mundo.

PROGRAMA FLORESTA-INDÚSTRIA RS
Programa Foresto-Industrial del Estado de Rio Grande do Sul

1. INTRODUÇÃO

O Programa Floresta-Indústria do Estado do Rio Grande do Sul resulta de uma conjugação de esforços dos setores público e privado, com a finalidade de promover o desenvolvimento sustentável do setor florestal gaúcho. O programa almeja estabelecer um panorama geral e um plano estratégico para o setor florestal, tanto pela ótica do setor público como pela ótica da iniciativa privada, que sirva de sustentação para a implementação de uma política pública consistente para todos os atores das várias cadeias produtivas do setor.

Na década de 90, a Secretaria de Coordenação e Planejamento do Governo do Estado do Rio Grande do Sul lançou os prognósticos para a economia do Estado, fundamentados no "Projeto RS 2010". No diagnóstico do "agribusiness" gaúcho foi salientada a situação crítica em que se encontravam os pequenos produtores de grãos, localizados em áreas geográficas de condições edafo-climáticas inadequadas, o que resultava em baixa produtividade e perdas recorrentes de safras. Foi especialmente apontada a região norte do Estado como uma das que não têm condições de manter a produção de "commodities" em pequena escala, uma vez que os preços de mercado dos grãos não viabilizam um nível de renda capaz de assegurar a reprodução das unidades de produção menores do que 50 hectares.

> "*Este é um caso com relação ao qual cabe falar, mais do que em reestruturação, em verdadeira reconversão, uma vez que o desafio não é o de tornar economicamente viáveis atividades produtivas já existentes, mas sim, o de encontrar novas atividades para os agricultores remanescentes nas áreas em questão. Evidentemente, aqui as saídas a prospectar, a partir dos estudos detalhados de identificação de mercados, devem buscar atividades agrícolas de alto valor agregado, provavelmente inseridas em programas de fomento à fruticultura e ao reflorestamento no Estado*" (Oportunidades e ameaças. Agribusiness pg. 29).

Enquanto isso na porção sul do Estado, conhecida como METADE SUL, ao se analisar a ocupação econômica desta região verifica-se que, historicamente, esta grande área geográfica foi destinada de forma extensiva às atividades agrícolas e pastoris, e que atualmente estas atividades apresentam-se com níveis extremamente modestos de rentabilidade se comparado a outras atividades empresariais.

Cabe destacar que os motivos desta situação passam, sem dúvida, pela contínua e rápida degradação do solo, a redução continua da produtividade, pelo grande aumento da competitividade entre regiões, estados e países, fato este que está provocando um novo arranjo na matriz econômica mundial.

É neste sentido, também, que se vislumbra a retomada do crescimento desta região com o fomento da atividade primária, baseada na utilização e otimização do sistema agro-silvo-pastoril e complementada com a atração de indústrias de base florestal. Acredita-se, ainda, principalmente em relação à metade sul do estado, que o fomento das atividades de florestamento e reflorestamento possibilitarão uma melhor ocupação do solo sem diminuir a produção agropastoril, e que se deve limitar às áreas nas quais estas atividades não forem economicamente interessantes. Da mesma forma, acredita-se que as atividades fornecerão trabalho a um grande contingente populacional, abrindo frente na retomada do desenvolvimento florestal do Estado, e na criação de um novo pólo econômico centrado na indústria de base

florestal que, por hora incipiente em toda a metade sul, embora apresente condições técnicas e econômicas para tal.

Como exemplos das previsões descritas no parágrafo acima, citam-se os grandes investimentos em florestamento que tem sido feitos pelo Uruguai nas áreas próximas da fronteira gaúcha, região de igual característica de clima e solo, e que se tornou grande exportadora de madeira serrada e beneficiada daquele país em menos de 20 anos.

Do lado ambiental, as florestas nativas têm sido devastadas desde o início da colonização e hoje somente se encontram áreas remanescentes da Mata Atlântica junto às encostas da Serra Geral. Apesar das limitações impostas pela legislação e dos controles existentes, observa-se ainda a derrubada das matas nativas, principalmente junto às margens dos rios, onde a agricultura tomou lugar das matas ciliares, permitindo que a chuva carreie as camadas mais férteis do solo, fragilizando as margens e assoreando os rios o que facilita a ocorrência de cheias mais constantes e reduzindo o uso múltiplo das águas.

A bibliografia examinada mostra que há uma carência de dados oficiais e que faz muita falta à sistematização de informações atualizadas que sirvam de subsídios aos agentes econômicos que atuam no setor florestal. Ainda, quando se analisa a bibliografia nacional produzida nos últimos anos, basicamente pelos técnicos de instituições oficiais assim como de empresas privadas, percebe-se a necessidade de um melhor conhecimento dos fatores que influenciam o setor e o quanto é urgente a definição de uma política florestal.

É dentro deste quadro que se insere o Programa Floresta-Indústria RS, associado a outras justificativas relevantes que fortalecem a elaboração do diagnóstico e plano, entre as quais destacam-se:

- Necessidade de desenvolvimento do setor florestal levando em consideração a sustentabilidade ambiental;
- Panorama internacional favorável;
- Previsões de déficit de oferta de matéria-prima para o setor;
- Fixação de mão-de-obra no campo;
- Possibilidade de criar uma infra-estrutura social advinda da melhoria da renda do setor primário;
- Comprometimento do Governo do Estado com o setor florestal.

2 ANTECEDENTES DO PROGRAMA

2.1 **Origem**

O ***Programa Floresta-Indústria RS*** teve origem na Associação Gaúcha de Empresas Florestais (AGEFLOR), a partir de idéias de um grupo de empresários do setor de base florestal liderados pelo então Presidente - Engº Florestal José Artêmio Totti – e pelo Secretário Executivo - Engº Agrônomo José Lauro de Quadros.

A idéia foi levada à Federação das Indústrias do Estado do Rio Grande do Sul (FIERGS), tendo como resultado a criação do ***Comitê da Indústria de Base Florestal e Moveleira da FIERGS***.

2.2 **Comitê da Indústria de Base Florestal e Moveleira da FIERGS**

É um organismo da FIERGS composto por entidades setoriais que tem como propósito aglutiná-las em torno de objetivos comuns.

2.2.1 ***Composição***

O Comitê da Indústria de Base Florestal e Moveleira da FIERGS é composto pelas seguintes entidades: Associação Gaúcha de Empresas Florestais (AGEFLOR); Associação das Indústrias de Móveis do Estado do Rio Grande do Sul (MOVERGS); Sindicato das Indústrias de Serrarias, Carpintarias, Tornearias, Madeiras Compensadas e Laminadas, Aglomerados e Chapas de Fibra de Madeira de Caxias do Sul (SINDIMADEIRA); Sindicato das Indústrias do Mobiliário da Região das Hortências (SINDIMOBIL); e Sindicato das Indústrias da Construção e do Mobiliário de Bento Gonçalves (SINDIMÓVEIS).

2.2.2 ***Missão***

O Comitê tem como missão, atuar com representatividade para o fortalecimento da cadeia de base florestal de forma integrada, comprometida com o desenvolvimento sustentável, e garantindo competitividade global.

2.2.3 ***Visão***

A visão definida pelo Comitê é de ser reconhecido como entidade indispensável para a cadeia de base florestal e tornar o Rio Grande do Sul referência mundial nesta área.

2.2.4 ***Justificativas***

A criação do Comitê foi justificada pelas seguintes razões:

a) Percepção de fragilidade pela falta de integração e existência de potencial inexplorado;

b) Falta de competitividade;

c) Imagem negativa;

d) Baixa integração;

e) Falta visão de complementariedade da cadeia;

f) Individualidade de ações;

g) Baixo poder político.

2.3 **Programa proposto**

O Comitê propôs um Programa de Desenvolvimento Regional que busca potencializar os benefícios da atividade industrial de base florestal.

O programa foi denominado, inicialmente, de ***Pólo Madeireiro-Moveleiro da Mesoregião Metade Sul***.

2.3.1 ***Bases do programa***

O programa proposto é alicerçado em duas colunas principais:

a) *Programa de financiamentos florestais*

Este programa é destinado a alocar recursos para o plantio de florestas, através de financiamento da produção florestal com prazos e juros compatíveis.

b) *Programa de atração de indústrias de base florestal*

Este programa destina-se a integrar a produção de matéria-prima florestal com a sua transformação industrial, através da implementação de mecanismo de atração de indústrias, como estabelecimento de infra-estrutura e oferecimento de incentivos.

2.3.2 ***Premissas básicas***

Os Programas de Financiamentos Florestais e de Atração de Indústrias devem:

a) Estar fortemente ligados com o objetivo de gerar matérias-primas para o Pólo Madeireiro-Moveleiro, com qualidade assegurada;

b) Estar vinculados, evitando que sejam gerados recursos florestais sem consumo.

2.3.3 ***Metas***

As metas propostas para o programa são as seguintes:

a) Ampliar a base florestal do Rio Grande do Sul (florestas plantadas) dos atuais 360 mil para 1 milhão de hectares, em 10 anos;

b) Elevar o faturamento do setor dos atuais R$3,5 bilhões para R$10 bilhões ao final do período;

c) Aumentar a oferta de empregos dos atuais 200 mil para 400 mil empregos diretos no final do período.

2.3.4 ***Ações preconizadas***

a) Estruturar um Grupo de trabalho misto (Governo do Estado e Comitê da Indústria de Base Florestal da FIERGS) para definir e acompanhar as ações;

b) Elaborar estudo de competitividade regional;

c) Identificar a disponibilidade de madeira local (RS) para atração de investimentos;

d) Identificar disponibilidade de madeira regional (Santa Catarina, Uruguai e Argentina);

e) Identificar gargalos na cadeia produtiva e buscar soluções;

f) Integrar Universidades e Institutos de Pesquisa ao programa para:
- Gerar conhecimento;
- Transferir conhecimento;
- Gerar mão-de-obra para gerenciamento.

g) Inserir Porto de Rio Grande no Programa, visando priorizar as exportações;

h) Estruturar e manter banco de dados de recursos florestais e demanda;

i) Definir estratégias para plantio de florestas, considerando:
- *Para que plantar* – uso;
- *Onde plantar* – microrregião;
- *O que plantar* – espécie;
- *Quanto plantar* – área;
- *Como plantar* – recursos e modelo de produção.

j) Definir estratégia para atração de indústrias:
- Foco na disponibilidade de madeira;
- Definir mix de empresas;

- Para *que* – uso;
- *Onde* – microrregião;
- *Como* – facilidades: infra-estrutura, benefícios fiscais, etc.

k) Definir estratégias para capacitação de mão-de-obra destinada à indústria de transformação e moveleira, através de convênios com instituições de ensino existentes e criação de escolas especializadas;

2.4 **Setor florestal do Rio Grande do Sul**

O Rio Grande do Sul possui, atualmente, cerca de 360.000 ha de florestas assim distribuídas:

GÊNERO	ÁREA (ha)
Acacia	100.000
Eucalyptus	110.000
Pinus	150.000
TOTAL	360.000

O faturamento anual do setor é de R$3,5 bilhões, cuja participação dos principais segmentos é a seguinte:

SEGMENTO	FATURAMENTO ANUAL (R$)
Movelaria	2,5 bilhões
Celulose e papel	500 milhões
Outros	500 milhões
TOTAL	3,5 bilhões

O setor é responsável por cerca de 250.000 empregos diretos e indiretos, assim estimado:

a) ***Movelaria*** – 33.000 empregos diretos e 150.000 indiretos;

b) ***Florestamento*** – 40.000 famílias;

c) ***Serrarias*** – 15.00 empregos diretos e 50.000 indiretos;

d) ***Setor de marcenarias*** – 10.000 empregos diretos.

2.5 **Pólo Madeireiro-Moveleiro da Mesoregião Metade Sul**

A proposição de um pólo madeireiro-moveleiro na Metade Sul é justificada pelas seguintes razões:

a) Por se tratar de uma região economicamente deprimida;

b) Pela disponibilidade de terras;

c) Pela elevada produtividade florestal da região;

d) Pela ligação com o Porto de Rio Grande.

Com a implantação do Pólo Madeireiro-Moveleiro, o Comitê estima alcançar os seguintes resultados:

RESULTADO	ATUAL	APÓS PÓLO	INCREMENTO
Faturamento	R$3,5 bilhões	R$10 bilhões	185%
Empregos	200.000	400.000	100%
PIB – Região Sul	R$13,2 bilhões	R$19,7	49%
PIB per Capita	R$5.280,00	R$7.880,00	49%
Participação Regional no PIB	16%	24%	50%

3. PROGRAMA FLORESTA – INDÚSTRIA RS

3.1 Objetivo geral

Elaborar plano estratégico visando o desenvolvimento de um ambiente propício à organização do Arranjo Produtivo Local de Base Florestal no Rio Grande do Sul, bem como melhorar a competitividade do setor em relação as variáveis empresariais, estruturais e sistêmicas, indispensáveis ao modelo de desenvolvimento previsto no PPA 2004 – 2007.

3.2 Objetivos estratégicos

1. Caracterizar a capacidade gerencial do setor público para implementar políticas públicas de desenvolvimento florestal;
2. Definir indicadores de competitividade para o setor de base florestal;
3. Realizar o balanço entre a oferta e a demanda de produtos e subprodutos florestais e analisar as tendências de mercado;
4. Realizar o zoneamento industrial e das áreas potenciais para uso com recurso florestal;
5. Identificar os elementos necessários para viabilizar instrumentos de política setorial.

3. Tendências

3.1 ***Social***

a) Criação da figura do Produtor Florestal;

b) Mudança na estrutura fundiária;

c) Fixação do homem no campo;

d) Criação de emprego e renda.

3.2 ***Cultural***

Restrições às plantações florestais;

3.3 ***Ambiental***

Maior limitação ao uso do solo com plantações florestais pela legislação;

3.4 ***Produção florestal***

Ampliação dos produtores de floresta (parcerias, integração);

3.5 ***Industrial***

a) Concentração em alguns segmentos;

b) Aumento de produtividade;

c) Redução do uso de mão-de-obra;

d) Revitalização de pequenas indústrias (serrarias);

e) Desenvolvimento de novos produtos;

f) Aumento da utilização de produtos tradicionais (madeira serrada, móveis, lenha, etc);

g) Desenvolvimento de arranjos produtivos locais;

3.6 ***Mercado***

a) Aumento de preços (falta de matéria-prima);

b) Novos players;

3.7 **Expectativas**

a) Desenvolvimento regional;

b) Melhoria da qualidade de vida da população (renda, saúde, educação, lazer, ...);

c) Agregação de valor (bens e serviços da floresta);

d) Investimento em plantações florestais;

e) Fixação do homem no campo com ampliação da área florestal;

f) Mudança comportamental dos atores através da utilização do planejamento estratégico setorial;

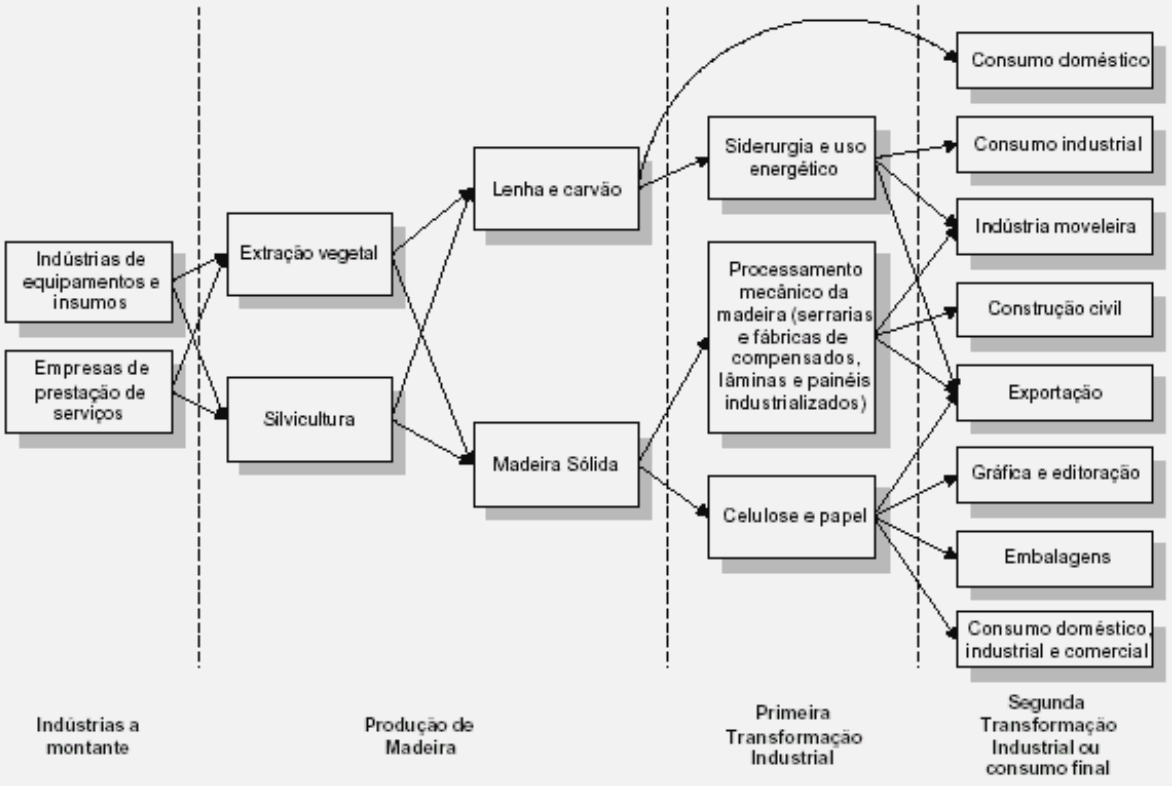
g) Geração de emprego e renda;

h) Manejo florestal para uso múltiplo (madeira, água, carbono, etc.).

4. SISTEMA INDUSTRIAL DE BASE FLORESTAL

O sistema industrial de base florestal é mostrado na figura 1 e dentro dele situa-se o setor de base florestal. Para definir o setor de base florestal que será utilizado como unidade de planejamento neste programa, a equipe de consultores levou em consideração não só as questões teóricas, mas também a articulação e representação política das entidades empresariais ligadas ao setor, bem como o Fórum de Competitividade do Estado do Rio Grande do Sul, coordenado pela SEDAI, e a importância da Biomassa Florestal na matriz energética gaúcha.

FIGURA 1 - Sistema Industrial de Base Florestal



Fonte: Adaptado de BACHA, C.J.C. Cadeia madeira/móveis*in* Apoio a instalação dos Fóruns de Competitividade nas cadeias produtivas couro/calçados, têxtil, madeira/móveis e fertilizantes (2000)

Nota-se pela figura 1 que o setor de base florestal é responsável pela produção da Madeira e pela primeira e segunda transformação industrial desta matéria prima.

Tendo estas considerações como base, o setor de base florestal no presente estudo ficará convencionado como sendo as empresas que atuam na produção Silvicultural, destinada ao suprimento da indústria de celulose e papel, ao processamento mecânico de serrados, compensados, laminados, reconstituídos e painéis, bem como ao suprimento energético na forma de lenha e carvão e a indústria moveleira.

5. PLANEJAMENTO ESTRATÉGICO

No presente caso utilizar-se-á o plano estratégico como instrumento de consolidação do processo de planejamento estratégico e os planos operacionais como instrumentos de ação.

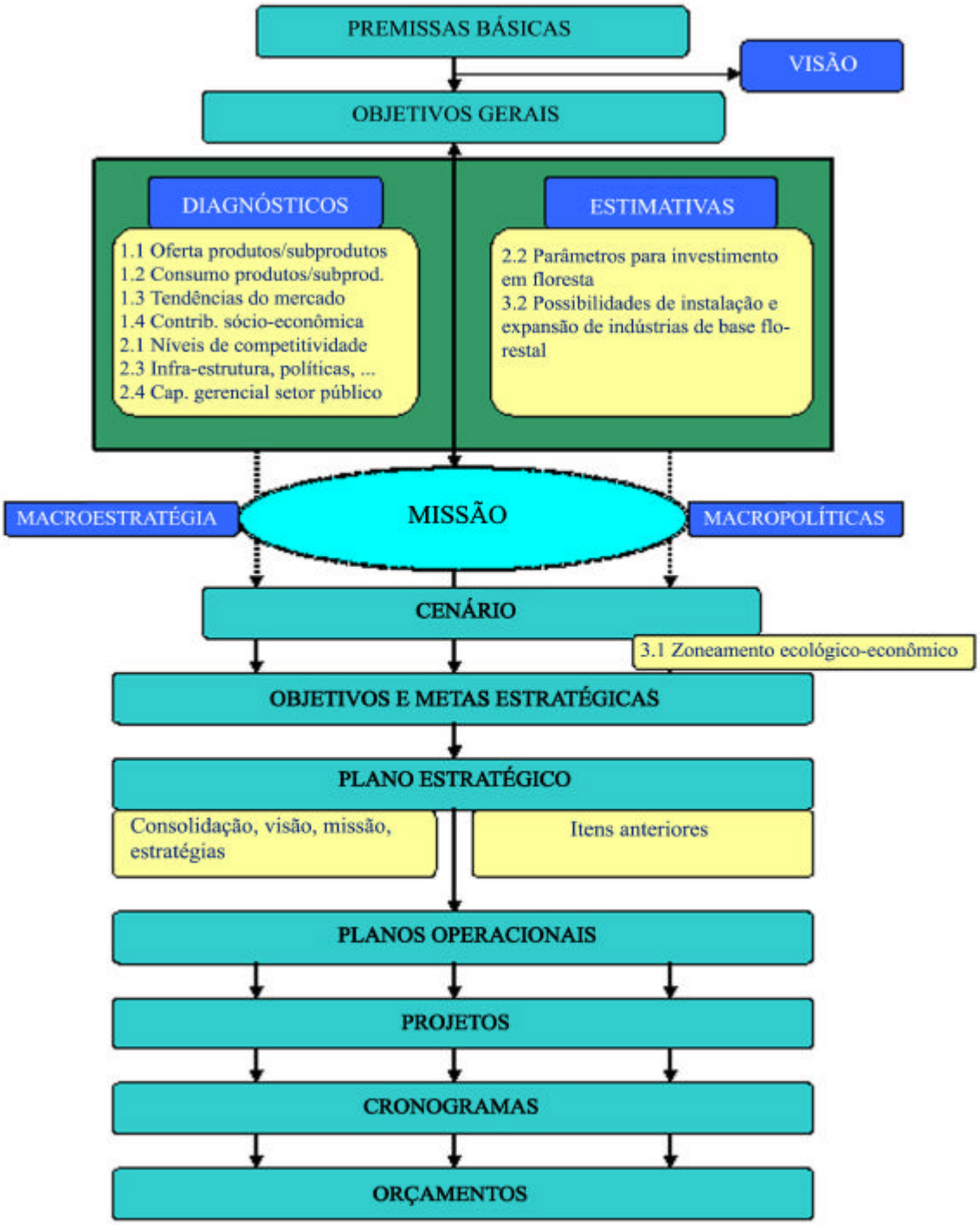
Na figura 2, são apresentados os componentes do planejamento estratégico que guiará as atividades do Programa Floresta-Indústria RS.

Nesta abordagem de plano estratégico como instrumento de consolidação fica evidente que o mesmo inicia pela visão dos principais atores envolvidos no processo de planejamento, ou seja, a visão pode ser considerada pelos limites que os principais responsáveis pela organização conseguem enxergar dentro de um período de tempo mais longo e uma abordagem mais ampla.

Algumas vezes, a visão pode configurar-se em uma situação irrealista quanto aos destinos da organização. Entretanto, esta situação não é preocupante, pois ocorrerá, posteriormente, uma análise interativa do setor diante dos resultados do diagnóstico expressos em um quadro de oportunidades e ameaças, forças e fraquezas ambientais.

Após essa fase, deve-se estabelecer a missão do setor, que é a sua razão de ser, e as suas estratégias, ou seja, as grandes ações ou caminhos que o setor deverá adotar para melhor interagir, usufruir e gerar vantagens competitivas no ambiente.

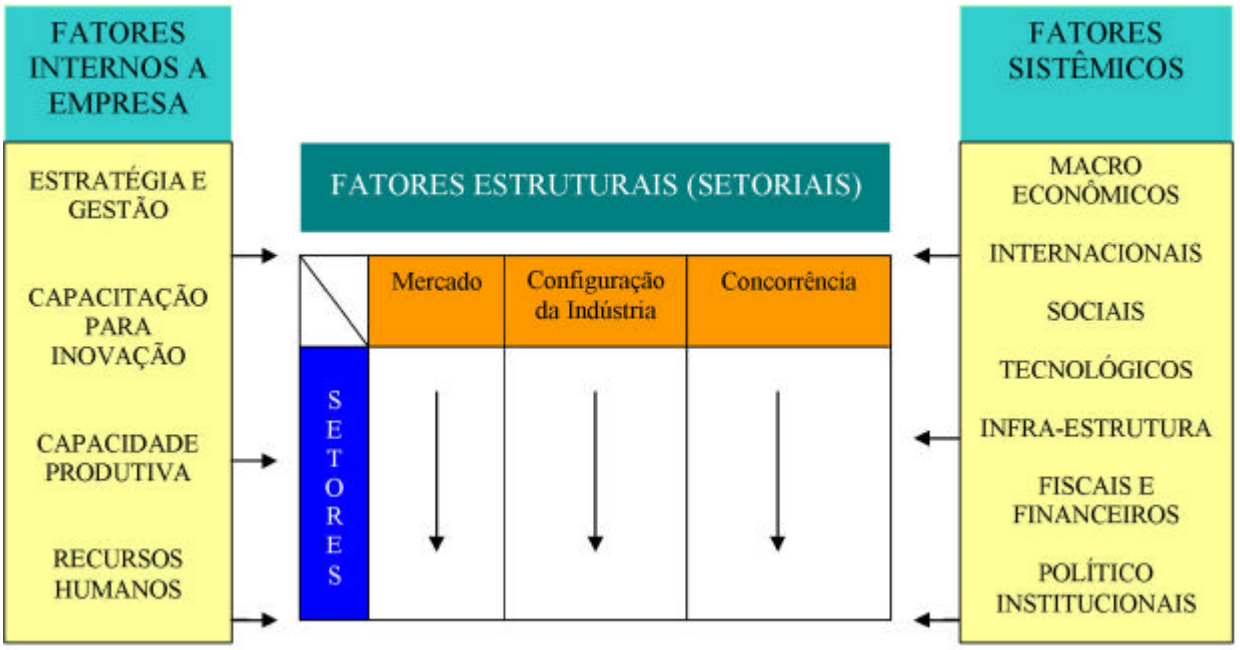
FIGURA 2 – Componentes do Planejamento Estratégico



6. FATORES DA COMPETITIVIDADE

O desempenho competitivo de uma empresa, indústria ou nação é condicionado por um vasto conjunto de fatores, que pode ser subdividido naqueles internos à empresa, nos de natureza estrutural, pertinentes aos setores e complexos industriais, e nos de natureza sistêmica, conforme mostra a Figura 3.

FIGURA 3: Fatores determinantes da competitividade da indústria.



Os ***fatores internos*** (empresariais) à empresa são aqueles que estão sob a sua esfera de decisão e através dos quais procura se distinguir de seus competidores. Incluem os estoques de recursos acumulados pela empresa, as vantagens competitivas que possuem e a sua capacidade de ampliá-las. Pode-se citar, entre outros, a capacitação tecnológica e produtiva; a qualidade e produtividade dos recursos humanos; o conhecimento do mercado e a capacidade de se adequar às suas especificidades; a qualidade e amplitude de serviços pós-vendas; as relações privilegiadas com usuários e fornecedores.

Os ***fatores estruturais*** (setoriais) são aqueles que, mesmo não sendo inteiramente controlados pela empresa, estão parcialmente sob a sua área de influência e caracterizam o ambiente competitivo que ela enfrenta diretamente.

Os ***fatores sistêmicos*** da competitividade são aqueles que constituem externalidades *stricto sensu* para a empresa produtiva.

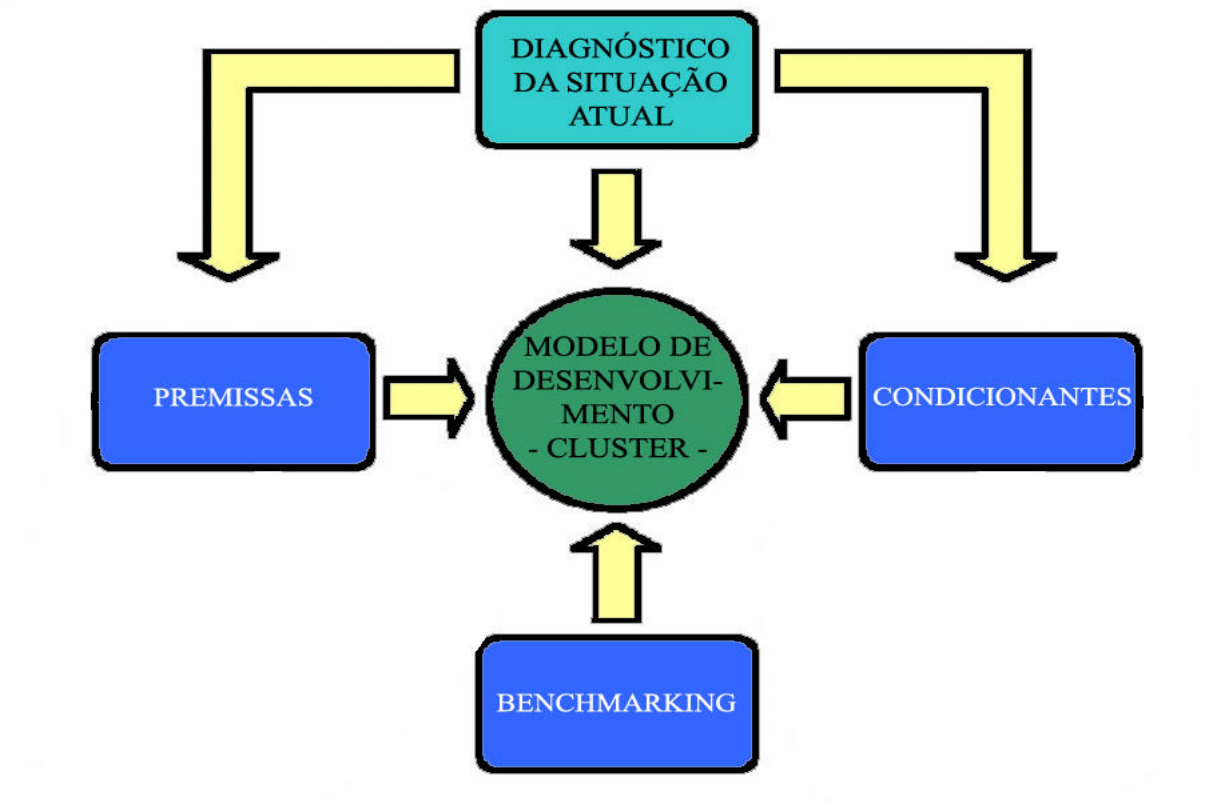
Também afetam as características do ambiente competitivo e podem ter importância nas vantagens competitivas que firmas de um país têm ou deixam de ter frente às suas rivais no mercado internacional.

7. MODELO DE DESENVOLVIMENTO DO PLANO ESTRATÉGICO

O modelo proposto para o plano estratégico será desenvolvido através do diagnóstico da situação atual, assim como em premissas básicas e condicionantes que serão definidas. Complementarmente, será realizado um *benchmarking* junto a alguns dos principais clusters do setor de base florestal existentes, de forma a identificar e analisar como ocorrem os processos de desenvolvimento em diferentes núcleos de base florestal. A figura 4 ilustra o modelo proposto.

Dado que as ações para a configuração de clusters são centrais neste modelo proposto, na seqüência conceituar-se-á os principais elementos desta forma de aglomeração industrial.

FIGURA 4: Modelo de desenvolvimento para o plano estratégico.



8. CLUSTERS DE BASE FLORESTAL

Em nível mundial existem vários clusters relacionados ao tema floresta-indústria. Um exemplo muito apropriado é o cluster do setor de base florestal da Finlândia. Este cluster tem trazido forte impacto a sócioeconomia do país e se formou em torno de uma atividade com forte vantagem comparativa natural. Tais vantagens naturais estão representadas pela grande superfície florestal do país, assim como pela localização das florestas que se apresentam perto do mar, o que reduz consideravelmente os custos de transporte e permitem alcançar facilmente o mercado internacional, principalmente a Europa.

Tratando-se especificamente das PME's de base florestal, existem diversos clusters distribuídos pelo mundo, como por exemplo:

- Brianza (Lombardia, Itália): talvez seja o mais antigo cluster baseado em pequenas e médias empresas de base florestal orientados, basicamente, a produção de móveis. Em virtude do forte desenvolvimento da indústria têxtil local, a produção de móveis está concentrada, atualmente, em móveis com tecidos onde o componente *design* é o diferencial do produto;

- Bento Gonçalves, RS: caracteriza-se como o principal centro produtor de móveis do Brasil, orientado à produção de móveis a partir de painéis reconstituídos;

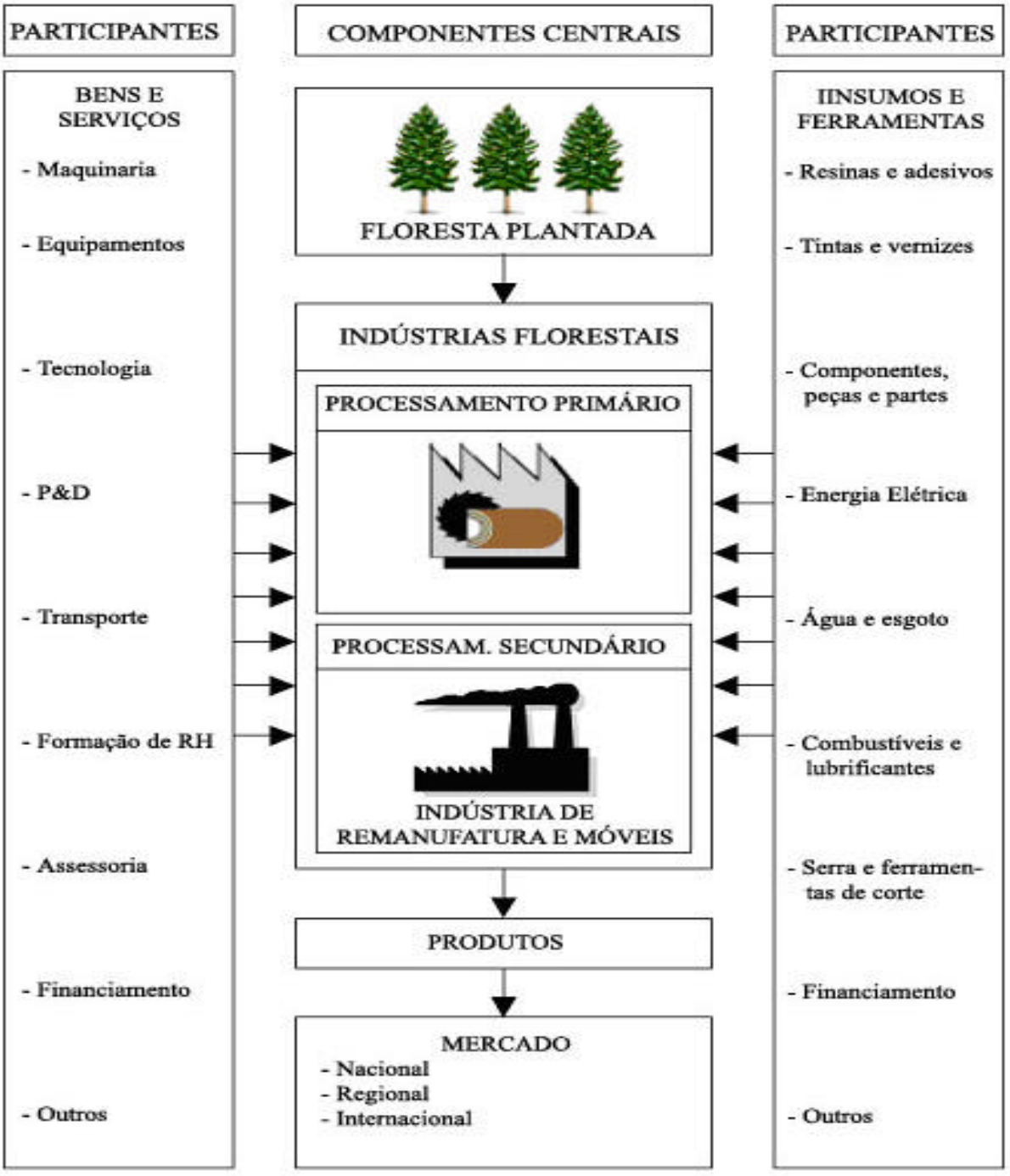
- São Bento do Sul, SC: é o principal cluster brasileiro ligado à produção de móveis de madeira sólida de pinus.

É importante mencionar que nem sempre uma simples aglomeração de indústrias pode ser considerada como cluster. Em verdade, o cluster transcende o conceito simplista de aglomeração de indústrias que caracteriza um pólo empresarial ou industrial. O cluster quebra a verticalização industrial, pois os riscos dessa forma de operação são maiores (ineficiência, inefetividade e inflexibilidade), além de limitar o desenvolvimento socioeconômico de uma determinada cidade ou região.

O cluster permite um aumento na produção e produtividade em oposição a verticalização ou as tradicionais aglomerações industriais, conceitos que estão baseados tradicionalmente na minimização dos custos. As vantagens do cluster estão baseadas no acesso as informações especializadas, custos de transação, complementação e incentivos, exercendo assim um importante papel no desenvolvimento de inovações.

Na figura 5, exemplifica-se um dos modelos de cluster de base florestal, que pode ser implementado como resultado das ações deste plano estratégico.

FIGURA 5 - Modelo de cluster de base florestal.



Observa-se na figura 5, que toda a cadeia produtiva está envolvida, partindo da existência de uma base florestal (plantações florestais) responsável pelo fornecimento de matéria-prima (toras) para a indústria de processamento primário e, por conseguinte, para a indústria de processamento secundário, que são chamados componentes centrais.

Além desses componentes centrais, existem também os chamados participantes, onde se enquadram os seguintes:

- Fabricantes e fornecedores de máquinas e equipamentos;

- Fabricantes, fornecedores e distribuidores/representantes de insumos e ferramentas;

- Fornecedores e distribuidores de combustíveis e lubrificantes;

- Prestadores de serviços para as florestas (colheita, manejo, construção e manutenção de estradas, etc.);

- Prestadores de serviços na área de manutenção industrial;

- Prestadores de serviços na área de logística;

- Empresas especializadas em assessoria técnica da atividade florestal (mapeamento, inventário florestal, etc.);

- Empresas especializadas em engenharia e consultorias nas áreas de planejamento e gestão, indústria, mercado e outras;

- Empresas especializadas em construção de obras industriais;

- Agentes comerciais; e

- Instituições especializadas em treinamento, capacitação e pesquisas.

Os participantes mencionados anteriormente representam importante elemento de competitividade para as PME's do setor de base florestal, com complementariedade de grandes empresas, caracterizando-se como um mecanismo indutor para a dinamização da economia regional.

9. CONCLUSÕES

O Programa Floresta – Indústria RS conta com os seguintes fatores para sua implementação:

a) Cenários regional, nacional e internacional favoráveis;

b) Vontade política do governo, setor privado e sociedade;

c) Produtor rural necessitando de novas alternativas;

d) Disponibilidade de terras no RS;

e) Tecnologia de ponta na produção florestal;

f) Região Sul, Uruguai e Argentina constituem a última região no mundo com excelência para plantações florestais;

g) Oportunidade para mudar a sócio-economia do Rio Grande, especialmente a da Metade Sul, e a qualidade de vida dos gaúchos.

STRATEGIC OPPORTUNITIES FOR EUCALYPT PLANTATIONS IN MESOPOTAMIA

EVAN D. SHIELD

Introduction

Last year, in Concordia, I delivered a paper in which I questioned both the sustainability of certain Argentine markets for the lumber of *Eucalyptus grandis* and the suitability of that lumber – by virtue of its properties or lack of them – for certain of the applications to which it was commonly directed. I was soon given to understand that my comments were widely regarded as a condemnation of Eucalypt sawmilling in general.

I regret having caused such unwarranted consternation, but retract not a word of my statements of concern. Lumber markets in Argentina will change and quite dramatically if positive economic growth can be maintained. In the course of these changes, demand for some classes of lumber will decline, that for other, higher classes of lumber will grow. Additionally, more discerning consumers will demonstrate to lumber suppliers, sawmillers and producers that misapplication of lumber can only result in weakening demand and lower prices.

Perhaps I failed to place sufficient stress on my strong conviction that plantations of *Eucalyptus grandis* can produce excellent lumber for selected, appropriate applications and, in doing so, command premium prices in global markets. The key to success seems to be in the discernment between such applications and those which are more readily available in the local market.

Today, I intend to discuss some observations and strategic concepts for Eucalypt forestry in Mesopotamia. My objective in doing so shall be to focus on strategies that, hopefully, will maximize benefits for Argentines, both those whose livelihoods are intrinsically associated with this sector and those in the broader community. Again, I fear, I may be courting trouble.

I seek not to be disparaging of current practice, even if I must be critical of it. I come to this somewhat self-appointed task with the ambition of issuing a challenge to those in the forestry sector and, perhaps optimistically, to make even a small difference.

Potentials and Priorities

Let me begin with the observation that, by world standards, the Mesopotamia region of Argentina contains mostly superior and often premium sites for Eucalypt plantations. Certainly, those *"tierras coloradas"* of Northern Corrientes and Misiones have few peers of which I am aware.

In such a situation, I believe the appropriate strategy is to use such sites for the production of high value plantation crops. Essentially, this means the production of sawlogs of larger diameter and high quality. To do so in Mesopotamia seems to me to be following a traditional almost as old as the plantation business itself, given that the demand for lumber for fruit boxes was – as I am told – the prime reason for the earliest Eucalypt plantings. Certainly, I would hope to find support among some 330 sawmillers in Corrientes and Entre Rios for giving sawlog production first priority in a strategic appraisal of the future for Eucalypt plantations.

I regret to say that I cannot escape the conclusion that the productive potential of Mesopotamia's superior and premium plantation sites is sadly under-utilized. The reasons for this seem to be many and often cannot be separated from the economic misfortunes inflicted on Argentina over the past 30 years. Thus, conservatism in silvicultural practice is prevalent. Indeed, at its extreme, this conservatism may lead to silvicultural practices that are approaching the ridiculous. What is sadly missing is the notion of exploiting the full potential of the site, while affording it the maintenance required to sustain that potential. To witness under-utilization of site potential and, at the same time, its progressive loss through mismanagement is properly disturbing.

Unfortunately, under-utilization of site potential is not confined to the "*pymes*" among plantation owners. Even the larger corporate plantation owners appear to either elect not to apply silvicultural interventions intended to produce larger and less defective logs or, alternatively, to intervene with a decided timidity. This is both surprising and disappointing given the pioneering and demonstrably successful silvicultural practices at Forestadora Tapebicua and the substantially larger, and no less successful, example afforded by COFUSA, at Rivera in Uruguay.

These two companies both seem recognize these strategic concepts :

(a) future markets will not be the same as present markets ;
(b) export markets offer better rewards than domestic markets can in terms of both volume and unit revenues. With diversity, they are also likely to be more secure ;
(c) in open lumber markets, substantial price premia are paid for greater width, thickness and freedom from defects ;
(d) only logs produced under relatively long rotations and radical silvicultural regimes can attain the larger diameters and greater freedom from defects to allow these price premia to be won ;
(e) a collateral advantage of converting such logs is that the costs of that conversion are significantly lower than those of smaller, more defective logs because of greater mill productivity and higher volumetric recoveries and grade yields ;
(f) superior revenues derived from marketing of premium lumber – in terms of both dimensions and quality – are combined with reduced costs of production of that lumber so as to make intensive management of plantations affordable.

Unapologetically, I recommend a sawmilling-focused future for Eucalypt plantations in Mesopotamia. Importantly, it needs be also to be internationally and not parochially focused.

Indeed, I would go so far as to suggest – and I am at some risk in this – that I and others may have been wrong in placing too much emphasis on the importance if site quality for managed-for-sawlog plantations. This is undoubtedly restrictive, but, logically, safe. There is emerging evidence that sites of medium, even low, quality can produce Eucalypt sawlog economically if sufficiently radical silviculture is applied and land prices are sufficiently modest. Thus, the potential for Eucalypt sawlog production in Mesopotamia may be greater than is currently acknowledged.

Pulpwood

In placing strong emphasis on a sawmilling strategy for Eucalypt plantations in Mesopotamia, it is appropriate to highlight the plurality of this activity. It has a clear distinction from the singularity of modern pulpwood production and utilization. I have little doubt that its economic contribution is also more substantial.

Nevertheless, I acknowledge that some pulpwood production is inevitable in the managed-for-sawlog Eucalypt plantations and the associated processing plants. Its beneficial utilization presents challenges, but none appear insurmountable. Above all, what appears to be required is greater innovation.

In what seem to be the instances of certainty in Uruguay and Chile, residue pulpwood has increasing potential and value as a fuel. Perhaps even in Mesopotamia, a wood-fuelled thermal power station is a possibility.

What I consider to be the least desirable option is the establishment of a large new pulpmill similar to those to be built in Uruguay. My objections are not broad-based ones, nor even within the realm of forestry. Indeed, they can be distilled to the simple issues of plurality and sovereignty.

Proliferation

Today, almost all Eucalypt lumber produced in Mesopotamia is from *grandis* logs. Without doubt, this had led to the inappropriate application of this lumber.

Over several months, I have studied the possibility of using a greater number of species in managed-for-sawlog production. Let is be clearly understood : I am not suggesting anything more than the use of additional species to complement, not necessarily to replace, *E. grandis*.

Any additional species used for managed-for-sawlog plantations would need – as a matter of priority – to be proven producers of quality lumber. Indeed, given the productivity potential of *grandis* plantations and the probability that any complementary species would be less productive, the lumber of the new species must be capable of attracting price premia over that of *grandis*.

By no means is it to be construed that this proposal is intended to promote species on the basis that they may have – or may appear to have – some silvicultural merit. Frost tolerance is an example and the promotion of species supposedly possessing this quality – regardless of its utilization and market potential – is not supported in any way.

While my mental exercise is by no means concluded, these Eucalypt species are suggested as potential candidates to complement *grandis* : *saligna, maculata, pilularis* and *cloeziana*.

From a lumber marketing perspective, the wood of these species provides a substantial and significantly beneficial complementary in terms of wood colour, density (and dependent properties, such as hardness) and natural durability. Indeed, it is difficult to imagine a higher value application for larger volumes of hardwood lumber that one of this mix could not satisfy. In the specific instance of flooring and decking – perhaps the application consuming more of the world's hardwood lumber than any other and, certainty, one demonstrating strong growth – the mix is, perhaps, close to perfect.

Proposal

Perhaps the most radical but nevertheless serious proposal I can make is that these additional species should receive preference in terms of the productivity of the sites on which they are established. This seems strategically sound given that, almost assuredly, they would be of lesser productivity than *E. grandis*, while in all probability, they would command higher unit values.

Thus, for example, managed-for-sawlog plantations of *grandis* would be encouraged on superior sites. Premium sites would be dedicated to the others.

An exciting future for Eucalypts in Mesopotamia ? Potentially, yes ! But is it now time to wake up ?

18/05/2006

FOREST CERTIFICATION IN THE AMERICAS: STATUS AND PROSPECTS

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ABSTRACT

Forest certification is increasing in extent and importance throughout the world, with about 277 million ha certified as of 2006, or about 7% of the world's forests, and 12% in the Americas in total. Forest certification is intended to ensure that forests are managed in an economically, environmentally, and socially desirable manner. Certified forests must meet rigorous best practice standards and provide appropriate benefits to workers and communities. The certification standards usually are inspected by third party auditors, who ensure conformance to the standard, providing quality assurance for consumers. Forest certification offers marketing, trade, and performance advantages for producers. Furthermore, it has been very influential in setting the international and national forest policy agenda. However, certification has significant costs, which are compensated more by strategic factors than directly by better prices. The tradeoffs between perceived benefits and costs will determine the merits of adopting forest certification.

RESUMEN

La certificación forestal está aumentando en alcance e importancia en todo el mundo, con aproximadamente 277 mil millones de hectáreas certificadas en 2006, o 7% de los bosques en el mundo, y 12% en las Americas. Su objetivo es asegurar que los bosques se manejen en forma económica, ambiental y socialmente deseable. Los bosques certificados deben cumplir con estándares rigurosos de mejores prácticas de manejo forestal y deben proporcionar beneficios apropiados a los trabajadores y a las comunidades aledañas. Los estándares de la certificación son examinados generalmente por auditores de una tercera parte independiente, quienes aseguran conformidad al estándar y proporcionan la garantía de calidad para los consumidores. La certificación forestal ofrece la publicidad, el comercio, y las ventajas de un mejor rendimiento para los productores. Además, ha sido muy influyente fijar los programas internacionales y nacionales de la política forestal. Sin embargo, la certificación tiene costos significativos, los cuales son compensados más por factores estratégicos que directamente por mejores precios. Las compensaciones entre las ventajas y los costos percibidos determinarán los méritos de adoptar la certificación forestal.

INTRODUCTION

In the last decade, Sustainable Forest Management (SFM) has become the dominant paradigm for discussing forest management and protection in the world. SFM addresses economic, ecological, and social components of forestry. Several international SFM Criteria and Indicator processes and accords address SFM in temperate and tropical forests. These generally include broad criteria that state principles for forest management, and indicators

that can be used to measure and track the status of the world's forests at the national, or perhaps forest management unit, level. Parallel with SFM, forest certification has developed to measure forest management, environmental protection, and social benefits from forest ownership and forest practices at the forest management unit or stand level (Ramesteiner and Simula 2002). These new public SFM processes and private forest certification systems all work within the existing context of national, state, or province forestry laws and agencies. Forest certification has become the principal new means that producers and consumers can use to verify sustainable forestry and to help market forest products throughout the world.

Forests in the Americas

Statistics about forests in the Americas help inform discussion of forestry programs (Table 1). South America has about 45% of its total land area in forests. Brazil has the greatest extent of forest in the Americas, with about 477 million ha, or 56% of its land base. Uruguay has the smallest share of forested land in the Americas at 8.6%. At 34%, Mexico surprisingly has slightly more of its total land area classified as forested than the U.S. and Canada. In South America, the northeastern countries of French Guiana, Guyana, and Suriname have the highest percentages of their land base under forest cover, ranging from 70% to almost 95%. The northwestern countries of Colombia, Ecuador, and Venezuela, as well as Bolivia, have a smaller share of their area classified as forests, though still more than North America, at 39% to 54%. Argentina has 33 million ha of forests, which comprise only 12% of the land cover in the country (FRA 2005).

The loss of forest area from 1990 to 2000 was greatest in percentage terms in Central America, at –1.47% per year, although this rate dropped to –1,23% per year from 2000 to 2005. From 1990 to 2000, South America lost 0,44% per year. The rate of forest loss in South America increased to 0,50% per year between 2000 and 2005. There was no significant loss of forests in North America from 1990 to 2000, only –0,01% per year from 2000 to 2005, virtually all in Mexico. In terms of total area, forest loss was greatest in Brazil from 1990 to 2000 at 2,7 million ha per year, which increased to 3,1 million ha per year from 2000 to 2005. In total, South America lost an average of 4,3 million ha of forests per year from 2000 to 2005 (FRA 2005).

Planted forests comprise about 5,6% of U.S. total forest area. In South America, plantations account for approximately 1,1% of Brazil's forest area; 3,7% of Argentina's forest area, 16,5% of Chile's forest area, 50,9% of Uruguay's forest area, and only about 1% or less of the other countries in South America (FRA 2005). FAO (2003) also reports on forest types and wood volumes by country and region. Canada has 26% temperate and 76% boreal forests; the U.S.A. has 37% subtropical, 48% temperate, and 15% boreal; and Mexico has 70% tropical and 30% subtropical. Most of the countries in South America have 100% of their forest area classed as tropical forest. The only major exception is Chile, with 54% subtropical and 45% temperate forests. Brazil has 2% subtropical forests and Argentina has 5% subtropical and 4% temperate, with the rest classified as tropical, surprisingly (FAO 2003).

FAO data (2003) indicate that Brazil has 64% of the timber volume in South America with 71 billion cubic meters, followed distantly by Peru, Venezuela, Bolivia, and Colombia, ranging from 10 billion to 5 billion cubic meters each. The rest of the South American

countries each have less than 2,5 billion cubic meters of total timber volume each. In contrast, Canada has 29 billion cubic meters of timber volume, the U.S.A. has 31 billion, and Mexico has 3 billion.

Table 1. Land, Forest, and Population Statistics for Major Forested Countries in the Americas, 2005

Country	Land Area (000 ha)	Total Forest Area (000 ha)	Forest as % of Total Land Area	Planted Forest Area (000 ha)	Certified Forest Area (ha)	Cert. as % of Forest Area	Popula-tion. 2004 (million)
Canada	922 097	310 134	33,6	-	119 154 387	49,1	31,5
Mexico	190 869	64 238	33,7	1 058	613 571	1,1	103,5
U.S.A.	915 895	303 089	33,1	17 061	43 662 553	19,3	294,0
N America	1 837 992	677 461	36,9	18 119	163 430 511	31,1	429,0
Belize	2 280	1 653	72,5	-	104 888	7,8	0,3
Costa Rica	5 106	2 391	46,8	4	48 189	2,4	4,2
El Salvador	2 072	298	14,4	6	0	0	6,5
Guatemala	10 483	3 938	36,3	122	475 248	16,7	12,3
Honduras	11 189	4 648	41,5	30	37 281	0,7	6,9
Nicaragua	12 140	5 189	42,7	51	16 727	0,5	5,5
Panama	7 443	4 294	57,7	61	12 189	0,4	3,1
C America	51 073	22 411	43,9	274	694 522	3,9	38,8
Argentina	273 669	33 021	12,1	1 229	131 214	0,3	38,4
Bolivia	108 438	58 740	54,2	20	1 537 832	2,9	8,8
Brazil	845 651	477 698	56,5	5 384	3 796 723	0,7	178,5
Chile	74 881	16 121	21,5	2 661	2 036 263	13,1	15,8
Colombia	103 871	60 728	53,5	328	58 444	0,1	44,2
Ecuador	27 684	10 853	39,2	164	21 431	0,2	13,0
French Guiana	8 815	8 063	91,5	1	0	0	0,2
Guyana	21 498	15 104	70,3	-	0	0	0,8
Paraguay	39 730	18 475	46,5	43	61 133	0,3	5,9
Peru	128 000	68 742	53,7	754	26 936	0,1	27,2
Suriname	15 600	14 776	94,5	7	0	0	0,4
Uruguay	17 481	1 506	8,6	766	78 094	6,0	3,4
Venezuela	88 206	47 713	54,1	-	139 650	0,3	25,7
S America	1 754 741	793 597	45,2	11 357	7 972 553	0,9	362,3
Total Americas	3 891 707	1 493 469	38,4	29 750	172 097 586	12,0	830,1
World	13 063 900	3 869 455	29,6	186 733	276 800 000	7,2	6 301,5

Source: FRA 2005, FAO 2003, Certified Program Web Sites

Forest Certification

Areas by System

Forest certification has developed rapidly since 1993, and about 277 million ha, or 7% of the world's forests were certified as of early in 2006 (Tables 1, 2). Approximately 12% of all of the Americas forests are certified, with Canada having almost half of its forests certified. Canada also has 69% of the certified forest area in the Americas, and 43% of those certified

in the world, although this total could include some systems on the same lands. The largest forest certification system in the world is the Programme for Endorsement of Forest Certification, which endorses forest certification schemes developed in individual countries. In total, PEFC has recognized 184 million ha as certified, including 56 million ha in Europe and 126 million ha in the Americas. The Forest Stewardship Council (FSC) is the only system that has unified world principles and governance, and has about 68 million ha. Major forest certification systems in the Americas include FSC (34 million ha in the Americas), the Sustainable Forestry Initiative (SFI, 55 million ha; 22,3 in the USA and 32,4 in Canada), and the Canadian Standards Association (CSA, 71 million ha). Certficación Forestal (CertFor) in Chile and Certificação Florestal (CerFlor) in Brazil, which are recognized by PEFC, have 1.552.420 ha and 762.657 ha enrolled, respectively.

Table 2. Major Forest Certification Systems in the World, 2006

System	Area (million ha)
Programme for Endorsement of Forest Certification (PEFC)[1]	187,0[1]
Sustainable Forestry Initiative (SFI) (2004 data)	54,8
Forest Stewardship Council (FSC)	73,0
American Tree Farm System (ATFS)	12,1
Canadian Standards Association (CSA)	69,2
Certificación Forestal (CertFor)	1,6
Certificaçao Florestal (CerFlor)	0,8
Malaysian Timber Certification Council	4,7
Australian Forestry Standard	5,2
Total, All Systems	276,8

[1]Includes 69,2 million ha of CSA in Canada, 54,4 million ha of SFI in U.S and Canada, 1,6 million ha of CertFor in Chile, 0,8 million ha Cerflor in Brazil, 5,2 million ha in Australia, 56,5 million ha in Europe.
Sources: www.aboutsfb.org, www.fsc.org, www.pefc.org, www.mtcc.com.my, Chan 2005, personal comm. (ATFS), Metnick 2005, personal comm. (SFI), authors' research.

Forest certification was largely developed as a means to encourage sustainable forestry in the tropics. However, about 95% of currently certified forest area is in the northern hemisphere in the world, and in the Americas, with only about 5% in Central and South America. Until the Brazilian and Chilean certification schemes were initiated in 2002, forest certification in Latin America was only provided by FSC. FSC is the only forest certification system that has been applied throughout the world, and is one of the top three systems in terms of area of forests covered. As of November 2005, the Forest Stewardship Council (FSC) had provided 4,200 certificates covering 73 million ha in 62 countries. This included 104 certificates and 5.572.553 ha in 10 countries in South America (Forest Stewardship Council 2005). FSC is generally considered the "greenest" of the various systems based on its strong focus on environmental protection and social concerns, as well its support from environmental nongovernmental organizations (NGOs) such as the World Wildlife Fund and the Rainforest Action Network. Brazil and Bolivia have the largest FSC certified areas in South America, followed by Chile (Table 3).

With the implementation of the Brazilian and Chilean certification schemes, many areas of industrial forests, mostly plantations, have been certified in those countries. CerFlor in Brazil and CertFor in Chile are strongly supported by the forest industry in each country. In addition, major firms in Canada, Uruguay, Argentina, Chile, and Brazil have received ISO 14001 certification. This includes at least 127.000 ha in Uruguay and 233.000 ha in Argentina that are not certified under other forest certification systems. Most of the 1.6 million ha of CertFor in Chile also is ISO 140001 certified, and probably much is ISO certified in Brazil as well. In addition, the United States Forest Service is moving to at least first party ISO 14000 certification of its entire National Forest System under its new planning regulations (USDA Forest Service 2005), which will include about 78 million ha. Green Tag (2006), with 28.000 ha, is a small system in the United States and Canada. Several Canadian provincial small woodland owners associations have certification systems in process as well, which are being consolidated into a national system currently.

Table 3. Major Countries Forest Certification for FSC in the Americas, 2005-2006

Country	Hectares	# Certificates
Argentina	131 214	8
Bolivia	1 537 832	15
Brazil	3 034 066	52
Chile	483 843	16
Colombia	58 444	2
Ecuador	21 341	2
Paraguay	61 133	2
Peru	26 936	1
Uruguay	75 094	5
Venezuela	139 650	1
South America	5 572 553	104
Belize	104 888	1
Costa Rica	48 189	14
Guatemala	475 248	14
Honduras	37 281	3
Nicaragua	16 727	4
Panama	12 189	12
Central America	694 522	48
Mexico	613 571	35
U.S.A.	9 225 250	100
Canada	17 488 732	163
North America	27 327 553	298
Total of Above	33 594 628	450

Source: Forest Stewardship Council 2005, 2006
Note: Canada and U.S.A., 2006; Latin America, 2005

Standards

Each of the forest certification systems has various principles, criteria, objectives, standards, and performance indicators, depending on the language used in that system. These may be as few as 20 or so indicators to more than 200 for each system. These standards are then audited to ensure that

organizations conform to each one. Depending on the system, failure to conform or meet the standards may prevent certification, or may require corrective action before or after certification.

The FSC framework for evaluating sustainable forest management consists of ten Principles and associated Criteria that focus on social, economic and ecological issues. The individual principles cover (Forest Stewardship Council 2000): (1) compliance with laws and FSC principles, (2) tenure and use rights and responsibilities, (3) indigenous people's rights, (4) community relations and worker's rights, (5) multiple benefits from the forest, (6) environmental impact (biodiversity), (7) management plans, (8) monitoring and assessment, (9) maintenance of high conservation value forests, and (10) plantations.

The Brazilian Certificaação Florestal (CerFlor) certification program encompasses five broad principles: (1) compliance with the law, (2) rationality in management and forest resources striving for sustainability, (3) care for biological diversity, (4) care for air, water, and soil resources, and (5) socio-economic and environmental development (Inmetro 2003). The Chilean Certficación Forestal (CertFor) has nine fundamental Principles, translated roughly as follows: (1) sustainable forest management planning, (2) native ecosystem values and biodiversity protection, (3) productivity and protection from damaging agents, (4) water quality protection, (5) respect for community rights and assistance in developing the quality of life, (6) respect for agreements and indigenous rights, (7) respect for workers rights, health, and fair pay, (8) respect for laws, regulations, and treaties of Chile, and (9) evaluation and improvement of the preceding principles (CertFor 2003).

Each of these three systems has strong components related to environmental protection, community rights, and worker relations and protection. FSC is probably the 'greenest' and strictest regarding high conservation value forests, justification for plantations, and a complete ban on genetically modified organisms (GMOs). FSC is considered most rigorous for community benefits, but CerFlor and CertFor have many of these principles as well. FSC has certified a large area of forest plantations in Latin America. The implementation of CerFlor and CertFor is indeterminate since they are new, but the standards are strict.

In North America, the SFI Objectives (Sustainable Forestry Initiative 2004) state that the program participants must: (1) broaden the implementation of sustainable forestry by ensuring the long-term harvest levels based on the use of the best scientific information available; (2) ensure long-term forest productivity and conservation of forest resources through prompt reforestation, soil conservation, afforestation, and other measures; (3) protect water quality in streams, lakes, and other water bodies; (4) manage quality and distribution of wildlife habitats and contribute to the conservation of biological diversity; and (5) manage visual impact of harvesting and other forest operations.

The SFI Objectives also require that program participants must: (6) manage Program Participant lands that ecologically, geologically, historically, or cultural important in a manner that recognizes their special qualities; (7) promote the efficient use of forest resources; (8) broaden the practice of sustainable forestry through procurement systems; (9) improve forestry research, science, and technology; and (10) improve the practice of sustainable forest management by resource professionals, logging professionals, and contractors through appropriate training and education programs. Finally, three objectives state that program participants must demonstrate (11) commitment to comply with applicable

federal, provincial, state, or other local laws and regulations; (12) broaden the practice of sustainable forestry by encouraging the public and forestry community to participate in the commitment to sustainable forestry and publicly report progress; and (13) promote continual improvement in the practice of sustainable forestry and monitor, measure, and report performance in achieving the commitment to sustainable forestry.

The American Tree Farm System was initiated in 1941, and required periodic inspection of the forests of participating "Tree Farms." However, the rigor of the rules was modest and the inspections were sporadic. In order to become credible for forest certification, new standards and auditing procedures were developed in 2002, and were implemented in 2004 (American Tree Farm System 2005). Audit inspections are now required every five years, and are conducted by cooperating foresters with forest industry, private consultants, or state foresters. ATFS has 9 broad Standards, 14 Performance Measures, and 22 specific Indicators.

ISO was created shortly after World War II to promote international manufacturing, trade and communication standards and to enhance global trading efficiency in these areas. In 1987, the ISO moved into the field of quality management and quality assurance (the ISO 9000 series), extending this further in the early 1990s to the environmental management field with the ISO14000/EMS series of guidelines (McDonald and Lane 2002). ISO 14001 is applicable to any organization that wishes to establish, implement and improve an environmental management system (EMS) or assure itself of conformity with its stated environmental policy. The EMS is based on the plan-do-check-act model. It has no absolute requirements except that it is in accordance with the law and standards the organization sets for itself. However, the organization must show they are attempting to prevent pollution and are continually improving their EMS (International Organization of Standardization 2004).

Impacts

All the forest certification standards have environmental protection as a major focus—perhaps the major focus. There is a plethora of standards designed to protect the environment and biodiversity during forest operations, require the use of best forest science, and monitor impacts of forest practices. Empirical evidence about the impacts of forest certification systems is modest, since they are new and estimating regional impacts is difficult.

Two recent surveys of certified forest lands in the United States found that environmental practices were better under forest certification schemes. The Texas Forest Service (Simpson et al. 2005) found that implementation of best management practices (BMPs) was statistically higher when the timber was delivered to a Sustainable Forestry Initiative (SFI) mill. A Manomet Center for Conservation Sciences (Hagan et al. 2005) study found that landowners who were certified sustainable under either SFI or FSC had significantly stronger biodiversity practices than landowners not certified. Furthermore, they concluded that there was no difference between FSC and SFI in terms of the overall biodiversity practice scores. Rickenbach and Overdevest (2006) assessed certification expectations and satisfaction with FSC certification in the U.S. The found that "signaling" benefits of getting better recognition for one's forest practices and public relations were ranked highest with the highest satisfaction, exceeding expectations. Participants had the greatest expectations for market benefits, but received less satisfaction with those. The category of "learning" about new

forest management practices ranked third in expectations and satisfaction. However, the differences among these categories were moderate.

Several international studies have examined the effectiveness of forest certification of FSC and PEFC. This includes a series of World Wildlife Fund European Forest Programme studies in Latvia, Estonia, Germany, Russia, Sweden, and the UK. These include individual country reports, and are summarized in a recent newsletter (WWF 2005). In total, they analyzed 2817 Corrective Action Requests made in those countries, covering 18 million ha of forests. The WWF summary concluded that FSC certification improved the conservation status and enhanced biodiversity levels in forests. This included consistent implementation of Environmental Impact Statements (EISs); identification, mapping and management or protection of natural areas and biotypes; increased deadwood levels; more natural regeneration to favor species diversity; and restoration of threatened forest types. Better economic outcomes included better game management; better planning and long-term sustainability; better monitoring of objectives; improved marketing and product tracking; and improved recreational, cultural, and historical benefits. Social benefits included better implementation of health and safety legislation; better equipment training; and public safety improvements.

Newsom and Hewitt (2005) analyzed global FSC/Smartwood impacts. They too found that certification required operations to make significant changes, and did "…not simply give a rubber stamp of approval to the good players and industry leaders. On average, certified operations were required to make changes affecting fifteen different forestry issues as a result of the forestry assessment." The ten most important categories of required changes included some in social issues–worker training, safety, and communication with stakeholders; environmental issues–aquatic and riparian areas, sensitive sites, and high conservation value forests; and systems issues–management plans, monitoring, chain of custody, and inventory.

An extensive study by the Federation of Nordic Forest Owner's Organisations (2005) examined the effectiveness and efficiency of FSC and PEFC in Finland, Sweden, and Norway. In brief, they found that forest certification has improved sustainable forest management, with the greatest contributions being in the area of environmental protection. This has required greater environmental investments by forest landowners, but has not brought significant economic benefits to forest owners to date. The report does note that the better environmental image may enhance market access in the long term for Nordic timber and wood products.

Various other studies have examined forest certification governance and implementation, most notably by Cashore et al. (2004) and his colleagues. These have focused on the role of forest certification in implementing SFM processes, and fulfilling a role as non-state governance to achieve sustainable forestry through market processes. We certified our state and university lands in North Carolina, and published several studies on those efforts and costs (Cubbage et al. 2002, 2003; Pressley et al. 2004). In addition, we summarized the interaction of forest certification and plantations this year (Cubbage et al. 2005). Our studies estimated that costs for forest certification were significant, at about $1,25 per ha to $9,25 for initial certification, and perhaps $0,61 to $4,58 per ha per year to maintain certification, depending on the land ownership size (1800 ha to 11.000 ha). The costs of certification were greater for small forest owners than large ones because auditing and preparation costs must

be spread over fewer hectares. Many forest plantations have been certified, which provides an imprimatur for intensive management and even use of exotic species when managed appropriately as part of a natural landscape.

There also are benefits to firms that may be provided by forest certification. It may help with strategic positioning and public relations, or help satisfy senior management and corporate social responsibility goals. Certification can help avoid problems with government regulators or protests from environmentalists, or boycotts of one's products. For marketing, it may help retain market access, capture new markets, attract investors and capital to the firm, or garner better timber prices. For employees, certification and environmental management systems (EMS) can improve worker safety and training; provide better morale and professional image; improve internal communications; improve record keeping and monitoring; and enhance management efficiency. Certification should lead to better management practices, with more use of science; better communication with external stakeholders; constructive dialogue with auditors; and institution of continuous improvement processes.

Debates

There are many debates about the merits of forest certification. Some are widespread and explicit; some are more implicit. Various critics have cited the large costs of forest certification (e.g., Caulfield et al. 2001, Laband 2005), and inferred that these systems are foisting social agendas on hapless forest landowners and managers. While not published, some discussion suggests that firms or governments in developing countries feel that certification is being promoted or required by developed countries so that the developed countries can compete better, due to their presumed technological and managerial advantages. Another concern is that high fixed costs of certification put smaller landowners at a disadvantage compared to large, industrial producers. There are large debates about the social values included in forest certification standards, at least with FSC; the environmental rigor of different systems; what practices are regulated and how much; and the on-the-ground impacts or improvement in forest practices. A fundamental critique from environmentalists is that some systems are merely "greenwash" to cover up the same old practices (e.g., Carrerre 2006). On the other hand, some industrialists suggest that they are substantive, but only required due to "greenmail" direct action campaigns and protests at a firm's stores, which extort adoption of certification systems to prevent loss of sales or damage to corporate image. Only a few of these debates have been (or can be) empirically tested to date because of the newness of forest certification. Some debates are summarized below.

The FSC standards for plantations clearly contain many regulations and proscriptions regarding plantations and their limits. These range from only using genetically improved materials from conventional tree breeding programs, not genetically modified organisms (GMOs), to blending plantations with part of the natural landscape. Exotic forest plantations are permitted if they are more productive than natural species, but are not encouraged. Nevertheless, FSC has approved the greatest number of exotic forest plantations in the world, particularly in the southern hemisphere. Companies in Latin America are actively seeking FSC certification to ensure access to international markets in Europe, Japan, Canada, and the U.S. Certification also helps locally, by confirming that the companies are providing social

benefits to local communities and to employees of the firm, as well as protecting the environmental benefits of water, native flora and fauna, and natural forests (Cubbage et al. 2005).

FSC currently has a major two-year review of their forest plantation standard underway in response to criticism from environmental NGOs (ENGOs), and fears by certified organizations that plantations will not be certified or that the standards will become unreasonable. FSC recognizes that plantations are simple forests, but believes that they have an important role to play in the conservation of biodiversity, water, and soils at the local level, and that they can contribute to social and economic benefits for local communities. However, critics abound, such as Ricardo Carrare (2006) at World Rainforest Movement in Uruguay, who just released a report in 2006 criticizing FSC certification of plantations in that country.

Controversy over forest certification systems has erupted in the Southeast U.S. in particular. In March 2005, the Dogwood Alliance and other ENGOs started a campaign against SFI, calling it the "Same-old Forest Industry" program. This included national media releases, purchasing of ads, and a major joint protest letter against SFI that was signed by 90 scientists throughout the South and posted on the Dogwood web site, along with an extensive amount of materials challenging the merits and credibility of SFI (Dogwood Alliance 2005a, 2005b). The letter claimed that SFI does not discourage buying of wood from biologically sensitive areas; that SFI allows conversion of natural to planted forests; that SFI allows harmful logging practices; and enumerates other alleged failures of SFI. Instead of supporting the forest industry-based SFI, they advocated the use of FSC. SFI responded with a letter on their web site, supporting the independence and accomplishments of SFI, and pointing out flaws in the assumptions of the Dogwood Alliance letter, and noting the specific indicators in the SFI standard that rebut the specific Dogwood claims (Banzhaf 2005).

The debates between FSC and SFI in the U.S. continue, with environmental groups and industry employing many new and creative approaches to advocate their values. The first major U.S. firm, Potlach, achieved dual SFI and FSC certification in 2004, and stated that they felt the two systems were complementary. Environmentalists successfully placed stockholder initiatives on the ballots of three major forest products firms with holdings in Arkansas in 2006–Weyerhaeser Company, Kimberly-Clark Corporation, and International Paper. These proxy resolutions ask the companies to study the feasibility of certifying their timberlands and production facilities under the FSC standards, not just SFI. This unique approach places more pressure for companies to adopt the "greener" FSC approach (NWAnews 2006).

Discussion and Conclusions

The Americas contain about 38% of the world's forests, and Brazil has about 38% of all the forests in the Americas and 14% of all the forests in the world. Forest loss continues to be significant in Central and South America, and is becoming a renewed issue with moderate population growth and rapid rural and recreation development in North America. Proposals to prevent these losses range from using markets to pubic intervention. Forest certification employs market approaches, but in so doing requires forest owners to comply with public forestry, environmental, and social laws as well. We think that certification is the most

significant innovation affecting forest practices in decades. But only 12% of the forests in the Americas are certified, with more than half of these in Canada. In Latin America, certified forests comprise only 1% of the total forest area. Thus realism suggests that to develop means to protect and manage forests, we must not only examine the merits and expansion of forest certification, but also the impacts of uncertified markets and public policies, both within and outside of the forest sector.

Forest certification has been increasing in extent throughout the Americas. The key forest values set forth in national laws, the different SFM criteria and indicators, and forest certification systems are related. National forestry laws reflect the intentions of government to protect and assist in management of forests. SFM Criteria and Indicators provide means that national governments can measure, monitor, and track the status of forests, and compare them among countries and with national forestry goals. Forest certification provides a means that SFM goals can be implemented through markets at the forest management unit level. Laws and forest certification are normative—they prescribe how forest should be managed. Laws are often implemented poorly. To date, however, forest certification, which works through market pressures to demonstrate SFM practices, has had more teeth. Independent third-party auditors inspect forest practices and must stake the reputation of their firm and their system on ensuring compliance with the standards. Furthermore, the standards have been strengthened periodically.

Forest certification has potential for significant impacts on natural and plantation forest management and measurement and protection of biological diversity. Forest certification by FSC requires that managers favor natural stands and high conservation value forests. The Sustainable Forestry Initiative certification process in North America includes wildlife and biodiversity as major components of its standards. FSC mandates rigorous standards for forest plantations, especially of exotic species, and careful planning to justify how they complement natural forests and are juxtaposed in the forest landscape. Social forestry standards also are important for FSC. The new CerFlor and CertFor approaches also have rigorous standards for both social and environmental components. Compliance with national laws is required under all forest certification systems, which will clearly enhance implementing those laws. Having certified organizations document and comply with national laws can substitute for weak national agency implementation.

These detailed measurements of forest management practices for environmental, social, economic standards will have significant on-the-ground effects on forestry in the Americas. In North America, Chile, Brazil, and Uruguay, most large forest products firms have adopted forest certification, under CSA, SFI, FSC, or the nascent Brazil and Chile standards. Interestingly, there is a greater percentage of adoption the farther north one looks in the Americas. This may be attributed to the aggressive programs developed in Canada and in the United States, and probably to the greater ease of certification with larger industrial forest management. The vast, diverse, and scattered ownership patterns in Brazil, or even small private owners in the U.S. South, have been less amenable to the intensive forest management planning, performance, and auditing than larger industrial systems. In fact, even with FSC, large industrial ownerships or major government holdings still comprise a large share of the total certified forest area. This discrepancy between certified forest shares by country does need to be bridged for forest certification to achieve its promise in the tropics and subtropics of Latin America.

Our discussions with managers at many major firms indicate that certification has reformed thinking and practices about the economic, ecological, social, managerial, and scientific aspects of sustainable forestry. While some of this is rhetoric, the new view toward forestry is being imbued throughout the organizations as the certification standards trickle down to most employees and operations.

Furthermore, forest certification audits are performed by major international firms. The reputation of these firms depends on their transparency, independence, and rigor. The audits require rigorous evaluation of environmental management systems, forest policies, and forest practices to meet economic, ecologic, and social standards. Establishing and implementing a quality program to meet the detailed forest certification standards is absolutely required to successfully pass the external audits.

The continued application of SFM criteria and indicators through forest certification schemes will enhance data collection, scrutiny, management, and protection of natural forests throughout the world. At the same time, forest certification offers promise for the continued social imprimatur to grow and manage intensive forest plantations under reasoned guidelines and standards. Firms also should benefit from better planning, better morale, better marketing, and in other means from forest certification.

On the other hand, certification may be viewed as unwanted external controls on the practice of forestry in less developed countries, or indeed developed countries. Forestry firms and agencies will need to spend significant effort and costs to achieve and maintain forest certification. The hope is that this effort will be paid back with better access to international markets, preventing environmental protests and adverse impacts on sales, and improved environmental and social performance of forestry organizations.

Forest certification will continue to be demanded by the pubic, by buyers of wood products, and by environmental NGOs that drive much of this agenda. With success, forest certification will continue to enhance forest management, forest protection, and social benefits in the Americas in the future. The tradeoffs between perceived benefits and costs discussed here will determine the merits of adopting forest certification and its rate of expansion in different countries.

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