A REVIEW OF THE SOCIAL, ECONOMIC AND ENVIRONMENTAL IMPACTS OF THE FORESTRY INDUSTRY IN SOUTH AFRICA

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PREFACE

I would like to acknowledge and thank my supervisor, Professor Albert van Jaarsveld for his valued input and the learning opportunities he has provided.

I would also like to acknowledge all the named and un-named participants who provided me with insights into the complex array of issues within the industry. I would also like to thank Philip Owen of SAWAC (South Africa Water Crisis), Wally Menne (Timber Watch), Linda Lipparoni (Wakkerstroom Trust & Rand Water) and Professor Braam van Wyk, Botany Department, University of Pretoria for their unique insights and the valuable discussions.

I would like to thank the many people whom I interviewed for their time and insights, especially those people who took a risk in coming forward with information that has been extremely valuable.

I would like to thanks my partner Carolyn, and my family for their support and encouragement whilst I completed this research.

I certify that this report is my own work and all references used are accurately reported.

Signed: Davin Chown

ABSTRACT

A study of the economic, environmental and social impacts of the forestry plantation industry in South Africa was undertaken with specific reference to the impacts on biological diversity within the plantations, as well as impacts on the grasslands, indigenous forests and other ecologically sensitive zones impacted on by the forestry industry.

The research centered on the question as to whether the perceived positive contribution of the industry to the South African economy was not in some way nullified by the impact on the economy, social aspects of the workforce and communities affected by the industry, as well as the environmental impacts of the industry and its practices. In addition, an attempt has been made to in some way quantify eco-system benefits in order to give an indication of the value that is being lost or impacted on by the ongoing operations of the industry.

The study also investigated the potential negative effects on biodiversity and whether in fact there has been a negative impact on biodiversity within the various regions where large scale plantation development and harvesting is practiced. The study focused on the various levels of impacts, namely economic, social and environmental, whilst leaning heavily on the impact on biodiversity. In addition, the study also undertook to corroborate evidence from local and international experience, regarding the impact of the industry on various aspects of the ecological and social structures within society.

A source of consolidated information quantifying the benefits as well as the costs to society of maintaining and allowing the plantation industry to continue on its path has not been established and it is hoped that the evidence from this study may make a strong case for a form of full cost accounting within the industry. This study examines a number of the interlinked impacts that the industry has on society and attempts to place these within the economic context of the industry.

Research methods were exclusively qualitative and included semi-structured interview with a number of consultants, academics, forestry managers, forestry workers, community members, conservationists and environmental activists. Personal communications were held with industry specialists mainly from South Africa. A number of plantations and indigenous forests were

visited during the process of the SAFCOL (South African Forestry Company Limited) privatization process. Additional visits were conducted to observe sawmills and pulp mills operations during the assessment periods.

The study outlines a number of ways in which the industry has developed in order to meet international demand, and ways in which it has developed a strategy to cope with the rapidly globalising nature of the forestry, paper and pulp milling and paper production industries. To this end, an assessment of the forestry value chain from an industry perspective was conducted.

In addition the study outlines a number of improvements and key actions that the industry can take in order to integrate progressive environmental thinking and good stewardship practices into their core business models and value propositions

The study found that whilst the forestry and paper and pulp processing industries contribute substantially to the South Africa economy that there are a range of impacts that are not taken into consideration when a full valuation is conducted as to the overall addition to, or detraction from the natural capital stock. In addition, the study has also found that there are substantive negative impacts on the environment, society and the economy in ways that are not yet fully acknowledged and fully accounted for within the industry as a whole.

Recommendations on how the industry may improve their positioning within the changing markets, given the outlined range of issues, are made.

1 INTRODUCTION

1.1 Background to the Research

The South African forestry industry, and more specifically the plantation industry, is a dominant player within the global forestry industry (PWC, 1998) with SAPPI being the largest coated wood free paper company in the world with a market share of 25 %. The South African indsutry has an annual average growth rate of 5,2% since 1970 as compared to global averages of 3,0% (Forestry SA, 1999). South Africa is rated as the 12th largest producer of pulp and the 24th largest producer of paper and board products in the world (Forestry SA, 1999).

Domestically the industry is a significant force within the South African economy. The industry contributes R 2 billion annually to the Gross Domestic Product (off a turnover of R 12 billion) and is said to be one of the largest employers in South Africa employing approximately 70 000 people (Van Wilgen, 1999; DWAF, 1996). The industry has over the past 6 years undergone significant change stemming mostly from the response to globalisation and the internationalsation of key players like Mondi and (South African Paper and Pulp Industries Limited (hereafter referred to as SAPPI). In addition, the state has divested itself of its plantations and forestry assets through a large scale privatisation process which has been fraught with complexities and met with mixed responses and results from various roleplayers.

It must also be noted that whilst we refer to the "forestry" sector, that this is a catch-all phrase that needs to be examined in the light of the restructuring, reinvestment and divestiture taking place within the local industries. In particular this refers to the move by Mondi and Sappi to divest from their forestry holdings or plantations, and enter into joint ventures with a range of international players to set up separate entities to manage the plantations. This frees Mondi and SAPPI up to be able to manage the core operations which are focussed on processing , paper products , and pulp.

However, South Africa possesses a strong "forestry" industry in relative world terms. Despite the fact that the industry is small in comparison to a number of its competitors, namely Brazil, New Zealand, Chile, the industry has reputation for delivering products of high quality and economic

value (DWAF, 1998; Hassan, 1998; Howard, pers comm, 1999; Edwards, 1999). Such plantations are based on mono-cultures bred for rapid growth, uniformity and high yield of raw material. Planting in even-aged stands requires extensive preparation of the soil, fertilization,regular spacing of trees, seedling selection, mechanical or chemical weeding, use of pesticides and mechanised harvesting in short rotations. The environmental and social impacts of this form of industrial development and processing are widespread (Carerre & Lohmann, 1996; Bright, 1998).

Despite plantations being seen to be an important contributor to, and sector within, the South African economy, the process of growing timber and the expansion of the forestry industry itself, is placing a number of significant demands on the resource base that it relies on for its continued expansion and existence (Armstrong & Van Hensbergen, 1996; Van Wyk, 2000; Scott et al, 1998).

The area of commercial plantations in South Africa has been estimated to stand at 1,5 million hectares and covering "just 1,2% of South Africa" (Scott et al, 1998). These comprise mainly 57% pine, 35% eucaplypts and 8% wattle.

It is widely acknowledged (Abramovitz, 1998; Armstrong et al, 1998; Armstrong & van Hensbergen, 1996; Carrere & Lohman, 1997; Bright, 1998; McNeely,1998) that plantations of alien monoculture trees used to develop the forestry industry have a significant impact on the economy, ecology and social structures and interactions of entire regions and countreis.

In some instances clearly corroborated data shows that plantations are estimated to reduce mean annual streamflow by 3.2 % and low-flows by 7.8% (Scott et al, 1998). It is argued by Carrere & Lohmann (1998) and Versveld (1998) that significant examples exist where reduction in streamflows and water deficits caused by plantations reduce availability of water for a range of important agricultural activities. In addition, there is reduced availability of water to cathcments that supply urban and rural populations with water, and where catchments are affected by afforestation, significant reduction is availability of water for key ecologoical processes and functions, such as the maintenance of wetland functions, are reduced. Versveld (1998) sights research into examples frm the Kruger National Park, and the communities abstracting water

downstream from rivers running through the Park, that low flow impacts severley affect these communities as well as the ecological processes dependent on the flows of these rivers.

The highest concentration of plantations take place in Mpumalanga at 7,2% of land area and this region experince the largest reduction in flows – almost 10% of total flows. In Northern Province the highest relative impact on flow reduction is seen where plantations are concentrated in humid upper catchment areaas that are the principal source of dry-season flow in otherwise dry secondary catchments.

Although the research completed by Scott et al (1998) appears relatively comprehensive, concerns abound (SAWAC, 2001) that these streamflow reductions and estimations of afforested areas are based on models and surveys completed in 1993. Areas of non-commercial plantings have largely been excluded from the various studies according to the research and do not cover areas such as woodlots and wattle invaded areas, and plantings at power stations and mines on the highveld. The study also confims that a number of the newer plantations or recently afforested areas have not been accounted for as these plantations will only be visible once a 60% canopy cover is reached. Areas in the north-earten Cape have experienced rapid afforestation since 1990. Indigenous forests were also mapped but excluded.

It may be however argued that the apparently small amount of legal plantation area is the tip of the iceberg based on the study by Van Wilgen (1999). An additional 1.6 million ha of "illegal plantations" exist, much of them as a result of the introduction of alien species in order to pursue the highly profitable plantation and paper and pulp industries that South Africa has become respected world wide. It is argued (Lizamore, 1999) that a great number of the alien plantations stem from the uncontrolled spreading from forestry industry plantations.

The social, economic and environmental impacts, and some of the resultant implications, are examined with a view to articulation a consolidated view of these impacts vis-à-vis the strong economic benefits that are received by society. There is a significant focus on the specific impacts on biodiversity and its resultant or knock-on industries. This has been an imperative given the growing trend and need to fully quantify the impacts of an expanding primary resource

extractive industry versus the move on a global scale to valuing biodiversity and its resultant industries.

Economically, the industry contributes significantly to the Gross Domestic Product (GDP) of the country, R3,9 Billion in 1997 (Forest Owners Association, 1999) , and for this reason it is necessary to examine what this contribution is. At the same time there are costs incurred in maintaining, and expanding, the industry. These costs have in many instances been completely negated in the economic models given the lack of either sufficient understanding of these impacts and the economic models used to quantify these, or of information that will facilitate an the process of economic quantification.

On the basis of literature and studies currently available, as well as anecdotal information, it is necessary to establish a consolidated view of the impacts of the plantation industry in order to fully assess the true impacts and benefits associated with this continued form of economic activity.

A number of new valuation models exist which are being used by industry analysts to assess the value of organisations operating in the natural resources industry. A number of new business models are emerging which focus on the impact of organisations on the "triple bottom line", namely financial, social and ecological capital.

1.2 Limitations to the research

Ths study has focussed on a range of impacts that may or may not assist the forestry industry and its stakeholders to clearly identify and deal with these impacts in as constructive manner as possible. The measures and actions identified apply to all stakeholders. It is recognised that the social, envionmental and economic factors impacting on biodiversty and foretry management practices are indeed complex and that the full range of these issues need to examined if it is to be argued that the forestry industry's impact is solely a beneficial one.

A further potential limitation to this study is the depth and breadth of this research possible within a limited part-time study basis. The forestry and paper milling and production industry is

an enormous global industry. Even within the SADC region, and within South Africa specifically, the industry is large and the dynamics complex. The effect of not being able to interview a large number of people in the industry is mitigated by focussing instead on finding evidence for and against the central question instead of looking for trends within the industry.

The assumption was made that all information gathered during personal, telephonic and email interviews was truthful and accurate. In addition the assumption has been made that the presentations, discussion forums and fact sheets distrubuted at community forums has been accurate and factual.

A second assumption ws made that the findings of the study can be largely applied to the industry as a whole. Direct information on the impacts and practices in the industry were gained from both local and international sources and pointed toward gloabal and local trends rather than simply localised individual patterns of behaviour. In reality, some industry players may argue that they have moved rapidly to off-set the perceived impacts of their individual organisations or operations.

The industry has moved raidly within the last 18 months to position itself for further intensifying global competition. With the internationalisation of South Africa's largest players, and the resultant divestment strategies, some of the players have moved to off-set a number of the perceived negative aspects of their industries by implementing strong ISO14001 pogrammes (SAPPI Annual Report, 2000) as well as ensuring plantations are vetted and certified by the Forestry Stewardship Council (Mondi, 2001).

In particular the global focus on the impacts of plantations and biodiversity , as well as the consumer demand for eco-certification, has meant that organisations have had to develop rapid mitigation strategies to off-set negative perceptions of the industries (Carrere 1996; Abromovitz, 1998; Dudley et al, 1995).

Although the forestry industry has moved to divorce the ownership of plantations from the downstream processing, milling, pulping and paper production operations, the focus of this

research has been to integrate the impacts of these operations in order to produce a holistic review of the impacts of the industry in each facet of the value chain.

2 RESEARCH PROBLEM

The research problem is centered around the question of whether the social, ecological and economic impacts of the forestry industry do not off-set the positive contribution and value that the industry provides to society as a whole. Given that the objective of industry is to grow and expand into new markets (SAPPI, 2000; MONDI, 1999; Abramovitz, 1998; Carrere, 1996), the impacts of current industrial activity and envisaged new plantation development must be weighed up against the potential negative implications of this growth ideology.

One of the central goals of sustainable development is to lessen the worlds dependence on certain resources , and to develop a world that is less polluting (WBCSD, 2000). The promise of the internet age and the hi-tech industries quest for a paperless world in support of these objectives needs to be reviewed given the ongoing drive by paper companies to keep feeding the worlds wood- based products economy (Abromovitz,1998; Dudley et al, 1995; Bright,1998).

Using the "Triple Bottom Line" and sustainable investment models developed by Elkington (1999), Dunphy (2000) and Hawken et al (2000), the forestry industry and its operations are placed into context within these "natural capital" or "triple botom line" investment frameworks. The focus is on attempting to balance the overall contribution of the industry with the impacts that it is having on the development of, or detraction from, natural, social and financial capital.

Thus, within the context of a growing industry that appears to create value, the objective is to examine whether value is not loast given new theories of valuing eco-systems, biodiversity and eco-system functioning.

Following on from this, the research attempted to answer the following related questions:

- What is the impact of the forestry and paper and pulp industry on biological diversity within the various ecologically sensitive and valuable eco-systems in South Africa?;
- What are the benefits of the industry as it stands now bearing in mind the different valuation models for plantation economies versus the lack of true valuation of biodiversity; and,

- What are the strategic benefits, if any, of the industry in adopting a more holitic and strategically focussed approach to sustainable development and sustainable investment based on the "triple bottom line" model?

3 METHODOLOGY

This study is largely qualitative in nature. Data for the study has been assimilated from a number of sources and grouped according to emerging themes related to specific focal points in the study.

A significant amount of data was collected during field visits to plantations primarily in the Easter and Western Cape, and Mpumalanga, as well as during the due diligence process preceding the sale of the state forestry assets to private concerns during 1999 and 2000. A cluster analysis on the available data was conducted in order to determine the emerging trends and key issues. These were then subjected to further analysis in order to determine the major factors influencing the investment and operational decisions and considerations relative to the trends in the industry worldwide.

Information for the economic aspects have been derived from:

- Discussions with local and international industry experts and consultants;
- Economic reviews for the industrial plantation industry;
- Literature sources listed in the bibliography;
- Direct alternative data sources including Department of Water Affairs and Forestry,
- Forestry Economic Services and Statistics South Africa.

Information for the ecological aspects has been derived from:

- Case study results;
- Literature sources listed in the bibliography;
- Expert opinion and discussions with a range of ecologists, biologists, entomologists, forestry scientists, foresters and industry executives;
- Attendance of workshops with interested and affected parties, including the major industrial plantation companies.

Information for the social aspects of the study have been derived from:

- Interviews and discussions with key government and parastatal stakeholders in South Africa and Zimbabwe;
- Discussions with professionals in Social Impact Assessment and social forestry;
- Discussions with plantation workers, environmental and conservation interest groups, and trade unions.

4 LITERATURE REVIEW

The study draws on,and brings together, a number of broad concerns and theories: a) investment and valuation theories regarding the most appropriate strategies for sustainable investment and integrated resource management in order to present an accurate valuation of biodiversity, and mitigate the negative aspects of the forestry industry , b) concern for the social, environmental and economic impacts of the industry based on local and global trends and, c) concern for the impact on species biodiversity in particular, again based on local and international trends and research.

4.1 Sustainable Investment and the "Triple Bottom Line" – a new corporate ideology for the forestry sector?

4.1.1 Defining sustinable investment

The now famous Brundtland Report defines sustainable development as "development that meets the needs of current generations without compromising the ability of future generations to meet their needs" (Brundtland, 1989).

The concept has now been developed further where organisations such as the World Business Council for Sustainable Development (WBCSD) are actively promoting the concept of eco-efficiency and sustainability as part of the drive toward sustainable development (Burger, 2000). The WBCSD defines eco-efficiency in terms of the delivery of competitively priced goods and services designed to satisfy human needs and enhance quality of life ***while progressively reducing*** (my italics and emphasis) environmental impacts and resource intensity throughout the entire life-cycle.

Out of the ongoing development and realisation by industry that it is central to this ongoing change and to reshaping the way industry views its impact on natural and social capital, a new framework for corporate resource management is evolving. Hawken et al (2000), Dunphy et al (1996) and Elkington (2001) provide a new working definition and framework for harnessing natural resources and building on natural capital, and define this as "sustainable investment".

Investment takes on a new definition in these terms: "Sustainable Investment provides stakeholders with an acceptable long-term return on their financial capital, whilst not irredeemably running down ecological or natural capital , and at the same time building social capital (the relationships that exists between stakeholders)". Hawken et al (2000) refer to this as the three forms of capital, namely natural, social and financial capital.

It is argued by critics and analysts of the plantation industry (Abramovitz, 1998; Armstrong et al, 1998; Bright, 1998; Carrere & Lohmann, 1996; Dudley et al,1996; Manuel, 1992) that most forestry companies do not incorporate the natural and social capital aspects into their balance sheets, or for that matter corporate planning cycles, as they have seen this as mostly irrelevant to these processes.

As is argued by leading financial advisory groupings who are leading the way in sustainable investment (Bank Sarasin, 1999; SAM, 2000) most organisations listing on the Dow Jones conventional indeces, or for that matter any of the other international indeces, are not required to account for the nature in which they conduct their business other than to show solid returns for shareholders. An organisation that has a detrimental effect on the natural or social capital base may yet show solid financial returns but does not full account for its impact on the natural capital base.

In the same vein, organisations do not in any way, whether internally or externally, value the resource base they are extracting from, or what is referred to as natural or ecological capital. Biological diversity, or any other form of diversity, or eco-system services are not in any way quantified so as to be able to show the potential short and long-term negative impacts of the current dominant economic and accounting imperatives favoured by large conglomerates, small scale growing and harvesting operators, as well as their shareholders (Abramovitz, 1998; Benyus, 1997; Carrere & Lohmann, 1996; McNeely, 1998).

Sustainable investment as an investment ideology, as opposed to "sustained growth" or "sustainable yield" arguments favoured by large conglomerates, will require forestry and wood processing organisations to fundamentally review the way in which the account for their business

development priorities and profits. This will mean developing a new corporate ideology that is able to balance the "triple bottom line" (valuing natural, social and ecological capital) and show that there are new ways of doing business within the constraints imposed by the current pattern of unsustainable business practices within the forestry sector (Chown, 1996; Elkington, 2000).

This challenge will need to be met irespective of whether this be in the planting and growing and harvesting of large scale monoculture plantations of alien species, or whether this be in the downstream processing of, and value-adding to, a range of wood based products.

4.1.2 A "Sustainable" forestry sector – assessing growth and the global consumption imperative.

In their quest for industry supremacy or dominance, and maintenance of their competitive positioning, commercial forestry and paper and pulping companies are having to find new ways to compete and more effectively use their resources (WBCSD,1999; Edwards,1999; FES, 1999; WRM, 2001).

The Food and Agriculture Organisation estimates the global trade in wood products like timber, pulp and paper to be worth approximately US$ 142 billion per year (Abramovitz, 1998). Consumption of wood panels in Asia is rising at 5.5% per annum whilst paper consumption has grown at 6.7% per annum since 1980, which is twice the world average. Global consumption of paper (including newspaper and paperboard) has grown at 3.3% per annum from 1980 to 1994.

Today, it is estimated that approximately 40% of the worlds industrial wood harvest goes into making paper products whilst 46% of the worlds paper output is used to make packaging materials, and 41% goes into communications (newspaper, printing and writing paper) and 5% ends up in household and sanitary products (Abramovitz, 1998).

The downturn in the global paper and pulp markets (SAPPI, 2000; Edwards,1999) that hit the industry over the last two to three years, has seen organisations needing to find new ways of maintaining their competitive positioning yet, with a singular focus on the financial bottom line.

The Food and Agriculture Organisation has also predicted a downturn in the longterm for the South African industry (Edwards, 1999).

Along with this has been the need to increase resource use and depletion in order to drive a potentially unsustainable industry. The development of new strategies to promote the growth in the forestry and paper industries have largely seen an increase in demand for resources (Financial Mail, January 2000).

The forestry industry in South Africa , through the Forestry Owners Association (now called Forestry South Africa) and the Department of Water Affairs and Forestry, list a number of challenges that the industry will need to meet in order to service the growing global competition, work within the constraints of growing resource scarcity, and develop new markets in order to drive consumer consumption patterns:

- Increasing its business on a sustainable basis within the constraints of limited land and water resources;
- Retaining its cost competitiveness with overseas rivals;
- Meeting potentially tightening environmental certification and market requirements;
- Developing informed consensus as to the future development of the forest sector in relation to its resource use and environmental and social costs and benefits (DWAF, 1997);
- Developing stakeholder agreement on the implementation of appropriate systems to achieve sustainable forest management (DWAF, 1997); and,
- Restructuring the forestry industry to provide new economic opportunities for historically disadvantaged people (DWAF, 1997).

The industry has a dual challenge at a macro-level: meet the business and financial goal of sustained growth and shareholder returns, whilst attempting to deal with a range of constraints that may impede this growth.

The operational challeneges of sustainaing a growing and ever incerasingly complex global market for wood-based products can be see in the complexity of the operations as detailed in Appendix 1.

This highlights the number of areas within the industry that have a significant impact on the ability of large scale operators to maintain their footing in the industry whilst having to meet the challeneges as described above. Hence, the implications of these challenges are vast given the nature of the current unsustainable manner in which the industry has chosen to conduct its business.

4.1.3 Unsustainable demand for natural goods and services – Hohens Framework

Hohen (in Elking ton, 2001) has developed a framework that clearly articulates the the increasing demand on resources and the interaction with new means of meeting these demands. He argues that efficiency and substitution measures will progressively squeeze unsustainable technologies, business models and industries through the next century (Elkington 2001).

Hawken et all (2000) and Hohnen (in Elkington, 2001) argue that business seemed to think that there was so much natural capital that it didn't seem worth taking into account. In spite of what such signals as the Gross Domestic Product or the Dow Jones Industrial Average indicate, it is ultimately the capacity of the photosynthetic world and its nutrient flows that determine the quality and quantity of life on earth (Benyus, 1997; Hawken; 2000).

Thus the impact that a company or commercial organisations operations will have on a range of eco-system services and processes are of vital importance. In this instance, the impact of planting up what were previously grasslansd and sensitive eco-systems, with a variety of alien trees in order to support the forestry industry, is of great importance (Amrstrong et al, 1996; Carrere & Lohmann, 1996; McNeely, 1998; Van Wyk., pers. Comm; 1999).

It remains to be seen whether the predicted demand for new technologies will result in their actual uptake, thus impacting significantly on the viability of current technologies and processes being used by large forestry organisations. Hohen believes that organisations will be forced

along the funnel and will eventually, through a variety of impacts , be forced to adopt new ways of valuing the resources that they consume. His framework is highlighted below.

New forms of valuing and industries impact and contribution to, or detraction from, the regenerative systems and stock of natural capital needed to be developed (Hawken, 2000; Elkington, 2001; Dunphy et al, 2000).

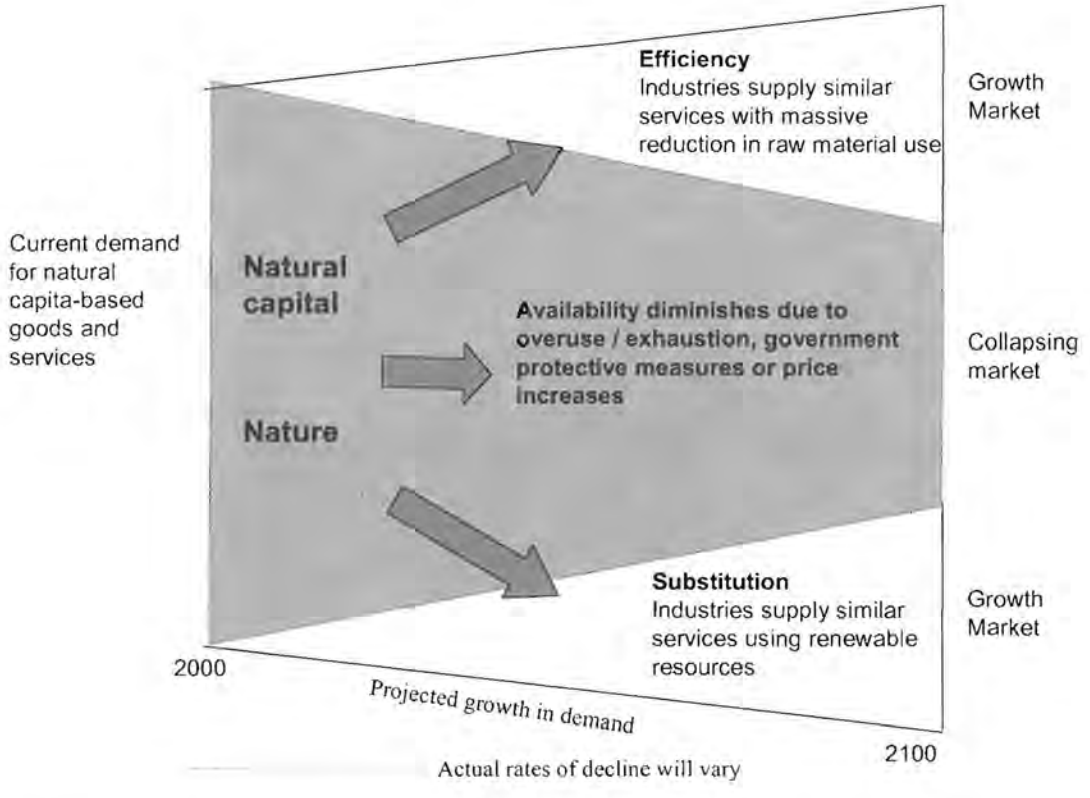

Diagramme 1: Natural Capitalism, 2000 – 2100 (Paul Hohen, Greenpeace)

Calculated at company level, a solid financial return may be what investors and shareholders demand. However, as recent cases have shown (Elkington, 2001; Dunphy, 2000; Abramovitz, 1998; Bright, 1998; Carrere, 1996; McNeely, 1996) , the cost in social and ecological terms may compeletely negate these perceived financial gains.

In many cases the apparent economic gains have in the medium term been off-set completely by the costs of bio-invasions from exotic or alien species. The negative impacts on biodiversity (species diversity, genetic diversity) and natural capital stock such as eco-system services (water supply, soil nutrients, recreational potential, pollination capability), eco-systems processes and function (fire, flood and erosion regimes), eco-system rehabilitation, loss of eco-system services and goods (wild flowers, grazing land, medicinal plants, fuel wood supplies), increase in cost to human health, and a range of other negative costs to society as a whole, are now clearly documented, and in some cases quantified (Abromovitz, 1998; Bright, 1998; Von Weizsacker et al, 1997).

Developing, expanding or positioning current or new enterprises in terms of their impacts, will have a key role to play in deciding the nature of their future sustainability. This is imperative in the current debate around the expansion of the forestry industry in South Africa and its impacts on grasslands, biodiversity and other industries such as agriculture (Carrere, 1996; Menne, pers. comm., 1999; Meulman pers.comm., 1999; Owen, pers.comm; 1999; Van Wyk, pers.comm., 1999).

4.1.4 Framework and conditions for sustainability – Diesendorf's Model

Dunphy et al (2000) argue that a new framework for corporate sustainability is necessary against this background. The Framework for Sustainability, developed by Diesendorf (1998), indicates a number of conditions and levels that organisations will need to measure themselves against in order to assess the readiness to engage in a transformative path to sustainability.

Sustainability is treated as the goal or end-point of a process called "sustainable development" or "ecologically sustainable and socially equitable" development. With regard to corporations, it is more meaningful to consider the degree to which they are sustainability-promoting or sustinability-impeding. The forestry industry needs to be weighed up against this framework in order to assess their espoused commitment to sustainability versus the actual impact measured by the framework.

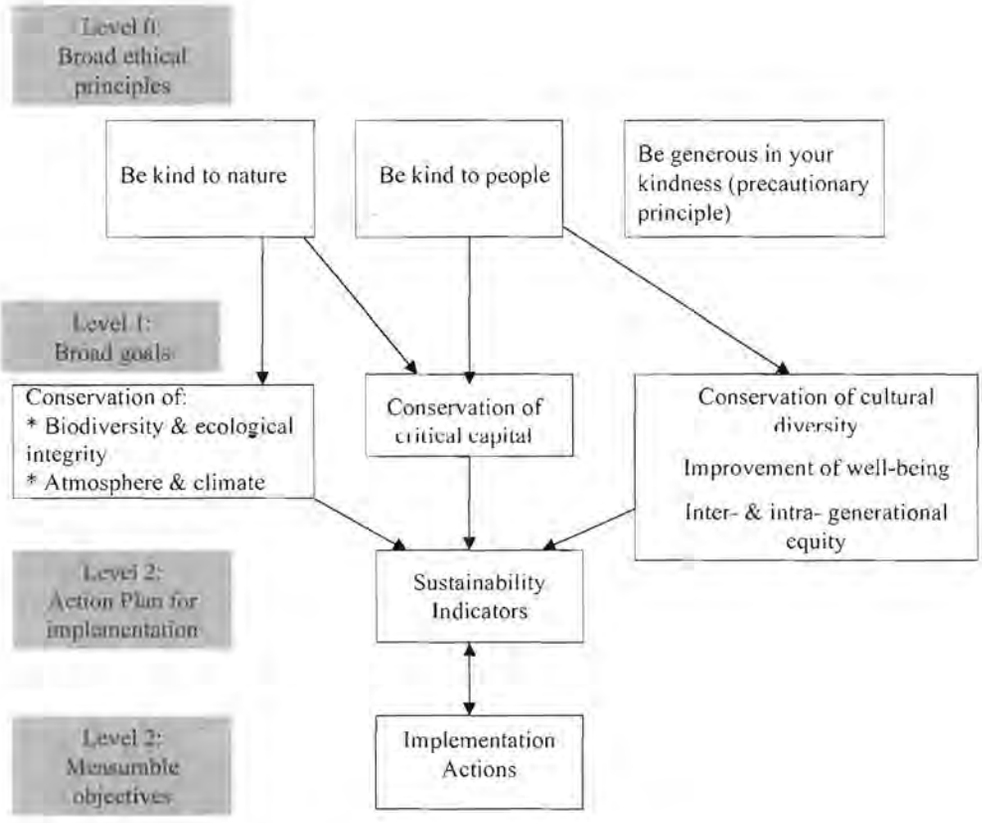

Diagramme 2: Framework for Sustainability (Diesendorf, 1998)

4.2 New competitive positioning – Balancing the Scorecard

Sustainability will play a fundamental role in the future performance and competitive positioning of industries, including the forestry and paper and pulp industries (WBCSD,2001). Organisations who wish to remain competitive it is argued, will need to reappraise their methods of developing corporate strategy, corporate valuation and performance management (Elkington,2001; Hawken et al,2000; Dunphy et al,2001; Bank Sarasin, 1999).

4.2.1 Elkington's MetaMatrix

Elkington's MetaMatrix defines a number of key characterists of organisations that begin to define their positioning in industry according to either their contribtion to, or detraction from , the stock of natural, social and financial capital.

Elkington (1999) defines the new "triple bottom line" approach as one that organisations will need to adopt in order to develop new innovative ways of thinking about their businesses and the impact they have on the systems around them.

Focussing on one bottom line may lead to success very narrowly defined, which has been echoed in the sections in the paragraphs above. Yet the negative impacts on the other two "bottom lines", namely social and ecological, may off-set any potential true gains made in overall terms.

Elkington (2001) has developed the MetaMatrix which helps to plot business models, companies and value webs in terms of their impacts on the regeneration or degeneration of the various forms of capital – natural, social, human, intellectual, institutional, cultural and financial. The analogies of butterflies, bees, caterpillars and locusts are directly applicable to the forms of commercial organisation and their impact on the the systems that support them.

Thus the linkages are made with either a degenerative and destructive form of utilisation of resources, or with a form of enterprise that works to develop or re-stock the various forms of capital that are available. Given the emphasis on sustainaing the growth of the forestry industry (and by implication the paper and pulp industries) it may be questioned, given these frameworks, whether this growth orientation will support sustainable development. The Metamatirx describes the key attributes of the organisations positioning and its approach to resource use as well as issues such as Corporate Social Responsibility (CSR).

MetaMatrix	Low Impact	High Impact
Regenerative (increasing return)	**Butterflies** •Sustainable Business Model •Strong commitment to CSR •High visibility, loud voice •May publicly attack locusts •Widely networked •Commercial lightweight	**Honeybees** •Sustainable business model •Strong business ethics •Constant innovation,cross-pollination •Capacity for heavy-lifting •Strategic use of natural capital & other resources •Sophisticated technology •Multiple capital formation
Degenerative (decreasing return)	**Caterpillars** •Longer term, an unsustainable business model •High "burn rate" •Relatively low impacts •Potential for switching to regenerative mode	**Locusts** •Highly unsustainable business model •Tendency to swarm, overwhelming habitat •Destroys various forms of capital •Zero cross-pollination •Blind to early warnings

Diagramme 3: The MetaMatrix (John Elkington, 2001).

4.2.2 The Sustainability Scorecard

The KPMG Sustainability Scorecard borrows on the famous Balanced Scorecard developed by Norton and Kaplan, and builds into the scorecard additional parameters of sustainability. This provides a further framework against which the forestry industry will be able to measure their true impact way beyond the compliance approach driven through ISO14001 and the Forestry Stewardship Council certification, which in itself is being called into question (WRM, 2001). The various frameworks and approaches to developing a view on organisational sustainability must be supplemented by tools that can be used to measure the progress.

Defined parameters of sustainability can be used by organiations to assess performance against quantified, measurable goals . The argument forwarded by Elkington (2001) is that in terms of initiatives such as the Global Reporting Initiative, organiations will need to start to develop and use tools that provide an accurate picture of actual performance against a defined set of metrics. This will assist in valuing an organisation more accurately in terms of its contribution to, or detraction, from the stock of natural capital.

The scorecard approach below shows the dimensions that are interlinked but does not as yet define the parameters within each of these focal areas.

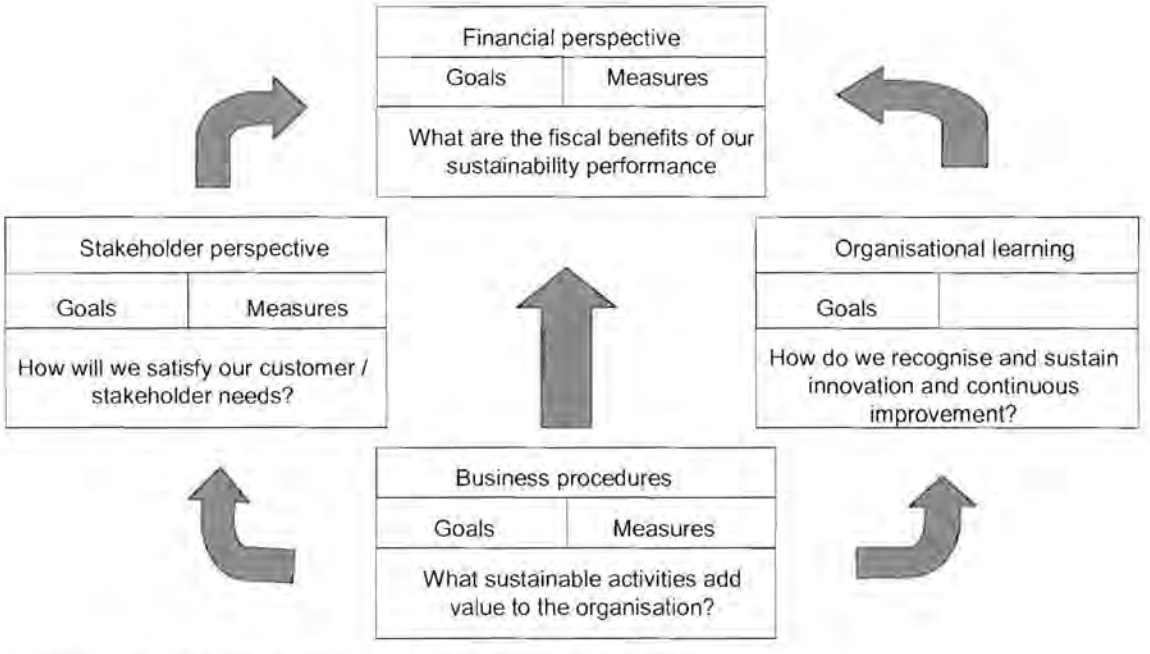

Diagramme 4: The Sustainability Scorecard (form John Elkington, 2001).

4.3 Taking stock of the natural resource base

4.3.1 Natural Capital - valuing eco-systems, ecosystem services and biological diversity

Valuing natural capital and social capital is a task not often undertaken by economists and students of economic theory (Bright, 1998; Hawken, 2000). The finance and investment

community have seldom had to account for the nature of their investments in these terms and the focus has been on developing theories, mechanisms and indicators like the Gross Domestic Product, Gross National Product and Producer and Consumer Price Indeces (WBCSD, 2000; Bank Sarasin, 1999). This is echoed in the manner in which companies report on their financial results.

The large forestry and processing concerns have similarly, not focussed on mechanisms such as Full Cost Accounting or Environmental Shareholder Value approaches to valuing or allocating a price to all aspects of their operations (Bank Sarasin, 1999; Abramovitz & Mattoon, 1999).

The various indeces on the global stock exchanges reflect daily the prices and valuations attached to conventional forms of processed goods an services, as well as to some degree the value, in processed form, of some minerals such as gold, platinum or diamonds.

However, there are no real indicators articulating the true value of a wetland, grassland, unique eco-system or indigenous forest. Companies to not reflect on their balance sheets the impact of removing certain natural capital from the eco-systems and what impact this might have on the systems themselves.

The indirect values attached to the services often emerge once the systems has been damaged and a "clean-up" has to be effected , or some form of rehabilitation must take place, or some cost is attached to its failure to function efficiently (Bright, 1998; Abramovitz, 1998). As is indicated in the Working for Water Programme the programme will generate employment and have a positive impact on the economy (Van Wilgen, 1999). However, the perverse logic stems from the need to clean up alien invaded areas critical to maintaining the ecosystem functioning in the gretaer Cape Town area, amongst others.

The United States Office of Technology Assessment (OTA) estaimates the damage done by 79 major biological, or aliens species, invasions into the US at US $ 97 Billion (Bright, 1998). This is only an indicator of the losses that the OTA is able to document. It is argued by Bright (1998) and Benyus (1999) that in any kind of ecosystem, natural or artificial, the closer you get to a monoculture, the less stable the system is likely to be. As an example , US crop loses attributable

to weed infestations in monoculture crops amount to US$ 4.1 billion annually. Added to this must then be the cost in application of herbicides, pesticides and fertilizers.

Developing monculture crops in areas that were previously genetically diverse, such as grasslands, indigenous forests or wetlands, and in eco-systems and landscapes that supported a great deal of biological diversity, have created an economic equation that has offset most of the positive gains from the industries that replaced the biologically diverse regions (Carrere, 1996; Arnold, 1997; McNeely, 1998).

Some of the figures are displayed below.

Industry / region	Global / local crop or ecosystem values	Infestation / loss	Economic cost to industry / economy	Social cost
USA	General	Damage by 79 major invasions (monoculture crops)	$ 79 billion	uncosted
USA		Crop losses due to exotic weeds	$ 4,1 billion annually	uncosted
		Herbicide costs	$ 3,6 billion to $5,4 billion annually	uncosted
Value of worlds 8 most important economic crops	US$ 580 billion	Pests	$ 244 billion	uncosted
		Global pesticide use	$ 31 billion	uncosted
Ecuador – shrimp	Value not	Viral epidemic	$ 200 million	uncosted

industry	presented			
Black sea fisheries	$135 million	Leidy's comb jelly	$ 30 million annually (cumulative losses $360 million)	Loss of 2 million jobs

Table 1: The Costs of Bio-invasions (Bright, 1998)

Developing moncocultures of exotic pines that have turned invader are a major problem for areas like the Western Cape where it is estmaited that the various invading species, such as Acacia, Pine and Eucalyptus, will reduce the water supplies to the region to more than two thirds of the current supply (CAPE, 2000; Bright, 1998).

McNeely (1998) argues that economists consider the production of a good – such as timber or pulp – to be economic only when the total benefits exceed the total costs. However, it can also be argued that the production of the good may well be profitable in the commercial sense even if it is not economic. The example is cited of the way many tropical forests are being harvested: the harvesting is not economic if the costs – including the long term costs to communities, disruption of watersheds, pollution of rivers, loss of genetic resources – exceeds the benefits, but it may well be profitable for some individuals or corporations. However, these individuals or corporations do not pay the full costs of their exploitation.

The rationale above may be extended to the plantations of South Africa where it is argued that the true costs of the forestry industry do not take into account the losses incurred or damage done to ecosystems and their functioning (Owen, 1999; Van Wilgen, 1999; Armstrong et al, 1998).

5 FINDINGS AND DISCUSSION - REVIEWING THE IMPACTS OF THE FORESTRY INDUSTRY

5.1 Forests and plantations as a natural resource

5.1.1 A limited natural resource

South Africa in not naturally endowed with forests that are able to supply the needs of the people and the forest product economy as a whole (DWAF, 1999; Forestry Industry Association, 1990; Edwards,1999).

South Africa has an area of roughly 122 million hectares of which 3.1 million hectares (2.6 per cent) are under national parks. Another 2.8 million hectares (2.3 per cent) of the country is under other forms of conservation. Thus approximately 4.3 per cent of the country's land mass is protected. According to African Development Bank (1993) and Hassan (2000) it is estimated that the country has only betwen 330 00 to 400 000 hectares of indigenous forest of which 54 000 is privately owned. This will be dealt with later in order to examine the strategy of the foresting companies in their quest to expand their interests using the small scale farmers who own parts of these indigenous forests.

It is argued by the Department of Water Affairs and Forestry (DWAF) that limited deforestation is taking place as most of the indigenous forests have been cleared over the last 100 years. The main reasons cited are conversion of forests for agriculture and harvesting for construction, and timber and fuelwood.

Given the relative lack of renewable resources for the forestry sector, large-scale commercial tree plantations have been established in order to meet the demand for wood based products.

5.1.2 The forestry industry

The area of commercial plantations in South Africa has been estimated to stand at 1,.5 million hectares and covering "just 1,2% of South Africa" (Scott, Le Maitre & Fairbanks, 1998). They comprise mainly 57% pine, 35% eucaplypts and 8% wattle. Carrere and Lohmann (1996) and the World Rainforest Movement (2001) argue that to simply quote the area under plantations as a percentage of total land utilisation or conversions is misleading. This approach does not substantively reflect in any way the nature of the impact that this conversion may have on ecosystems or processes critical to the survival of certain industries or communities.

Plantations are seen to be an important contributor to, and sector within, the South African economy (DWAF, 1996; Poyry, 1999). However, the process of growing timber and the expansion of the forestry industry itself, is placing a number of significant demands on the resource base that it relies on for its continued expansion and existence (Carrere, 1996; Van Wyk, 2000; Scott et al, 1998).

The forest products industries, i.e. all those industries using wood and wood products as raw material, constitute a significant part of the South African economy, contributing about 7,4% to the output of the country's manufacturing sector in 1993/94. They earned about R1,28 billion in net foreign exchange from total export earnings of about R3,6 billion in 1994/95. Their relative contribution to the economy has grown steadily in the past 20 years.

Number of Jobs	Forestry	74 000
	Primary wood processing	60 000
	Secondary wood processing	384 000
Contribution of forestry to total agricultural output	8.8%	
Contribution of forest products to total manufacturing output	9.2%	

Contribution of forest and forest products to total exports	4%

Table 2 : Contribution of the Forestry Sector to the South African economy (Figures at end 1999)

The many jobs involved in these industries mean that over one million mainly rural people depend on this industry directly (DWAF, 1996; Van Wilgen. 1999).

South Africa possesses a strong "forestry" industry in relative world terms (DWAF, 1996). Despite the fact that the industry is small in comparison to a number of its competitors, namely Brazil, Austraila, New Zealand, Chile, the industry has reputation for delivering products of high quality and economic value (DWAF, 1996; Hassan, 1998; Howard, 1999).

The industry is structured around plantations based on mono-cultures bred for rapid growth, uniformity and high yield of raw material (Howard, 1999; WRM, 2001). Planting in even-aged stands requires extensive preparation of the soil, fertilization,regular spacing of trees, seedling selection, mechanical or chemical weeding, use of pesticides and mechanised harvesting in short rotations. The impacts of this form of industrial development processing are widespread and carry with them a range of costs in the form of negative impacts on natural and social capital (Carerre & Lohmann, 1996; McNeely, 1998; Abramovitz, 1998).

This sector currently consumes about 19 million m^3 of wood a year (in 1993/1994), about 43% of which is hardwood and the rest, softwood. Sixty percent of this is consumed in pulp manufacture, 23% in sawn timber, and about 12% in mining timber. Pulp consumption is growing at about 3% per year, and saw timber at 2%, but mining timber consumption is declining. Investments in the forest products industry are valued at about R12,0 billion, of which 90% is in pulp and paper mills.

Potential productivity of these plantations is relatively high by world standards, averaging about 20 m^3 per ha per annum. They currently yield about 18,5 to 19 million m^3 of wood per year,

which satisfies over 90% of domestic demand and provides for a surplus for export, largely as pulp, paper, wood chips and other products (DWAF, 2000).

According to the DWAF (2000) the average realised yield of about 13 m^3 per ha per annum is lower than average potential productivity, because many plantations are still young, and about 7 to 8% of plantation land is temporarily unplanted. Neglect of some industrial forests, such as in the former homelands, also contributes to poor realised yields.

The South African forestry industry is relatively well organised, with two main industry associations (FIA, 2000):

- Southern African Timber Growers Association representing over 1 000 growers in the farming sector ;
- Forest Owners' Association representing primarily corporate forestry enterprises (which own 63,2% of the total area of commercial plantations).

The state, through SAFCOL, has also had an extensive interest in industrial forestry. These assets are currently in the process of being restructured and sold under leasing agreements to a range of current and new forestry management companies.

According to the Forestry Industry Association (2000) many black farmers have entered forestry (currently, approximately 12,000) mainly under contract to large companies (DWAF 1996). The restructuring of SAFCOL has seen a number of small to medium size empowerment groupings taking significant stakes in the forestry sector in line witrh the governments privatisation and empowerment strategy and policy.

It may however, be argued that the apparently small amount of legal plantation area is the tip of the iceberg based on assessments by Van Wilgen (1999). An additional 1.6 million ha of "illegal plantations" exist, much of them as a result of the introduction of alien species in order to pursue the highly profitable plantation and paper and pulp industries that South Africa has become respected for world wide .

It is argued (Lizamore, pers.comm, 1999) that a great number of the alien plantations stem from the uncontrolled spreading from forestry industry plantations. Black Wattle plays a major role in the infestation and invasion of prime agricultural land as well as grasslands where, for example, 20,1% of the land in KwaZulu-Natal has been tramsformed through the development of plantations (Armstrong et al, 1998). At least 92% of the Natal Mistbelt has been transformed and 41% is under commercial plantations (Armstrong et al, 1998) and most of this land is also heavily invaded with wattle.

The social, economic and environmental impacts, and some of the resultant implications, are examined with a view to articulation a consolidated view of these impacts vis-à-vis the strong economic benefits that are received by society. There is a significant focus on the specific impacts on biodiversity and its resultant or knock-on industries. This has been an imperative given the growing trend and need to fully quantify the impacts of an expanding primary resource extractive industry versus the move on a global scale to valuing biodiversity and its resultant industries.

On the basis of literature and studies currently available, as well as anecdotal information, it is necessary to establish a consolidated view of the impacts of the plantation industry in order to fully assess the true impacts and benefits associated with this continued form of economic activity.

Currently, the impact of the Forest sector can be summarized as follows (FIA, 2000):

- the area planted is 1,518,138 hectares (1,2% of SA total land area);
- approximately 400,000 hectares owned by the Forestry Industry remains unplanted (APS restricted), being managed primarily for the conservation of flora and fauna (including water);
- the turnover of the Forest sector is R2 billion per annum which equates to ± 7% of Agricultural GDP; s
- sustainable annual production is over 18 million m^3 per year;
- it employs almost 70,000 people, mainly in rural areas, and has an employment multiplier of almost 6 in downstream activities;
- it is a major catalyst for rural development;

- it can produce wood sufficient to meet 95% of the country's wood products demand;
- it is ranked 4th in the world in terms of the number of forest management units with FSC certificates;
- only 10% of its output is exported in unbeneficiated form;
- it produces enough timber to enable the timber processing sector to achieve the following:
    - a turnover of in excess of R12 billion p.a.
    - the export of 35% of its value-added production to the value of R5,6 billion p.a. (net trade surplus of R3,0 billion p.a.)
    - a contribution of 7,4% to S.A.'s total manufacturing GDP.

5.2 Current challenges facing the forest industry

The forest sector makes a significant contribution to the economy of South Africa and plays an important role in job creation and poverty relief. However, it faces a number of challenges including:

- Increasing its business on a sustainable basis within the constraints of limited land and water resources. A relatively small part of South Africa is suitable for forestry. These are the high rainfall areas (more than 700mm per annum). These areas are also the high water yielding areas of the country. Scott *et al.* (1999) showed that catchments in which some degree of afforestation has occurred comprise only 14% of the country, yet produce 53% of the mean annual stream flow and 70% of the mean annual low flows of South African rivers. Given this scenario there is an emerging conflcit with agricultural priorities;
- Retaining its cost competitiveness with overseas rivals;
- Meeting potentially tightening environmental certification and market requirements;

- Developing informed consensus as to the future development of the plantation forestry sector in relation to its resource use and environmental and social costs and benefits (DWAF, 1997);
- Developing stakeholder agreement on the implementation of appropriate systems to achieve sustainable forest management (DWAF, 1997);
- Restructuring the forestry industry to provide new economic opportunities for historically disadvantaged people (DWAF, 1997).

Whether the industry will meet these challenges remains to be seen. However, an aspect that will be critical in determining the industries abiliy to meet these challenges will be in the nature of the industry response. This refers in particular to instances where the industry will have to choose between genetic modification of its crops, and the resultant impacts associated with this approach to yield enhancement, or whether the industry will develop new methods of tree propagation without the negative effects associated with genetic modification.

5.3 Assessing the Ecological Impacts

5.3.1 Introduction

Although industrial forestry began in the last quarter of the nineteenth century with government projects, the main investment has been by the private sector. The largest part of this industry has proved to be highly profitable in the use of natural resources, although it comes at an environmental and social cost, especially if, as with other forms of development, land conversion is involved (Owen, 1999; Carrere & Lohmann, 1996; Armstrong et al, 1996; DWAF, 1996).

The impacts of the forestry industry, environmentally, socially and economicaly, are numerous (Armstrong et al, 1998; Armstrong & van Hensbergen, 1996; Bright, 1998; Carrere, 1996; Van Wyk, 1999) and based on the models and frameworks discussed in section 4, it is necessary to accurately quantify these impacts in a meaningful manner which to date appears to have been avoided by industry and the broad body of researchers who draw their support from the forestry industry.

Most plantations are located where climatic conditions are suitable for afforestation in the Northern Province, Eastern Cape, and Western Cape Provinces, with the largest plantation areas in Mpumalanga (624 000 ha) and KwaZulu-Natal (532 000 ha). However, sigificant divestment from the forestry sector has taken place in the Western Cape given the governments planned strategy to convert a significant portion of the land to agriculture, toursim and rehabilitation. These areas are suitable particulalry for agriculture given the soil types and rainfall, and the location and distribution of the plantations must also be examined in this context.

Assessments by the Department of Water Affairs and Forestry (1996) indicate that most land suitable for further afforestation is located in KwaZuluNatal, Mpumalanga, and the Eastern Cape. The area currently afforested amounts to a significant fraction of the total area that could be biologically suitable for forestry (DWAF, 1996; FOA, 1999) . However, no mention is made of the full "triple bottom line" impact of further afforestation.

However, new afforestation, which is a major cause for concern from a range of stakeholders (Owen, 1999; Menne, 1999; Carrere and Lohmann, 1996; Chown, 1999; Meulman, 1999; Van Wyk, 1999) has increased by about 17 000 hectares per year in recent years. This is supported largely by Government policy and the interests of international aid agencies and foreign consultants (Carrere and Lohmann, 1996; WRM, 2000) aimed at expanding the forestry plantations and industry, and by the need on the part of the large forestry and processing companies for wood to support their globalisation drive.

Aside from the growing and harvesting, the forest products industries have environmental impacts which must be recognised and managed (DWAF, 1996; FES, 1999; Edwards, 1999; Manuel 1992). The statement from the Department of Water Affairs and Forestry places the current operations of the industry into context:

" In sawmills and mining timber mills, wood waste is often problematic and needs to be minimised, largely through improved processing and utilisation. Atmospheric emissions can be problematic, though only locally, and much reduced in recent years. Wood preservative chemicals need careful control and management".

The organised preservative industry is now implementing a new SABS code of practice to this end. However, since most wood is processed in pulp and paper manufacture, and because this involves large volumes of water, significant amounts of various chemicals, and large volumes of lignin-based emissions, it is this part of the industry where the meeting of environmental standards is most important.

Pulp and paper mills generate waste and water- and airborne emissions which are environmentally harmful and often offensive to neighbouring people (Millwatch, 1999; groundWork, 2000). Medical evidence (Hirsch, 1999) suggests greater health impacts than simply noxious odours for communities living in close proximity to the processing plants: "It's clear odour is more than a nuisance. It can cause health effects, neurologic effects, immune effects, respiratory effects, chemosensory effects. . . and cardiovascular effects. These effects can be permanent and ... for the majority there's no good way of treating them ... the best treatment is prevention and elimination of exacerbation and the best way to do it is to get rid of the bad odour, in this instance as a result of the pulp mill ."

According to the Department of Water Affairs and Forestry, South African mills have progressively improved their environmental management and introduced innovative processes to reduce waste and emissions. However, organisations such as groundWork, Timberwatch and Millwatch, would argue differently.

Continued improvement of environmental management will be needed to meet statutory standards, and similar demands from buyers on the international market. They are regulated through the Water Act and the Air Pollution Act, and in some measure through the Environmental Conservation Act. The stringency with which these Acts is applied will need to increase to protect the environment, meet the expectations of the South African public, and to assist firms trading internationally.

The Minister of water Affairs and Forestry has openly admitted that " the environmental impact of a vastly expanding forestry industry needs to be openly and extensively debated" (Star; 29/09/1995).

Commercial forestry is a threat to biodiversity (Wildlife Society, 1991). They have displaced the montane grasslands which have been reduced to small parcels of land, and according to some estimates as little as 4000 ha remains. This is the habitat of the blue swallow which is South Africa's most threatened bird species, with less than 100 pairs left. According to industry critics, despite all the forestry industries protestations of green awareness, it has not been able to reverse the decline in numbers of the blue swallows (Armstrong & Van Hensbergen, 1997; Burrows, 1999).

The forestry industry argues that of the approximately 1,8 million hectares of land under its control, 400 000 ha is unplanted and managed for conservation purposes. Currently there are 32 heritage sites registered in forestry areas covering 16 800 hectares. The forestry industry also argues that as a result of its conservation efforts, indigenous forests on its land have been saved (Pott, 1997) .

Detractors argue that this is ironic in that these pristine lands (from which numerous rural communities derived an living and lived in harmony with the environment until they were forcibly removed) only became the site of concern once the forestry companies moved into the area and proceeded to destroy the unique inter-relationship between the communities and their environment via forced removals and expropriation of land (Carrere & Lohmann, 1996; Menne, 20000; WRM, 2000).

Thus, the assertions of the forestry companies ignore the question as to how much of the indigenous forest land was displaced by exotic plantations given the extent of the indigenous in South Africa is only just over 1 percent of the total land area.

It would appear from the " *Guidelines for Environmental Management in the Commercial Forests in South Africa* " booklet, that environmental audits are in the process of becoming standard, and multiple-land use planning is encouraged to serve the development of eco-tourism and the needs of the local communities. The introduction of an industry-wide standardised environmental audit procedure and the application of the highest application of standards such as the ISO 14000 is envisaged (SAPPI Annual Report, 2000). However, the introduction of ISO does not account for natural resouce management valuations. Issues pertaining to the

effectiveness of ISO14001 have been raised in terms of the ability to apply the provisions of ISO14001 throughout the full chain of custody, thus guaranteeing that downstream growers and suppliers will adhere to the same standards as the bigger corporations (Menne, 1999; Menne, 2001).

The first of these multiple-land use planning forums have been established in the Wakkerstroom area. According to Elna Kotze (1997) of the Wakkerstroom Natural Heritage Association the impacts of the forestry industry in this area have been massive and are in the proces of being quantified. The community had moved into this area and attempted to save the wetland from encroachment by the forestry companies. The wetland, which it is argued plays a major role in the livelihood in the area, has been totally ignored as an option for developing a thriving eco-tourist area as opposed to the large scale afforestation that is being planned for the area. The corporations argue that the impact of forestry will be negligible but are not able to back this up with a substantive impact assessment.

In addition, members of the nearby villages who are suffering from the effects of prolonged unemployment due to the slump in mining activities in the eastern Transvaal highveld, are being lured by the promises of an industry which will provide them with a livelihood that currently does not exist. This scenario is further impacted on by the involvement of the local civic association and trade unions who are divided in their desire to see sustainable long term employment in the area without damage being caused to the local environment. Workers are cautious of the promises being made by big industries and their record of retrenchments.

However, it would appear that the moratorium on the issuing of new permits has provided the community with a breathing space so that they may speedily establish the *local integrated land-use planning forums* that are to be run by the provincial governments in conjunction with the communities and other stakeholders.

Another area that has been severely impacted on is the St. Lucia coastal zone in south eastern KwaZulu\Natal. The debate surrounding Richards Bay Minerals' plans to mine the eastern shores of Lake St. Lucia has met with resistance from community organisations who are in favour of the entire wetland area being turned into a park. This would strengthen the area as a major tourist

site. However, during the course of the revegetation of these areas along the eastern shores of the lakes, certain tracts of land are being planted up with trees for foresting purposes. These forests are being mixed with some of the indigenous plantations, but the impact on the biodiversity of the area has been negative (Wildlife Society of Southern Africa, 1991).

In essence the primary concern regarding the commercial plantations relate to the severe environmental impacts of monoculture (Carrere and Lohmann, 1996; Bright, 1998; Van Wilgen, 1999) . These impacts include:

- the loss of biodiversity in instances where plantations have replaced indigenous forests. This is clearly demonstrated in the example above;
- impacts on water resources. As monoculture species have a higher rate of water uptake compared to natural forest, there are significant impacts on the ground water table;
- competition with land for other uses. The pressure to expand has already been dealt with in previous paragraphs.

A point of great concern, due to the impact that it has on other aspects of the environment and development debate, is the nature of the forestry permit system.

The permit system was devised in 1972 and the assumptions on which the exploratory studies were done are no longer valid. There is also concern that the permit system is not able to sufficiently take into account the differences between the catchment areas, and that permits are thus inappropriately allocated. An additional concern is that the permit system was only introduced in 1972 and has only been applicable to new afforestation. As a result almost 70 percent of forestry plantations are not regulated by permits (Johns, 1993)

According to a Wildlife Society study (1991) it was noted that.." riparian zones on state forestry land are overgrown with no sign of reparation. In fact, on some of the state forestry land, new plantings are in direct contravention of the 20 metre rule " . This has important significance in a situation where the state is attempting to regulate the behaviour of the major private forestry companies, yet itself does not have a clean environmental record. Numerous documented cases

exist where planting still takes place within the riparian zones, and the FSC is being criticsed for lax application of standards such as the continued de-stumping of clear-felled areas with sulphuric acid (Dutlow, pers comm, 2001).

5.3.2 Impacts on Biodiversity

Empirical studies and other evidence indicate that tree farming has a marked impact on biodiversity generally (Bright, 1998; Benyus, 1997; Carrere and Lohman, 1996; McNeely, 1998; Owusu, 1999) and in a number of areas of South Africa (Armstrong et al, 1998; Armstrong & Van Hensbergen, 1996; Armstrong et al, 1996; Van Wyk, pers. comm., 1999).

Plant and animal species have been made extinct or are threatened by afforestation, and afforestation is largely responsible for the endangered status of one Veld Type, in KwaZulu-Natal (Armstrong et al, 1996; Armstrong et al, 1998; Armstrong & Van Hensbergen, 1996; Richardson, 1997). McNeely (1997) suggests that there is clear evidence that the introduction of exoctic species may have wide-ranging effects on community composition and dynamics, altering productivity, soil structure, nutrient cycling and water chemistry.

Timber farming affects all three components of biodiversity, namely composition, structure and function. This includes the elimination of genes, populations and species, change in communities, and change in landscapes. This is seen especially in the context that most plantations in South Africa are in the grassland biome (Van Wyk, 1999; Armstrong et al, 1996; Bright, 1998; Daily, 1997).

In South Africa, the example is cited of black wattles that pose a threat in the replacement of biologically diverse systems with single (or mixed) species stands of aliens, alteration of fire regimes, alteration of hydrological cycles and the destruction of riparian habitats (Van Wilgen, 1999).

Van Wilgen goes on to argue that increasing afforestation and spread of invasives may lead to even greater landscape-level changes due to cumulative impacts and the impact of habitat fragmentation. This is supported by Armstrong et al (1996).

In the case of wattle, invasion is likely to contribute to the fragmentation and reduction in the range and distribution of species which it displaces. This will ultimately result in reduced biodiversity and even extinction, especially in some regions that are sensitive to disturbance.

Biome/Veld Type	Number of Species	% Destroyed	% Conserved
Renosterveld	86	No figures	No figures
Grassland	82	60	2.4
Succulent Karoo	74	21	2.1
Fynbos	68	33	6
Forest	51	44	24
Nama Karoo	47	<20	0.47
Thicket	Unknown	44	6.4

Table 3: Biomes of SA : Mean species richness and conservation status

Plantations affect biodiversity structure by :

- changing vegetation structure in the planted areas from an open graminaceous form to a woodland form;
- altering the distribution, biomass and abundance of grassland plants, animals and micro-organisms;
- changing the fire regime;
- reducing habitat heterogeneity (mono-culture plantations);
- reducing connectivity between unplanted areas, and
- increasing patchiness and fragmentation of the landscape.

During the Cape Action Plan for the Environment, Cowling et al (2000) found that the overwhelming factor in terms of extent of landscape and habitat transformation is agriculture and forestry, especially on the lowlands where 31% of the natural habitat is thus transformed.

During investigations as to the impact of tree farming on avifauna in Mpumalanga it was found that where most afforestation had accurred, or potentially could occur, were areas that had a high diversity of grassland birds. The species diversity of grassland birds, and especially those threatened worldwide, was significantly and negatively correlated with the extent of afforestation (Armstrong et al, 1997).

Van Wyk (1999) argues that significant amounts of key tracts of the various biomes in South Africa have been transformed to the extent that the ecosystem functioning has been seriously threatened. Some of these comparisons are highlighted below.

In particular, Armstrong & van Hensbergen (1996), Armstrong et al (1997), Carrere and Lohmann (1996), Richardson (1998), McNeely (1998) found that plantations affect biodiversity function as seen through the following key documented examples:

- remnant grassland habitats may become isolated from larger areas of the same habitat type, thereby affecting demographic and ecological processes;
- gene flow between populations of a particular species in a region is likely to be reduced;
- soil properties are changed in planted areas resulting in extinction of certain soil organisms; and
- changes in ecosystem functioning such as nutrient cycling and energy.

In assessments comparing tree plantations with dairy farming, livestock farming, crop farming and sugar farming, it is perceived that tree farming has the greatest impact on water, soil , the social environment, biodiversity and the landscape (Armstrong et al, 1998; Armstrong and Van Hensbergen, 1996).

Key issues revolve around cumulative landscape-level transformation, and historically large areas of the grassland biome have been transformed by agricultural activity. Predator- prey relationships are affected as more and more of the landscape is transformed from grassland to plantations Armstrong et al, 1998; Van Wyk, 1999).

Considerably fewer small mammals occur in plantations compared with the grasslands that are replaced by trees (Armstrong & Van Hensbergen, 1997). In addition, fewer predators of small mammals could be supported with an increasing amount of afforestation, reducing species diversity and further affecting the food web and interactions among species.

5.3.3 Plant invaders and afforestation

Richardson (1997) has documented the introduction of alien trees through the set-up and development of large plantations in South Africa. Initially afforeststation with alien pines was driven by the belief that such plantings were beneficial to the environment and trees were often planted to repair damaged ecosystems. The impacts of these plantings were thought to be negligible.

However, in recent years, the realisation has occurred that these plantations have significant impacts on the environment and ecosystems (Richardson, 1997; Armstrong et al, 1998; Van Wilgen, 1999). Most plantations have transformed grasslands and scrub-brushland habitats. In key sites it was thought that grasslands were unsuitable for agriculture or grazing, but little thought was given to the richness in native biodiversity (Huston, in Richardson, 1997). Commercial forest plantations often serve as a source from which alien plants escape and start invading the surrounding indigenous natural vegetation (Lloyd, 2000).

The establishment of plantations in such sensitive areas alters vegetation structure, biomass distribution, plant density, vegetation height, leaf area index, litterfall and decomposition rates, fire behaviour, nutrient cycling and energy balance (Richardson, 1997).

The invasive spread of alien trees into areas ajdacent to plantations means that the negative impacts of practicing forestry with alien species are spilling over into areas set aside for conservation. Most impacts are detrimental to the invaded systems and threaten sustained functioning and the provision of important ecosystem services (Armstrong et al, 1997; McNeely, 1998; Richardson, 1997).

Within the context of large scale commercial afforestation, detailed cost-benefit amaylses for invasive alien trees that are also important economic crops are scarce. However, invasive pines have a major impact on catchment hydrology in the fynbos biome with run-off being seriously reduced (Scott et al, 1997) . In certain areas, perrenial streams are reduced to seasonal ones, with the resultant impact on acquatic biota.

The aggressive spread of agro-forestry species has led to the development of dense thickets which have rendered invaded land useless for normal farming and a range of economically beneficial tourism activities.

Richardson (1997) argues that the situation is generally more complex in the case of commercial forestry because multinational forestry companies frequently wield considerable economic and political power, especially in developing countries and because the methods for developing the full costs of the invasions, especially in conservation areas, is poorly developed.

Proponents of the plantation industry argue that the industry cannot be held responsible for the invasion of non-commercial lands by alien species although many of these species have entered South Africa through the commercial afforestation programmes (Fairbanks, personal communication, 1999; Edwards, 1999).

Several major studies have clearly outlined the serious threat that plant invaders pose to the natural and semi-natural ecosystems in many parts of the world (Van Wilegen , 1999; Holmes & Cowling, 1997). In particular fynbos shublands are a major component of the Cape Floristic Kingdom with high species endemism and highest recorded plant species densities for any temperate or tropical region in the world (Cowlinget al, 1992). By 1985 20% of the fynbos Kingdom was estimated to be invaded. The Cape Peninsula supports 310 km2 of natural vegetation of which 11% in invaded by dense alien stands and a further 33% is lightly invaded.

Invasion of fynbos by A.Saligna causes a reduction in local diversity and in the cover and frequency of remaining species, as was found for fynbos afforestd for 35 years by Pinus Radiata (Holmes & Cowling, 1997). In many of the invaded areas of the Western Cape the studies conducted by Holmes & Cowling indicate near total elimination of indigenous species.

5.3.4 Ecotoxicology, chemical pollutionand industrial effluent

External demand for South Africa wood products has been seen as an important stimulant for the South African economy (DWAF, 1996). The development of a processing industry around this has taken place over the last 40 years.

Cultivating large stands or areas of mono-culture plantation of alien species require intensive use or a range of herbicides, pecticides and fertilisers in the growing phase.

The forestry industry produces a range of industrial effluents and makes use of a range of chemicals in various stages of the processing operation (Emanuel, 1992; Ritchlin & Johnston, 1999).

Reliable studies show that biocides, heavy metals, acidification and agricultural and forestry practices cause changes in the soil composition and in decomposition and nutrient cycling,. Pentachlorophynol is used in the forestry industry world-wide due to its fundtion as a biocide. The PCP enters the soil mostly through use in the sawmills (Salminen & Haimi, 1997) and adversely affects the composition of nutrients as discussed above.

A range of noxious chemicals, some categorized as carcinogens, such as chlorine, are frequently used in the processing of pulp and paper, also known as the kraft process. Exposure to chlorine is documented as having significant impacts on workers and communities exposed to chlorine resulting in chronic rhinitis (Leroyer, 1999).

Air and land discharges of effluent from mills pose a range of hazards to both employees at the mills as well as communities living nearby to these facilities. The majority of emissions, both planned and accidental are discharged into various waterways and public sewage systems having

a significant effect on marine, aquatic and birdlife (groundWork, 2000; Ritchlin & Johnson, 1999).

South Africa saw a number of developments in the industrial procesing of wood products:

- A Rayon mill was built in the coastal town of Mkomazi in approximately 1950. Effluent was pumped directly into the river, which then flowed out to sea;
- A SAPPI mill was built on the Tukela in the town of Mandeni. Residents claim the smell and noxious odours are detectable from 50 km away, and the liquid effluent is sprayed onto a large tract of land near the mill;
- The Mondi and SAPPI plants at Ngodwana and Richards Bay have seen communities arguing that there is a link between the respiratory diseases in the area and atmospheric pollution from these mills.

On forestry plantations, herbicides and insecticides are sprayed manually or by aeroplane. These consist mainly of glyphosphate, garlon, picloram and in some cases paraquat (Emanuel, 1992). A great deal of controversy has surrounded the application and monitoring of these chemicals with the need to strongly monitor the impact on worker and community health (Millwatch, 1998; Carrere & Lohmann, 1996).

In many cases the preparation of hazardous chemicals for weed control or pest control takes place in an area where workers are most impacted. Often the effect of aerial spraying is the resultant spray-drift which exposes workers on nearby plantations to the negative impacts of various control agents. For some days after the application, chemicals are often still present in vegetation and soils.

The spraying of forests with various pesticides and biocides to control gypsy moth and varius other perdators has been shown to affect birdlife both directly and indirectly through dietary factors. This is more often than not due to the decrease in insect prey abaundance. Foraging behaviour is also affected along with and fat levels in adult songbirds (Salminen & Haimi, 1997).

It can be concluded that there are significant impacts from the waste waters and effleunts being emitted from the pulp processing facilities

5.3.5 Streamflow reduction and scarce water resources

The plantations are estimated to reduce mean annual streamflow by 3.2 % and low-flows by 7.8% (Scott et al, 1998). The highest concentration of plantations take place in Mpumalanga at 7,2% of land area and this region experince the largest reduction in flows – almost 10% of total flows. In Northern Province the highest relative impact on flow reduction is seen where plantations are concentrated in humid upper catchment areas that are the principal source of dry-season flow in otherwise dry secondary catchments (Scott et al, 1998).

Although the research completed by Scott et al (1998) appears relatively comprehensive, concerns abound (SAWAC, 2001) that these streamflow reductions and estimations of afforested areas are based on models and surveys completed in 1993. Areas of non-commercial plantings have largely been excluded from the various studies (Scott et al, 1998) and do not cover areas such as woodlots and wattle invaded areas, and plantings at power stations and mines on the highveld. The study also confims that a number of the newer plantations or recently afforested areas have not been accounted for as these plantations will only be visible once a 60% canopy cover is reached. Areas in the north-eastern Cape have experienced rapid afforestation since 1990. Indigenous forests were also mapped but excluded.

Water in South Africa is an extremely scarce resource and will play a critical role in future social and economic development. The average annual rainfall is approximately 500mm per annum. Coetzee and Cooper (1991) are more specific stating that most of the arid or semi-arid areas receive less than 250 millilitres per annum.

Sixty five (65%) per cent of the country receives less than 500 mm of rain annually which is regarded as the minimum for successful dryland farming (Fuggle and Rabie, 1995) and this impacts on the competition between land earmarked for agricultural or forestry expansion. Except for the eastern and southern coastal areas, most of the interior and western parts of the

country are arid or semi-arid regions. About 20 per cent of the land receives less that 200 mm of rain per annum. Potential evaporation ranges from 1100 mm in the east to 3000 mm in the west and is in excess of the annual rainfall.

Surface runoff is reduced through high evaporation losses as the potential evaportranspiration exceeds the rainfall over most of the country as has been argued. Fuggle and Rabie (1995) state that this runoff amounts to approximately 53 500 million cubic metres annually. One of the arguments forwarded for the expansion of the forestry areas, is that extensive afforestation will prevent further run-off and this can be put to use in the form of generating employment opportunities via an expanding forestry industry whilst contributing to better water resource management practices (DWAF, 1996).

The demand for water is also growing rapidly. According to Cooper (1993), DWAF (1996) , Agricultural Research Centre (1995) and Fuggle and Rabie (1995), the main sources of water utilisation are irrigation, mining, forestry, municipal and domestic use, industry, power generation and nature conservation. It has been noted by the abovementioned parties that the amount of water necessary for natural flushing of estuaries has been underestimated, and that too little water is allocated to sustain the natural environment.

Large scale tree plantations modify the following (WRM, 2000):

- The ratio between the amount of water intercepted by the foliage and the amount of water reaching the ground – the soil will tend to receive either more or less water than it received under its natural vegetation;
- Ratio of amount water which runs off the surface and the amount which is absorbed by the soil;
- The ration between the amount of water evapotranspired and the amount that enters the subsoil water supply.
- Changes to the water cycle leading to water deficits resulting in turn in the following impacts -:
    - Reduced availability of water for other agricultural production and industrial activities;
    - Problems of water supply for hydro-electric generation systems;

- Discontinuity of flow of watercourses in low periods.

Mozambique's rivers all originate somewhere else and according to research conducted by rural development organisations (Swift, pers.comm.,1997) by the time the water reaches Mozambique it is either badly polluted or the water has been reduced to a mere trickle and is insufficient to meet the agricultural needs of the central and southern areas close to Maputo.

Mozambican government authorities contend that a number of South African dams on the Injaka and Inkomati rivers in Mpumalanga and the increased agricultural and forestry usage of the Crocodile and Olifants rivers have aggravated the situation to the point where many of Mozambique's once major waterways have ceased to flow (Mail & Guardian, 19/10/1995; Gouws, Uys and White, pers.comm., 1996)

According to Willem Labuschagne, Director of Legal Services for Water Affairs, water supplies should increase when programmes such as the eradication of invading alien plants along water courses in South Africa begin to take effect. He argues that these invader plants can consume up to 30 percent of river-borne water. However, no mention is made of the possibility of re-establishing these areas with indigenous vegetation in order to prevent the possibility of soil erosion in these areas. This point has been raised by Jeunesse Park (Trees for Africa, pers.comm., 1998). To date no firm commitment has been given by the Department of Water Affairs and Forestry as to how they will prevent additional soil degradation due to loss of top soil in these sensitive areas.

What needs to be taken into account in this debate between concerns regarding the sustainability of expanding the forestry industry and the resultant water problems that will occur should the expansion programmes be put into place (Menne, pers.comm.,1999; Owen, pers.comm.,1999) .

5.3.6 An agricultural trade-off?

Land resettlment and the old land reform policies in South Africa have had major impacts given the nature of land use in South Africa (Ramphele, 1991). The resultant degradation due to overcrowding and overgrazing have had serious environmental and economic consequences

which impact severely on agricultural production and the ability of rural communities to sustain themselves. This includes the ability of communities to practice any form of subsistence farming.

The debate around the redistribution, restitution and tenure reform programmes have raised a number of issues which have led to "stand-offs" between farmers (both agricultural and forestry) and a number of rural communities regarding the re-allocation of land to rural communities for the purposes of small scale farming initiatives (Cock and Koch, 1993; Meulman, 1997; Menne, 1999). This land conflict has important consequences for the development of an integrated approach to land reform which should seek to integrate environmental concerns into the future agricultural, water and forestry practices.

According to Scotney and McPhee (1992) approximately 1.5 million households are dependent on agricultural production and roughly 200 000 hectares of arable land are lost to urbanisation each year. If one considers that a fair number of the forestry plantations are located in prime agricultural areas, and that these areas are subjected to rapidly escalating soil fertility problems and degradation (Laker, pers.comm, 1999) , one is able to deduce that these areas are destined to play an increasing role in the land conflicts and land use planning prioritisation.

The agricultural and rural sectors play a crucial role in the quest for sustainable development in South Africa. It is argued by Cooper (1993), Cock and Koch (1993), Reynolds (in Rampele, 1991) and Schrire (1992) that the resources in these areas are extremely fragile and that they must be protected.

South Africa's level of agricultural output is fairly high relative to the resource base. But it must be noted that only 3 percent of the land (or 4 million hectares) in South Africa is high potential agricultural land although 13.5 percent of the land is suitable for some form of crop production. Of this, 86 per cent is under crops. Coupled with the low and irregular rainfall that we experience, this places a limitation on the crop potential of large areas of the country.

Mapping of high potential agricultural land and high rainfall areas coincide strongly with a number of key plantation developments. The argument forwarded by the rural development

agencies (Swift, 1997) is that a great deal of South Africa's prime land has been planted up with pines, wattles and acacias at the expense of maintaining this prime agricultural land.

Pott (1997) argues that the impact on biodiversity, social and water from dairy farming is higher than both sugar and tree farming, thus making a case during his assessment for other forms of agricultural development, prioritising tree farming. However, as has been evidenced by Armstrong et al (1998) the scale of the studies and assessed impacts has been of grave concern during these studies, and that they key factor of transformation by the farming sector is not adequately addressed. However, the key result from the ctitiques of Pott's studies is that tree farming, and not agriculture, account for the highest percentages of land transformation in a number of provinces.

An additional point to consider is that based on the studies it is evident that the structure of pasture and sugarcane fields is more similar to that of grasslands than timber plantations (Armstrong et al, 1998).

These concerns point toward the fact that the plantation industry is arguing that tree farms are more desireable than other forms of agriculture from an economic point of view, given their direct economic value rated in price per ton (De Wit and Cooke, 1999), and are thus attempting to mitigate the impacts of the tree farms versus the impacts of other forms of agriculture. This will have implications for future agricultural policy and the inter-relationship between food security, land redistribution and resititution, water security, rural development, social upliftment and general agricultural development.

5.3.7 The cost of genetic manipulation

In order to develop a competitive industry new pressure are being placed on forestry companies to grow more product at a faster rate in order to keep up with the demand for products (Abramovitz, 1998; Carrere, 1996).

Genetically Modified (GM) species are being introduced as a means through which the industry believes it will be able to meet this demand. Key arguments in favour of the use of genetically

modified organisms are that they will require less growing time (shortening rotation cycles), require less water and fertilizers (able to cope with growth in drought sticken areas and potential marginal lands not currently suited to forestry) , require less pesticides and herbicides, and be able to produce better quality trees with less floors in the wood.

However, research indicates that this move will have significant impacts on biodiversity and ecosystems (Owusu, 1999). The more obvious and easily identifiable risks and impacts are listed:

- Where plantations of, or trials of, GM trees species are established close to pools of naturally occurring wild relatives, the risks of genetic pollution will be high;
- Gene flow can occur over substantive distances (600 km or more) and thus the potential of gene escape is high. Examples of such cases within the agricultural sector are already being reported;
- The introduction of trees modified for rapid growth will mean shorter, more intense rotations, greater water demand and reduced opportunity for nutrient recycling;
- In terms of herbicide tolerance, if the seed of non-sterile, herbicide tolerant trees is easily dispersed, the control of woody invasives in some pasturelands and sensitive ecological areas will become increasingly difficult; and
- Fast growing transgenic tree species could also become invasive weeds, disrupting natural forest ecosystems.

The World Wildlife Fund (1999) argues that while forest-related biotechnology research is still in its infancy compared to that taking place in agriculture, field trials of GM trees have proliferated around the world during the second half of the 1990's.

Owusu (1999) argues that given the shorter rotations of genetically modified tree plantations, the scenario exists that over the course of two or three rotations, site productivity would begin to decline, requiring increased fertilizer inputs or potentially leading to land abandonment. The key argument here is that the land base required to support plantation activities would expand more rapidly than previously anticipated,

possibly impacting on natural forests and sites of high biodiversity value. He goes further to state that most GM trials do not even consider nutrient and hydrological cycling issues.

Thus Owusus and the WWF argue that the basis for conducting a substantive assessment of the impacts of this technology are already floored and the true impacts will only be evident when it is too late to remedy the situation. They urge a moratorium on the further planting and commercialisation of GM tree crops until sufficient assessments have been completed regarding the nature and impacts of this technology.

5.4 Counting the social cost

What is not taken account of during the debate surrounding the possible expansion of the forestry industry is the current means of operation within that industry and how this industry impacts on the communities within which it operates and from which it draws its labour (Carrere & Lohmann, 1996; McNeely, 1998; WRM, 2000; Meulman, 1999).

Interviews with the Farm Workers Resource and Research Project (FRRP), members of the Farmworkers Union, the Transvaal Rural Action Committee (TRAC) and communities in Driefontein and Wakkerstroom (Chown, 1996) , indicates that the social costs of the forestry industries operations are seldom accounted for.

Whilst the forestry industry argues that it provides roughly around 1 million jobs (both direct and indirect), deractors argue that there is little mention of the conditions within which workers must live and work.

Critics argue that the true facts surrounding the employment practices are not easily accessible as the conservative forestry companies resist any form of "interference" by the trade unions (WRM, 2000; Husey, 1996). In addition the forestry companies are reluctant to provide figures on their retrenchment exercises over the past few years which, according to FRRP, provides a different picture to that provided by the forestry plantation companies themselves.

A number of key issues have been articulated by the communities affected by the industry as well as by workers within the industry (Carerre & Lohmann, 1998; Menne, pers.comm):

- With regard to specific actions regarding the use of chemicals, the industry should move toward a situation where it reviews its use of pesticides, herbicides and fertilizers. A specific example based on overseas trends would be, for example, the choice of lepidoptera-specific insecticides for use in pest control programmes as opposed to organophosphate or carbamate insecticides would represent a significant step toward environmental protection and conservation of species diversity, as it remains. (Holmes, B, Journal of Applied Ecology, 1998, 35:185 – 194)
- Loss of natural surface water has meant that communities can no longer grow crops such as bananas, tomatoes, potatoes and cabbages without irrigation which was not the case prior to the arrival of the plantations;
- Pastoralists with cattle and goats are forced into areas where there are a few remaining natural springs and rivers – damage to rivers and stream banks, pollution of ponds and springs now makes the water unfit for consumption;
- Community food security is threatened as areas traditionally used for growing fruit and vegetables becomes too dry or are shaded out when plantations are established too close to the fertile areas along streams and rivers.

It appears from interviews with critics of the industry that many of the women who are injured and lose their limbs complain that they are not compensated by the companies for whom they work (Meulman, pers.comm. 1998, Rural Women's Movement, 1997; Transvaal Rural Action Committee, 1997). The trend within the industry appears to be to move toward contract and casual labour in order to avoid the costs and labour issues associated with the empolyment of a large permanent work force (Carrere & Lohmann, 1996).

The industry has done much to promote rural development in line with the governments two key projects : the Reconstruction and Development Programme, and the Rural Development Strategy (DWAF, 1996; Edwards, 1999). This has largely been in the areas of establishing community woodlots and through the "outgrower" schemes launched by SAPPI and MONDI. This is aimed at ostensibly building social infrastructure and creating wealth for local communities.

Whilst it is evident that the industry does attempt to involve local communities in various schemes such as the out-grower schemes (SAPPI Annual Report, 1999) but there appears to be a number of key problems associated with the development of this strategy. The social and some environmental impacts are highlighted (WRM, 2000; Carrere and Lohmann, 1996):

- the perception that these are used as a means to circumvent the moratorium on further afforestation in provinces such as Mpumalanga (Swift, pers.comm, 1998);
- Prospective woodlot owners are not warned of the impending social and environmental costs of woodlots;
- No warnings are provided not to plant in wetlands, or close to rivers and streams;
- Communities are not told they will have to provide other land for their livestock to graze on;
- The long rotation cycles are not explained to communities, resulting in a loss of income for seven years; and
- The companies do not always guarantee to buy the crops from the farmers.

This is where the interface between the land reform process and the forestry industry expansion comes into play. It has been acknowledged by DWAF (1996) that the permit system for expanding forest land and the permits system for water rights to irrigate forest land has been abused. Currently the entire body of water legislation has been reviewed including farmers riparian rights to water that flows through their property (DWAF, 1998) .

Critics argue that large companies who are attempting to circumvent the moratorium on the expansion of plantations, and who cannot obtain water for irrigation purposes as the tracts of land they poses are larger than 500 hectares, are exploiting the problems created by the redistribution and land restitution programmes (Menne, pers.comm. 1999; Swift, pers.comm, 1997). However it must be noted that organised agriculture (which now includes certain of the forestry umbrella bodies) have already indicated that they will fiercely resist any initiatives that " will erode their rights to water - especially at a time when years of drought have pushed farmers backs against the wall" (Mail & Guardian,13/10/1995).

Case studies in the Wakkerstroom, Driefontein and Maputoland areas have revealed that the conservative farmers that are scared of losing their land under the governments restitution and redistribution programmes, are sub-dividing their lands and either letting them directly to the forestry companies (which enables the forestry companies to by-pass the water permit system and the need to apply for permission to afforest additional tracts of land), or " voluntarily " selling the land to the aspiring black farmers under the Department of Land Affairs Pilot Programmes (Swift, pers.comm. 1997; Jacobs, pers.comm, 1997).

It is argued by Swift (1997) and Jacobs (1997) that the tracts of land that are bought up by the government for redistribution purposes, and that are being returned to communities as a result of the land claims they have instituted , fall prey to a similar kind of scenario.

As soon as the communities are resettled on the land, the forestry companies take advantage of the fact that these communities have little or no farming skills, or the capital, to embark on farming projects (in cases where they do have the skills) according to critics.

Swift (1997) and Jacobs (1997) criticise the above practice stating that the forestry companies offer the land owners the opportunity to generate income over a fair period of time by leasing the land from the community or individual land owner, and offer to plant up the area with trees provided by the foresting companies. Thus they effectively have bought up the use value of the land and the chances of that land being used for long term sustainable agricultural practices is lost.

The rural communities have needs that cannot be met by the expanding forestry plantations. In particular social forestry, permaculture, woodlots, intercropping, woodlands and indigenous forests, and agroforestry receive limited attention in comparison to the needs that are deemed to suit the large forestry companies such as the out-grower schemes and farm forestry (Carrere & Lohmann, 1996; WRM, 2000).

One of the key concerns forwarded by the rural movements and communities themselves is the concern that they are also being exploited by the government and the World Bank schemes. What occurs in these cases is that communities are given their land back and are provided with access

to credit by the financiers of the land projects. The conditions under which the loans are granted places the aspiring farmers under great pressure to produce enough food to meet their own needs, as well as enough to sell in order to pay back the credit granted to them (Husey, 1997). This often leads farmers to adopting unsustainable farming practices together with a reliance on a range of pesticides and herbicides, which start the process of soil degradation.

In many cases, these farmers have given way to the pressures placed upon them, and approached the forestry companies to enroll on the out-grower schemes. The consequence is that the forestry industry is able to expand into areas not necessarily monitored by the government, and that valuable agricultural land is being lost to forestry (Swift, pers.comm., 1997; Jacobs, pers.comm., 1997).

The social impacts cannot easily be divorced from the environmental and economic impacts and considerations. However, what is lacking in most of the analyses is the integration of these impacts in order to understand the interrelationship between them.

It is evident from the assessments that the planation industry provides significant benefits to the economy and the social infrastructure. However, it is argued that the social benefits are accompanied by a range of social and environmetal costs that are not fully articulated or understood especially by the promotors of the forestry industry (Carrere and Lohmann, 1996; Abramovitz, 1998; WRM, 2000; Menne, pers.comm, 1999; Swift, pers.comm., 1997).

5.5 Economic Considerations – balancing the "triple bottom line"

It has become increasingly difficult to divorce the various aspects of the forestry industry from one another. The nature of global economics and the globalisation of industries and markets for wood products means that forestry companies are having to deal with increasing number of competitive pressures forcing them to seek new ways of maintaining their competitive positioning (Abramovtiz, 1998; Carrere and Lohmann, 1996; WRM, 2000).

The mono-culture tree plantations are increasingly being promoted in southern countries such as South Africa, Brazil, Chile and Indonesia as means by which to secure rapid growing supplies of

relatively high quality wood and fibre to fuel the growth and consumption of wood based products. (Carrere and Lohmann, 1996; Abramovitz, 1998). There is adequate access to inexpensive land, low labour costs and a fast tree growth regime which makes wood especially cheap (WRM, 2000).

National governmental economic strategies favour the development of the forestry industry siting key drivers such as the generation of direct and indirect employment, increasd exports and support for the countries development (WRM, 2000; Carrere and Lohmann, 1996; Abramavitz, 1998). A key driver is the need to reduce prices and keep foreign exchange flowing into the country.

The impetus for plantations is not driven by a locally expressed need (Owen, pers. comm. ,1999; WRM, 2000; Abramovitz, 1998), but through a range of actors with significant financial interest such as the multilateral development banks, aid agencies, consultants in developed countries, technology suppliers, and export credit agencies. It is argued by organisations such as World Rainsforst Movement that shiting pulp production to southern countries, as the northern supplies dwindle and as communities become more demanding of the standars set by the northern idustries, is a growing priority (WRM, 2000).

Southern governments to a large extent provide a number of hidden or overt subsidies and benefits which favour the implementation of plantation strategies. These include:

- direct subsidies such as payment of plantation costs; tax breaks; incentive schemes; relaxation of local law or restrictions on planting conditions; and,
- indirect subsidies such as government forestry research, road and port infrastructure, soft loans;
- cheap land in large quantities;
- low labour costs that are attractive to northern forestry companies;
- looser environmental regulations which are less of a hurdle to clear;
- encouragement by governments in the south to build pulp and paper mills in the developing countries through favourable financing agreements as mentioned above.

However, there appear to be a number of negative aspects and risks to the economic picture (WRM, 2000) :

- agroexport models which favour large-scale tree plantations create national level problems – one such problem is the concentration of wealth given that large scale industrial plantations require state support, and heavy, long term investments;
- as land is concentrated and transformed, local economies are destroyed and local people cut loose to seek niches as producers, consumers recyclers or commodities;
- risk of national dependence on a commodity prone to wild and irregular price fluctuations increases;
- the indiscriminate expansionism policy may lead to a glut of raw material, making cultivation progressively less profitable;
- Southern countries will need to start competing amongst one another at lower and lower prices, for industrialised buyers.

The overall financial risk, whilst in the short term seeming relatively manageable, may lead to rising financial losses as the true impacts of the North-South trading regime forces southern economies to operate at lower and lower prices whilst conversely increasing the costs in terms of rehabilitation, land conversion, loss of biodiversity and loss of a range of economic functions fulfilled by land now used for tree plantations (Benyus, 1997; Bright, 1998; WRM, 2000).

The forestry industry believes that it is in the interest of the broader South African community that expansion proceeds as soon as possible (DWAF, 1996; Edwards, 1999). However, what must be noted here are the conflicting reports that emanate form the industry and the ministry governing the industry itself.

Several reasons for this have been forwarded, in particular the reason that the ministry has a dual role: that of "policing" and promoting the forestry industry, and that of championing the rights and interests of the various other stakeholders (Owen, pers.comm., 1999; Menne.pers.comm., 1999).

Industrial plantations bring about a number of problems for people affected directly by these strategies (Carrere & Lohmann, 1996; WRM, 2000; Menne, pers.comm., 1999; Owen, pers.comm., 1999; Swift, pers.comm,1996). These impacts are:

- expulsion of rural people to make way for large plantations;
- these people either become plantation workers (usually seasonal or casual labour where working conditions are argued to be less than favourable) or migrate to informal settlements as the plantation industries create less jobs than the agricultural activities which they substitute;
- significant changes in the local power balance due to their economic power, thus becoming the main decision-makers in whole regions;
- plantations are not able to strengthen the local economies and secure the production of a range of local produce such as mushrooms, which would traditionally come from an integrated approach to community forestry;
- plantations do not assist local communities in securing a supply of fuel-wood given that a significant section of the rural and peri-urban community depends on fuel wood as a source of energy;
- many of the small farmers and subsistence farmers are being forced to move off their lands, migrate and lose their cattle;
- those farmers involved in outgrower schemes are not adequately informed about the costs of services provided by the companies; and,
- they are not told how difficult and expensive it will be to convert their land back to pastures and other crops.

Community groupings argue that there are a range of additional impacts on communities, most notably:

- with the expansion of plantation landholding many pastoralists have lost their land;
- most of the work created by the companies is sourced out to contractors who are not obliged to offer the normal fringe benefits associated with normal employment; and

- many contractors use illegal immigrants who are prepared to work for lower wages and cannot belong to a labour union.

Carrere and Lohmann (1996), Abramovitz (1998) and the WRM (2000) argue that a key aspect of the debate around forestry is linked to economics and productivity, and this is where the pro- and anti- arguments are most juxtaposed:

- as with tree plantations, native forests produce wood which can be sold, but they also produce many other kinds or products that are not factored into the overall economic equations;
- the true value of a range of medicinal plants, vegetable fibres, game, fruits as well as eco-system services such as soil conservation, water resources, biodiversity protection and the maintenance of micro-climates are in no way factored into the broader economic arguments; and
- tree plantations appear to be economically superior to native forests simply by comparing the volume of wood that can be extracted, but this is a limited view of the functional economic value of other forms of land utilisation.

However, if one compares the overall number of goods and services provided by tree plantations and other land forms (native forests, grasslands, wetlands) it is apparent that the latter may well be more productive given the range of unaccounted for ecosystems services available (Benyus, 1997).

It may further be argued (WRM, 2000) that what a tree plantation produces in terms of food, medicine or ecosystem services and has in fact a negative production given the detraction from the value of other resources such as water, soils or biodiversity.

In terms of social stability and economic growth forestry companies have been through a rash of downsizing exercises as a response to the economic cycles that hit them over the last few years. Many of the larger organisation could not compete on quality of their goods and services as they had not invested significantly in the development of their people (Bethlehem 1992). Retrenchment and labour cut-back exercises have been one of the major ways in which the industry has attempted to cut overhead costs whilst they redefined their competitive advantage,

and re-engineered themselves. This appears to be a continuing trend as SAFCOL transitions through the privatisation process (Poyry, 1995; Cress; 1999).

This ongoing process of instability in the employment cycle means that significant numbers of people have been left without jobs resulting in potential for the development of a range of social problems (McNeely, 1998; WRM, 2000; Menne, pers.comm.,1999).

It is argued that while the forestry industry earns R 5 billion in foreign exchange, this needs to be weighed up against the billions of rand that will be spent on simply providing water to the forestry zones, or alternatively supplying water to the cities or agricultural lands that has been used for forestry instead (Owen, pers.comm, 1999) . The cost of the Lesotho Highlands Project, aimed at supplying water largely to Gauteng, is estimated at R 18 billion per year to date. The complexity of the economic trade-offs are brought to light here.

MONDI claims that through its out-grower schemes it has already paid out close to R 14 million to the communities involved in these schemes (MONDI Annual Report, 2000). However, it does not bring into the account the money that has been lost through the lost agriultural potential of the land that may have been more productive had it remained under agriculture. Since no proper assessments of the areas have been done prior to the schemes being implemented, it is hard to conduct any form of cost-benefit analysis based on an accurate assessment of the carrying capacity of the land.

Detractors would argue that what is of great concern is the reluctance of the forestry company to consider planting some other form of indigenous trees in this tract of land that will allow the eco-tourism project to go ahead, and allow limited foresting, and still preserve the fragile eco-system in this region (Swift, 1997). It would appear that whilst the forestry companies engage in debate around the principle of sustainable development at home, what they do in neighbouring states is not subjected to the same set of principles. It is argued by the rural development and environmental organisations that this form of expansionism is nothing more than colonisation in another form (Lukey, pers.comm., 1998; Swift, pers. comm.,1997).

6 CONCLUSION AND RECOMMENDATIONS – OPPORTUNITIES TO DEVELOP A "TRIPLE BOTTOM LINE" FOR THE FORESTRY INDUSTRY

The evidence gathered during this research indicates that there are significant economic, social and environmental impacts of the plantation forestry industry in South Africa, both positive as well as negative. This is supported by the research conducted by a range of key practitioners in the industry, both locally and internationally.

It may be concluded that the "forestry" industry does play a significant role in the economy of the country, but it would be unwise to assume that it will do some for an unlimited amount of time without further amplifying the impacts of its operations on the systems on which it depends for its livelihood.

Clearly, there are a range of benefits, mostly economic, associated with the plantation industry resulting for the effective and efficient management of the industry (Armstrong et al, 1996; Bright, 1998; Abramavitz, 1998; Edwards, 1999; DWAF, 1996). The potential to add significnat value to the national GDP and the profitability of the forestry companies exists (SAPPI Annual Report 2000) and has been demonstrated.

What has also become clear are the costs associated with the industry as well as the intended expansion programmes of 17 000 ha per annum (DWAF , 1998). These costs require a great deal more quantification (Howard, 1999; Benyus, 1997; Carrere, 1996; De Wit & Crookes, 1999) in order to assess the true nature of the the full spectrum of these impacts. Significant gaps appear when it comes to showing the true value of a range of natural systems and processes, and being able to off-set these against the short-term financial gainsg being made by the industry.

The forestry industry, while conscious of its impacts on the natural and social environment, largely still operate on a business model that seeks to maximise shareholder returns whilst attempting to "manage" the negative aspects of the industry (Carrere & Lohmann, 1996; WRM, 2000; Abramavitz, 1998; Howard, 1999; Van Wyk, 1999) in order to ensure that operations are

not in any way hindered or restricted. This is a strategy which may have a negative impact on the stock of natural, social and financial capital in the long-term and inturn, may reflect negatively in the environmental shareholder value and public image of the organisation.

There have been a number of positive initiatives on the part of the industry such at the move toward implementation of ISO 14001, certifictaion of products and plantation practices by the Forestry Stewardship Council, and initaitives aimed at bringing more people into the industry through the outgrower programmes and restructuring of the industry (Financial Mail, January, 2000). However, there is no clear picture as to the full range of impacts of this programme and approach. Sustainable investments cannot be made on the basis of the current lack of substanitive and true industry costs and impacts.

It is evident that the industry still does not embrace the "triple bottom line" ideology and accompanying methodologies in order to measure the true impact of their operations from a economc, social and natural capital perspective (Elkington, 2001; Dunphy et al, 2000).

Research such as that conducted by De Witt & Crookes (1999) and Hassan (1998) needs to be extended to cover the costs and benefits of a wider scope of plantation activities and tree species, not just one species such as wattles. This approach can also be used to develop a full valuation model for all aspects of the natural capital stock such as is being used to develop a value for the South African coastline in the development of the Coastal Management strategy for the country.

In addition, the research methodology and ideology should be driven by a clearer, integrated approach to balancing the triple bottom line, as well a new economic model that incorporates the new valuation and Full Cost Accounting methodologies being used in other industries. Only when this starts to happen will a clear picture emerge of the true impacts of the industry across the full value chain, rather than a disaggregated view of operations, transport, supply chain and plantation holdings.

In order to support this approach, a clearer valuation will need to be conducted of the true value of biodiversity and ecosystem services in order to establish such a Full Cost Accounting model.

as well as accurately quantify the true impacts of plantation operations. This should be a focus of future research within the conservation and environmental economics community.

In addition a number of key conclusions can be drawn form the research and are summarised below:

- Forests and plantations are often used interchangeably by both professionals and researchers without recognising the defined and intrinsic differences between the two;
- An effort must be made to point out the significant differences between indigenous forests and mono-culture plantations of alien tree species in order to provide clarity for researches wishing to understand the true nature of the two systems and quantify their impacts;
- Tree plantations have a significant impact on biodiversity at various levels – composition, structure and function (Armstrong et al, 1998);
- Tree plantations have a major impact on the water resources of the areas in which they have been established, and large scale interventions will need to be mounted in order to off-set the water consumption levels if this is not to become a major crisis in the region. This is viewed alongside the demand for water from various sectors of society given the impacts already documented;
- Significant pollution in the forms of air and water discharges, use of pesticides and herbicides, and exposures by communities and workers to the noxious and hazardous chemicals used in the processing, has been evident. Although there are clear indication that industry is attempting to address the problems, there is a need to move toward cleaner production methodologies such as Totally Chlorine Free production methodologies and greater attention to the elimination of wastes pumped out to sea as is the case with SAPPI-SAICOR in kwaZulu – Natal (groundWork, 2000);
- A strong case has been made internationally for a switch in kraft mills to Totally Chlorine Free bleaching – this will enhance economic performance, improve health and safety of workers and communities, and reduce negative environmental impacts (Millwatch, 1999). The resultant positive impacts on the

image of the industry or individual players in the industry will be extremely beneficial to all stakeholders;

- With regard to specific actions regarding the use of chemicals, the industry should move toward a situation where it reviews its use of pesticides, herbicides and fertilizers. A specific example based on overseas trends would be, for example, the choice of lepidoptera-specific insecticides for use in pest control programmes as opposed to organophosphate or carbamate insecticides would represent a significant step toward environmental protection and conservation of species diversity, as it remains. (Holmes, B, Journal of Applied Ecology, 1998, 35:185 – 194)
- It appears from the literature and from interviews conducted with stakeholders in rural and urban areas, that the industry is reluctant to full address concerns and issues raised by the community (Owen, 1999; Menne, 1999; Meulman, 1998; Carrere & Lohmann, 1996; WRM, 2000). There is a trend towards mitigating or off-setting the negative aspects of the industries operations by launching sophisticated marketing campaigns aimed at providing a misleading picture to the public of the true nature of the industry and the associated impacts of the industry in its entirety;
- The social benefits of the plantation and processing industries are both positive and negative, with evidence leading one to believe that there has been a negative impact on the livelihoods of many rural and peri-urban communities despite the apparent gains made by the industry (Carrere & Lohmann, 1996; Menne, 1999). However, it must be noted that the industry appears to be a significant employer of scale and brings benefits to the people employed directly and indirectly by the industry. The economic and social benefits appear though, to be a double-edged sword. A number of the negative impacts on community and social structure are not fully accounted for, or in some cases adequately researched, and thus a model or picture needs to be built which full accounts for the range of impacts on a social and economic level in respect to the impacted communities;
- The programmes of genetic modification of trees, whilst seemingly providing benefits to the industry and environment, will have a major impact on biodiversity and other environmental factors. There is a need to balance off the

viability of the industry (with all its resultant economic pressures) with the impacts that this technology will have on the systems that support the industry;

- A great deal of misinformation appears to be entering the forestry and plantation domain through the generic use of "biotechnology" as a catchall phrase. The industry appears not to draw a distinction between biotechnology, silviclture using hybrids, and genetic modification of organisms. A greater deal of clarity will be needed in order not to trigger a range of negative perceptions of the industry linked with genetic modification, especially in overseas markets.

The implications of competing in a global market place are clear (Abramovitz ,1998; Carrere & Lohmann, 1996; Bright, 1998; Hassan, 1998) . Whether these will lead to the industry sacrifining the environment and adding to social costs must still be seen. However the argument forwarded in this study is that there is significnat room for improvement in the way that the industry in managing itself and the impacts derived from pursuing its current practices. The industry appears to be attempting to mitigate the effects of its current operational and management stratgies instead of developing a new ethos toward sustainability and the "triple bottom line" approach. There is no evidence that the industry is about to rethink its approach to the way in which it conducts its core business and the resultant impacts of this business model.

The importance of indigenous forests must be appreciated especially in conserving biodiversity, protecting water resources, regulating climate and fulfilling other ecological functions as well as serving community needs. This appears to be an issue that does not receive siginifcant attention and certainly does not enjoy the focus of major prpogrammes for the re-establishment of indigenours forests. The plantation companies could benefit significantly from moving away from a purely conservationists and reactionary approach, to one where they are seen to play a leading role in re-establishing a number of the important forests and eco-systems destroyed by the continuing operation and expansion of the mono-culture plantations.

Regarding the impact on natural capital stocks and biodiversity, there is ample evidence collated thus far (Benyus, 1997; Hassan, 1998) to demonstrate that:

- Systems where biodiversity is preserved contains abundant stocks of genetic materials that will support the development of products and services beneficial to human welfare;
- These resources, whilst almost entirely unexploited often possess exceptional economic value, yet this is being eroded through continuing destruction of natural systems and habitats;
- Plantations have a significant impact on these stocks of natural capital in that they displace highly sensitive and valuable eco-systems and tracts of land;
- The depletion of these stocks of natural capital are happening at a rate that will grossly reduce our scope for dealing with many basic economic problems. The intrinsic and additional economic value that is hidden within these natural systems are under-valued within the current economic valuation models and methodologies being used by organisations and governments .

Significant opportunities exist for the industry to move toward new forms of clean production and implementation of zero emissions technology. Trends in developed markets make a strong economic, social and environmental business case for cleaner technologies as these minimise their impacts on already stressed natural systems. Marginal improvements have been made in South Africa but it is the overseas operations of the big conglomerates that have made the most significant gains. South African operations do not appear to be the recipients of the same treatment.

It is highly desirable that reafforestation of indigenous forests be encouraged and community and social forestry options be explored and implemented (McNeely, 1998). The plantation companies should play a leading role in this area and not simply leave it up to the government to carry the responsibility of re-establishing these systems.

A critical element which has featured strongly during the research project is the lack of integration of economic, social and environmental assessments that are carried out prior to the establishment of new areas for afforestation of plantation expansion. The triple bottom line approach is not evident in the methodology in developing these expansion plans.

In addition it must be noted that the IDRC mission recommend that environmental and social impacts be conducted on existing plantations in order to establish current problem in existing plantations. Whilst some attempts have been made to do this through the interactive audits, visits and programmes launched by the plantation operators in Mpumalanga, these have not always been conducted in a fashion which assist in developing a positive manner in building the three forms of capital. These are seen as publicity exercises which may do more damage to the industry in the long run.

The permit system for the development of new plantations appears to be frought with complications and lacks credibility with key stakeholders. A significant intervention will need to be munted in order to restore faith in this process. However, this study has raised key questions as to the need for expansion of the plantations. Quite clearly there are two strongly divided opinions with the case for expansion being driven heavily by the industry. Of significant value in this debate will be the development of a sound Value Proposition for the expansion programme, based on best practice triple bottom line approaches being used internationally.

The IDRC report recommended that the afforestation process in certain areas be reversed. This appears to have been set in motion partially therough the industry restructuring process entered into by the state.

However, no clear picture is presented as to how the damage done by the industry will be addresssed. This referes specifically to the impacts on biodiversity, destruction of grasslands and natural forests, excessive water usage, damage to wetland systems, and the resultant impact or potential impact on eco-tourism. This needs to be the focus of more indepth and quantitative research driven by a triple bottom line methodology and mindset.

Besides restructuring the permit system it will be important to establish a voluntary code of conduct that will regulate the behaviour of the forestry community. A forestry forum should be etablished that will address issues of common interest and act as a vehicle for the development of the forestry industry. This forum must include al players in the forestry arena. SAPPI has indicated that it is already being forced to move in this direction by international competitive conditions and market demands.

What is of major concern, and what formed part of this study was the expansion strategy of the forestry industry.

All the parties concerned with the forestry issue, bar the major forestry corporations expressed the view that great caution should be exercised when considering the expansion of the plantations or further afforestation. The state forestry directorate had proposed to double the existing forest area within 30 years (IDRC Mission).

Given the current state of lack of information and substantive valuation models for various systems (valuation of biodiversity, wetlands, unique ecosystems) this strategy of expansion may produce more nagative than positive impacts, especiallyb within the context of developing a strong tourism sector for the country, and especially give n that the country has embarked on an export-led growth strategy. Any export strategy may be negatively impacted upon if the consumers and buyers of a product perceive that there are a range of negtaive social and environmental costs and impacts associated with the product they will be purchasing.

Afforestation must include planting of indigenous species and these programmes must make use of the indigenous knowledge bases of communities who have vast knowledge of community forestry. This may assist in mitigating the impacts of the the plantation expansion programmes that are seen to be negatively impacting on social and economic structures of some communities.

However, there is growing evidence to support the notion that afforestation should be halted for a number of reasons. South Africa faces a mounting risk of destroying its natural capital stock in order to pursue short term financial gains whilst sacrificing its biodiversity (and the value attached to that) and falling prey to a market place that is becoming increasingly volatile and difficult to compete in.

Greater emphasis will need to be placed on the trade off between agricultural needs and plantation expansion. The conflicting land use objectives of various government departments neesd to be solved within the context of a national development strategy that aims at job creation, industrial development and food security. The loss of prime agricultural land to plantation

development is perceived to have already had a major negative impact. This must be assessed and a clear strategy developed as to how to develop the agricultural sector without resorting to developing a range of negative impacts that will weaken the food security situation.

South African forest policy is directed at promoting a competitive and sustainable forest sector. It has as one of its objectives the development of a national set of criteria, indicators and standards of sustainable forest management applicable at the national scale, and at the scale of the forest management unit (DWAF, 1996).

The development of a new management and industry philosophy that embraces a triple bottom lines approach, as opposed to the current focus on a single bottom line, namely the financial returns, will strengthen the plantation companies and the paper industry in general.

Such an ideology or economic approach will ensure that the true impacts of the industry are researched, documented and above all quantified. This will allow sound investment decisions to be made against the background of the true impacts and benefits of the industry, as opposed to the current manner in which unsustainable invesment is being made and vitally important stocks of natural, social and financial capital are being eroded.

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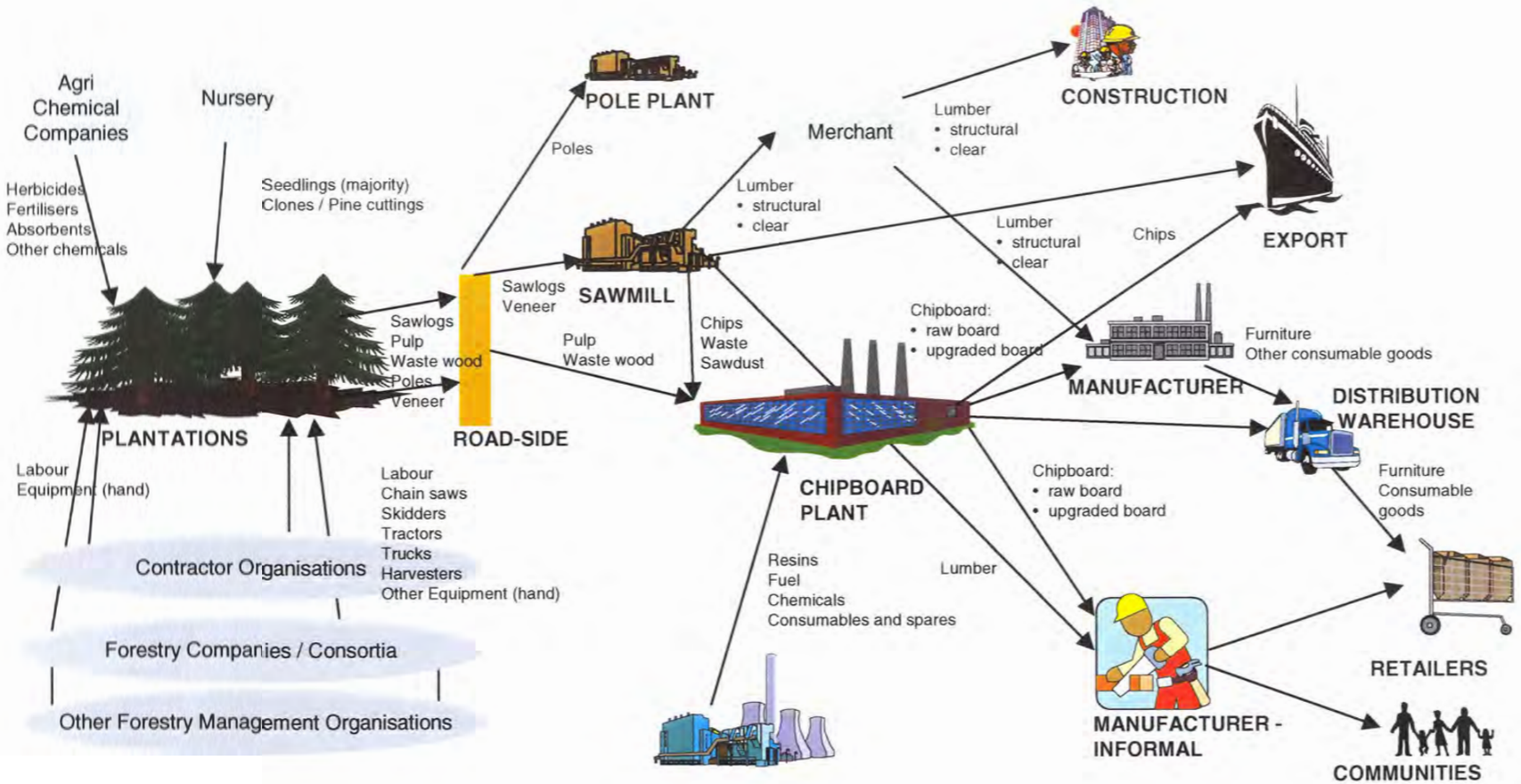
APPENDIX A

FORESTRY VALUE CHAIN


Agri Chemical Companies
Nursery
Herbicides
Fertilisers
Absorbents
Other chemicals
Seedlings (majority)
Clones / Pine cuttings
PLANTATIONS
Labour
Equipment (hand)
Contractor Organisations
Forestry Companies / Consortia
Other Forestry Management Organisations
Sawlogs
Pulp
Waste wood
Poles
Veneer
ROAD-SIDE
Labour
Chain saws
Skidders
Tractors
Trucks
Harvesters
Other Equipment (hand)
POLE PLANT
Poles
SAWMILL
Sawlogs
Veneer
Pulp
Waste wood
Chips
Waste
Sawdust
CHIPBOARD PLANT
Resins
Fuel
Chemicals
Consumables and spares
Merchant
Lumber
• structural
• clear
CONSTRUCTION
Lumber
• structural
• clear
EXPORT
Lumber
• structural
• clear
Chips
Chipboard:
• raw board
• upgraded board
MANUFACTURER
Furniture
Other consumable goods
DISTRIBUTION WAREHOUSE
Chipboard:
• raw board
• upgraded board
Lumber
Furniture
Consumable goods
RETAILERS
MANUFACTURER - INFORMAL
COMMUNITIES