A C.A.P.E. Biodiversity Conservation and Sustainable Development Project

BIODIVERSITY STRATEGY AND ACTION PLAN FOR THE CITRUS INDUSTRY IN THE GAMTOOS RIVER VALLEY

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	Acronyms and Abbreviations
BCI	Biodiversity and Citrus Initiative
CAPE	Cape Action Plan for People and the Environment
CARA	Conservation of Agricultural Resource Act
CFK	Cape Floristic Kingdom
CGA	Citrus Growers Association
CRI	Citrus Research institute
DWAF	Department of Water Affairs and Forestry
FPA	Fire Protection Association
NEMA	National Environmental Management Act
NWA	National Water Act

1. Introduction

Bohlweki SSI Environmental was appointed by C.A.P.E and the Baviaanskloof Mega-Reserve to draft a biodiversity strategy for the Citrus Industry of the Gamtoos River Valley in the Eastern Cape. Since the project has a long history of preparation, a certain level of groundwork has been completed and the Terms of Reference, therefore, was very specific.

The Gamtoos valley is part of the Baviaanskloof - "Valley of Baboons" – that lies between the parallel east-west running Baviaanskloof and Kouga mountain ranges in the western region of the Eastern Cape Province. The eastern-most extreme of the valley stretches to 95 km north-west of the coastal city of Port Elizabeth. The Gamtoos River consists of the confluence of the Kouga and Groot Rivers, which have a combined drainage area of 34 000 km^2 (See attached GIS maps). The Gamtoos Valley is roughly 70 km long and is surrounded by the Baviaanskloof Mountains.

Soil types in the valley is made up of sea deposits of the Uitenhage series, composed of rounded rocks, shale and clay, which forms more or less vertical faces of conglomerate. Flood plains consist of predominantly layered alluvium that was mainly brought in as silt by the waters of the Groot River out of the Karoo plains where most of its drainage region is located (DWAF Report).

The Gamtoos valley is situated in an intermediate zone between the summer and winter rainfall zones of the country; with an annual precipitation of less than 500 mm. Average maximum temperature is 25.2°C and average minimum temperature is 9.9°C. Light frost does occur in winter. Plants typical of the area are Macchia types and succulents such as "spekboom", "noors" and aloes, while trees common to the area include Acacia, Yellow wood, Wild olive and Wild fig (DWAF Report).

The Baviaanskloof area includes a cluster of formally protected areas managed by the Eastern Cape Parks Board, of which the most well-known is the 184 385 ha Baviaanskloof Nature Reserve - the third largest protected area in South Africa, and land that is almost exclusively used for stock farming. Irrigated crop production is restricted alongside some of the major rivers, most notably the Gamtoos River (Boshoff, 2005).

The Baviaanskloof area is known for its outstanding natural beauty, owing to its spectacular land forms, with which a diverse array of plants and animals are associated. The rich biodiversity of the Baviaanskloof Nature Reserve, which has been recognized internationally by being awarded prestigious World Heritage Site status, along with seven other reserves in the Cape

Floristic Region, provides a number of opportunities for local and regional economic development through activities such as nature-based tourism and game ranching. The area also contains a remarkable variety of pre-historical and historical sites and artefacts and fulfils a critically important role as a water catchment, to supplement the growing water needs of the agricultural sector and urban growth in downstream areas to the east and south-east (Boshoff, 2005).

Boshoff (2005) stated that a number of pressures need to be addressed if the full potential of the area were to achieve biodiversity conservation, maximum provision of water, and improvement of rural livelihoods. These pressures can be divided into: environmental, institutional and socio-economic and economical issues that entail sustainable concepts.

As part of fulfilling the potential of the area, an institutional arrangement, mainly in the form of a Baviaanskloof Mega-reserve Project Management Unit (contracted to the Department of Economic Development and Environmental Affairs (DEDEA) - Eastern Cape), have been put in place for the progressive planning and implementation of a Baviaanskloof Mega-reserve. The Mega-reserve was envisaged to comprise of a cluster of state-owned protected areas (core areas) within a network of private- and communal land, ultimately totaling a size of around 500 000 ha (Boshoff, 2005). To this end a "Conservation Strategy", based on a set of principles and underpinned by a vision and a specific set of objectives, was developed to guide this initiative.

Good progress in the establishment of the Baviaanskloof Mega-reserve has been achieved, but much work and many challenges still lie ahead. An overarching requirement that exists is the need to secure large scale funding to expand and maintain fully resourced provincial conservation agencies that can manage, monitor and evaluate the project, on both formal protected areas and on adjacent private or communal land. This will contribute significantly to maintaining the integrity of the Baviaanskloof World Heritage Site in the future. It has now become imperative that government, at the national and provincial levels (Boshoff, 2005), the private sector and industry give expression to its prioritisation and institutionalization of support for the mega-reserve project, and the subsequent biodiversity conservation.

Boshoff (2005) states that the Baviaanskloof Mega-reserve Project offers a unique and exciting opportunity to make a significant and lasting contribution to the conservation of globally important biodiversity, and to local economic development, with accompanying social upliftment.

As part of achieving these objectives this study was commissioned to produce a biodiversity strategy and action plan for the citrus industry in the Gamtoos River Valley that must be informed by:

a) The impact of the citrus industry on biodiversity and related Cape Floristic Region, Eastern Cape and National priorities and objectives for biodiversity conservation
b) The business case for biodiversity conservation in the citrus industry
c) The willingness of the citrus industry/champions to participate, and the nature of this participation.

In order to achieve the above the following activities and assessments were carried out:

- Situation analysis
- Establish/ develop a business case for biodiversity conservation as it relates to the citrus industry
- Explore mechanisms for strategy implementation
- Develop an industry specific biodiversity strategy and action plan
- Incorporation of social development aspects

2. Situation analysis

2.1. A profile of the sector, including institutional arrangements and governance mechanisms

As one of the key role players in the citrus industry, the Gamtoos Irrigation Board (GIB) divides the Gamtoos Valley into Sub-district I (Patensie), Sub-district II (Hankey) and Sub-district III (Loerie and Mondplaas). According a DWAF Report a Working Committee (WC) was established for each of the three sub-districts to allow for active participation of water users in the development of the Water Management Plan. Each Working Committee comprises the following members:

- A Board member (Gamtoos Irrigation Board)
- Two to four farmers from a sub-district
- A SABI irrigation designer
- A municipal office representative
- Board's Water Control Officer

The WC arranged various meetings to obtain background information on their cropping systems. They also interviewed a group of people with an intimate knowledge of the area which enabled them to establish cropping patterns for the GIB area. This report used this information as departure point.

2.1.1. Crops grown in the Gamtoos Valley

According to DWAF (DWAF Report), production of peas has disappeared over the years because of a lack of good markets. Similarly the dairy and ostrich industries historically associated with the upper districts (Sub-districts I and II) of the area disappeared over the years, together with associated crops such as lucerne. Generally, citrus orchards replaced the lucerne lands. In all three of the discussion groups, the participants mentioned an expected upsurge in the production of chicory as the only expected crop change in the valley. Sub-district I suggested the possibility of future cultivation of canning tomatoes. The same crops are generally grown throughout the valley, but the proportions vary among the sub-districts.

Approximately 50 per cent of Sub-district I are under citrus, with potatoes being the next most important crop. At the time of the report annual cash crop production was largely earmarked for the frozen vegetable companies, or for the fresh produce market, refer to **Figure 1** (Taken from DWAF Report). This has changed in the last couple of years.

Sub-district II, has less citrus with more annual cash crops, refer to **Figure 2** (Taken from DWAF Report).

Sub-district III comprising of the Loerie and Mondplaas areas, has vegetable production and *virtually no citrus* in the Loerie area, with the Mondplaas area devoted mainly to dairy farming, refer to **Figure 3** (Taken from DWAF Report).

Figure 4 (Taken from DWAF Report) gives the percentage breakdown of the various crops grown within the entire Gamtoos Valley.

Figure 1. Crop composition of Sub district 1 (Patensie)

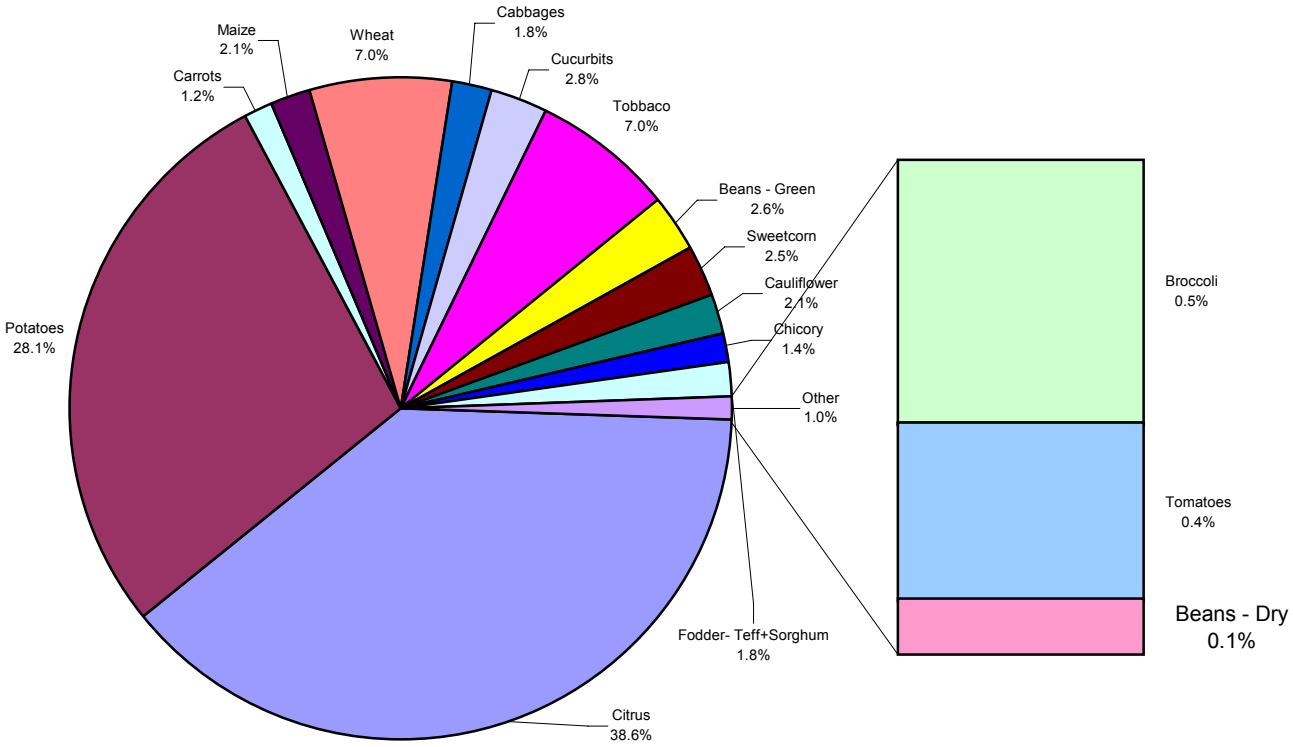


Figure 2. Crop composition of Sub district 2 (Hankey)

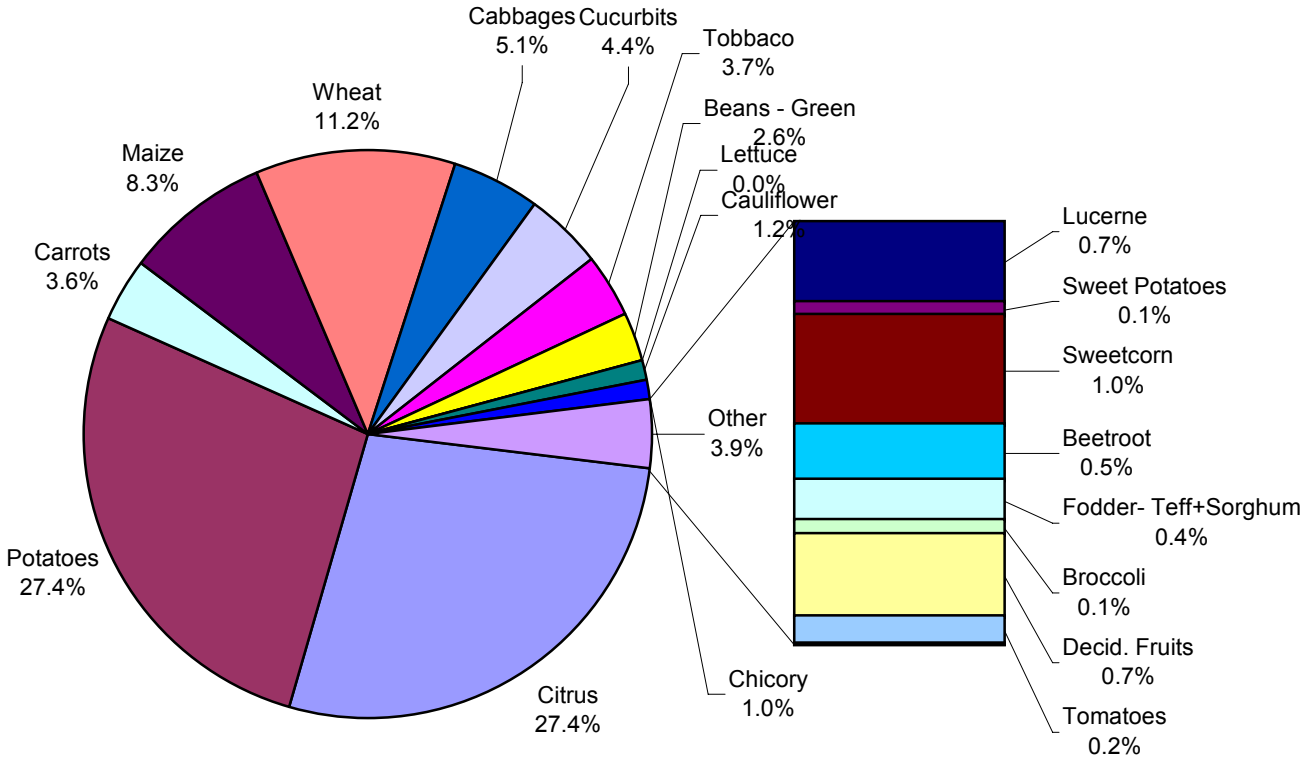


Figure 3. Crop composition of Sub district 3 (Loerie)

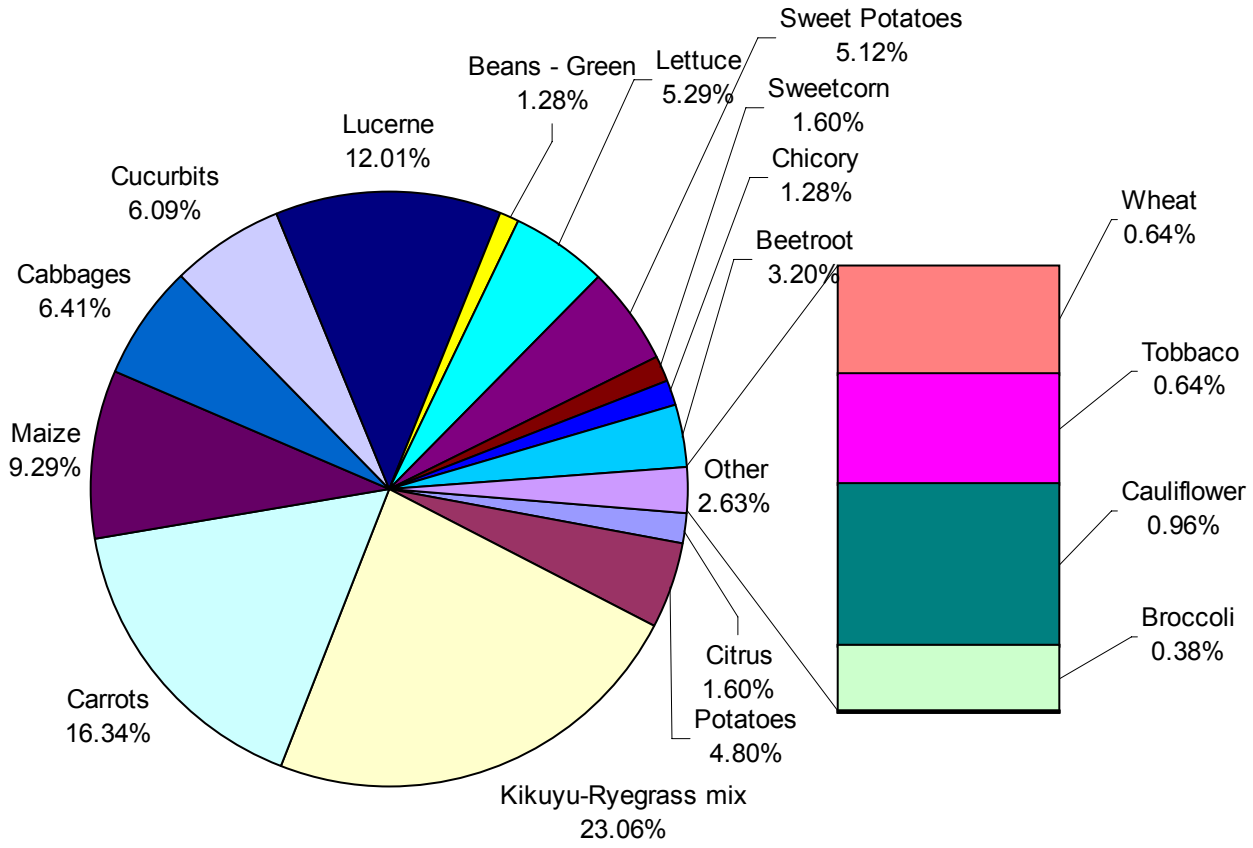
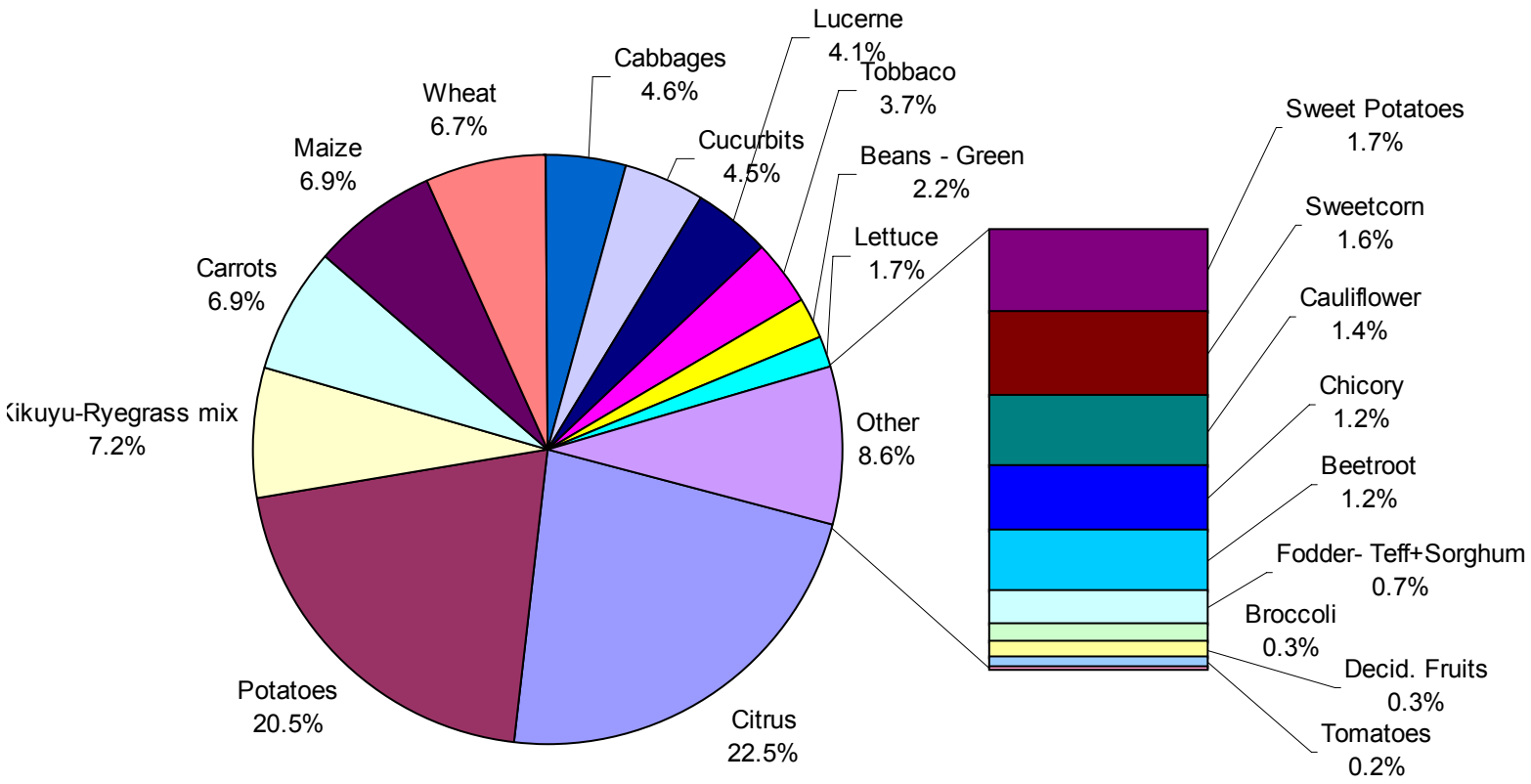


Figure 4. Crop composition of the Gamtoos Valley



For the purpose of this report the focus will be on Sub-district I (Patensie), having the highest percentage of citrus.

2.1.2. Citrus industry – Sub-district I Patensie

In the Patensie area Sub-district I, soils can be classified as 55% Loam, 20% Sandy Loam and 25% Loamy Clay. The farmers mentioned compaction as one of main problem of their soils, which is common in soils of alluvial origin (DWAF Report).

Centre pivots and drip irrigation is dominant in the valley, with permanent crops under either drip or micro sprinklers for citrus, whilst pastures are under permanent systems.

With regards to water quality, farmers mentioned a pH of 7.5, and a Total Dissolved Solids content of about 140 ppm, which is good. Farmers have reported higher concentrations of Manganese when dam levels have been low.

In terms of water use farmers believe that they are motivated to use water efficiently because leaching of nutrients by over-irrigation is costly to them. Over-irrigation can lead to decline in fruit quality due to lower sugar content, root rot (*Phytophtera*) and maintenance and energy costs associated with the running of centre pivots erode already low profit margins.

Dempsey (2007) reported that the Eastern Cape sector of the citrus industry consists of 3% Grape Fruit (Pomelo), 43% Lemons, 36% Navels, 32% Soft Citrus en 16% Valencia types. The Patensie area is also known for the production of high quality Navels.

According to Dempsey (2007), the growth of the South African citrus industry relies on cooperation between individual production areas, management strategies, development of new technologies, and the incorporation of the following five principles of sustainability:

- Biological productivity – maintain and increase production
- Economical viability – supply and demand
- Conservation of Natural Resources – sound management (best practices)
- Reduced risks – cooperation
- Social acceptability – consumer demand and improved living environment (After Groenewald, 2005)

The citrus industry in the Gamtoos valley is well structured and organized with the Citrus Working Group being a major role player.

The citrus industry in the Gamtoos valley is currently experiencing growth due to the very good financial returns and the percentage management hours needed for producing a hectare of citrus. At this stage 40% of irrigation lands are occupied by citrus production. This comes to an estimated 3200 hectares which are occupied by citrus trees in the valley. Currently growers are supported by institutions such as the Citrus Growers Association (CGA), Citrus Research institute (CRI) and various consultants advising growers on aspects like technical, marketing and financial support. Incorporation of socio economic aspects are becoming more important and independent certification audit companies tends to support growers that recognize the socio economic aspects.

The products are exported through various export companies responsible to manage the volumes and anticipate market information so that producer returns can be optimized. Citrus products are packed at various pack houses (+/- 20 pack houses) through out the valley. These pack house can pack anything between 100 000 to 2, 5 million cartons of citrus per season. The packed products are then transported by truck or container to the Port Elizabeth harbor where the logistical channel continues.

From the client/supermarket side competitive advantage in the market place drives the supply and demand system in the citrus industry. Therefore housewife's/buyers tend to become part of the value chain in such a way that they are asking healthier and safer products on the shelves. This leads to direct production amendments on the side of the citrus producer in the Gamtoos. Luckily the effects are to the advantage of the buyers as well the producers. By improving production dynamics local producer are compelled to adhere to these new requests otherwise they need to change from exporting to local marketing. As mentioned earlier advantages in the way of recognizing the environment as being part of a sustainable production unit plays a vital role. This lead to developing a biodiversity strategy that entails mentoring growers in such a way that they recognize the significant role of biodiversity in the production process. This can lead to a marketing strategy which can improve returns from a marketing side.

2.2. Nature and significance of the impact of the citrus industry on biodiversity

Any human activity has some degree of impact on the environment. The citrus industry is no different, and it is therefore important from both a biodiversity conservation point of view and from the citrus industry that these impacts be minimized to ensure a sustainable environment conducive to a sustainable industry.

The direct & indirect impacts of the industry, through its operations, supply chain, use of products & services, will affect biodiversity negatively. These impacts can be minimized through mitigation and proper management strategies. The aim of this document is to draft such a strategy that will be a win-win situation for both biodiversity and industry.

The main objective is not to re-invent the wheel but to improve, if necessary, current practices which are in place. For example more than 90 % of growers in the Gamtoos valley area must adhere to certain "good agricultural practices" in terms of Euregap to export citrus products. Currently Euregap is a certification system that is in place and used by almost every farmer. Because there is an "Environmental Policy" already included in this system, the strategy must focus on enhancing/improving this specific policy or otherwise stipulating rules and regulation which must be recognized by the growers before taking part in this Biodiversity & Citrus Initiative (BCI).

The following have been identified as threats to the biodiversity of the area resulting directly or indirectly from the activities of the citrus industry.

2.2.1. Destruction of Threatened Ecosystems (vegetation types) through indiscriminate ploughing of virgin soil

All vegetation types in South Africa have been classified according to being critically endangered, endangered, vulnerable or least threatened. This classification was based on how much of the vegetation type is remaining compared to its original extent. In the Western Cape alone, 15 vegetation types are already critically endangered (De Villiers, 2005). It is therefore strongly recommended that before any new lands are developed, DEDEA - Eastern Cape be contacted to determine the conservation value of any reamianing virgin land. Development of new lands may constitute a listed activity in terms of the National Environmental Management Act (NEMA – Act

107 of 1998), which would require either a "Basic Assessment" or a full "Environmental Impact Assessment" (EIA) before authorization will be granted to proceed. The attached GIS generated vegetation map shows the different vegetation types, and the large transformed areas. Any proposed new orchards should be mapped and assessed in terms of the conservation status of the vegetation types within which it occurs. Agricultural extention officers, the Baviaanskloof Mega-Reserve or BCI manager should be contacted to confirm the conservation status of proposed new orchards.

It is very important that any ploughing of virgin soils be properly authorized and managed. Ploughing of areas having an excessive slope increase the risk of erosion and result in a higher sediment load in rivers and associated aquatic ecosystems.

It is extremely important that large untransformed areas be left and be linked through a network of ecological corridors to ensure that ecosystem processes maintain biodiversity. Biodiversity of animals and plants are the only mechanism through which ecosystems maintain enough resilience to cope with change.

2.2.2. Degradation of Aquatic Ecosystems (wetlands & rivers)

Rivers and wetlands are the arteries of the broader environment that manage and maintain water quality and quantity for us free of charge. Due to all human activities these natural and free services have been reduced to the extent that we need to manage water quality and quantity at great expense.

Wetlands are an integral part of all aquatic ecosystems that act like large kidneys and livers that purify water. Wetlands also act like giant sponges holding back water during floods and releasing it during dry periods. This flood attenuation function is critically important to reduce flood damage. Wetlands fulfill and important filtering-function by removing excessive nutrients, heavy metals and sediments and thus purify water. Wetlands also provide special habitat for many plant and animal species who depend on them for part or all of their lifecycles (such as important pollinators), and can act as a natural firebreak. For these reasons wetlands need to be protected for the free services they supply. With 50 % of wetlands across the world destroyed we have an obligation to protect all functioning wetlands and to create artificial wetlands.

With this background any human activity, including the citrus industry should keep this in mind during planning and operations.

The biggest threats to aquatic ecosystems are the following:

- Intrusion into flood plains
- Infilling of wetlands
- Draining of wetlands
- Dumping in rivers and wetlands
- Over abstraction of surface and groundwater
- Increased hardened surfaces that result in more over land flow
- Habitat destruction in the river, both channel and bed structure degradation
- Altered flow regime (Hydrology)
- Altered energy curves in rivers (scouring flows)
- Altered sediment loads (Excessive erosion and sedimentation due to ploughing)
- Altered water quality (Increased nutrients though irrigation return flows, pesticide pollution into aquatic eco-systems)
- Pollution of water and soils (pesticides and chemicals)
- Damage to riparian vegetation that undermines river bank-stability
- Altered bank storage capacity under high flow conditions due to hardening of flood plain surfaces, creation of levees to protect flood plain orchards
- Destruction of wetlands – water quantity and quality management affected
- Straightening of river channels that increase water speed and scouring flows
- Smoothing of river beds that increase water speed and scouring flows
- Channelization affecting groundwater recharge and discharge processes

All these aspects need to be understood, respected and managed to ensure sustainable systems.

Marketing information (supply and demand – political climate) has lead to increased production cost which triggered more development of lands. This caused farmers to develop natural veld with unacceptable vertical slopes causing accelerated erosion. This will result in large quantities of topsoil being transported into the Gamtoos River.

All developments of water resources require authorisation from the Department of Water Affairs and Forestry (DWAF) in terms of section

21 and 22 of the National Water Act (36 of 1998), and Department of Environmental Affairs in terms of the National Environmental Management Act (NEMA – 107 of 1998). The Conservation of Agricultural Resources Act (43 of 1983) also restricts activities within wetlands.

2.2.3. Invading Alien Plants

Invasive alien plant species have a significant negative impact on the environment. Invasive alien vegetation proliferate because they get the opportunity to spread without having natural competition, diseases and pests to keep population growth in check. It generally occurs where conditions are optimal for them and therefore out-compete indigenous vegetation and reduce biodiversity. The shading effect of their large canopy cover shades indigenous species and leads to a loss of indigenous biodiversity. By and large, no natural undergrowth survives under alien vegetation stands. This reduces soil cover and cause accelerated erosion and higher sediment loads in rivers. Invasive alien vegetation further causes the following effects that impact directly on biodiversity:

- habitat destruction
- increasing the risk and intensity of wildfires
- reducing surface runoff and groundwater recharge

Landowners are under legal obligation to control alien plants occurring on their properties in terms of the Conservation of Agricultural Resources Act (CARA - Act 43 of 1983).

2.2.3.1. Identification of alien species

Table 3 of the CARA regulations lists all declared weeds and invader plants. Alien plants are divided into 3 categories based on their risk as an invader:

- **Category 1** - These plants must be removed and controlled by all land users. They may no longer be planted or propagated and all trade in these species is prohibited (e.g. Rooikrans, Hakea)
- **Category 2** – These plants pose a threat to the environment but may have commercial value. These species are only allowed to occur in demarcated areas and land owners must obtain a water use license as these plants consume large quantities of water (e.g. black wattle, grey poplar, pine).
- **Category 3** – These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed, but no new plantings may

occur and propagation of plants for sale is not allowed (e.g. Jacaranda, Syringa, Sword fern).

a) Alien grasses

Alien grasses can be the worst invader in mostly lowland ecosystems adjacent to farms, but are often the most difficult to detect and control. Alien grasses out-compete indigenous annual grass and bulb species that make up an important part of the species diversity in renosterveld and fynbos. These alien grasses also increase the fuel load of the veld causing more frequent and hotter fires, which can be detrimental to biodiversity. The planting of flood plains with grass is a common practice and this needs to be addressed as part of the biodiversity strategy for the citrus industry.

Most common alien grass species include: Wild oats (gewone wilde hawer); Italian ryegrass (Italiaanse rog); Quaking grass (bewertjies); Kikuyu (kikoejoe); Ripgut brome (predikantsluis); and Rats Tail Fescue (wildegars).

2.2.3.2. Fire Management

Fire management within the citrus industry may have a severe impact on the biodiversity of the area if not managed properly. Although fynbos, thicket and renosterveld are fire-adapted systems, just one or two inappropriate fires at the wrong time of year, to frequent, or no fires at all, can cause local extinction of many indigenous species. Landowners individually and collectively as the citrus industry, are responsible for the prevention and management of all fires that occur on your land, in terms of the National Veld and Forest Act of 1998. You will be assisted in complying with these regulations if you and your neighbors form a Fire Protection Association (FPA).

FPA's are a voluntary association formed by landowners to jointly prevent, predict, manage and extinguish veld fires. The main advantage of an FPA is that no presumption of negligence can be used in civil proceedings due to fire damage if you belong to an FPA, even if the fire started on your property. Furthermore, resources can be combined more effectively with other landowners to manage fires more effectively and firebreaks can be placed where best for the area as a whole, not just one property.

It is mainly the corridor areas and undeveloped lands that will be managed by fires and that will be affected through bad fire management practices. Sadly this would also be the areas where the los of biodiversity will have the biggest impact.

2.2.3.3. Ecological corridors & habitat fragmentation

Ecosystems function as large continuous areas that have ecotone (transition) areas where smaller, but not isolated, units occur. These smaller units and ecosystems types are naturally connected. Through human activities and developments these units may become separated or disconnected fragments. It is therefore important to recognize the need for ecological corridor areas to protect these processes that keep these systems functioning. Corridors of natural habitats are needed to link fragments to allow species movement, pollination and nesting to continue. They can also provide additional habitat where animals can breed, feed and shelter. The citrus industry is also dependent on naturally occurring pollinators. Indiscriminate pesticide use may have a severe impact on these pollinator organisms.

Research on renosterveld habitats has shown that in order for patches of natural veld to be functionally viable, they should ideally be within 500m of another patch and connected by pollinator-friendly terrain (old lands & pastures are more pollinator friendly than vineyards and orchards). This is applicable to all other vegetation types like fynbos and thicket. No single figure is available for suggested corridor widths or lengths, as this depends on which animal, plant or vegetation type is in question. However, the wider the better! The citrus industry should show there commitment to biodiversity conservation though recognition of these facts and through implementing and managing identified ecological corridors. The large landscape initiatives aim to create large strategic corridor areas, but this needs to be maintained by smaller scale ecological corridors to link all ecosystem processes. The citrus industry should therefore take note of the Baviaanskloof Mega-reserve as a corridor and aim to link ecosystem process associated with it.

2.2.3.4. Game Management on farming areas adjacent to the citrus industry

Many farmers re-introduce game on farms where natural veld is transformed to grassland. However game on private land can only be viewed as a form of conservation if the correct game management ensures that the condition of the natural vegetation is not

detrimentally impacted. Otherwise, this is simply another form of farming. Care must be taken that this doesn't become a problem rather than an asset. Only indigenous game may be retained and introduced, otherwise many secondary problems may arise.

It is strongly recommended that only game species that historically occurred in that area are kept and not 'extra-limital' species. Species which occurred historically in the area are best adapted to local conditions and will have the least impact on the natural veld.

Where veld condition shows signs of deterioration, it is advisable to withdraw animals from that area and the veld left to rest.

"Problem animal" control

Wild animals can become a problem in many farming areas as a result of cultivated habitats and readily available food that have been introduced into their natural environment. Under natural conditions game numbers will be self regulatory, but through our actions we disturb this natural balance and then human intervention become necessary to prevent damage to the environment. Due to peak cultivated fruit production occurring in summer creating an abundance of food, their reproductive cycles have changed and their numbers have increased. This abundance of food also keeps the population growth unnaturally high.

2.2.3.5. Waste Management

Good waste management practices can make a profound contribution towards retaining biodiversity, and conversely bad waste management can negatively impact on biodiversity. Waste management includes waste water from the citrus industry. It must be remembered that any industry that produce effluent must get a license from DWAF to discharge the effluent into any natural drainage or wetland.

Specific waste management aspects

Disposal of waste is controlled by the National Environmental Management Act (NEMA – Act 107 of 1998), and the National Water Act (Act 36 of 1998). Waste related activities are listed in terms of NEMA under the following: Activity 1(0) in GN No. R. 386:

> *"The construction of facilities or infrastructure, including associated or infrastructure, for-*

The recycling, re-use, handling, temporary storage or treatment of general waste with a throughput capacity of 20 cubic metres or more daily average measured over a period of 30 days, but less than 50 tons daily average measured over a period of 30 days;"

Irresponsible and ignorant waste management can have severe environmental and health risks.

All redundant packaging material, chemical containers and alike should be discarded off at registered waste sites only (Adhere to Euregap requirements). The health and environmental consequences of ignoring this could be catastrophic.

Similarly waste water from the citrus industry may contain dangerous pollutants and needs to be managed accordingly. All waste water produced by the industry should be treated of screened in artificial wetlands before being discharged to natural drainage systems.

Implementation of suitable buffer areas, containing natural vegetation, around orchards and packing facilities will also help to reduce the impact of waste on the biodiversity of the Patensie area. The buffer areas will at the same time help to address the required need for smaller scale ecological corridors to link ecosystems processes.

2.2.3.6. General environmental issues affecting biodiversity

Any activity that disturbs the natural water quality of the aquatic ecosystems, soil surface, vegetation cover (indigenous and non-indigenous) and natural soil chemistry has the potential to impact on the biodiversity of the area. It is therefore important to take note of these aspects when any activity is planned, executed and maintained. The following are practical examples:

1. Design and lay-out of farm roads should minimise erosion, (good maintenance is the key), and avoid sensitive ecological areas such as wetlands or rare plant populations.
2. Prevent undue soil erosion, avoid ploughing slopes with a gradient steeper than 20 percent (as detailed in the *Conservation of Agricultural Resources Act, 1983).*
3. Consult conservation experts to compile a simple generic conservation plan for the natural vegetation on the farm. This should include guidelines to monitor ecosystem health.

4. Consider formally setting aside threatened natural areas for conservation under the Baviaanskloof Mega-reserve to give these areas secure conservation status, and truly ensure these areas remain conserved for future generations.
5. Consult with experts regarding the use of pesticides and mineral treatment of soils.
6. Implementation of suitable buffer areas containing indigenous vegetation around the footprint of the citrus industry activities. These buffer areas must also be implemented along the rivers, flood plains, wetlands and other related aquatic ecosystems. These buffer areas will help keep unwanted substances out of the natural areas and thus help buffer the impacts of the industry on biodiversity. Buffer areas will at the same time create much needed smaller scale ecological corridors connecting ecosystem processes.

2.3. Legal environment and compliance as it relates to impact of the citrus industry on biodiversity

Agriculture is governed by many different pieces of legislation. The relevant provisions of laws that govern the citrus industry's impact on biodiversity and natural resources include, but are not limited to:

- National Environmental Management Act (NEMA - Act 107 of 1998).
- Other legislation that affects the citrus industry is the Constitution of the Republic of South Africa (Act 108 of 1996),
- Biodiversity Act (Act 10 of 2004),
- Conservation of Agricultural Resources Act (CARA - Act 43 of 1983),
- National Veld and Forest Fire Act (Act 101 of 1998),
- National Water Act (NWA - Act 36 of 1998),
- Protected Areas Act (Act 57 of 2003),
- Subdivision of Agricultural Land Act (Act 70 of 1970) and
- the Land use planning ordinances (LUPO) etc.

However, the intention of the legislation is not to stop development but to ensure sustainable development of the environment to the benefit of all.

The two most important pieces of legislation that govern the day to day activities of the citrus industry that could impact on biodiversity is NEMA and the NWA. Both Acts have listed activities that may not proceed without prior authorization from the relevant authorities.

The following is a brief summary of activities that would generally require some form of investigation and authorization before it may be executed:

Activities that may constitute listed activities in terms of NEMA and NWA	**Which Act apply**
Ploughing of new lands (virgin soil)	NEMA
Stabilizing of river banks	NEMA, NWA
Flood damage repair to orchards in flood plains	NEMA, NWA
Bulldozing in rivers and streams	NEMA, NWA
Diversion of river flow	NEMA, NWA
Abstraction of groundwater	NEMA, NWA
Abstraction of more water	NEMA, NWA
Construction and upgrade of roads wider than 4 meters	NEMA
Construction and upgrade of pipelines	NEMA
Construction and upgrade of bridges	NEMA
Construction and upgrade of dams and weirs	NEMA, NWA
Discharge of effluents	NWA
New water uses	NWA
Storm water discharges	NEMA, NWA

In terms of biodiversity conservation, it is always advisable to contact the authorities if you are uncertain of any activity planned that may affect the environment negatively.

2.4. Biodiversity targets for the sector

The different impacts that the citrus industry may have on biodiversity and the environment, as identified under 2.2, was used to generate the biodiversity targets for the sector. These targets will be discussed under the same headings as listed in 2.2.

2.4.1. Stop the destruction of Threatened Ecosystems (vegetation types) through well planned and properly authorized ploughing of virgin soil only in extreme cases where required

The citrus industry should aim not to destroy any remaining parts of threatened or vulnerable vegetation types or habitats. Any development of new lands must be regarded as constituting a listed activity in terms of the National Environmental Management Act (NEMA – Act 107 of 1998), which would require either a "Basic Assessment" (BA) or a full "EIA" before authorization will be obtained to proceed. All relevant government departments should be contacted in the event of

expansion of existing industry footprints into virgin soils. Alternatively existing agricultural soils, or existing transformed areas should be targeted.

The citrus industry should recognize biodiversity hotspots in their area of operations, including any aquatic ecosystems (Rivers, wetlands, seeps, springs and drainage lines) (See attached GIS layers).

Areas that will be identified as buffer areas around the citrus industry's current footprint should be maintained and managed as being sensitive.

The following is proposed to achieve the conservation of biodiversity within the area where the citrus industry operates:

- All new orchards should ideally be developed on old agricultural lands and not on virgin soil with pristine natural vegetation. *A ploughing permit must be obtained from the National Department of Agriculture in order to develop virgin soil as stipulated in the National Environmental Management Act (Act 107 of 1998), Conservation of Agricultural Resources Act, 1983 (No 43 of 1983), regardless of who owns the land. Any land that has not been worked for more than 10 years is regarded as virgin ground.*
- Not all natural areas have the same conservation priority. While large areas of mountain habitats still remain in marginal farming areas, the majority of lowland ecosystems have been transformed. Priority habitats such as renosterveld, lowland fynbos and thicket vegetation on alluvial soils should be avoided at all costs.
- Similarly operations of the citrus industry should remain clear of any aquatic ecosystems, e.g. streams, rivers, wetlands and flood plains – including buffer areas around these vitally important ecosystems.

2.4.2. Stop any further degradation of Aquatic Ecosystems (wetlands & rivers)

All **rivers and wetlands** should be viewed as being sensitive and managed with care. No further degradation of any aquatic ecosystems should be allowed by the citrus industry. Special measures may be required to curb current impacts on wetland and river ecosystems. The following activities should be better managed to reduce the impacts of the industry on aquatic ecosystems:

- Reduce or stop further intrusion into flood plains to protect the important flood plain processes.

- No infilling of wetlands should be allowed for any purposes at all.
- No draining of wetlands should be allowed to increase cultivated areas, this will be at the expense of sound water resource management.
- No dumping should be tolerated in rivers and wetlands. Waste sites should be moved away from these ecosystems.
- Abstraction of surface and groundwater should be closely monitored and controlled.
- Any in-stream activities (bulldozing etc.) that cause any form of habitat destruction in the flood plain, river - both channel and bed structure degradation, should be minimised, and properly authorized in terms of the relevant legislation (NEMA and NWA).
- Modification of the flow regime of rivers is regulated by the NWA, and should be properly enforced.
- Any earth moving activities in or near a river may alter the energy curve in a river. These activities should not commence before proper authorization is obtained and or without consultation with ecologists and engineers.
- Storm water discharges should be diverted through natural or artificial wetlands where possible.
- No discharge of any chemicals or effluent to rivers may commence without proper authorization (NWA) and consultation with experts.
- Irrigation return flows should be managed through good agricultural practices in terms of irrigation requirements, fertilization and pesticide applications.
- Indigenous riparian vegetation must be retained and kept clear of alien vegetation.
- No straightening of river channels must be allowed as this will increase water speed and result in scouring flows that will cause damage down-stream.
- No channelisation of rivers, streams or drainage lines should be allowed. This has detrimental impacts on the groundwater recharge and discharge processes within rivers.
- No pesticides should be used close to aquatic ecosystems particularly where spray drift can end up in rivers, wetlands and flood plains.
- Implementation of buffer zones around sensitive aquatic ecosystems. These buffer areas should be left to re-establish naturally with indigenous vegetation.
- Implement bio-monitoring (SASS5 or MiniSASS) in Gamtoos River.

All developments in water resources require an authorisation from the Department of Water Affairs and Forestry (DWAF) in terms of section 21 and 22 of the National Water Act (36 of 1998). The Conservation of Agricultural Resources Act (43 of 1983) also restricts activities within wetlands.

2.4.2.1. Guidelines for Wetland management

- Wetlands must be identified and delineated in order to be conserved. It is best to identify wetlands in the summer months, as some seasonal wetland areas may not be easily recognised in the drier winter months.
- Buffer areas of undeveloped land should be maintained around wetlands, and be kept free of alien plants. The buffer width will be determined by the size of wetland as well as impacts of adjacent land use, but is recommended between 25-75m.
- The source and downstream portions connected to the wetland should not be separated. This will alter the hydrology and result in the wetland becoming desiccated.
- All activities in a catchment have an effect on wetlands (e.g. catchments hardening, i.e. roads, paved areas will lead to higher run off and possible erosion of wetlands). Good agricultural practices need to be maintained at all times. All the guidelines within Euregap should be followed stringently.
- Make sure that no over-abstraction of surface or ground water feeding into a wetland occurs, which can cause the wetland to dry out. No high-yield boreholes should be sunk near natural wetlands. Within the Table Mountain Group Sandstone domain deep groundwater use may affect wetlands far away from the point of abstraction.
- 'Damming' of wetlands, will change seasonal wetlands into permanent water bodies and the very special habitat formed by the wetland will be lost. Damming requires authorization from DWAF.
- Check for any pollution sources that could impact on water quality such as seepage from manure & compost heaps and domestic waste dumps.
- Alien plants use far more water from wetlands and should be removed at all costs. Note: Always use "manual" methods first, when clearing aliens in wetlands as wetlands are very sensitive to soil disturbances.
- It is illegal to interfere with the flow regime of aquatic ecosystems by canalizing water flow, digging drainage ditches or infilling by dumping soil and rubble. Wetland functioning can in most cases be

successfully restored by diverting flow back to a wetland, and or by closing drainage ditches or canals draining the wetland.

- Wetlands may be utilized for grazing, provided the grazing pressure is not too high, is in the correct season (usually summer). Livestock should be kept away from the deeper, wetter areas with unstable soils. When grazing is allowed it is important to monitor for signs of degradation and erosion by overgrazing.
- Always include a buffer area around all wetlands to buffer the impact of the citrus industry on the biodiversity in wetlands.

    - For more information on wetland management and rehabilitation go to:
      www.wetland.org.za-pracmanage.htm.
    - For Wetland delineation: Use 'A practical field procedure for identification and delineation of wetlands and riparian areas' (DWAF 2003) at www.dwaf.gov.za.

2.4.2.2. Management guidelines for Rivers

- Always abide by the requirements of the National Water Act: According to this act all water-use from a river/watercourse have to be registered/authorised by the Dept. of Water Affairs and Forestry (DWAF), This includes:
    - Abstraction from a river.
    - Building of farm dams (section 117 and 12).
    - Discharging effluent or any other form of pollution into river.
    - Altering (e.g. 'bulldozing') the beds, banks and course or characteristics of a watercourse, even if the flow is erratic/seasonal (section 21).
- Any activity within 32 meters of a river is also controlled by the National Environmental Management Act (Act 107 of 1998). Proper authorization is required for these activities that are regulated by the provincial Department of Environment (DEDEA).
- It is imperative to control invasive alien plants, such as wattle, gum, pine and poplar (including aquatic weeds e.g. Parrots Feather, Water hyacinth) in or near aquatic ecosystems. Invasive alien plants reduce river flow, and de-stabilize river banks, in crease the fuel load during wild fires and increase sediments.
- Keep riparian zones intact, free of alien vegetation and rehabilitate where necessary. The well-being of river ecosystems is heavily dependent on the health of the adjacent natural vegetation, or 'riparian habitat'. This vegetation stabilizes the riverbank, filters pollutants, helps maintain a natural water temperature, create in-

stream habitat, contribute organic matter in support of aquatic life and acts as a buffer to adjacent land uses.

- Degraded river banks should be rehabilitated by gently sloping it and planting it with indigenous vegetation to prevent erosion and to improve water quality, but only after proper authorization by the relevant authority (DEDEA and DWAF).
- Never make a river straight as this will increase water speed and scouring flows.
- Never make the river bed or bank smooth as it will also result in an increase in water speed with higher scouring flows.
- Allow adequate buffers strips of indigenous riparian vegetation (ideal is 30-40m) along rivers and streams, to minimise the effect of fertilizer and pesticide run-off from cultivated land. These strips should be a minimum of 10m wide next to each bank of the river.
- Minimise water use by implementing 'best practices' e.g. drip irrigation. If possible, store water in winter rather than pumping in summer.
- The damming of rivers and building of weirs is not permitted by DWAF & DEDEA without special permits, as dams stop flow, cause sediment build up and prevent species from migrating.
- Correct river & wetland management and rehabilitation is a complex science and freshwater experts should be consulted when required. Depending on the level of assistance required, advice may be at no cost (generally from government agencies) or will be charged for.

2.4.3. Control and Manage Invading Alien Plants

In terms of the Conservation of Agricultural Resources Act (CARA - Act 43 of 1983) all land owners are required to control invasive alien vegetation. The citrus industry should make a concerted effort to control and manage all category 1-3 invader vegetation. The ecological (biodiversity) and economic benefits of controlling alien vegetation is significant. Alien vegetation incurs many hidden costs to the citrus industry if not controlled, like:

- Need to stabilize river banks.
- Reduced water run-off.
- Increased sediment load in rivers and aquatic ecosystems.
- Choking of rivers with subsequent higher flow speed and scouring flows causing flood damage.
- Increased fuel load that makes wild fires more dangerous and difficult to control.
- Pure cost of controlling thick stands of alien vegetation.

- Loss of biodiversity that reduce sustainability of agricultural industry indirectly.

All invasive alien vegetation (including alien grasses) should be controlled in:

- Riparian zones
- Wetland areas
- Flood plain areas
- Buffers areas and ecological corridors
- Entire catchments due to the reduction these plants cause in run-off
- All drainage lines
- Within natural vegetation (virgin soil)
- All orchards should be kept free of invasive alien vegetation species that can escape and become a major problem in future.

Only registered herbicides should be used during invasive alien management. Follow-up operations should always be part of the planning and implementation of any alien eradication programme.

2.4.3.1. General invasive alien vegetation clearing principles that can be implemented

- All alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money and significant effort.
- As a minimum, the plan should include a map showing the alien density & indicating dominant alien species in each area.
- Start clearing the lighter infested area first (with young/ immature, less dense trees) to prevent the build up of seed banks. Starting with less dense areas will also require fewer resources and have greater impact in the long term. In the case of alien species confined to rivers, it is ideal to start in the headwaters and then move downstream, thereby removing the source of re-infestation.
- Dense mature stands should ideally be left for last, as they probably won't increase in density or pose a greater threat than they are at the moment.
- Collective management and planning with neighbors allows for more cost effective clearing and maintenance considering that alien seeds are easily dispersed across boundaries by wind or water courses.
- Biological control is cost-effective and very safe compared to the expense and risks associated with herbicide use. However, biological control seldom solves the problem completely and is more

effective in controlling aliens than eradicating it. Biological control should be used in conjunction with other management practices.
- Always consider the role of fire in alien clearing operations. Fire with the appropriate management is a cost effective clearing method, but untimely and uncontrolled fires easily and often defeat the purpose of mechanical and bio-control clearing. Follow up operations after a fire is always required for the removal of seedlings.
- All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing.

2.4.4. Implementation of sound Fire Management to protect biodiversity

Fire should be recognized as a management tool within the citrus industry that may have severe impacts on the biodiversity of the area if executed incorrectly. It is proposed that the citrus industry create various Fire Protection Agencies (FPA's) as required in terms of the National Veld and Forest Act of 1998. This will ensure that land owners are assisted in complying with these regulations and make the industry more effective in coping with wild fires.

2.4.4.1. General fire management principles

- Frequency: The interval between fires should be determined by the growth rate of natural existing plants. No fire should be permitted in fynbos until at least 50% of the population of the slowest-maturing species in an area has flowered for at least three successive seasons (recommended: 12-20 years for fynbos depending on the area's rainfall). These time frames would differ for the different vegetation types like Renosterveld and Thicket. Always get expert advice when drafting a controlled fire management plan.
- Season: Generally, a late summer or early autumn burn is best for fynbos species, but due to the risk of runaway fires at that time, burning is usually only feasible in March and April. This may not be true for thicket and other vegetation types, hence the need for expert advice.
- Intensity: Intensity of fires is influenced by the fuel load, fuel moisture, relative humidity, gradient and wind speed. The intensity can be manipulated by selecting conditions, point of ignition relative to slope and wind that will lead to the desired type of fire, remembering that the more intense the fire generally the better it is for fynbos, provided that the fuel load has not been increased by alien vegetation.

- Proportion of area burned: It is vital to maintain a mosaic of different vegetation ages within a property (a variety of approved burning practices and veld ages is the best way to maintain species diversity).
- General aspects: Inform property neighbors and local municipality fire officers of your intention to burn at least two weeks prior to the event. Also get expert confirmation on the proposed timing and frequency of the fire for the specific vegetation type.
- Ensure fire fighting equipment is maintained and in good working order before the start of each fire season.
- Keep accurate records of fire, using a map of veld age as a basis. Note the date and time of ignition, weather conditions, etc.
- Do not leave an extinguished fire unguarded for at least two days after a burn.

Livestock should not be allowed to graze natural areas in the winter and spring, following a fire. Many of the renosterveld bulbs and annuals are vulnerable to grazing pressure by domestic stock in the first 2 years after a fire. This would apply to other vegetation types too.

2.4.5. Implementation and management of Ecological corridors and prevention of habitat fragmentation

Because of the importance of corridor areas linking ecosystems together as a mosaic of interrelated habitats, such areas should be identified and managed as natural areas. These corridors of natural habitats are needed to link habitat fragments to allow species movement, pollination and nesting to continue. This will ensure a sustainable environment for the citrus industry by preventing complete ecosystem collapse. Monocultures are known to cause severe pest problems and this will be reduced by having large enough ecological corridors.

Ecological corridors can be created by allowing natural veld to establish in a buffer area around all activity zones of the citrus industry. These buffer areas should be wide enough to keep unwanted effects from the citrus industry from affecting the biodiversity around it. Buffer areas and will automatically act as ecological corridors and create a win win situation for the citrus industry and conservation.

There is no generic guideline available for suggested corridor widths or lengths, as this depends on which animal, plant or vegetation type is in question. However as a rule thump it should be between 10-50 meters.

This is applicable to the smaller buffer areas/ecological corridors on a particular farm. The larger ecological corridors linking larger ecosystems process will require much larger areas (e.g. Baviaanskloof Mega-reserve). See the last GIS map for an example of what is meant by the above in a practical manner. The larger corridors, like the Baviaanskloof Mega-reserve link the large scale ecosystems processes, but the smaller corridors (on farms) form the important micro-scale links connecting ecosystem process from the mountains to the river as an example.

Ecological corridors planned within the citrus industry should recognize the larger landscape corridor area of the Baviaanskloof Mega-reserve and aim to link ecosystem process with it, particularly in the large transformed area of the citrus industry in the Gamtoos valley (See GIS maps).

2.4.5.1. General guideline for corridor management

During the design phase of any new orchard blocks, due consideration should be given to leaving corridors between blocks or establishing new ones where they are lacking. An indigenous landscaper can be consulted for advice on species suitable for planting in these areas. The attached GIS map contains some proposed larger strategic corridors that need to be protected and managed.

Corridors should include river and stream bank vegetation and wide road-side verges. Entire river valleys are ideal for creation of corridors to link ecosystem processes from the hinterland to the sea. Where no natural land remains on a property, portions of old fields that are left to naturally rehabilitate can also act as animal movement corridors and to provide shelter.

All buffer area around aquatic ecosystems and other sensitive habitats, and around orchard blocks could easily be managed back to indigenous vegetation and in doing so serve as ecological corridors as well.

2.4.6. Game Management in farming areas

Because this aspect does not relate to the activities of the citrus industry directly, it would be sufficient to make a strong recommendation that only game species that historically occurred in the area are kept and re-introduced. No ‘extra-limital’ species should be introduced at all. Species which occurred historically in the area are

best adapted to local conditions and will have the least impact on the natural veld.

Game can become problem animals, and it is therefore essential to fence orchards according to the types of animals occurring in the area.

2.4.6.1. *"Problem animal" control*

Wild animals may become a problem in any farming area because of the cultivated habitats and readily available food sources being introduced into the natural environment. However in many instances control of problem animals are having a far greater impact on biodiversity than the animals themselves.

It is always advisable to contact Nature Conservation regarding the most environmentally friendly and effective method of dealing with "damage causing" animals. **EXTERMINATION BY POISONING SHOULD BE AVOIDED AT ALL COSTS!** Poisons are indiscriminate and kill everything, good and bad and can really have severe negative impact on the biodiversity of the area.

The following guidelines are recommended for the control and management of problem animals:

- **Birds** – Setting of cages to catch problem bird species is advisable. Even shooting of birds is permitted provided the correct permits are obtained from the nature conservation agencies to catch and hunt problem animals.
- **Antelope** – recommended control methods provided by nature conservation agencies include:
    - Spray-on repellents, but these unfortunately do not last long as they are washed off with the rain.
    - Fencing off vineyard blocks with 1.2m Bonox fencing or jackal-proof fencing has proved the most effective preventative measure.
    - Loosening the soil in sandy areas in a strip right around a citrus block that is targeted by antelope. Antelope do not like walking on loose, unstable ground and so will not pass over the strip to get to the vineyard. This will however, not work as well in clay-rich soils.
    - Hanging a number of cheap radios in trees near the area frequented by buck to play through the night is another option. Combining the radios with a few indicator lights on fences is even more effective.

- **Baboons** – If hunting of baboons is opted as control measure, it is better not to shoot the alpha male as they know how to steer their troop to safer areas away from human interference. If the alpha male is gone, younger, males will take over who are not experienced with this form of troop control. Rather selectively remove some of the young females than the old males. Never remove an entire troop, as two or three more troops from surrounding areas will move in and replace the previous troop, exacerbating the problem. Electric fencing as well as employing people as "baboon monitors" can also be effective for baboon control. Permits are required from nature conservation agencies before commencing these activities.
- **Porcupine and Bush pig**– 1 electric wire in a fence placed 25-30cm above the ground is effective in keeping them out of fields and away from irrigation piping.

2.4.7. Sound Waste Management by the citrus industry

Incorrect waste management is probable one of the largest threats to biodiversity conservation in this sector. It is therefore critically important that waste be managed in a responsible and environmentally sensible manner.

Although waste sites are generally controlled by legislation, small private non-commercial farm waste disposal sites have been exempted from this requirement on condition that:

- Waste sites should not be situated near any water course and above 1:100 year flood lines.
- Waste sites must be adequately fenced to prevent entry of people and animals.
- Waste sites must not overly an area with a shallow or emergent water table.
- Never dump waste in wetlands or other aquatic ecosystems.
- Burning of waste should not create a nuisance to neighbors.
- Waste site should not cause any nuisance conditions due to the breeding of flies and other vermin.

2.4.7.1. General guidelines for waste management for the citrus industry

- Refuse management must comply with legal prescriptions and may not pollute the environment (particularly wetlands and water sources) or create a health hazard.

- Compile a waste management plan, where waste is seen as a resource and recycled where possible.
- Educate farm workers and their families on waste management and recycling.
- Minimize pesticide drift from orchards onto natural areas. Avoid aerial spraying and where possible use Integrated Pest Management (IPM) methods and avoid drift altogether. Sufficient buffer area may also reduce the effect of spray drift.
- Minimize fertilizer runoff into natural areas, and especially wetlands and rivers. This runoff favors the spread of alien plants and actively poisons many indigenous plant species and aquatic animals. Department of Water Affairs and Forestry has issued target water quality guidelines, addressing impacts on water quality (visit their website for these guidelines – www.dwaf.gov.za).

2.5. Business case for biodiversity conservation as it relates to the citrus industry

2.5.1. What is biodiversity?

Biodiversity can be defined as "all the genes, species, ecosystems and processes that allow life to persist over time". It also describes the necessity of having many different types of habitats, plants and animals. When biodiversity is intact, species and ecosystems are resilient, enabling them to adapt to environmental changes. It is essential for the environment to have different types of indigenous plants and animals to enable it to persist with environmental change, particularly maintaining ecosystem functioning with climate change. Climate change has been accelerated making it more important to protect biodiversity at all cost. When biodiversity is lost, nature's response is unpredictable, making it difficult for citrus growers to plan production and to protect natural resources.

2.5.2. Why should the Citrus Industry have a Biodiversity Strategy?

The Cape Floral Kingdom (CFK) is the smallest, yet one of the richest plant kingdoms on earth, and has earned international recognition as a global biodiversity hotspot and as South Africa's newest World Heritage Site. Unfortunately, the CFK is under increasing threat from agriculture, urban development and invasive alien species, with only 9% of the unique renosterveld and lowland fynbos ecosystems remaining, and much of the succulent karoo also under threat. Since 80% of the CFK is privately owned, landowner participation in conservation efforts is essential.

The Biodiversity and Citrus Initiative (BCI) present a great opportunity to both the citrus and conservation sectors to achieve their objectives. The citrus industry can benefit from leveraging the biodiversity of the CFK as a competitive marketing advantage, and from using the BCI as a tool to achieve sustainable natural resource management. The conservation sector will benefit from the pioneering biodiversity best practices in the citrus industry, and from conserving the CFK's most threatened habitats for future generations.

2.5.3. The BCI should aim to:

- Prevent further loss of biodiversity and habitat in sensitive areas and ecosystems
- Increase the total area demarcated as natural habitat as contractual protected areas to act as ecological corridors
- Include and manage smaller ecological corridors within their activity zones
- Promote changes in farming practices that enhance the suitability of orchards as habitat for biodiversity, and reducing impacts of farming practices on biodiversity, both in the orchards and in surrounding natural habitat.
- Reduce enviro-economical emissions through managing pack-house, farming, logistical and marketing practices.
- Incorporate local conservation projects into the day to day farming practices ("Spekboom" project etc.)

If the biodiversity benefits are properly marketed it presents an opportunity to create employment, increase revenue and build an ecotourism angle for the citrus industry.

There should be potential strategic and commercial benefits of biodiversity friendly activities to the industry and its members that could include:

- **Soft benefits** such as: good environmental reputation, public trust, loyalty of investors, increased employee morale, delivery on environmental commitments.
- **Tangible benefits** such as: license to operate, reduced remediation costs, increased land value because of good land stewardship.

Conversely, what are the risks to the citrus industry if this is not adopting/implemented.

3. Mechanisms for the BCI implementation

An important aspect to remember is that good systems already exist that can either be maintained, stream lined or improved. Feedback from the stakeholder engagement on 14 February 2008 clearly indicated a strong commitment from the citrus industry to make this work. There was strong support from all present to get the BCI implemented. The following aspects culminated from the meeting:

- There must be champions to take the biodiversity initiative forward.
- Three key activities should be identified and implemented as a pilot phase of implementation.
- Definite time frames needs to be fixed for the implementation.
- There should be a dedicated office with critical permanent staff to drive the biodiversity initiative.
- The biodiversity initiative office must have dedicated staff with specific key performance areas.
- The existing water user association should add an additional point to their agenda to play a "watch-dog" function to ensure that environmental (biodiversity) issues are dealt with satisfactorily within the BCI domain. They must report and monitor the performance of the relevant government departments, and file ministerial inquiries should they suspect non-compliance to any regulations that are not addressed by officials.
- There must be a social development angle included in the initiative.
- Ecological corridors are very important and should be identified, implemented and managed accordingly.
- There was consensus that the Gamtoos River must be seen as the primary corridor as it is a common denominator through-out the industry.
- There must be clearly identified benefits for the citrus industry to take part in the initiative, like biodiversity branding, earning credits and or some form of accreditation mechanism.
- The biodiversity initiative should be aligned and integrated with Euregap.
- The biodiversity initiative/strategy should be communicated to all three groupings in the Gamtoos Valley namely, the Conservation conscience, strictly commercial farmers and laborers (social development).
- Collective management and planning with neighbors allows for more cost effective implementation practices resulting in a more adaptive socio-economical environment.

It is proposed that the citrus working group get an office going at a strategic place in the Gamtoos Valley with the following minimum critical staff:

- One receptionist
- One project manager

The receptionist should be able to handle day to day queries and the administration of the biodiversity initiative, while the technical position (Project manager) should focus on marketing, management of the biodiversity initiative, and going out on site to explain the rational for the initiative.

It was proposed during the meeting of 14 February 2008 to fund the office and staff through the citrus working group in collaboration with the Baviaanskloof Mega-Reserve programme.

4. Industry specific biodiversity strategy and action plan

The following are proposed as the biodiversity strategy and action plan for the citrus industry in the Gamtoos Valley.

4.1. Aim to achieve biodiversity targets (2.4)

The BCI partners must diligently work together to achieve the biodiversity targets of the citrus industry as described under 2.4. This can be achieved through the implementation of all the guidelines as stipulated under the various targets, and through the implementation of the BCI Biodiversity Guideline (Appendix A) together with Euregap.

4.2. Creating an enabling environment for the citrus industry to implement biodiversity best practices

The BCI partners must establish an enabling environment to assist the citrus industry with adopting biodiversity best practices. This process should include defining partner's roles and responsibilities, securing funding, opening a BCI office, employing a project manager and extension officer, and building capacity to meet the objectives of the BCI.

4.3. Extend the biodiversity guidelines already in Euregap into day to day operations of the citrus industry

The BCI should work closely with the citrus industry to include relevant biodiversity guidelines into their day to day operations as it relate to, and enhance, Euregap requirements. The BCI Biodiversity guidelines

have been developed that is practical and realistic for growers and producers to implement, with maximum conservation benefits. The first draft is attached as Appendix A. The BCI Biodiversity guidelines addresses the biodiversity targets as identified under 2.4.

4.4. Identify and enlist biodiversity champions in the citrus industry

Through marketing the BCI should enlist interested producers and growers to champion the initiative. These "champions" will be guided through the implementation of the BCI Biodiversity guidelines, and assisted with building a biodiversity story into their citrus identity. The role of champions is to test the implementation of the biodiversity guidelines, and to demonstrate the tangible benefits to the citrus industry.

4.5. Extend conservation stewardship to the citrus industry

The current stewardship programmes of the Baviaanskloof Mega-reserve (BMR) should be extended where possible. Stewardship programmes encourages land owners to enter into formal contracts with the BMR to conserve critical sites. Although this might only be a small portion of a land owner's farm, benefits to the land owner could include property rate rebates, securing the area for conservation, assistance with land management, alien plant clearing and positive media coverage. This should be investigated by the Baviaanskloof Mega-reserve.

The BCI should aim to establish voluntary sites in the interim until such time as a formal stewardship programme is established as part of the Baviaanskloof Mega-reserve.

4.6. Develop a biodiversity citrus route

The BCI should aims to establish a biodiversity citrus route where visitors are exposed to both the citrus and the biodiversity experience of each participating producer. This will expose the citrus industry to foreigners visiting the area and create a new market opportunity. For example, guides from the local community can be trained to conduct tours of the natural vegetation, communicating the producer's story and the role of biodiversity conservation in sustainable citrus production. This will also be part of addressing the social development by creating job opportunities, a curio market as a secondary spin-off and bringing much needed money into the area. The biodiversity citrus

route may become an opportunity to create employment and develop a new ecotourism angle.

The success will of the above strategy will depend largely on close co-operation and endorsement from the citrus industry (Citrus Growers Association, Patensie Citrus Limited).

Any other possible opportunities for collaboration between the Citrus industry and the Baviaanskloof Mega-reserve, with specific reference to the aim of developing a viable biodiversity based corridor that addresses social and economic development needs in the region must be identified and pursued.

4.7. Incorporation of social development in the citrus industry

With the large unemployment figure in South Africa all industries have a responsibility to address social development if we want to curb this threat to our economic stability and crime situation in South Africa.

The biodiversity strategy should recognize this and aim to play an important role in social development. The implementation of the BCI clearly creates a lot of opportunities to do social development.

The creation of international awareness of what the citrus industry is achieving in terms of biodiversity conservation should be extended to show the industry's commitment to also play an important role in social development. Social development includes the creation of employment opportunities that will culminate from the implementation of the BCI in the citrus industry, more money becoming available through additional markets like the citrus tourism route and curio markets. However, the social development potential of empowering communities about the environment and making them aware of the importance of biodiversity should not be under estimated. This in itself will make the people more proud and allow them to take responsibility for their actions.

Local communities can be developed through the following activities that forms part of the implementation of the BCI:

- Tour guides for attractions on the citrus tourism route.
- Employing teams to control invasive alien vegetation. This could be co-funded by DWAF.
- Making and selling of curios/furniture by local communities.

- Better money for products on the international market because of the biodiversity branding can allow better wages to farm workers making them more economically active.
- Farm laborers that can give account for their responsible actions because they understand the reasons for doing things in a specific manner by being trained to understand biodiversity principles.
- Employing people to do environment education with local communities.
- Creating biodiversity friendly infrastructure for local communities.

5. References:

1. Biodiversity and Wine Initiative: www.bwi.co.za.

2. Boshoff A. 2005. The Baviaanskloof Mega-Reserve: An environmentally, socially and economically sustainable conservation and development initiative. TERU Report no. 52.

3. Dempsey P. 2007. Strategiese evaluering van 'n volhoubare waardeketting vir die Gamtoosvallei Sitrusindustrie. Masters Thesis. University of the Free State.

4. Groenewald, I.B. 2005. Sustainable Agriculture: Definitions, Misconceptions, Reality and Case studies. Ongepubliseerde navorsingsverslag. Universiteit van die Vrystaat, Januarie.

5. De Villiers, C.C. (Ed), 2005.*Fynbos Forum Ecosystem Guidelines for environmental assessment in the Western Cape*. c/o Botanical Society of South Africa, Conservation Unit, Kirstenbosch, Cape Town. (021-7998824).

6. IPW Manual (Chapter 2) Biodiversity Guidelines. (Undated)

7. Knight FH, Conrad J and Helme N. (Undated) Biodiversity Best Practices Guidelines for Potato Production in the Sandveld. A Biodiversity & Business Initiative.

8. DWAF Report. (undated) Water Conservation and Demand Management in the Agricultural sector: Gamtoos Pilot Project.

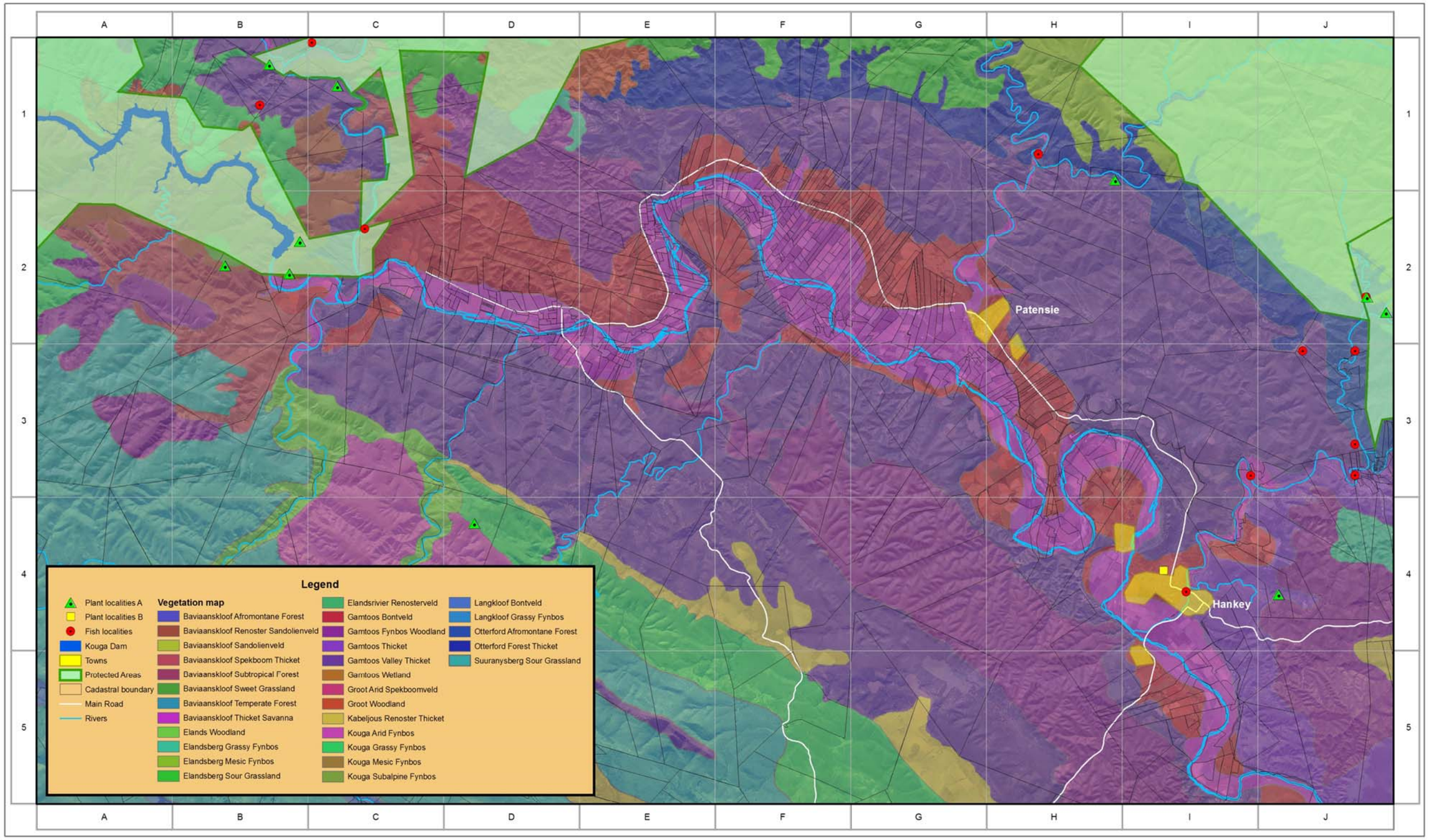
Appendix A: Biodiversity Guideline for the Citrus Industry

BCI - CITRUS INDUSTRY SPECIFIC BIODIVERSITY CONSIDERATIONS					
Section	**Control Point**	**Level**	**Complies Yes/No**	**Not applicable & Justification**	**Comment**
B1. THREATENED ECOSYSTEMS					
B1.1.	Have you determined whether future planned orchards on virgin soil will be affecting threatened vegetation types/ecosystems?	Major must			
B1.2.	Have you received authorization from all relevant government departments to proceed with the clearing of virgin soil to establish new orchards?	Major must			
B1.3.	Did you consider and plan to leave ecological corridors and buffer zones around aquatic ecosystems during establishing new orchards?	Major must			
B1.4.	Have you assessed the slope and erosion potential of the proposed future orchards?	Minor must			
B1.5.	Are all requirements of Euregap adhered to?	Minor must			
B2. AQUATIC ECOSYSTEMS (WETLANDS & RIVERS)					
B2.1.	Do you know where all aquatic ecosystems occur on your farm?	Minor must			
B2.2.	Do you have buffers zones of indigenous vegetation around all aquatic ecosystems on your farm?	Major must			
B2.3.	Are rivers, wetlands and flood plains part of ecological corridors on your farm?	Major must			
B2.4.	Are you controlling invasive alien vegetation in the buffer areas around aquatic ecosystems?	Major must			
B2.5.	Are you doing properly planned fire management in aquatic ecosystems and associated buffer areas?	Major must			
B2.6.	Do you get proper authorization from the	Major must			

	relevant government departments before doing any activities within 32 meters of any aquatic ecosystem?				
B2.7.	Do you get proper authorization from the relevant government departments before drilling and using any boreholes?	Major must			
B2.8.	Do you allow the discharge of any industrial effluent, waste water or orchard run-off into aquatic ecosystems?	Major must			
B2.9.	Do you reduce or prevent herbicide spray from entering aquatic ecosystems?	Minor must			
B2.10.	Do you interfere with the natural flow of any aquatic ecosystems by any of the following: • Diverting water • Discharging waste water • Discharging storm water • Bulldozing of river beds and banks	Major must			
B2.11.	Do you manage the ecological corridors and buffers zones associated with aquatic ecosystems as indigenous veld?	Recommended			
B2.1. INVASIVE ALIEN VEGETATION MANAGEMENT					
B2.1.1.	Are you controlling "Invasive Alien Plants" on your farm? (CARA Regulations)	Major must			
B2.1.2.	Do you know where all invasive alien vegetation occurs on your farm and what "Invasive Category" each invasive species is?	Major must			
B2.1.3.	Do you get an expert opinion (Gamtoos Irrigation Board) when controlling invasive alien vegetation regarding methodology and best practice (pesticide types)?	Major must			
B2.1.4.	Have you mapped, prioritized and planned invasive alien vegetation management?	Minor must			
B2.1.5.	Are you doing the required follow-up after invasive alien vegetation have been cleared? THIS IS EXTREMELY IMPORTANT AND MUST BE DONE!	Major must			

B2.2. FIRE MANAGEMENT					
B2.2.1.	Do you belong to a Fire Protection Agency (FPA)?	Recommended			
B2.2.2.	Do you get expert advice on best management practice before doing controlled burning?	Major must			
B2.2.3.	Do you manage your natural veld with controlled burning?	Minor must			
B3. ECOLOGICAL CORRIDOR MANAGEMENT					
B3.1.	Do you have a network of ecological corridors of indigenous vegetation between your orchard blocks?	Major must			
B3.2.	Do you control invasive alien vegetation in ecological corridors?	Major must			
B3.3.	Do you manage the ecological corridors according to BCI guidelines?	Minor must			
B3.4.	Do you understand the value of ecological corridors on your farm?	Recommended			
B4. GAME MANAGEMENT IN THE CITRUS INDUSTRY					
B4.1.	Do you only have indigenous game on your farm with no "extra-limital" species?	Minor must			
B4.2.	Do you have a conservation management plan for the ecological corridors and natural veld areas?	Recommended			
B4.3.	Are you managing your game according to the BCI guidelines?	Recommended			
B4.1. Problem animal management					
B4.1.1.	Do you get expert advice when doing "Problem animal" control on your farm?	Minor must			
B4.1.2.	Do you use any poison to control "Problem animals"? (NEVER USE POISONS!!)	Major must			
B4.1.3.	Do you get the required permits to control "Problem animals"? (Nature Conservation permits)	Major must			
B5. WASTE MANAGEMENT					
B5.1.	Do you adhere to all the requirements of Euregap?	Major must			
B5.2.	Have you got an approved waste disposal	Recommended			

	site on your farm?				
B5.3.	Is your waste disposal site far enough (at least 100 m) away from open water systems (rivers, seeps, springs, wetlands and flood plains)?	Major must			
B5.4.	Are all pesticide and other chemical containers disposed off according to legal requirements?	Major must			
B5.5.	Is all your staff properly informed about waste management on your farm?	Minor must			
B5.1. Waste- and storm-water management					
B5.1.1.	Do you discharge any waste- or storm-water directly to any aquatic ecosystem? (PLEASE STOP THIS IMMEDIATELY)	Major must			
B5.1.2.	Do you treat waste water before discharging it to natural aquatic ecosystems?	Major must			
B5.1.3.	Did you get expert advice on storm water discharges to aquatic ecosystems?	Minor must			
B5.1.4.	Do you screen storm water before discharging it to aquatic ecosystems?	Recommended			
B5.1.5.	Have you educated all farm workers about the danger of pollution to water sources and channeled water through urine, faecies, french drain outflows etc.	Major must			



SSI
A DHV COMPANY
Linking People
Promoting Growth

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Biodiversity Strategy
Citrus Industry
Gamtoos Valley

Vegetation Map

N
W E
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Date:

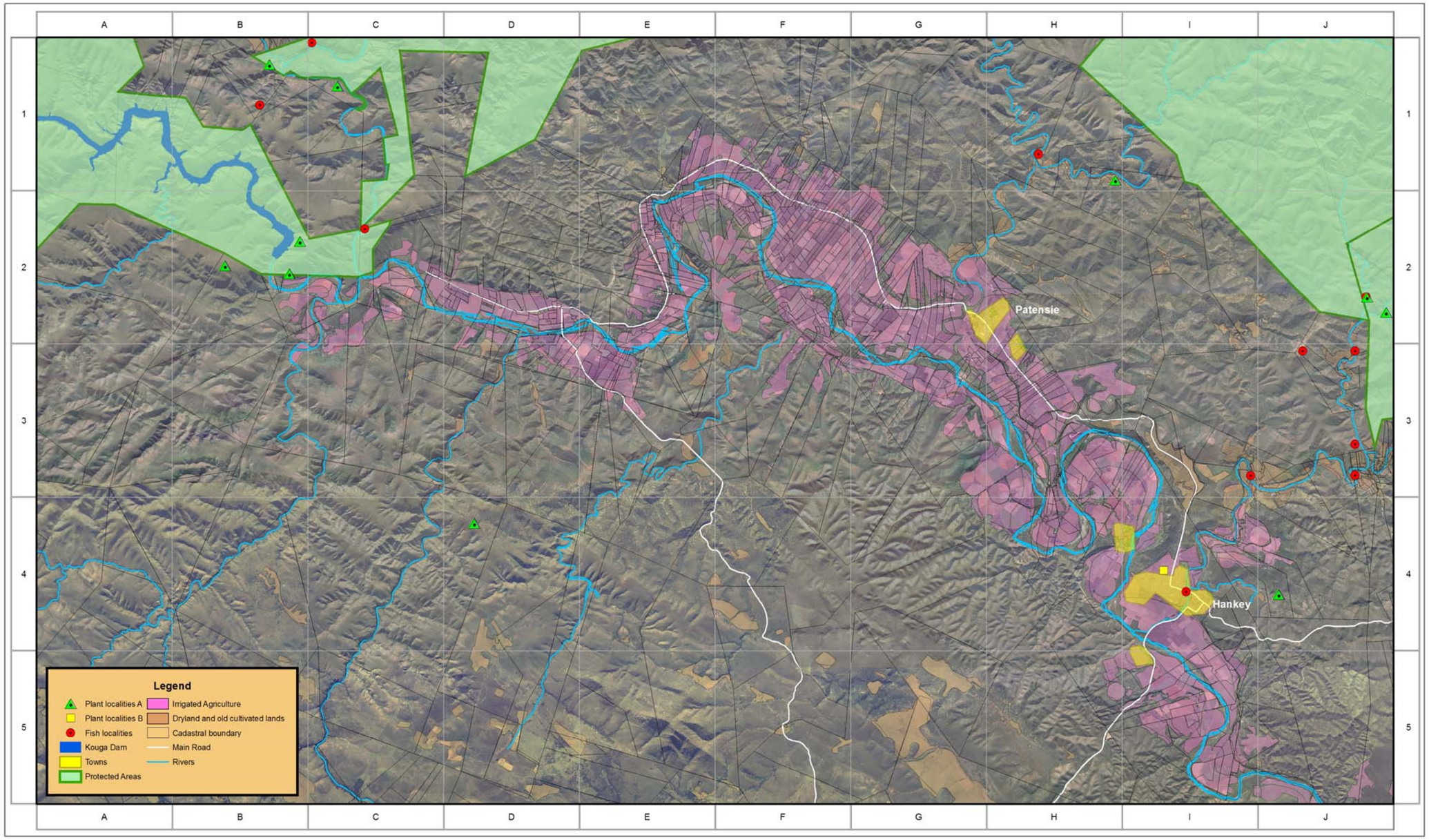
13 March 2008

Projection: Transverse Mercator
Speriod: WGS 84
Central Meridian: 25
Reference Latitude: 0
Scale Factor: 0
False Easting: 0
False Northing: 0

Scale 1:107,698

0 0.40.8 1.6 2.4

Kilometers



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Biodiversity Strategy
Citrus Industry
Gamtoos Valley

Transformation Map

N
W E
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Date:

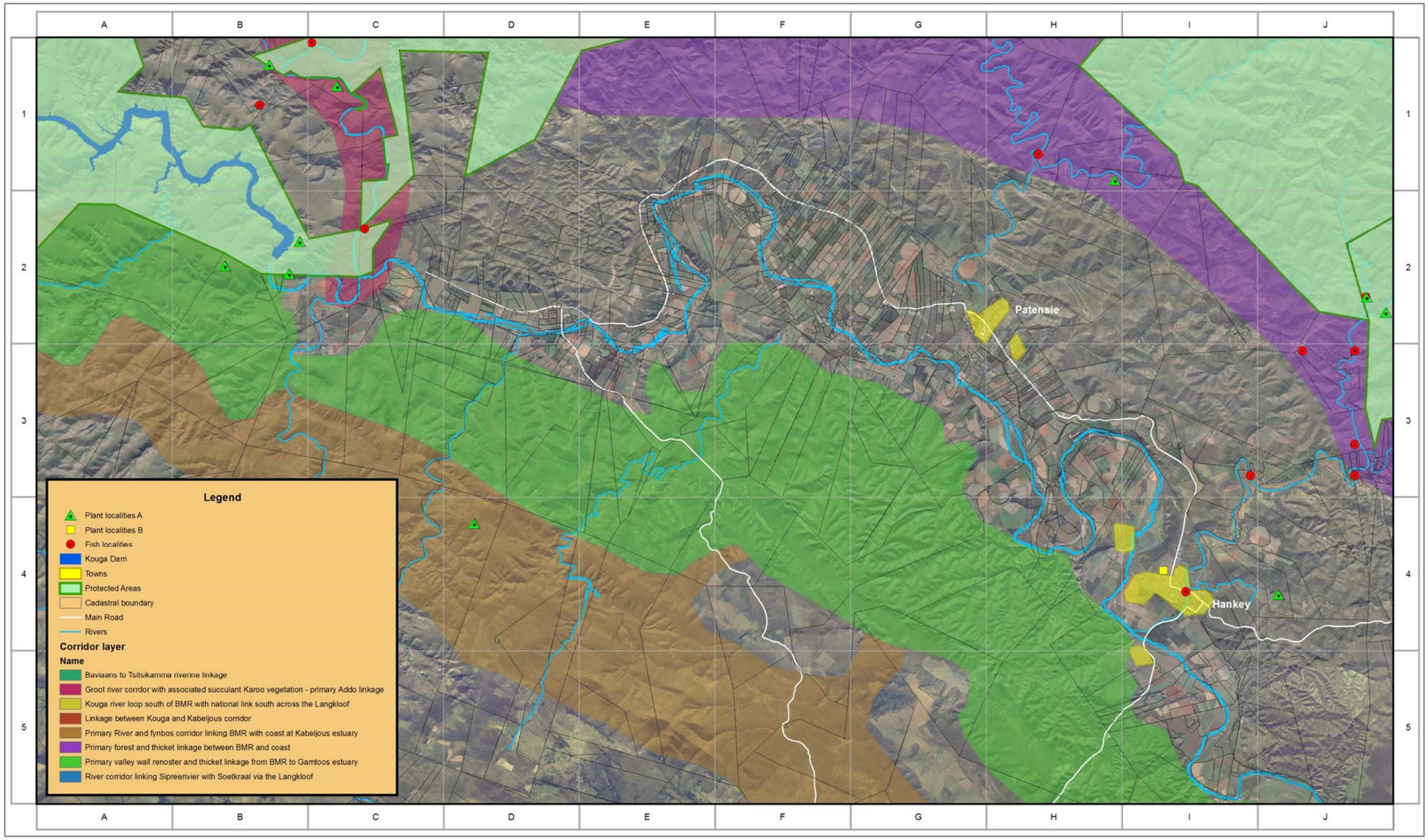
13 March 2008

Projection: Transverse Mercator
Speriod: WGS 84
Central Meridian: 25
Reference Latitude: 0
Scale Factor: 0
False Easting: 0
False Northing: 0

Scale 1:107,698

0 0.40.8 1.6 2.4

Kilometers



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Biodiversity Strategy
Citrus Industry
Gamtoos Valley

Corridor Map

N
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Date:

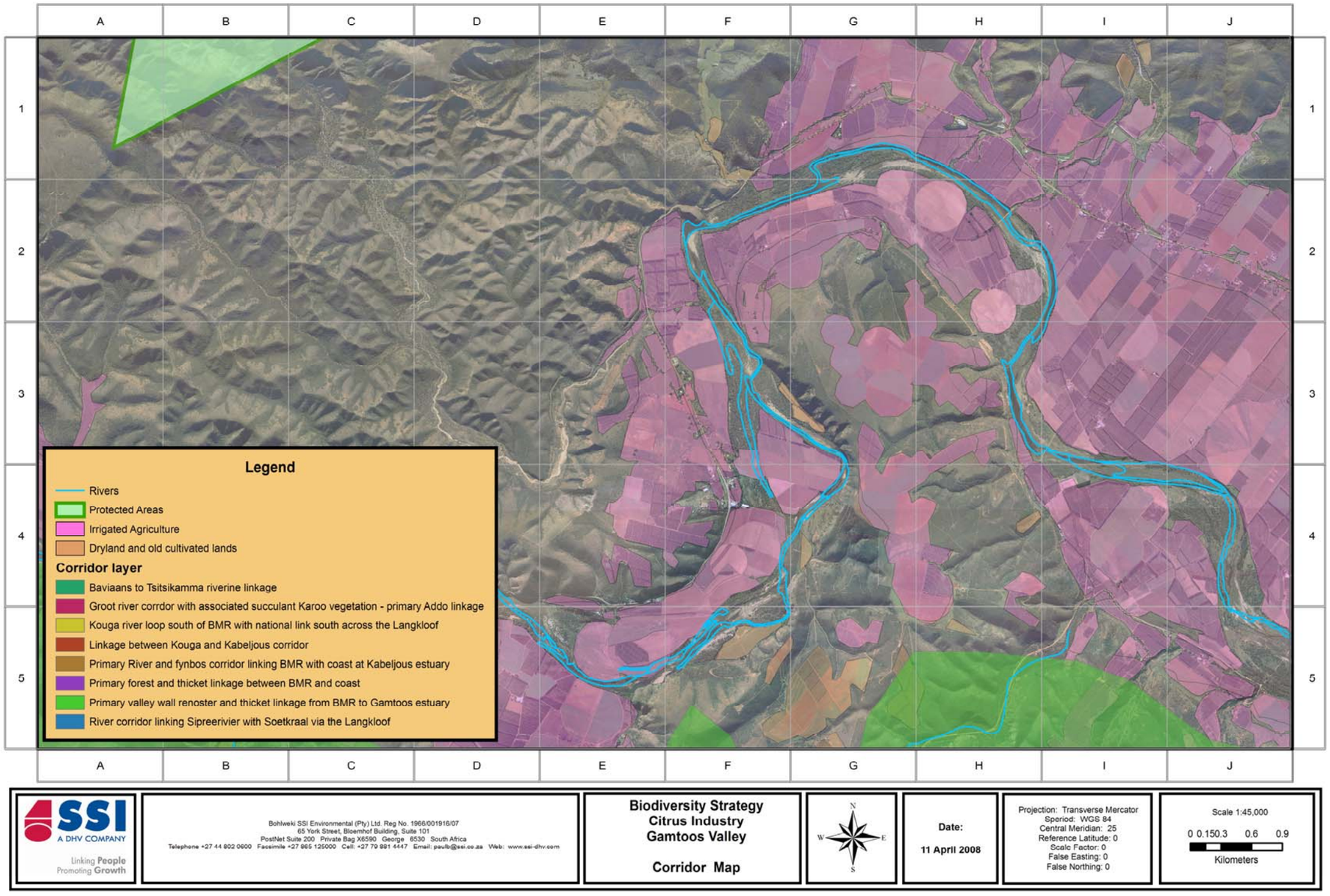
13 March 2008

Projection: Transverse Mercator
Speriod: WGS 84
Central Meridian: 25
Reference Latitude: 0
Scale Factor: 0
False Easting: 0
False Northing: 0

Scale 1:107,698

0 0.40.8 1.6 2.4

Kilometers



IMPORTANT NOTE: All the pockets of natural vegetation that is not under the purple color are potential corridors linking the ecosystem processes to the larger corridors (Green) in the top and bottom of the map. The river is an important linear corridor linking inland processes to the sea and coastal zone, and the other smaller patches link mountain and flood plain ecosystem processes.