A Learning Process on Spekboom-Based Carbon Economy Systems and Opportunities

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<th>Description</th>
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<tr>
<td>ABFRP</td>
<td>Addo Elephant National Park, Baviaanskloof Nature Reserve and Great Fish River Nature Reserve Restoration Project</td>
</tr>
<tr>
<td>CCBA</td>
<td>Climate, Community &amp; Biodiversity Alliance</td>
</tr>
<tr>
<td>CDM</td>
<td>Clean Development Mechanism (under UNFCCC Kyoto Protocol)</td>
</tr>
<tr>
<td>CERs</td>
<td>Certified Emission Reductions</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>CO₂e</td>
<td>Carbon dioxide equivalent</td>
</tr>
<tr>
<td>COP</td>
<td>The Conference of the Parties</td>
</tr>
<tr>
<td>COP21</td>
<td>The 21st yearly session of the Conference of the Parties (COP)</td>
</tr>
<tr>
<td>DBSA</td>
<td>Development Bank of Southern Africa</td>
</tr>
<tr>
<td>DEA</td>
<td>Department of Environmental Affairs</td>
</tr>
<tr>
<td>DEA-NRM</td>
<td>Department of Environmental Affairs’ Natural resources Programme</td>
</tr>
<tr>
<td>DNA</td>
<td>Designated National Authority.</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EPWP</td>
<td>Expanded Public Works Programme</td>
</tr>
<tr>
<td>ETS</td>
<td>Emissions Trading Scheme</td>
</tr>
<tr>
<td>EU-ETS</td>
<td>European Union Emissions Trading Scheme</td>
</tr>
<tr>
<td>GCBR</td>
<td>Gouritz Cluster Biosphere Reserve</td>
</tr>
<tr>
<td>GEF</td>
<td>Global Environment Facility</td>
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<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>GHG-reduction</td>
<td>The reduction of Green House Gases</td>
</tr>
<tr>
<td>INDCs</td>
<td>Intended Nationally Determined Contributions</td>
</tr>
<tr>
<td>J4C</td>
<td>Jobs for Carbon project</td>
</tr>
<tr>
<td>Kyoto Protocol</td>
<td>International treaty which extends the 1992 United Nations Framework Convention on Climate Change (UNFCCC)</td>
</tr>
<tr>
<td>LUI</td>
<td>Land User Incentive scheme</td>
</tr>
<tr>
<td>MRV</td>
<td>Measurement, reporting and verification</td>
</tr>
<tr>
<td>NAMA</td>
<td>Nationally Appropriate Mitigation Actions</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization (Non-Profit)</td>
</tr>
<tr>
<td>NRM</td>
<td>Natural Resource Management Programme under DEA</td>
</tr>
<tr>
<td>PACE</td>
<td>Promoting Access to Carbon Equity</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Private Partnerships</td>
</tr>
<tr>
<td>RRRG</td>
<td>Rhodes Restoration Research Group</td>
</tr>
<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
</tr>
<tr>
<td>VCS</td>
<td>Verified Carbon Standard</td>
</tr>
<tr>
<td>VER</td>
<td>Voluntary or Verified Emission Reductions</td>
</tr>
<tr>
<td>VOS</td>
<td>Voluntary Offset Standard</td>
</tr>
<tr>
<td>WESSA</td>
<td>Wildlife and Environmental Society of South Africa</td>
</tr>
<tr>
<td>WWF</td>
<td>World Wildlife Fund</td>
</tr>
</tbody>
</table>
Executive summary

This report was commissioned as a learning process for practitioners who are involved in the Gouritz Cluster Biosphere Reserve (GCBR) and the Jobs for Carbon project (J4C). The report looks mainly at the carbon economy and how the J4C can further finance spekboomveld restoration in the Little Karoo. International and local carbon markets are explored and how they work. In addition to carbon as a means of financing spekboomveld restoration, other potential options are explored which emerged whilst engaging with experts in this field. Some of the key feedback that emerged was that additional sources of income may make spekboomveld restoration more viable financially. Additional options include Biodiversity Offsets, Green Bonds, sustainable agriculture and engaging the private sector on their sustainability objectives. Key to the success of spekboom restoration projects will be investing in experimentation and research to identify best planting methods to maximize plant survivorship and predictability for potential investors. This report will be further deconstructed to create learning workshops for practitioners, landowners and stakeholders in the GCBR and J4C.
The Jobs for Carbon (J4C) project was initiated due to the identified need to restore degraded spekboomveld vegetation as well as to uplift the socio-economic conditions of the local community within the Gouritz Cluster Biosphere Reserve (GCBR). Overstocking of livestock such as sheep, goats, ostriches and historical land use in the Little Karoo have led to vegetation changes and land degradation over the past centuries since settlers arrived (Beinart 2003). The local community in the project area of VanWyksdorp, is historically disadvantaged and there is high unemployment and low economic development. The main economic activities centre on agriculture such as livestock farming, irrigated lands and some tourism.

The project set forth to restore 300 hectares of spekboomveld, by planting spekboom (*Portulacaria afra*) truncheons in degraded spekboomveld. The mapping of the VanWyksdorp surrounds was done to determine where the spekboomveld occurs in the project domain and the levels of degradation. *Portulacaria afra* is a key species in spekboomveld and has a high potential for carbon sequestration when planted. It also has the potential to stimulate biodiversity recovery, as it can act as an ‘ecosystem engineer’ (van der Vyver et al. 2013). Spekboomveld is part of the Thicket Biome and holds a wide diversity of succulent, forb and shrub species however it has been severely degraded in many places over the past century (Hoare et al. 2006).

The J4C project, led by the GCBR in partnership with WESSA (Wildlife and Environmental Society of South Africa) and RRRG (Rhodes Restoration Research Group) is looking to potentially expand and more lands are being sought to go beyond the initial 300 hectares to be restored. This is dependent on funding and potential income which may be generated, as well as availability of willing land owners. The carbon baseline assessment has been done for initial lands (Bolus et al. 2016). The mapped restoration area, in the surrounding vicinity of VanWyksdorp, has a potential of up to 5300 ha of severely degraded spekboomveld that could be restored (Vlok 2014).
a) **Purpose of report**

The stakeholders in the Jobs for Carbon project identified that there was an information gap between scientists and key industry players on the one hand and the local implementers and stakeholders of the project. This led to commissioning an information gathering process so that information and lessons learnt from experts in the industry could be collected and digested into workshops for local stakeholders and implementers such as trust members, project managers and land owners. This report forms the basis of the initial phase of information gathering which will then be packaged for local capacity building of stakeholders in the Jobs for Carbon project.

b) **Methods**

Experts in the industry were identified so that they could be approached for interviews for key areas such as carbon markets and mechanisms, the new South African Carbon tax rules, requirements of the DNA (Designated National Authority), possible EIA regulations, sustainability managers of the private sector and the rules and requirements for switching land-use. In addition, opportunities from other climate/biodiversity finance avenues such as biodiversity offsetting were explored based on what the experts thought could possibly work for the GCBR and J4C context. The process was advised by James Reeler of WWF (World Wildlife Fund), who have a key interest in the success of the J4C project. The process also included a ‘snow-ball’ approach so that new experts who were highlighted could also be approached for information.

The information gathering process also included an approach which would deconstruct the jargon of carbon markets and associated climate mechanisms so that it could be understood by stakeholders of the J4C who have not been exposed to the key terms. Therefore the report breaks down the key concepts and terms so that it can be converted into an explanatory workshop for J4C stakeholders and ultimately a handbook for land owners. Information was sourced from the following experts in the field: Tony Knowles (Cirrus Group), James Reeler (WWF), Mike Powell (Rhodes Restoration Research Group - RRRG), Anthony Mills (C4 EcoSolutions), Andrew Purnell (NCC), Japie Buckle (DEA-NRM), Julie Clarke (DBSA), Marijn Zwinkels (Living Lands), Anton Cartwright (Credible Carbon), Myles Mander (Future Works), Johnathon Hanks (Incite). Information was also gained from key related reports such as the National Treasury’s document on offsets (*Government of South Africa* 2014), the Department of Environmental Affairs and Development Planning guideline on biodiversity offsets (*Department of Environmental Affairs and Development Planning* 2007) and the Eco-Invest report (*Mander et al.* 2015).
2. The international and local carbon economy

a) How carbon markets and standards work

i. Brief introduction

This section begins by looking at how the carbon economy works internationally and locally. The key terms to understand first in the global carbon economy are the ‘market’ and the ‘standards’. The market in essence operates like a ‘market place’ where carbon is traded. The carbon credit (equal to 1 metric tonne of ‘carbon dioxide equivalent’ - CO₂e) is the unit traded in the market. Standards on the other hand are the method and process used to verify and approve that the carbon credits are ‘real’. (see Glossary of terms on page 12, for further explanation of key words)

When separating the markets they fall into two categories, the compliance (formal) market and the voluntary market. As they state, the compliance market refers to markets where it is mandatory for companies to limit their emissions below a certain level through reduction or offsetting. Voluntary markets deal with companies who are reducing their carbon emissions voluntarily, sometimes referred to as VERs (Voluntary Emission Reductions). The compliance market is more regulated due to its mandatory nature. There are highly recognised standards from the voluntary markets, such as the Verified Carbon Standard (VCS) and the Gold Standard\(^1\). These follow similar requirements to a compliance market standard, such as the Clean Development Mechanism (CDM) follows. In some instances compliance markets will allow these standards while others won’t.

In summary a market is setup for specific ‘industry players’ and has standards associated with it which are either allowed or not allowed, depending on the rules and regulations of the market. Like in a financial market there are ‘brokers’ who help a project sell their credits. Each standard has its own registry so that all credits are accounted for and cannot be traded elsewhere (‘double counting’ - see page 12). The market can be by-passed, and this would be called an ‘over-the-counter sale’ or unilateral trade. There is sometimes an option to sell the carbon credits before the carbon has actually been sequestered. This is usually for projects which require start-up funding. There is a risk that the carbon may not be realized. When the credits are generated they are owned by the investor up to the limit agreed on through the sale. In essence the route which is chosen is dependent on a projects’ needs and the market rules.

\(^1\) http://www.goldstandard.org/resources/faqs
ii. Compliance (formal) vs voluntary standards

The difference between formal and voluntary standards is explained by the Eco-Invest Report II (Mander et al. 2015) report as follows:

There are various carbon emission off-set standards that can be used, all with different characteristics and resulting in different trade prices on the open market (see Figure 1). Compared to CDM2, the VCS20073, VER+4 and VOS5 standards have the same or comparable tests for additionality and they take their lead from and follow the example of CDM methodologies in this regard.

All require third party verification. What is different, though, is that there is no separation between the verification and the approval process, as the auditor verifying the project also does the approval. As a result of this non-separation of verification and approval, the latter three standards are cheaper than the CDM since they involve fewer parties and processes. In addition, VER+ and VOS exclude projects that have a high chance of adverse environmental and social impacts, such as large-scale hydroelectric schemes.

The Verified Carbon Standard (VCS), Verified Emission Reduction (VER) and Voluntary Offset Standard (VOS) are all voluntary carbon standards while the CDM is a formal standard. ‘Additionality’ is one of the key principles of verifying offsets and is discussed further below, under the key offsetting principles section (see page 12).
**Clean Development Mechanism**

<table>
<thead>
<tr>
<th>Main Supporters</th>
<th>Market Share</th>
<th>Additonal Tests (relative to CDM)</th>
<th>Third party Verification Required</th>
<th>Separation of Verification and Approval Process</th>
<th>Registry</th>
<th>Project Types</th>
<th>Excludes Project Types with high chance of adverse impacts</th>
<th>Co-Benefits Relative to CDM</th>
<th>Price of Offsets</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNFCCC Parties</td>
<td>large</td>
<td>= yes yes yes</td>
<td>All minus REDD, new HFC, nuclear</td>
<td>no</td>
<td>+</td>
<td>€14–30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Authors’ Comments:** The CDM is part of the Kyoto protocol and aims to create economic efficiency while also delivering development co-benefits for poorer nations. It has been successful in generating large numbers of offsets. Whether it also has delivered the promised development co-benefits is questionable.

**Gold Standard**

<table>
<thead>
<tr>
<th>Environmental NGOs (e.g., WWF)</th>
<th>Requirement</th>
<th>=/±</th>
<th>yes</th>
<th>yes</th>
<th>Planned</th>
<th>EE, RE only</th>
<th>yes</th>
<th>+</th>
<th>VERs: €10–20 CERs up to €10 premium</th>
</tr>
</thead>
</table>

**Authors’ Comments:** The GS aims to enhance the quality of carbon offsets and increase their co-benefits by improving and expanding on the CDM processes. For large scale projects, the GS requirements are the same as for CDM. Yet unlike CDM, the GS also requires the CDM additionality tool also for small-scale projects.

**Voluntary Carbon Standard 2007 (VCS 2007)**

<table>
<thead>
<tr>
<th>Carbon Market Actors (e.g., IETA)</th>
<th>Requirement</th>
<th>=/±</th>
<th>yes</th>
<th>no</th>
<th>Planned</th>
<th>All minus new HFC</th>
<th>no</th>
<th>-</th>
<th>€5–15</th>
</tr>
</thead>
</table>

**Authors’ Comments:** The VCS aims to be a universal, base-quality standard with reduced administrative burdens and costs. The VCS plans to develop performance-based additionality tests. Those tools have not yet been developed and are thus not included in this rating. Prices for projects implemented under VCS ver. 1.

**VERs+**

<table>
<thead>
<tr>
<th>Carbon Market Actors (e.g., TÜV SÜD)</th>
<th>Requirement</th>
<th>=</th>
<th>yes</th>
<th>no</th>
<th>yes</th>
<th>CDM minus large hydro</th>
<th>yes</th>
<th>-</th>
<th>€5–15</th>
</tr>
</thead>
</table>

**Authors’ Comments:** VER+ offers a similar approach to CDM for project developers already familiar with CDM procedures for projects types that fall outside of the scope of CDM.

**Chicago Climate Exchange (CCX)**

<table>
<thead>
<tr>
<th>CCX Members and Carbon Market Actors</th>
<th>Requirement</th>
<th>=</th>
<th>yes</th>
<th>yes</th>
<th>yes</th>
<th>All (mostly soil carbon)</th>
<th>no</th>
<th>-</th>
<th>€1–2</th>
</tr>
</thead>
</table>

**Authors’ Comments:** CCX was a pioneer in establishing a US carbon market. Its offset standard is part of its cap-and-trade programme.

**Voluntary Offset Standard (VOS)**

<table>
<thead>
<tr>
<th>Financial Industry and Carbon Market Actors</th>
<th>Requirement</th>
<th>=</th>
<th>yes</th>
<th>no</th>
<th>Planned</th>
<th>CDM minus large hydro</th>
<th>yes</th>
<th>-</th>
<th>N/A</th>
</tr>
</thead>
</table>

**Authors’ Comments:** VOS closely follows CDM requirements and aims to decrease risks for offset buyers in the voluntary market.

**Climate, Community and Biodiversity Standards (CCBS)**

<table>
<thead>
<tr>
<th>Environmental NGOs (e.g., Nature Conservancy) and large corporations</th>
<th>Requirement</th>
<th>=</th>
<th>yes</th>
<th>no</th>
<th>N/A</th>
<th>LULUCF</th>
<th>yes</th>
<th>+</th>
<th>€5–10</th>
</tr>
</thead>
</table>

**Authors’ Comments:** The CCBS aims to support sustainable development and conserve biodiversity. The CCBS is a Project Design Standard only and does not verify quantified emissions reductions.

**Plan Vivo**

<table>
<thead>
<tr>
<th>Environmental and social NGOs</th>
<th>Requirement</th>
<th>=</th>
<th>no</th>
<th>no</th>
<th>yes</th>
<th>LULUCF</th>
<th>yes</th>
<th>+</th>
<th>€2.5–9.5</th>
</tr>
</thead>
</table>

**Authors’ Comments:** Plan Vivo aims to provide sustainable rural livelihoods through carbon finance. It verifies and sells ex-ante credits only. Third party verification is not required but recommended.

**Figure 1.** Details of verification processes and the range in price of the offsets for the CDM (compliance) and voluntary standards as per 2008. (Kollmus et al. 2008 in Mander et al. 2015)
What comes out of a comparison of formal and voluntary standards is that the voluntary route is generally cheaper, due to the difference in the auditing process. One of the main challenges for smaller projects in the South African context is that the international formal and voluntary standards both tend to have high costs because of the expense of using international experts for the auditing process. This means there is a need to find more cost effective methodologies and potentially develop local expertise to validate and monitor projects.

There is potential in the voluntary market for innovation in developing methodologies, mechanisms and expertise which may be more cost effective and accessible for smaller projects. In South Africa, Credible Carbon is a carbon registry with its own standard, which sells carbon on the local voluntary market. Credible Carbon has its own verification process, with independent auditors. When a project decides to follow verification through a voluntary standard it is not easy to sell the credits in a formal market as the formal market has its own specific rules and regulations. In summary each standard needs to be assessed in relation to its pros and cons before a project decides to use it to verify its carbon credits, based on the costs and where the project would like to sell its carbon credits.

iii. Carbon offsets

In this section reference is made to the key terms of offsetting, explained by the National Treasury document released in 2014. Carbon offsetting is the goal of trading a carbon credit, in that an organization which emits carbon would like to reduce their carbon emissions through avoidance, reduction or sequestration. The carbon credit is used as the ‘currency’ and measure of offsetting.

Carbon Offsetting is described as follows by the National Treasury’s document (Government of South Africa 2014):

A carbon offset is a measurable avoidance, reduction or sequestration of carbon dioxide (CO₂) or other GHG emissions. Carbon offsets are sometimes described as project-based because they typically involve specific projects or activities that reduce, avoid or sequester emissions. Through investment in carbon-offset projects, entities will be able to fund GHG-reduction measures implemented by other entities to reduce their own carbon tax liability, often in a manner that is cheaper than what could be achieved through investment in a firm's own operations.
In other words, companies are able to seek the cheapest route to reducing their carbon emissions by buying carbon credits at a cheaper price than it would cost them to reduce their emissions ‘in-house’.

The National Treasury’s document (2014) continues (Government of South Africa 2014):

Offset projects can involve different GHGs and are therefore quantified and described with a standard form of measure: metric tonnes of CO₂-equivalents (tonne CO₂e) (Ramseur, 2007). Carbon offset projects are developed and evaluated under specific methodologies and standards which enable carbon credits to be issued. Depending on the type of methodology used for the development of carbon credits, they can either be sold in the voluntary or compliance carbon markets.

Here the type of methodologies used to offset are discussed, showing that a project has different choices depending on which market (formal or voluntary) they would like to sell their credits. A company which has a mandatory reduction may only be able to use a formal market route such as the CDM. When breaking down the value of a carbon credit, CO₂ equivalent units are used to represent other GHGs which may be emitted by companies or industry so that they are comparable. One carbon credit represents one tonne of Carbon Dioxide equivalent.

With regard to the types of project used the National Treasury’s document (Government of South Africa 2014) explains:

Carbon offset projects can be categorised according to either the technology employed or type of GHG reduction, or the specific methodology selected to develop the project. The four most common categories of offset projects are: biological sequestration, renewable energy, energy efficiency, and reduction of non-CO₂ GHG emissions (Ramseur, 2007).

The Jobs for Carbon project would fall under the biological sequestration category, and more specifically as an afforestation project.

Regarding the choice of a methodology or standard the National Treasury’s document (Government of South Africa 2014) continues:
The Carbon offset methodology defines the parameters and operations required for calculating emission reductions or removals delivered by a carbon offset project during its lifetime. Project developers can use pre-existing methodologies or develop new ones (ODI 2010). Carbon offset methodologies have to be approved by an entity assigned with the administration of a specific standard. This ensures that all carbon offset projects in the world developed under the same methodology conform to the same rules.

Carbon offset project development has to follow a specific methodology and be issued under a specific **standard**. While the type of carbon offset project would influence the cost of the project development, the selling price of carbon offsets is generally determined by the **market**.

The Jobs for Carbon would therefore have to look at the different options and the pros and cons of registering with a specific standard. The price of the carbon credit that can be achieved using a specific standard would also have to be considered, and would be determined by the market chosen. Here the scale of the project will be important when looking at the costs of a standard and the returns that may be gained from selling carbon credits.

### iv. Key carbon offsetting principles

The principles of offsetting are important for any carbon sequestration project to understand as these have to be adhered to during the project to fulfil the requirements of offsetting. This is so that the project can receive credits which are ‘real, additional and permanent’. These principles are used by carbon standards to verify a project and the carbon credits it produces. Standards which do not evaluate all of these principles thoroughly would be considered to be ‘weak’ or unreliable standards. Formal standards such as the CDM rigorously verify a project against all of these principles. The principles of offsetting from the National Treasury Offsets document of April 2014 ([Government of South Africa 2014](#)) are shown below.

**Additionality**—GHG emissions reduction that the carbon offset project delivers are additional if they would not have occurred under a ‘business-as-usual’ scenario.

**Permanence**—GHG emissions reduction delivered by the project are permanent and unlikely to be reversed. Additional guarantees can be built in so that potential reversals will be compensated.
Real – Delivered GHG emission offsets originate within tangible physical projects with proof that they have occurred or will occur at a specific point in time.

Measurability – Delivered GHG emission reductions are quantifiable by accepted methodologies.

Monitoring & Verification – Delivery of the GHG emissions reduction should be monitored by an independent third-party verifier with the appropriate local and sector expertise. Accreditation requirements for potential validators/verifiers should be strict so as to ensure they have sufficient expertise and competencies to fulfil their tasks.

Leakage – The carbon-offset project should guarantee that the reduction of GHG emissions delivered does not cause leakage (that is additional or higher emissions outside the project boundary).

Double counting – It should be guaranteed that the project GHG emissions reduction occurs outside the scope of taxable activities to prevent double counting of emissions. Projects should be registered within a specific registry to avoid use of the same offset twice.

Synchronisation (Timing of emissions reduction) – Time periods for emissions offset flows should be matched to the emissions flow or emissions vintage. Rigorous and conservative accounting must be used to calculate baselines and establish boundaries.

Enforceability – Offsets delivered by the project should be backed by legal instruments that recognise the validity of the offsets created, provide for transparency of the MRV (Measurement, Reporting and Verification) system and ensure exclusive ownership.

Co-benefits – In addition to reducing GHG emissions and mitigating the effects of climate change, offset projects should have the potential to deliver additional social and economic benefits. Within the South African context offsets can contribute towards charting the pathway to a low-carbon economy and creation of green jobs and investment in non-fossil fuel-based energy generation.
A project seeking carbon credits needs to make sure that all of these key principles are being adhered to otherwise the validity of the carbon credits can be put into question. This is where a reputable and tested carbon standard is preferable as it would assess the project for all of these aspects. Whether the carbon credits generated are sold through the formal market, voluntary market or through an over-the-counter sale, the standard used will determine the extent to which the principles of offsetting are adhered to.

v. Glossary of terms from this section

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbon credit</strong></td>
<td>‘A carbon credit is a permit that allows the holder to emit one tonne of carbon dioxide. Credits are awarded to countries or groups that have reduced their greenhouse gases below their emission quota. Carbon credits can be traded in the international market at their current market price.’</td>
</tr>
<tr>
<td><strong>Carbon tax liability</strong></td>
<td>The tax liability of companies based on their carbon emissions.</td>
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<tr>
<td><strong>Carbon</strong></td>
<td>The chemical element with symbol C on the periodic table.</td>
</tr>
<tr>
<td><strong>Carbon standard</strong></td>
<td>Carbon standards publish standards, methodologies, protocols and tools for GHG accounting and maintain a registry for the purchase and sale of offsets.</td>
</tr>
<tr>
<td><strong>Carbon vs CO₂</strong></td>
<td>The fraction of carbon in carbon dioxide is the ratio of their weights. ‘1kg of CO₂ can be expressed as 0.27kg of carbon, as this is the amount of carbon in the CO₂.’</td>
</tr>
<tr>
<td><strong>Compliance (formal) carbon markets</strong></td>
<td>‘Compliance markets are created and regulated by mandatory national, regional or international carbon reduction regimes.’</td>
</tr>
<tr>
<td><strong>CO₂</strong></td>
<td>Carbon dioxide, a chemical compound made up of one carbon atom and two oxygen atoms.</td>
</tr>
<tr>
<td><strong>CO₂ equivalent (CO₂e)</strong></td>
<td>‘Carbon dioxide equivalent is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO₂e signifies the amount of CO₂ which would have the equivalent global warming impact.’</td>
</tr>
<tr>
<td><strong>CDM</strong></td>
<td>Clean Development Mechanism (under UNFCCC Kyoto Protocol). The CDM allows emission-reduction projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one tonne of CO₂. These CERs can be traded and sold, and used by industrialized countries to meet a part of their emission reduction targets under the Kyoto Protocol.</td>
</tr>
<tr>
<td><strong>GHG</strong></td>
<td>Greenhouse gas. Gases that trap heat in the atmosphere. The main ones being carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), fluorinated gases.</td>
</tr>
</tbody>
</table>

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2 http://www.investopedia.com/terms/c/carbon_credit.asp
4 http://www.co2offsetresearch.org/policy/MandatoryVsVoluntary.html
6 https://cdm.unfccc.int/DNA/view.html?CID=197
7 https://www3.epa.gov/climatechange/ghgemissions/gases.html
**GHG-reduction**: The reduction of greenhouse gases.

**MRV**: Measurement, reporting and verification.

**Offsetting**: ‘the use of carbon credits to enable businesses to compensate for their emissions, meet their carbon reduction goals and support the move to a low carbon economy.’

**VCS**: Verified Carbon Standard. ‘VCS was founded in 2005 by environmental and business leaders who saw the need for greater quality assurance in voluntary carbon markets. The VCS Program is the world’s most widely used voluntary GHG program. More than 1300 certified VCS projects have collectively reduced or removed more than 185 million tonnes of GHG emissions from the atmosphere.’

**VER**: Verified or Voluntary Emissions Reduction.

**Vintage**: The date at which the carbon credit was created to when it expires. Carbon credits are created when they have been verified by a relevant standard.

**Voluntary carbon markets**: ‘The voluntary carbon markets function outside of the compliance market. They enable businesses, governments, NGOs, and individuals to offset their emissions by purchasing offsets that were created either through the CDM or in the voluntary market . The latter are called VERs (Verified or Voluntary Emissions Reductions).’

**VOS**: Voluntary Offset Standard. Carbon offset screen that accepts other standards and methodologies using certain screening criteria. It currently accepts Gold Standards, VER projects and projects that employ CDM procedures.

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**b) Global carbon markets and frameworks**

With the key principles of the carbon economy explored, in this section the global context will be described in terms of key international agreements and the changing nature of the global carbon economy. *(see Glossary of terms on page 19, for further explanation of key words)*

**i. The UNFCC and the Kyoto protocol**

Within the global context, the UNFCCC (United Nations Framework Convention on Climate Change) is the main driving force behind the international compliance market. There are also current and emerging national and regional compliance markets. The World Bank 2015 report on carbon trends estimates that there are 40 national jurisdictions and over 20 cities with ETS’s (Emissions Trading Schemes). A number of these are still planned such as the South African carbon tax. Some examples internationally are the Japan Carbon tax, the France Carbon tax and the UK

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9 [http://www.v-c-s.org/about-vcs/who-we-are/](http://www.v-c-s.org/about-vcs/who-we-are/)
10 [http://www.co2offsetresearch.org/policy/MandatoryVsVoluntary.html](http://www.co2offsetresearch.org/policy/MandatoryVsVoluntary.html)
carbon price floor. Some regional examples are the Tokyo CaT, Shanghai Pilot ETS, California CaT and the Quebec CaT to name but a few (World Bank 2015).

The Kyoto Protocol is an international treaty which aims to reduce greenhouse gas (GHG) emissions of nations and was adopted in 1997 and entered into force in 2005\textsuperscript{12}. It is the main treaty under the UNFCCC (Figure 2) with the goal of addressing climate change by reducing greenhouse gases to levels which would avoid dangerous climate change impacts.

\textbf{Figure 2.} Organizational structure diagram of the UNFCC, showing the CDM under the Kyoto Protocol\textsuperscript{13}.

\textsuperscript{12} https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-a&chapter=27&lang=en

\textsuperscript{13} http://unfccc.int/bodies/items/6241.php
Within this context, carbon trading is an instrument which emerged in response to the Kyoto Protocol so that countries could meet their carbon emissions targets by using a permit system (carbon credit) to offset their excess GHG emissions. The CDM (Clean Development Mechanism) was developed as a flexible mechanism for this purpose, where CERs (Certified Emission Reductions) units could be traded in emissions trading schemes or ‘carbon markets’. The CDM was set up so that developing and developed countries could trade carbon credits, as the developed countries typically emitted more GHGs. However, the new Paris agreement does not separate developed and developing countries as such.

The EU-ETS (European Union – Emissions Trading Scheme) is one such market where there is a ‘cap and trade’ system. In other words, countries have a cap in terms of what emissions they are allowed and the excess must either be reduced or traded as an offset. The countries regulate the industries and companies within their borders to reach their targets, sometimes with a carbon tax liability to incentivize companies to reduce their carbon emissions. The CDM allows countries to look for the cheapest carbon credits to offset their emissions globally from CDM projects. This is based on a supply and demand system which means that the price fluctuates according to the market.

At a national level, a Designated National Authority (DNA) approves CDM projects in a host country which will contribute to the country’s sustainable development goals, and seek CERs 14 (Certified Emissions Reductions). NAMAs (Nationally Appropriate Mitigation Actions) then refer to actions that reduce the emissions of developing countries and fall under the government’s policies, in line with their sustainable development goals 15.

The voluntary carbon market mentioned previously falls outside the compliance/formal market. The main difference is that the voluntary market is unregulated, however there are internationally recognized and rigorous standards such as the VCS (Verified Carbon Standard) and the Gold Standard which monitor and verify the carbon credits which are to be traded 16, as discussed in the previous section. The reputable standards sometimes use the methods from the CDM but can only be qualified as part of CDM if they go through the CDM system. These carbon standards publish standards, methodologies, protocols and tools for GHG accounting and maintain a registry for the purchase and sale of offsets. Generally, the two markets have different types of groups involved, for example, the compliance market tends to be used for ‘energy intensive industries’ while the voluntary market is used.

14 https://cdm.unfccc.int/DNA/
15 http://unfccc.int/focus/mitigation/items/7172.php
16 http://www.goldstandard.org/resources/faqs
more by businesses, NGO’s and individuals who are looking to offset/reduce their carbon footprint.

ii. The changing carbon market and the Paris agreement

There has been a major drop in the price of carbon offsets since the 2008 financial crisis. In 2008 it was trading up to 30 € per tonne of CO\(_2\)e for the CDM but has dropped significantly since then. As shown previously in Figure 1, the prices vary across the different mechanisms both formal and voluntary. The major drop in price since 2008, which reached 5 € per tonne of CO\(_2\)e in the CDM, has led to less enthusiasm in the formal/compliance based mechanisms, because of the low returns. In essence the market is currently in limbo and waiting for clarity on the future of the carbon market, whereby prices may increase. However there are still a large number of formal carbon markets and planned emissions trading schemes (ETS) (World Bank 2015), which shows that governments have not abandoned the concept of carbon trading as a mechanism for reducing emissions.

COP 21 or the United Nation Climate Change Conference 2015, was held in Paris in December 2015. This was the 21\(^{st}\) ‘Conference of the Parties’ to the UNFCCC. The negotiations at the COP 21 are known as the Paris Agreement and countries set out their Intended Nationally Determined Contributions (INDCs) to reduce GHGs, within the climate change context. There is a process to push for regular improvements on these commitments. The COP 21 conference agreement which has been recently signed by South Africa creates the opportunity and stimulus for new mechanisms to be developed so that the target of keeping warming to below 2 degree Celsius globally can be reached.

The key outcomes of the COP 21 are as follows from the European Commission\(^{17}\):

- a long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels;
- to aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change;
- the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries;
- to undertake rapid reductions thereafter in accordance with the best available science.

\(^{17}\) http://ec.europa.eu/clima/policies/international/negotiations/paris/index_en.htm
The COP 21 (Paris) agreement re-commits nations to new emission targets however these are not necessarily sanctioned or have punishments if not met. Therefore there is a risk that they may not be fully implemented by governments, however it does show that there is still commitment to the process of reducing emissions. COP 21 is to take effect in 2020 once 55 countries, making up 55% of global emissions sign and ratify 18. The South African carbon tax is one of the new proposed mechanisms for lowering South Africa’s carbon emissions and is discussed further in the next section.

iii. Glossary of key terms from this section

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<tr>
<td>NAMA</td>
<td>Nationally Appropriate Mitigation Actions.</td>
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<td>Kyoto Protocol</td>
<td>International treaty which extends the 1992 United Nations Framework</td>
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<td></td>
<td>Convention on Climate Change (UNFCCC) that commits State Parties to</td>
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<td></td>
<td>reduce greenhouse gas emissions. It is ‘an international agreement linked</td>
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<td></td>
<td>to the United Nations Framework Convention on Climate Change, which</td>
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<td></td>
<td>commits its Parties by setting internationally binding emission reduction</td>
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<td></td>
<td>targets. Recognizing that developed countries are principally responsible</td>
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<td>for the current high levels of GHG emissions in the atmosphere as a result</td>
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<td>of more than 150 years of industrial activity, the Protocol places a</td>
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<td>heavier burden on developed nations under the principle of &quot;common but</td>
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<td></td>
<td>differentiated responsibilities.&quot; 19</td>
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<tr>
<td>INDCs</td>
<td>Intended Nationally Determined Contributions.</td>
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<tr>
<td>COP</td>
<td>The Conference of the Parties.</td>
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<tr>
<td>COP21</td>
<td>‘The 21st yearly session of the Conference of the Parties (COP) to the 1992</td>
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<tr>
<td></td>
<td>United Nations Framework Convention on Climate Change (UNFCCC) and the</td>
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<td></td>
<td>11th session of the Meeting of the Parties to the 1997 Kyoto Protocol. 20</td>
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<tr>
<td>DNA</td>
<td>Designated national authority. The organization granted responsibility by</td>
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<td></td>
<td>a Party to authorise and approve participation in CDM projects. (Department</td>
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<tr>
<td></td>
<td>of Energy in South Africa)</td>
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<tr>
<td>ETS</td>
<td>Emissions Trading Scheme</td>
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<tr>
<td>EU-ETS</td>
<td>European Union Emissions Trading Scheme. ‘The Kyoto Protocol enables a</td>
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<tr>
<td></td>
<td>group of several countries to join together and form a so-called ‘bubble’</td>
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<tr>
<td></td>
<td>that is given an overall emissions cap and is treated as a single entity</td>
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<td></td>
<td>for compliance purposes. The 15 original member states of the EU formed</td>
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<tr>
<td></td>
<td>such a ‘bubble’ and created the EU Emissions Trading Scheme (EU-ETS). The</td>
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<td></td>
<td>EU-ETS is a facility-based cap-and-trade system which came into force in</td>
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<td>2005. Under this cap-and-trade scheme, emissions are capped and allowances</td>
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<td></td>
<td>may be traded among countries. The EU-ETS is the largest mandatory cap-and-</td>
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<td>trade scheme to date. 21</td>
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<tr>
<td>GEF</td>
<td>Global Environment Facility. Environmental finance facility under the</td>
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<tr>
<td></td>
<td>UNFCCC.</td>
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18 http://ec.europa.eu/clima/policies/international/negotiations/paris/index_en.htm
19 http://unfccc.int/kyoto_protocol/items/2830.php
20 http://www/cop21paris.org/about/cop21
21 http://ec.europa.eu/clima/policies/ets/index_en.htm
c) The South African context

iv. South African carbon tax

The South African carbon tax is proposed to take effect in January 2017. The Bill is still to be submitted to parliament to be approved. The legislation is in its second draft and is expected to be finalized shortly. It is being set up as a mechanism for South African companies to be incentivized to reduce or offset their emissions. Companies are likely to be liable by 2018 for the tax. The South African Treasury will be engaging with the South African Revenue Service (SARS) to discuss the administrative mechanisms that would be required for the tax.

There is a proposed phased approach to the SA carbon tax whereby there will be large rebates of up to 90% (starting at 60 %) in the first phase starting in 2017 and thereafter these will be reduced. By 2020 the aim is for there to be no rebate. There is a set carbon price as part of the carbon tax set at R120 per tonne of carbon, which should be increased by approximately 10% a year. The fact that the price is set is an advantage for projects looking to approach investors as there is more certainty about price. The SA carbon tax in effect creates a local formal/compliance market. Therefore for the J4C project to benefit from the SA carbon tax it would have to follow the methodologies and verification defined by the legislation.

Certain activities will be preferred in the carbon tax over others for emissions offsets. Spekboomveld restoration will most likely be on the preferential list because of its multiple benefits of carbon sequestration, restoration of degraded landscapes and job creation. At present only the international standards such as CDM, VCS and CCBA (Climate, Community & Biodiversity Alliance) are likely to be approved to be used to offset for the SA carbon tax. These are relatively expensive due to the project document development, international auditors required and the highly intensive field work required for carbon baselines and monitoring.

As mentioned previously there is an opportunity to develop a more cost effective local methodology. This will potentially be investigated in the Baviaanskloof thicket restoration project funded by the GEF (Global Environment Facility), which is likely to start in 2016. However the new method will only be developed to be used in 2020 once the SA carbon tax is in full effect. The GEF funding will initially look at improving the carbon monitoring component, not the verification process. Therefore there is scope for developing local verification too.

Voluntary standards will require registration so that there is no double accounting in the system for the SA carbon tax. This does not mean that they become formal standards. They are registered so that a project cannot sell the same carbon credits
to both the formal and voluntary market, known as ‘double counting’. Therefore regulatory oversight will be required. The South African Treasury has not yet indicated that it will include national standards, preferring to use established international standards at present. This may be so that they can potentially sell carbon credits internationally if global carbon markets resuscitate or if the Rand/Dollar exchange favours international selling. This option is open if international standards are used. Credible Carbon, a local voluntary registry with an online trading facility, is looking to be registered for the South African carbon tax but this has not happened yet. It is unclear if Credible Carbon will be approved as one of the standards.

A reliable and cost effective standard is what may be needed for the South African carbon tax so that new carbon sequestration projects are not setup to fail because of high costs relative to the income that can be generated. This would give projects more choice so that they are not limited to using relatively expensive standards such as VCS.

v. Credible Carbon as a local voluntary standard, registry and trading platform

Credible Carbon is a carbon trading company, linked to PACE (Promoting Access to Carbon Equity), and is trying to develop the voluntary carbon market in South Africa through providing a carbon trading platform and registry.

Credible Carbon uses four key questions to assess a project. They are as follows 22:

- Is the project real - does it exist?
- Is the planned technology in place and functioning according to its design specification?
- Is the quantification of carbon in line with locally and internationally accepted norms, unbiased and verifiable?
- Does the project make a discernible impact in poverty?

Credible Carbon uses independent auditors such as the University of Cape Towns, Energy Research Centre, SouthSouthNorth, Urban Earth and Carbon Calculated.

Credible Carbon is focused on projects which contribute to poverty alleviation. The majority of the credits are sold locally and at least 70% of the income from credits is

22 http://www.crediblecarbon.com/credible_carbon/what_is_credible_carbon.htm
said to go back to the project which generated the carbon credits. The process from project development to selling credits is shown below, with the auditing intervals in Figure 3.

**The Credible Carbon Standard: Making the carbon market work for the poor**

Figure 3. The Credible Carbon process for verifying, buying and selling carbon credits.23

Credible Carbon is a model for the local voluntary market as it aims to be cost effective and assess projects against the key principles of offsetting, as well as using methods which are based on international standards. However Credible Carbon has not yet verified a spekboomveld restoration project to sell carbon credits, and it remains to be seen how this process would unfold. This is an option for the Jobs for Carbon project to explore.

vi. Private sector interest

The private sector has still invested relatively little in spekboom carbon sequestration and thicket restoration in South Africa to date. There are a number of reasons why the private sector has not engaged fully yet, especially in spekboom restoration projects.

Some of the potential reasons raised for the lack of private sector investment are as follows:

23 http://www.crediblecarbon.com/credible_carbon/what_is_credible_carbon.htm
• Low carbon prices.
• **Uncertainty** about carbon markets.
• **Lack of knowledge and understanding** of carbon sequestration projects like spekboom restoration.
• **High costs** of project development.
• **Spekboom is sometimes considered high risk** because of variable plant survivorship and uncertainty about sequestration rates.
• Local projects are **not marketed adequately**.
• Spekboom projects can **sequester carbon relatively slowly** (3-5 years before first credits).
• Projects **require bridging finance** till credits are acquired.

Due to these reasons many private sector offsets by South African companies are being done in other countries or on other projects such as renewable energy projects and not spekboom restoration. This may change when the South African carbon tax is initiated and companies are forced to offset all the emissions from their operations locally. This would create a potential gap in the market and greater local demand.

To attract the private sector to spekboom restoration a key requirement is that parameters of uncertainty need to be defined. A minimum and possible maximum of potential carbon sequestered needs to be ascertained, as well as the rate (tonnes carbon per year per hectare) at which this can be achieved. The scope for predictability needs to be narrowed and the potential risks identified. Research will give more certainty to the industry and this should ideally be initiated by an independent body to make it available to the industry. This will be especially important for spekboom restoration in the Klein Karoo because there has been little research in the Little Karoo on carbon stocks and rates of carbon accrual. Investors will want a range of certainty for their investments. Linking spekboom restoration to other benefits and offsets may also be attractive to the private sector rather than focusing only on carbon. For example spekboomveld restoration could be linked to water and biodiversity benefits, and/or eco-tourism and game farming among others.
3. Spekboom restoration & carbon sequestration; Lessons from the Eastern Cape

a) Potential carbon sequestration

Much research has been done on the sequestration potential of spekboomveld in the Thicket Biome. Net carbon accrual rates of between 3.2 t C ha\(^{-1}\) yr\(^{-1}\) (van der Vyver et al. 2013) and 4.2 t C ha\(^{-1}\) yr\(^{-1}\) (Mills & Cowling 2006) and up to a total carbon accrual of between ~71 to 88 t C ha\(^{-1}\) have been observed in spekboomveld in arid regions of the Eastern Cape such as the Baviaanskloof South Africa (Powell 2009, Mills 2010). In less arid areas this can be even higher for intact Thicket where spekboomveld is found. Some of these areas have been planted extensively through the ABFRP (Addo Elephant National Park, Baviaanskloof Nature Reserve and Great Fish River Nature Reserve Restoration Project), under the Natural Resource Management Programme (DEA-NRM) of the Department of Environmental Affairs (DEA) and the guidance of the STRP (Sub-Tropical Thicket Restoration Programme).

The predictions for carbon sequestration, from planting spekboom truncheons has shown to be variable for a number of reasons. A recent paper by Mills et al. 2015 explains how the survival of spekboom planted during the STRP has shown variable success.

b) Planting methods & survivorship

The planting method and timing of planting are some of the key factors for the high mortality at some of the planting sites in the Eastern Cape. A major recommendation in the Mills et al. 2015 paper is for a more innovative approach to planting so that survivorship can be increased. Also good monitoring and adaptive management of the restoration plan are necessary to identify where survivorship is low, so that appropriate action can be taken sooner in the project cycle. Identifying the key factors which contribute to survivorship can help avoid big losses in planted spekboom truncheons. As can be seen from Figure 4, survivorship varies between 0 and 80% across restoration sites. The results are still being further analysed to identify the key causes of mortality of the planted spekboom truncheons across the STRP experimental area.
Figure 4. The location of the 331 test plots carried out by the STRP to monitor survivorship within the Eastern and Western Cape. The different survivorship results are shown in different colours for all the treatments in the plot. (Mills et al. 2015)

A paper by Marius van der Vyver, who has done previous research on spekboom survivorship for his PHD, is expected to be released this year and may identify some of the drivers of survivorship. This will look at the data from the 331 thicket-wide plots (Figure 4) which were set up to monitor the survivorship of planted spekboom using different planting treatments. The Thicket wide plots were planted across the Thicket Biome during the early stages of the STRP, and there are some which have been set up near the J4C project domain, namely VanWyksdorp. The main message regarding survivorship is that there are multiple variables that can affect survivorship and these need to be identified and then mitigated for in the restoration project on a continual basis. Key variables may include climate, aspect, soil type, time of planting, angle of truncheon, nursing effects of nearby plants, soil compaction, soil moisture, frost and soil depth among others. These variables are still being researched to see which are most relevant to spekboom survival. Projects would be wise to do their own experimentation and research to try and identify local variables. This would also give confidence to potential investors.

There is an immediate need for more test plots and field research in the Western Cape as the thicket-wide plots are limited in their range, treatment and are found mostly in the Eastern Cape (Figure 4). Transferring the results of studies in the
Eastern Cape to the Western Cape can be tricky as there are differences in conditions such as soil and climate. This would be an important funding area to look into so that predictions can be made for the Western Cape situation in the Klein Karoo, and a reliable carbon sequestration case made to approach potential investors.

c) Thicket biodiversity regeneration

Another area which requires more research funding, is the ability of planted spekboom to restore thicket to its original state, and encourage other species such as succulents and shrubs to return. There has been some research such as the study by van der Vyver et al. 2013, which has shown the potential of planted spekboom to stimulate biodiversity recovery, as it acts as an ‘ecosystem engineer’. If a biodiversity case is to be made for spekboom restoration, then more evidence of this is required. In addition the potential for other species to be added to the restoration mix would be beneficial if they can add to the speedy recovery of plant diversity to restored areas. Species to use could be context specific and would be best identified by an expert Karoo botanist such as Jan Vlok. Examples of species that could possibly be used are Lycium, Euclea, Crassula, and Aloe species. What may be required is to create clumps so that these species can create a ‘nursing’ effect on the spekboom to help its survival and growth. However van der Vyver et al. 2012, shows that it can be economically unfeasible for projects looking at restoration with other thicket species other than spekboom, due to the higher costs of propagation and potentially low survival rates. Restoration projects should have research and development components to be testing different combinations and methods, and their economic feasibility, so that context specific methodologies can be developed.

d) Progress of the E.C. carbon projects so far

To date the largest spekboomveld restoration project is that of the ABFRP in the Eastern Cape, which was funded by the DEA. This project was initiated on government land in the form of parks and nature reserves such as Addo-Elephant National Park, the Baviaanskloof Nature Reserve, the Great Fish River Nature Reserve and the Camdeboo National Park. These areas are managed by different public bodies such as South African National Parks (SanParks) and Eastern Cape Parks and Tourism Agency. There are few examples of private restoration projects. Kuzuko Lodge is one of these which borders the Addo-Elephant National park of the Darlington section. The EPWP (Expanded Public Works Programme) through the DEA-NRM programme have entered into agreements where they partially fund the planting of spekboom on some private lands. On private lands there is a Land User
Incentive (LUI) scheme, whereby land-owners pay for a portion of the restoration costs.

The LUI scheme requires land owners to submit proposals to the DEA-NRM. The DEA-NRM assesses proposals based on the cost of labour (R/person day), and the contribution being requested from the DEA-NRM. This is because a large focus of the DEA-NRM is job creation at the most efficient cost. A ‘per person day’ rate is calculated by taking the entire restoration budget and dividing it by the number of days worked in total by all employees. The DEA-NRM is likely to support a proposal if the per person day rate is cost effective and falls within their strategic areas. The land owner would have to carry the remainder of the costs. The cost to restore one hectare is also important as this shows the efficiency of the planting teams (R/hectare).

To date the ABFRP has completed its carbon baselines and project document. The project was validated through the VCS (Verified Carbon Standard) and CCBA (Climate Community and Biodiversity Alliance). However no carbon credits have been sold as yet for the project. Mills et al. 2015 estimate that up to ¬$80 million has been spent so far by the government on the science and restoration project with over 10 000 hectares planted with spekboom truncheons at a density of 2500 cuttings per hectare. There is large effort to find ways to get the private sector involved, however this has not yet happened due to the depression in the carbon market, and the high expenses of validating projects through the VCS system.

4. Potential finance mechanisms & income streams

Feedback from experts about the potential for investment in spekboomveld restoration highlights that carbon sequestration, on its own, may not be able to fund the entire project costs and a ‘bundling’ approach may be required to make it financially viable. However caution must be taken when bundling as a project must not break the ‘additionality’ principle, which is required for verification. Some of the potential options that were raised are discussed further below.

a) Biodiversity offsets

Combining carbon offsets with biodiversity offsets is a possibility for spekboomveld restoration projects. The Western Cape Province already has good offset guidelines for development projects through the EIA (Environmental Impact Assessment) legislation. The vegetation which is to be offset usually needs to be moderately
threatened for it to be offset and of a similar type of vegetation. Lukey et al. (Government of South Africa 2015) detail a discussion document on environmental offsets in South Africa, which include biodiversity offsets as well as wetlands and carbon. This shows that government is exploring the possibility of developing different forms of offsets in future. However biodiversity offsets have already been done in the Western Cape.

The Provincial guideline on biodiversity offsets (Department of Environmental Affairs and Development Planning 2007) refers to the definition of biodiversity offsets as follows:

The most often cited definition of biodiversity offsets is “conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to aspire to no net loss of biodiversity. Before developers contemplate offsets, they should have first sought to avoid and minimise harm to biodiversity” (ten Kate et al 2004).

There is a Western Cape biodiversity offsetting mechanism and guideline (Department of Environmental Affairs and Development Planning 2007). This is triggered by the EIA regulation. The EIA authority managing the development makes a recommendation in the authorization of the development. The developer approaches an EIA consultant to see how much land needs to be offset with ideally similar vegetation and threatened status, as part of the EIA process. The ratio of land required to offset the land developed is also determined during the EIA process.

The Provincial guideline on biodiversity offsets (Department of Environmental Affairs and Development Planning 2007) refers to the main parties involved in a biodiversity offsets as follows:

The six main parties having roles and responsibilities in a project where biodiversity offsets may be appropriate are the:

- Developer (acting on behalf of private shareholders).
- Competent authority (acting on behalf of the greater public).
- Cape Nature (acting on behalf of biodiversity conservation in the province).
- Environmental Assessment Practitioner (acting on behalf of the broader environment).
- Specialists contributing to the EIA process (acting on behalf of their particular area of expertise).
• Interested and affected parties (acting in the interests of particular communities or sectors of the public).

Sometimes bigger companies who are doing developments can meet their offset needs with their own land. This can be done on moderately degraded land which can be restored, not completely degraded such as previously ploughed land. The offset area must be in a natural state, but can be degraded with aliens or from overgrazing, and consequently restored for the offset. A trust is usually setup to manage the offset area for the life of the offset, which is typically for the life of the development.

The Provincial guideline on biodiversity offsets (Department of Environmental Affairs and Development Planning 2007) refers to the criteria for different ratios of offsetting area (i.e. hectares) as follows:

Offsets are calculated by multiplying this measure by a basic offset ratio linked to the conservation status of the affected ecosystem, namely:

- A 30:1 ratio for ‘critically endangered’ ecosystems, where an offset would be appropriate in exceptional circumstances only;
- A 20:1 ratio for ‘endangered’ ecosystems;
- A 10:1 ratio for ‘vulnerable’ ecosystems; and
- No offset for ‘least threatened’ ecosystems.

It is preferable to offset developments which are local so that it is similar vegetation type. Usually the developer will also try and own the land. The ‘like for like’ approach, where vegetation is replaced with the same as was destroyed, is however losing traction as it is not always feasible. In the case of spekboomveld restoration, one could identify the vegetation types and then approach developers who may be offsetting spekboomveld. The cost of restoring the spekboomveld and the management of the area could then be covered by the developer. The level at which spekboomveld is endangered would need to be investigated. This may depend on the type of spekboomveld and vulnerable species present. Jan Vlok the expert Karoo botanist may be best placed for this. It must be noted that biodiversity offsetting is considered a last resort for developments as the process prefers ‘avoidance’ to ‘mitigation’.

The Provincial guideline on biodiversity offsets (Department of Environmental Affairs and Development Planning 2007) refers to the additional factors to consider as follows:
The area determined by the basic offset ratio is then adjusted by a range of context-specific considerations, including:

- The condition of the affected habitat;
- The significance of residual impacts on threatened species;
- The significance of residual impact on special habitats;
- The significance of residual impact on important ecological corridors or process areas; and
- The significance of residual impact on biodiversity underpinning valued ecosystem services.

The security of the offset is critical in the long term to meet the sustainability objectives of the development project. Therefore the following must be done on the offsets lands to ensure its protection and security (Department of Environmental Affairs and Development Planning 2007):

- **Measuring the residual negative impacts on biodiversity** to determine an appropriate offset;
- **Determining the most appropriate type** of offset: ‘like for like habitat’, ‘trading up’ (where habitat of a higher priority for biodiversity conservation than that affected by development is targeted as an offset) or monetary compensation;
- **Determining the size of the offset** required to compensate for residual negative impacts on biodiversity and, where the proponent intends to purchase, lease or secure habitat as an offset, the optimum location of the offset;
- **Deciding on the best way to secure the offset**: donation to Cape Nature or an accredited Public Benefit Organization, stewardship agreements or acquiring ‘like for like or better’ habitat;
- **Reaching agreement** on the offset; and
- **Developing an Offset Management Plan** (where relevant) after the developer has reached agreement with a suitable landowner on such aspects as ownership, access, possible title deed restrictions, and the management, monitoring and evaluation, and auditing of the offset.

In summary the following key questions would need to be answered sufficiently through the process for the biodiversity offset to be considered for approval (Department of Environmental Affairs and Development Planning 2007):
The key factors that need to be considered in evaluating an offset proposal are:

1. Would the proposed biodiversity offset compensate fully for the residual negative impacts on biodiversity and be functionally viable in the long term? Would the offset result in benefits for biodiversity?

2. Where the proponent is to secure habitat as an offset, would the offset have residual negative effects on local communities, or could they be adequately compensated? Would the offset be acceptable to the main affected parties?

3. Are there sufficient guarantees that the offset/s would be secured, managed, monitored and audited, as required, in the long term? Are there any unacceptable risks associated with the offset?

The J4C has the potential to position itself to offset biodiversity for development projects but would have to engage on all the above issues mentioned. Key parties to engage with would also be the Western Cape government and Cape Nature as they are crucial to the EIA process. Once this has been done, developments which meet the right criteria could be referred to the J4C to offset. However it is important that all engagements are done before the EIA process commences so that the relevant stakeholders are aware of the J4C as a potential option.

b) Green & Water Bonds

The Eco-Invest II report (Mander et al. 2015) defines Green Bonds as follows:

Green Bonds are financing instruments established with the specific objective of raising funds from investors to support bank lending for projects that are deemed to meet certain criteria, usually related to climate change mitigation. Green Bonds are established in response to investor demand for ‘impact investing’, which is based on the concept that one can achieve social and environmental good while earning a competitive return on investment. Through such specialised investments, people can make good in the world and make money while doing it.

Green and Water Bonds work very much the same way that a normal financial bond works. A bond is issued and is guaranteed usually by a government entity. An investor in bonds looks to buy bonds because they are lower risk, as they are guaranteed, and to get a fixed return on their investment.

The main difference between a normal bond and a green bond is the area of investment. Green Bonds are limited to investments which contribute to sustainable
and green economies. Some of the key areas are renewable energy, public transport, agriculture and forestry, building efficiency, waste and water issues. There has been much growth in Green Bonds (Figure 5) in the last few years with most of the issuance coming from development banks and the corporate sector (Figure 6). Internationally municipalities have also begun issuing Green Bonds to attract investment in the ‘green’ sector.

![Green Bond Issuance by Year](image)

**Figure 5** Exponential growth in Green Bonds Internationally.²⁴

![2014 Green Bonds by Issuer Type](image)

**Figure 6** The contribution of different organizations to Green Bonds, with development banks showing the biggest contribution in 2014 internationally.²⁵

In South Africa the first Green Bond was issued on the JSE in December 2015 and was targeted at renewable energy projects. Green bonds are still relatively new in South Africa, however they appear to be gaining traction. The key to looking for funding through a bond of any type is that a project would have to show that the investment can provide a return, like any other investment. The J4C would have to make the case for this when looking to get funding from Green Bonds, through for example carbon credits or water benefits.

The Eco-Invest II report (Mander et al. 2015) goes on to explain why banks are still reluctant to invest in natural capital projects:

> Currently, the market is considered to be too tenuous for the development of the Green Bonds associated with natural capital. This should also be seen in the light of the comments made by the banking sector in the previous section, which show a significant aversion to unknown and untested business models. It is suggested, however, that with time and demonstrated value from investment in natural capital, Green Bonds may become a viable and useful mechanism to promote investment in natural capital and development of the nature-based economy, particularly where this relates to renewable energy generation (e.g. from alien plant biomass), and climate mitigation through forest restoration or spekboom planting.

Water Bonds on the other hand may be more viable for the J4C as it falls within the GCBR, which is a catchment area for the Gouritz. Here the key would be to make the case for the water benefits from restoration to downstream users who may be able to pay for the benefits. This could include private farmers or municipalities. This too is new to South Africa, however WWF and their partners are looking at raising funds for Water Bonds in the Umgeni catchment, Kwazulu Natal. This may provide a case study for Water Bonds in the South African context (Colvin et al. 2015).

c) REDD+

REDD (Reducing Emissions from Deforestation and Forest Degradation) has not yet been developed in South Africa. Scale is an issue in South Africa as large forests are preserved elsewhere such as in Brazil and the DRC to obtain REDD accreditation, however South Africa’s forests are relatively small in comparison. Proving that there is adjacent destruction to the intact forests which are being preserved, is also key to REDD. Economies of scale need to be considered as the price per tonne of carbon is

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26 https://www.jse.co.za/articles/ifc-launches-green-bond-on-the-jse
usually lower for REDD projects than other carbon offsets projects. REDD+ projects are potentially more viable as they include reforestation. REDD+ as defined by UN-REDD\textsuperscript{27} is as follows:

\begin{quote}
'REDD+ goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.'
\end{quote}

Conservation International which leads a number of REDD projects states the case for REDD as follows\textsuperscript{28}:

\begin{quote}
About 11\% of human-caused greenhouse gases come from the destruction of tropical forests. REDD+ is a system being designed by the United Nations Framework Convention on Climate Change (UNFCCC) to reduce these emissions. Under REDD+, countries and landholders that protect and restore forests are rewarded by developed countries. (For example, a community could receive REDD+ funding, or training to improve yields from existing farmland, in return for avoiding the clearing of standing forests.)
\end{quote}

A national strategy is still required for REDD+ to happen in South Africa, with spekboomveld also defined as ‘forest’. To get REDD accreditation a project has to go through the international standard of REDD, which makes it expensive. For the local market it would be best to have a local standard and local auditors, as suggested for the local carbon market, to reduce overhead costs.

d) Sustainable agriculture & alternative crops

An important area which should be considered for additional sources of revenue is from high value alternative crops which would work alongside spekboomveld restoration. Irrigated crops such as olives and lucerne, or essential oils can be a potential source of revenue while spekboomveld restoration is taking place. This of course is dependent on the land-owners having access to such lands. This would allow private land owners the opportunity to not lose income from putting part of their land away for restoration.

Other options are tourism, game farming and bee-keeping. High quality honey can be produced in spekboomveld areas. Game farming can slowly be introduced once the restoration has reached a point where it can sustain browsing. This takes the

\textsuperscript{27} http://www.un-redd.org/aboutredd
\textsuperscript{28} http://www.conervation.org/projects/Pages/saving-forests-to-keep-our-climate-safe-redd.aspx
restoration approach to a landscape level and looks at sustainable farming methods and alternative income streams, in parallel to carbon sequestration.

Living Lands in partnership with the Four Return Development Company and Commonland has been developing the value of alternative crops with farmers in the Baviaanskloof and lessons could be learned there. One of the models is to encourage farmers to move from goat farming and invest in alternative agricultural production. With the partnership it helped secure investment in growing and processing essential oils with the Baviaanskloof landowners. This was done in the context of an integrated catchment management plan and business case for sustainable farming. This model could be a potential option to explore for the J4C.

e) DBSA and the Green Fund

The DBSA was looked at for this report to assess whether it could potentially fund a project such as the J4C. However it appears that the DBSA is currently only looking to invest in large scale projects of approximately over 500 million Rand. The DBSA focus areas are currently: Education, Energy, Health, Housing, ICT (information and communications technology), Transport and Water. The stated objectives of the Green Fund at the DBSA are described below:

One of the key tenets of the Green Fund’s investment philosophy is to support impact-focused green economy ventures that promise sustainable economic activity with tangible social and environmental outcomes. Funding opportunities have been made available through public applications to proposals that will be announced via mainstream print media and the Green Fund website. In addition, the Fund also actively seeks out and supports initiatives that meet its selection criteria and focus areas.

The GCBR would need to possibly focus on a water related project at a much larger scale to look at receiving funding or investment from the DBSA. The J4C outcomes do encompass the social and environmental spheres which are required. Looking at funding from the DBSA could potentially be an option if the J4C reaches a critical scale. The Eco-Invest report (Mander et al. 2015) reports that the Wildlands Trust received seed funding with the eThekwini Municipality in KwaZulu-Natal for 1000 hectares of forest restoration in local community areas. It may be worth approaching the Wildlands Trust for learning and advice on how they received the funding for their restoration project.

29 http://www.sagreenfund.org.za/wordpress/
f) Corporate sector sustainability

When looking at corporate sustainability and approaching a company, it is important to understand the company, its objectives and needs. For example many sustainability consultants offer services such as reducing a company’s footprint. This can include carbon, water, energy, waste or ecological footprints and would be company specific. Consultants then also offer sustainability assessments of companies.

When engaging the corporate sector in relation to corporate sustainability, the J4C would have two main routes to decide on. The project could either use a broker to sell environmental services such as carbon credits or the alternative is to do a bilateral trade or over the counter deal.

The first option would require engaging a carbon registry such as Credible Carbon who work with PACE (Promoting Access to Carbon Equity) as its project proponent. The broker or project proponent can link the project with the client. The broker already has a client base and knows which clients would be interested in carbon credits from a project such as the Jobs for Carbon project. The limitation here is that the sale would be limited to carbon, and other benefits such as water, biodiversity and jobs may not be included in the price.

The second option is to approach the private sector through a bilateral agreement or ‘over the counter’ sale of ecological services. In this situation the project needs to look at approaching the private sector from a business point of view. This is especially in light of voluntary engagement, as carbon or ecological footprints are not yet legislated against in the corporate sector. This will change for carbon if and when the SA carbon tax is introduced.

What is required initially is for the project to develop a ‘service offering’. This should include:

- **What is being offered.** E.g. Biodiversity, water, carbon, social benefits.
- **How it will be done.** E.g. Restoration on degraded lands in the Karoo.
- **How much.** E.g. Hectares, number of species protected, jobs created.
- **Cost.** E.g. How much will it cost per hectare, per job etc.
- **What are the risks.** E.g. Fire, game, land owner agreements etc.

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30 http://www.gcxafrica.co.za/
31 http://www.futureworks.co.za/?page_id=20
The service offering can then be taken to various businesses which may be interested in these ecological and social benefits. Here some research into which businesses would be interested is needed. The service offering can then be taken to the businesses to begin negotiations by either:

- A senior member of the project (E.g. Chairperson).
- A fundraising agent (typically takes 10% of funds raised).
- Or a broker (if the service is limited to carbon for example).

The reason the service offering is important is that companies will want to report back to their shareholders to show what they are receiving in return for their investment or contribution. The relationship with the company then becomes critical, for the company to keep interested in investing. The project does not only need to look local and could look for companies which operate nationally and internationally, such as Unilever or Seeff. They can be approached to offset their environmental footprint or form part of their sustainability priority areas.

Living Lands with their partner Four Returns Development Company has recently engaged the corporate sector to support their efforts in the Baviaanskloof. They have entered into an agreement with GEFT as part of the Coca Cola RAIN program. Living Lands will restore up to 1000 hectares of spekboomveld, and this is based on the connection of increased water retention from spekboom restoration. The restoration of the catchment is likely to improve the water base flow in the system (van Luijk et al. 2013). This will partly secure the Coca Cola bottling plant’s water use in Port Elizabeth. The Baviaanskloof River ends up in the Kouga dam. The Kouga dam is one of the main water sources for the city of Port Elizabeth. This type of approach to a company, to improve their sustainability, could be followed by the GCBR and J4C.
5. Project development

This section looks at the different stages in the value chain for a spekboomveld restoration and carbon sequestration project. It also highlights recommendations raised of how to approach the private sector and finally how partnerships with government play an important role in project success.

a) The value chain for a carbon project

The value chain for the development of a spekboomveld carbon sequestration project is identified as follows from the experts approached:

1. Project design and development
   Here the project is conceptualized and planned in terms of areas to be planted, implementers, projected costs, projected rates of return etc.

2. Funding and Investment proposals
   Once a project design has been developed, funding or investment needs to be sourced. A good project design will aid in getting funders on board where the costs, financial returns and ecological/social benefits are clear.

3. Baseline assessment & drafting of project documents
   To get verification of the project both a baseline and project document would have to be compiled.

4. Harvesting and cutting of spekboom
   This stage involves the actual ground implementation whereby the spekboom can be sourced for the planting. This can be from neighbouring farms who are willing to supply spekboom cuttings.

5. Restoration planting
   This stage is the main part of the restoration process whereby cuttings are planted, and areas are replanted if necessary if there has been high mortality after a given monitoring period. Project managers need to be identifying causes of mortality if survivorship is low and adapt planting methods accordingly. Experimentation and research on best methods for local conditions should be ongoing to build confidence for potential investors.
6. **Project management and administration**  
   This part of the value chain is ongoing and requires that all components are managed and administered adequately.

7. **Carbon sequestration monitoring and verification**  
   During the project life, the carbon stocks need to be monitored at relevant intervals. This is usually every 3-5 years. Verification of the project also needs to be done by a chosen carbon standard. Verification of the project can also occur earlier in the project in step 3, depending on the standard used.

8. **Marketing and sales of carbon credits**  
   Once the project has been verified, and the 1st monitoring event has been completed, the carbon sequestered can be assessed and the credits sold by the carbon broker being used. If a specific carbon standard is being used such as VCS they would be involved in defining where the carbon credits could be sold.

9. **Managing Funds**  
   Here the management of the funds raised from selling carbon credits can take on various forms depending on the arrangement between different parties involved in the project and the organizational structure. Mander et al. 2015 recommend a model of pooling the carbon from various land owners and then using the funds across the land owners for further restoration.

b) **Approaching the private sector**

   From a private sector perspective there is lots of work done scientifically on spekboomveld restoration but there is a lack of the business perspective. This may be a disadvantage and the ability to meet business needs must be developed if much needed finance is to be gained for restoration, from the private sector.

   Recommendations raised about approaching the private sector for investment are as follows from consulting key experts:

   - Need **long term planning with key milestones**.
   - Do the **groundwork upfront**.
   - **Spread risk** across a number of buyers.
   - Create **portfolio of buyers** to reduce risk.
   - Project developers need to get **commitment from clients** before projects begins.
   - Approach companies that will have a **specific interest in the project**.
   - **Build relationships** over time.
Create a template for an agreement.
Have good legal advice on agreements.
Create a platform to engage on (e.g. One stop shop).
Support an industry forum which can bring together industry players.

A project process to engage in a private sector client is recommended as follows:

1. Identify prospective groups.
2. Establish connection.
3. Qualify if they are in the position to invest.
4. Identify whether they want environmental or social benefits.
5. Quantify what the client needs out of it.
6. Quantify the amount of land available with committed land owners.
7. Explain what J4C has done in past and what they will do in future.
8. Explain how the SA Carbon tax will affect them and how J4C can offset the company tax burden (if applicable).

Following these steps an agreement may be reached where both parties are clear about what can be achieved.

c) Government as a partner

Due to the high initial costs of spekboomveld restoration it is highlighted that engaging with government agencies for support may be pivotal to getting spekboomveld restoration to be successful in the long run. Government has taken the lead with many restoration projects already such as the STRP in the Eastern Cape but there is increasing perceptions that the private sector needs to be more involved as Government has limited funds. The Eco Invest II (Mander et al. 2015) report suggests that government can be engaged through:

- The Natural Resource Management programme (DEA – NRM)
- The national Green Fund (DBSA)
- Or national/municipal treasuries.

In addition to this public private partnerships (PPPs) are suggested as a potential model forward to engage with government. Mander et al. 2015, goes on to say that:

For Eco-Invest, Public-Private-Partnerships (PPP’s) are an important institutional mechanism for leveraging private sector investment. In particular PPP’s are likely to be critical where Government seeks to broker long term business
partnerships between the private sector and SMME’s / previously disadvantaged communities to secure equitable opportunities and economic benefits from the development of a biodiversity economy, or payment for ecosystem services.

Therefore there is space to create public-private partnerships where government seeks to engage business orientated projects which support the public good and the environment. There may be an opportunity for the J4C to bring government and the private sector together with the aim of restoring degraded landscapes in the GCBR.

d) Legislative and legal matters

This section deals with potential legislation which may affect spekboomveld restoration, based on feedback from experts.

i. Environmental Impact Assessment (EIA) requirements

There are no EIA regulations which stop the restoration of spekboomveld with the planting of spekboom truncheons at present, on private lands. Large scale spekboomveld restoration has already been implemented in the Eastern Cape without the requirement of an EIA.

The biodiversity offsets route would require engaging in the EIA process of the developer, to ensure that the offsets site would meet the criteria. The Provincial guideline on Biodiversity offsets (Department of Environmental Affairs and Development Planning 2007) says the following about relevant legislation which needs to be adhered to during the EIA process of the development:

Many of these laws, policies or plans provide direction for, or inform, the use of biodiversity offsets as an instrument for environmental management. Importantly:

- The conservation of the natural environment is required in terms of the Constitution, the National Environmental Management Act (NEMA), and its Biodiversity Act. The national environmental management principles in Chapter 2 of NEMA include the need to ‘avoid, or minimize and remedy’ the disturbance of ecosystems and loss of biological diversity, and the need for development not to jeopardize ecological integrity.
- The Western Cape Provincial Spatial Development Framework (PSDF, approved by Provincial Cabinet in 2005) created the policy framework for biodiversity offsets to curb the continual erosion of biodiversity. It is
intended that the PSDF will be approved as a Structure Plan in terms of the Land Use Planning Ordinance (15 of 1985).

- The National Biodiversity Strategy Action Plan (NBSAP) explicitly recognises the need for biodiversity offsets.
- Biodiversity plans at different scales identify priority and/or irreplaceable areas for biodiversity conservation; typical ‘receiving areas’ for biodiversity offsets.

The Western Cape government should be engaged before developing biodiversity offsets to identify how the project should engage in the EIA process.

With regards to green/water bonds, REDD+, and sustainable agricultural options each case would need to be evaluated specifically based on the project proposal to identify what legislation may be relevant.

ii. SA carbon tax

The South African carbon tax bill is yet to be passed, whereby the regulations will be defined. These would however most likely fall under the National Treasury Department and the SARS (South African Revenue Service).
6. Conclusions & recommendations

The carbon market is well-developed internationally and is growing in South Africa and opens opportunities for the J4C project in the GCBR. Expanding the project further appears feasible if the project can look into various financial models and options. Alternative financing from sources such as sustainable agriculture and water bonds show potential but will require more research for the GCBR context to identify how it can be taken forward. The Eco-Invest report II has already looked at spekboomveld restoration and carbon sequestration and highlights the needs for public and private investment, and shows that spekboomveld restoration and carbon sequestration is potentially viable with the correct models and support. Key to the success of spekboom restoration projects will be investing in experimentation and research to identify best planting methods to maximize plant survivorship and predictability for potential investors. The GCBR has the opportunity to weigh up the pros and cons of the various options so that an informed and potentially multi-pronged approach can be taken.
7. List of key organizations & potential partners in South Africa, for the J4C and GCBR

**Non Profit Organizations**
- Green Trust (WWF & Nedbank)
- Living Lands
- PACE – (Promoting Access to Carbon Equity)
- Table Mountain Fund (TMF)
- Wildlands Conservation Trust
- World Wildlife Fund (WWF)

**Government entities**
- Cape Nature
- Department of Environmental Affairs’ Natural resources Programme (DEA-NRM)
- Expanded Public Works Programme (EPWP)
- Green Fund (DBSA)
- Sub-Tropical Thicket Restoration Programme (STRP)
- Western Cape Province

**Private companies**
- C4 Eco-Solutions
- Carbon Check
- Credible Carbon
- Future Works
- Promethium Carbon
- NCC Environmental Services
8. References


The Gouritz Cluster Biosphere Reserve (GCBR) is a citizens' initiative dedicated to environmental conservation combined with socioeconomic development in South Africa's greater Gouritz River region, roughly spanning from Swellendam to Uniondale, and from Prince Albert to the coast. UNESCO has formally designated this region as a place of major biodiversity significance for the planet under its global Man and the Biosphere Programme. Registered as a non-profit company, the GCBR organisation facilitates practical projects that demonstrate a balanced and effective approach to ecological sustainability and human development. It seeks to increase people's ability to efficiently manage natural resources for the well-being of both human populations and the environment in this unique region.

www.gouritz.com