

## Carbon and Koalas Collide: The science of trees, mapping and the carbon economy

This document articulates two things:

1. **Protecting the koala forests of Australia is an imperative step towards reducing greenhouse emissions in Australia and,**
2. **Our science shows it will be impossible to replace the carbon in those forests if they are destroyed.**

### THE AUSTRALIAN KOALA FOUNDATION'S VIEW FOR THE FUTURE OF THE PLANET

As the AKF prepares to visit Copenhagen for the United Nations Climate Change Conference, we are coming to grips with the fact that the protection of existing forests in a country like Australia has limited relevance to the existing discussions. After watching the October negotiating sessions in Bangkok with interest, we feel that our worst fears are going to be realised – there is the potential for financial support for increased industrial logging of natural forests, and the conversion of these forests to plantations. Rather than finding real solutions, it appears that the “old system” is simply trying to work the “new system” to its advantage. Developing countries fear native forest protection, but ironically it could be their and the world’s salvation.

The AKF is arguing for a new way of thinking. Like HRH the Prince of Wales’ Rainforest Project, the AKF believes the global community must recognise the true value of our natural forests on all continents, not just the Third World. If we do not, we know the future of life on earth will change forever. We cannot continue to delude ourselves that planting new saplings will counteract the removal of existing forests. The figures below will stand for themselves.

The core of AKF’s philosophy and message is that the argument for preservation of carbon sinks such as Australian bushland has become increasingly relevant. We need to rethink our attitudes to our forests, and make a new assessment as to how we value these areas.

Let’s start with the basics.

#### 1. Money in the Bank.

Existing forests are our ‘carbon vault’ – money in the bank so to speak. What is the point of attempting to reduce our carbon emissions if the carbon already locked up, the carbon ‘in the bank,’ is not protected?

Protecting existing forests, and repairing and restoring degraded habitats will secure and renew the carbon we already have in the bank. As these forests continue to grow and thrive, we can be assured of a good rate of return; these forests will sequester and store significant stocks of carbon, and augment other climate change prevention measures. The koala rejects outright the premise that anyone has the right to cut down a tree.





## **2. Mapping with integrity leads to good solutions.**

Mapping biodiversity is easy, and knowing each and every tree on the Australian landscape is not actually impossible. In fact the AKF's current data comes close to doing just that. Why is it that the business world can map telephone poles, bus shelters, all manner of human infrastructure, but fail to acknowledge and map the life force of this planet - the environment? It is staggering that our Governments worldwide have little regard for mapping of our biodiversity. Even if mapping has been done, it is often at too high a resolution to be useful for the hard decisions needed in planning and sadly is often mapped to watch for declines rather than promote regeneration.

So, how can we protect our forests and the carbon within if we do not know what we have? Only by mapping our vegetation, our trees, can we properly value our existing forests. The next logical step from that is to use those maps to broker relationships between companies around the world who want to voluntarily offset their emissions and landholders wanting income and biodiversity protection. If you can accurately measure the carbon in existing trees, then offsetting schemes could have far more integrity than those currently on the table. Companies contributing to the protection of trees can actually pinpoint the trees they are responsible for protecting. In short, accurate, high quality mapping can bring credibility to carbon offsets and of course lead to strategic and logical plantings to decrease fragmentation, the curse for all animals on the planet.

## **3. Investing in our wild places**

It is critical that we are able to attract the necessary funds to provide proper management of our existing forests and landscapes.

The AKF knows that there are conscientious and responsible people who want to help protect our environment. There is already a voluntary market, to provide funds to provide for the protection of the forests of Australia, and the world. Why isn't it on the table at Copenhagen?

In Australia, the Carbon Pollution Reduction Scheme (CPRS) only directly affects the top 1,000 polluting companies. This leaves over 99% of companies in Australia with no legislative requirements to invest in the carbon economy, but we know a portion of these people will still want to invest in Australia's future. The AKF wants to broker partnerships with the landowners of Australia and those that have responsible business practice. Bringing them together will provide a strong investment in our future, and the future of the planet.

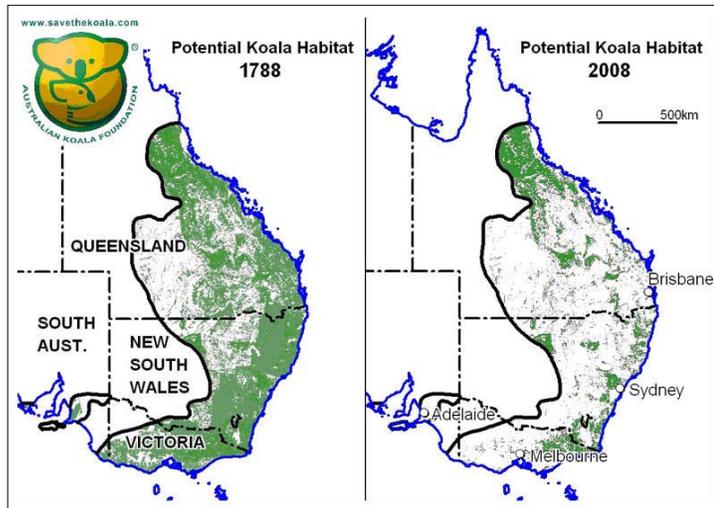
We must remember that there are governments, international organisations, businesses and NGOs who believe that carbon trading will be a magic bullet. However, a lot of what we see and read could easily be described as "the Emperors New Clothes." Without an ethical approach and integrity, carbon trading will become the new sub-prime. The same forces that caused the global financial crisis could well be at work here.

Ultimately, we believe that the answers will be in the trees. Protect what we already have around us. Give a true value to our Earth's assets. Save every tree, regenerate what has been lost, and let nature take its course. This is not about political games or opportunities for big business. It is about the planet. It is about the long term survival of our world and the future of the collective people who live here.



### THE STORY SO FAR

Since 1788, when Australia was first settled by Europeans, nearly 65% of the koala forests of Australia have been cleared – over 116 million hectares. The remaining 35% - approximately 41 million hectares - remains under threat from land clearing for agriculture, urban development and unsustainable forestry. The koala forests of Australia are located along the east coast, and currently constitute about 5% of the landmass of Australia. These forests constituted approximately 20% of the landmass at the time of European settlement.



The Australian Koala Foundation knows that Australia could lead by example and protect these forests, whether under the Kyoto Protocol or some other instrument, by recognising their cultural and economic importance, and their contribution to the carbon debate. If these forests are acknowledged, the koala would then be able to show simple solutions to global problems for both developed and developing nations. Like AKF's motto: *No Tree, No Me*.

The AKF has done the maths, and there are staggering consequences for the removal of existing native koala forests and the carbon<sup>1</sup> they contain. It may be an impossible task to replace this carbon stock.

### DO WE PLACE THE RIGHT VALUE ON OUR (KOALA) FORESTS?

In 1968, Garrett Hardin suggested that pollution resulted from a fundamental failure of markets to incorporate the full cost of their economic activities<sup>2</sup>. Similarly, **the koala forests of Australia are being cleared because our society fails to place an appropriate economic value on our forests** - even though koala tourism was projected to earn Australia \$2.5 billion during the Olympic year in 2000<sup>3</sup>. Ironically, the Australian Government does not make the link. Protect the forests, conserve the koalas, and watch the tourism industry flourish. These natural assets are just taken for granted.

On a day-to-day basis, these forests provide a range of services to our society, including (but not limited to) water purification, erosion control, sources of pharmaceutical and industrial products, and carbon sequestration and storage. Forests also have psychological, spiritual and cultural value.

These forests are also home to the koala – a unique marsupial, with beauty and charm, loved around the world.



Yet the economic value of forests is only seen in terms of timber, land for development, or urbanisation. Farmers of course recognise the importance of forests to food production, but this can be lost on the average urban dweller and even this land is now under threat from drought and mineral exploration.

Under those scenarios, do we actually receive value for money? More importantly, is it sustainable?



**In some instances, wood harvested from these koala forests continues to be sold for as little as \$2.50 to \$6 a tonne<sup>4</sup>.** In third world countries, wood prices are reduced even further or worse illegally logged. Similarly, agricultural activities on marginal land in some parts of Australia are resulting in the clearing of koala forests and the degradation of land for approximately \$5 a hectare. There must be a better way to manage and restore these massive and damaged landscapes.

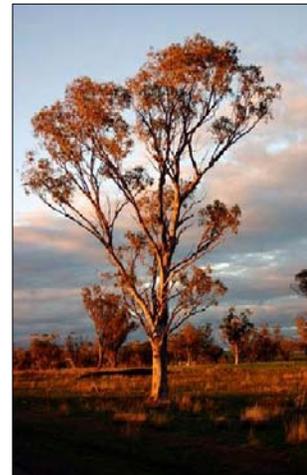
### SEEING THE CARBON FOR THE TREES

It is well recognised that existing eucalyptus forests play an important role in carbon sequestration and storage. Even school children know that trees take CO<sub>2</sub> from the atmosphere and convert it into organic carbon as they grow. As long as the trees in existing forests do not decompose or burn, the carbon is safely locked away.

Natural forests are far more valuable than plantations as carbon sinks. They are more resilient to climate change and disturbances than plantations because of their genetic, taxonomic and functional biodiversity. This resilience includes regeneration after fire, resistance to and recovery from pests and diseases, and adaptation to changes in radiation, temperature and water availability (including those resulting from global climate change)<sup>5</sup>. There is also evidence that mixed species communities are capable of sequestering and storing more carbon than monocultures<sup>6,7</sup>.

Australia's intact koala forests constitute a significant standing stock of carbon that should be protected from carbon emitting land-use activities for a range of reasons.

It is tragic to think of what has already been lost. The broadscale destruction of our forests, in the past and at present, contributes to and is arguably a leading cause of the majority of our problems, both in the first and third worlds. Protecting these forests must be one of the solutions.



### PROTECTING FORESTS IN DEVELOPED COUNTRIES IS JUST AS IMPORTANT AS IN DEVELOPING COUNTRIES

What is the point in protecting the forests of developing countries while we destroy the forests in developed countries? Why haven't the Kyoto Protocol and Reducing Emissions for Deforestation and Degradation (REDD) discussions recognised the importance of this? Under existing agreements, the destruction of existing forests is merely included within emissions and removals from Land Use and Land Use Change and Forestry (LULUCF). However, LULUCF accounting has been flawed, and there are no real incentives offered to protect these forests. While REDD will provide incentives to protect existing forests, these incentives will only be available to developing countries.

The IPCC estimates suggest that deforestation is responsible for the loss of up to 18% of global carbon emissions<sup>8</sup>, and the effects of climate change will likely increase this as bushfires and drought become more prevalent. It is imperative that the world understands that by protecting all of our existing forests, we guard ourselves against the impacts of climate change. If the world's forests were protected, we would realise a significant drop in carbon emissions. Our oceans, currently under immense pressure absorbing our carbon emissions, would also get a well deserved rest.





If the world is serious about reducing carbon emissions, why are we willing to see the continued destruction of natural forests, such as the koala forests of Australia, and the loss of the carbon these forests contain?

### **WHY DON'T WE PROTECT OUR FORESTS?**

Because they are currently being logged and cleared for all sorts of financial gain. But what people do not realise is that this is causing untold damage to the landscape, and of course creating more greenhouse emissions. And these forests are impossible to replace.

### **WHY IS GLOBAL ATTENTION NOT FOCUSED ON THE PROTECTION OF FORESTS?**

Primarily, discussions have not focused on the protection of existing forests as a result of Kyoto Protocol rules and a lack of political will<sup>9</sup>.

Existing, natural forests are considered unimportant, because:

1. Everyone wants the status-quo and wants to be able to continue to do as they please. By and large logging native forests is still a very lucrative endeavour.
2. It is easier to tell another country what to do than protect your own forests.
3. People believe that these forests have, by and large, already done their job, having sequestered large amounts of carbon over previous decades.
4. Young trees supposedly sequester and store carbon better than old trees.

Yet scientific evidence suggests old-growth forests remain active carbon sinks; old-growth forests continue to sequester significant amounts of carbon. And newly planted saplings will require years to sequester similar amounts of carbon; at a conservative estimate, the carbon stored in the average mature Eucalypt tree (a tree with a dbh<sup>10</sup> of approximately 50 cm) is equivalent to planting 1,500 saplings.

Despite the evidence, the value of keeping existing forests in their natural state has not been recognised in the Copenhagen discussions. Instead, we have a situation where forests in developed countries are not protected, and forests in developing countries are potentially at risk from forestry and plantations. Why?

### **HOW CAN WE PROTECT THE KOALA FORESTS OF AUSTRALIA?**

The Australian Government has recently tabled their Carbon Pollution Reduction Scheme (CPRS) in Parliament. They claim that "addressing climate change is one of the key economic and environmental challenges facing Australia and the rest of the world."<sup>11</sup>

However, while the sentiment and the rhetoric are great, the actions of the Australian Government tell a very different story.

**Australia is misleading the world.** Our Government talks about protecting forests in developing nations, but ignores the destruction of habitat and the continuing production of carbon emissions in Australia. While National Greenhouse Accounts figures suggest a reduction in emissions since 1990, data supplied by the Statewide Landcover and Trees Study (SLATS) in Queensland suggest the total amount of land clearing in Queensland is approximately 50 per cent higher than the amount estimated by the Federal Government's National Carbon Accounting System (NCAS)<sup>12</sup>. LULUCF





agreements may require reductions in emissions from land clearing, but we have little confidence that these agreements are being reflected in on-the-ground action.

**At the same moment the CPRS is being debated, koala forests are being cleared for development on the East coast of Australia.** On the eastern side of the Great Dividing Range, forests are being cleared for roads, agriculture and urban development, and on the western side the Australian Government is allowing large areas of agricultural land to be allocated for mineral exploration by Australian and international gas and coal companies, with the aim of extracting millions, perhaps billions of tons of coal.

Not only is this counter productive to the argument for a sustainable planet at this time, but it is a great threat to future food production in Australia, and to our chances for a sustainable future. The desire for a sustainable way of life is a growing trend, but even if we waved a magic wand and everyone wanted sustainability right now, there is a long way to go because so much of our landscape has already been severely degraded. It will take hundreds, perhaps thousands of years to restore the Australian landscape.

Our political leaders remain stuck in a robber baron mentality, actively pursuing activities which increase the country's and the world's carbon emissions, whilst ignoring the benefits of protecting existing forests. **Eucalypt forests have been shown to be some of the most valuable carbon sinks in the world<sup>13</sup>.** Our Governments are not showing leadership nor accepting that the world cannot continue to expand in this way. With an estimated world population of nearly 10 billion by 2060 – as food land becomes increasingly scarce – our Government's actions do not auger well for a sustainable and green future.

Our governments have failed to embrace and encourage investment in new technologies, and there is little political will to introduce cradle to grave controls of the exports of Australia's vast and numerous minerals.

Instead, we suggest that the carbon economy is headed towards a system of perverse rewards.

### REWARDED FOR BAD BEHAVIOUR

If you look at the proposals currently on the table for Copenhagen and presumably in meetings to follow, the system is merely providing opportunities for those who have already destroyed their natural resources and environment.

CDM legislation will provide carbon credits for restoring land cleared prior to 1990. It's like rewarding a child that has broken his toy.

REDD mechanisms will allow countries to seek financial incentives for promising not to clear forests. The child who has started to destroy his toy and who is now threatening to break it further, will also get rewarded.



But, the person who has kept their toy/land in pristine condition gets nothing. Why is this?

Sadly this story is the basis of most restorative landcare funding in Australia and elsewhere in the world. Those that have preserved and protected are ignored and those lands are becoming more and more important.

The Parties to the Kyoto Protocol, and the Copenhagen talks themselves, have forgotten about those landowners who have protected and managed their land. The world at large has failed to recognise their enormous importance for the future of the planet. There are a growing number of 'good'

landholders who wish to protect their trees. Carbon incentives, if offered, will be snapped up by those wishing to do so.

Why should the importance of regenerating cleared, barren, or degraded land be recognised as a priority under the agreements reached at Copenhagen while the protection of pristine forests in the first world be forgotten? Our research has shown that new plantations will not and cannot offset the current trends in Australia and presumably elsewhere.

We must recognise the value of the carbon stored in existing forests, and provide incentives to allow proper management of these assets.

### WHAT VALUE SHOULD WE PLACE ON OUR FORESTS?

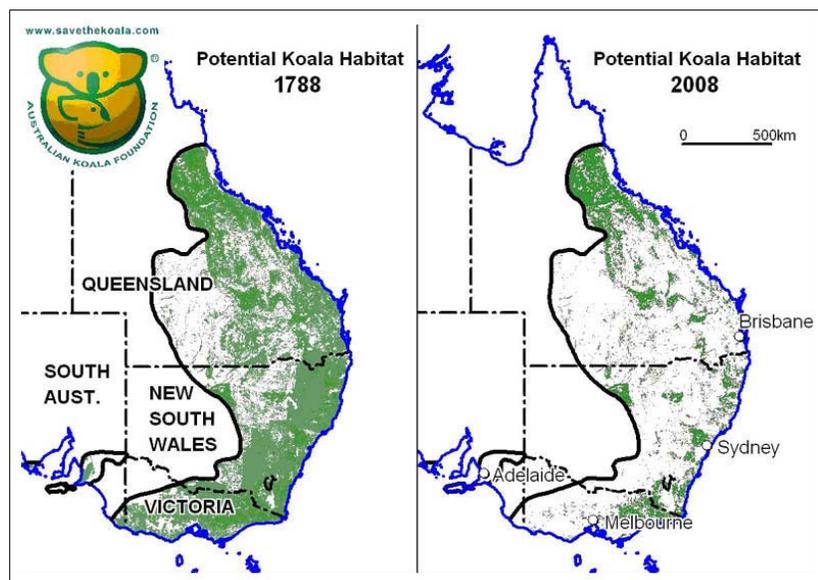
The Australian Koala Foundation (AKF) has been funding and conducting research in the koala forests of Australia for more than 20 years. **Our database contains the records of over 80,000 trees across 2,000 field sites; we have utilised this data to provide estimates for the carbon densities in forests across the East coast of Australia.** Expanding this research, in June 2009 the AKF conducted a thorough survey, measuring every tree on “*Illawarra*”, a typical property on the outskirts of Brisbane, Australia to determine how much carbon (CO<sub>2</sub>) was stored in the trees. The results of these studies provide a staggering insight into the importance of existing forests in the carbon debate.



A total of 921 trees were assessed. Using a scientifically accepted methodology for evaluating the amount of carbon stored in trees, we estimate 330 tonnes of carbon is held on this 1.2 ha site. If these trees were felled, replacing this amount of carbon would require planting 660,000 saplings over 66 hectares - a ridiculous scenario that is impossible to achieve. **Yet such concerns have not entered the climate debate.**

In the AKF maps<sup>14</sup>, we identify the amount of remnant vegetation left in Australia (41 million hectares). Using the carbon figures from the “*Illawarra project*,” we can produce an estimate of the amount of carbon held in the koala forests of Australia<sup>15</sup>.

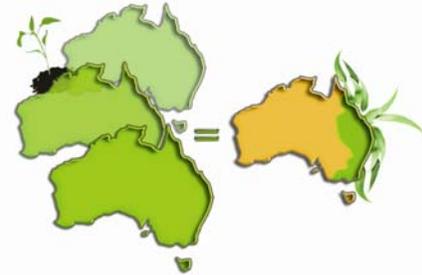
If we assume a carbon price of \$AU35/tonne, even a conservative estimate of the value of the existing koala forests of the East coast of Australia would equal \$AU 393 billion (38.6% of the GDP of Australia in 2009).





**If these trees were to be cleared, the number of saplings required to replace this carbon tomorrow would equal 22.5 trillion trees.**

Replanting this many trees will require an area equivalent to three times the total area of Australia!



### **WILL THE NUMBERS STACK UP?**

An old tree in the suburbs of Brisbane, Australia, a *Eucalyptus tereticornis*, was measured. This tree, named after a character from Tolkien's Lord of the Rings, *Treebeard*, is of unknown age. Given his immense size, however, we estimate he is more than 200 years old, and holds 180 tonnes of carbon. This carbon has taken hundreds of years to sequester; how can we put a price on this? On a global carbon market, this tree could be worth \$AU 6,000 (at \$AU 35 per tonne), or even \$AU 9,000 (at \$AU 50 per tonne). A much younger nearby tree, a *Corymbia maculata* was known to have been planted on 1st February, 1988. To continue with the literary reference, let's call him *Quickbeam*. The AKF measured this tree, and we estimate it contains 0.7 tonnes of carbon, equivalent to \$AU 24.50. *Quickbeam* has been growing for more than 20 years, yet still does not even hold 1% of the carbon contained in *Treebeard*. Similarly, a new plantation sapling does not contain even 0.1% of the carbon held in *Quickbeam*.



**The older the tree, the more valuable it is in the fight against climate change. We should be seeking to protect trees such as *Quickbeam*, so that one day it can be as imposing as *Treebeard*.**

Until the global community recognises the environmental and carbon value of existing forests, these trees will continue to be destroyed. We need to rethink our economic assessment of the value of these areas. We may find that there is greater value in protecting our forests, rather than alternative land management regimes (such as timber production, agriculture and unsustainable housing projects that cover arable land with concrete).



But there are no incentives currently available to support land-holders to maintain the carbon stored in existing forests, and no incentives to protect these forests. The AKF will argue in Copenhagen that we need to recognise the significance of our forests in the climate debate, and introduce effective measures to help protect and restore these precious places. The AKF will argue that even without the support of the Protocol, voluntary markets will move into place once the above logic has been adopted.



## WHAT IS THE RIGHT PRICE FOR CARBON?

Who knows? Many believe the carbon market will not even get off the ground. As existing forests are not on the negotiating table, many think the protection of existing forests can only be relegated to the “voluntary” markets.

### Is there a voluntary market?

We think so.

We know of several companies from the United States and England who have voluntarily wanted to offset their footprints and have found it almost impossible to find legitimate ways of doing so.

In comes the AKF’s “*Illawarra project*.” This land holder could make \$12,000 from the carbon stored on the property (at \$AU35/tonne). Forty percent of this money could be paid out over the first two years, with the remainder withheld, and only paid out if the trees remain after five years or longer. That money could provide a strong incentive to manage and protect existing forests or even individual trees. One could imagine a school with a large tree being paid to keep it – opening up all sorts of economic incentives if it was brokered correctly.

If we extrapolate the results from the Illawarra project over the whole East coast of Australia – then the amount of carbon that could be “sold” on the market is \$AU 400 billion – equal to 38.6% of the GDP of Australia. If the price of carbon were to increase to say \$AU70-90/tonne – it would become nearly a trillion dollar market force.

**Over one trillion dollars** for trees that are doing “nothing.” Or as one member of the community said years ago “for trees laying idle.”

These are staggering sums and could set the way for a completely new market economy. People owning large tracts of unproductive cattle and sheep grazing land could well see the argument for keeping their trees and indeed being paid to manage to keep them, not only for economic reasons but for the environmental protection of the planet. Ideas abound!

## WHERE TO NOW?

To seek new partnerships with people and organisations who think like we do, and to Copenhagen to tell the story of the koala. Dr. Douglas Kerlin, Chief Ecologist of the AKF and myself will be in Copenhagen to find opportunities for collaboration with people of like mind. We must all work together to find solutions that are realistic. We have the science and the solutions for many of the issues on the table. The global community must acknowledge that our existing forests are a bank, holding our carbon savings. We must seek to identify and audit our carbon savings, and provide incentives to allow the long term protection of these assets, and this planet. **Are you interested?**

The beautiful koala has taught me all I need to know at this time in history – koala trees have carbon in them and they must be protected if we are to save both the planet and the koala for future generations.

Deborah Tabart OAM  
Chief Executive Officer  
Australian Koala Foundation  
akf@savethekoala.com  
Phone: +61 (7) 3229 7233




---

## Notes

- <sup>1</sup> For the purposes of this document, the term carbon is used to refer to CO<sup>2</sup> equivalent.
- <sup>2</sup> Hardin, G. 1968. The Tragedy of the Commons. *Science* 162:1243-1248.
- <sup>3</sup> Hundloe, T. and Hamilton, C. 1997. Koalas and tourism: An economic evaluation. <https://www.savethekoala.com/pdfworddocs/general/tourism.pdf>
- <sup>4</sup> Egan, C. State's cheap timber sales 'undermine native forest policy' *The Age* April 5, 2009.
- <sup>5</sup> Mackey, B.G., Keith H., Berry, S.L. and Lindenmayer, D.B. 2008. 2008. Green Carbon: The role of natural forests in carbon storage. ANU E Press, Canberra.
- <sup>6</sup> Forrester, D.L. Bauhus, J. and Cowie, A.L. 2005. On the success and failure of mixed-species tree plantations: lessons learned from a model system of *Eucalyptus globulus* and *Acacia mearnsii*. *Forest Ecology and Management* 209:147-155.
- <sup>7</sup> Forrester, D.L. Bauhus, J. and Cowie, A.L. 2006. Carbon allocation in a mixed-species plantation of *Eucalyptus globulus* and *Acacia mearnsii*. *Forest Ecology and Management* 233:275-284.
- <sup>8</sup> Intergovernmental Panel on Climate Change (IPCC). 2007. The Fourth Assessment Report Climate Change 2007: Synthesis report, Intergovernmental Panel on Climate Change, <http://www.ipcc.ch/>
- <sup>9</sup> Keith, H., Mackey, B.G. & Lindenmayer, D.B. 2009. Re-evaluation of forest biomass carbon stocks and lessons from the world's most carbon-dense forests. *Proceedings of the National Academy of Sciences* 106:11635-11640.
- <sup>10</sup> Diameter at breast height
- <sup>11</sup> Australian Government. Carbon Pollution and Reduction Scheme Green Paper. July 2008.
- <sup>12</sup> MacIntosh, A. 2007. The National Greenhouse Accounts and Land Clearing: Do the numbers stack up? [https://www.tai.org.au/file.php?file=web\\_papers/WP93.pdf](https://www.tai.org.au/file.php?file=web_papers/WP93.pdf)
- <sup>13</sup> Keith H., Mackey B.G., Lindenmayer D.B. 2009. *Ibid*.
- <sup>14</sup> These maps are a culmination of 8 million dollars of peer-reviewed research conducted by the AKF and universities research groups, and over twenty years of field research and ground truthing. For further information, refer to <https://www.savethekoala.com/conservation.html>
- <sup>15</sup> This estimate is a rough figure. Estimates of the amount of carbon stored in the koala forests of Australia range from 85t/ha in Southwest Queensland, to over 1000t/ha in the highlands of Central Victoria.