My name….I work for….

What I am doing here then with a presentation that deals with disaster risks, disaster risk resilience, the role of insurers, in a session that deals with the links between disaster risk reduction and ecosystems?

I am here to present on the outcomes of a study, foused on a district in South Africa called Eded, that UNEP FI supported but which was chiefly undertaken by the above organisations: Santam, a South African insurer and a member of UNEP FI, WWF South Africa, the University of Cape Town, the Council for Scientific and Industrial Research.

RISK Understand and describe the socio-ecological risk landscape – spatially, temporally and systemically

RESILIENCE Understand and describe the status and main drivers of socio-ecological resilience within this landscape

ROLE Understand the role of insurance (formal and informal) in reducing risk and increasing resilience in this landscape

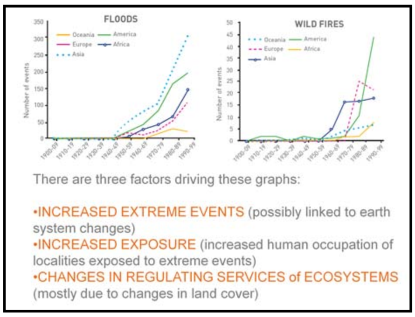
RESPONSE Determine the potential response by the formal insurance industry to reducing risk and improving resilience of the socio-ecological landscape and that of its business in the area

"Risk and resilience in a changing world: the insurance collaboration" is a strategic research partnership between the Santam Group, the CSIR, the UCT's Centre of Criminology and the WWF in South Africa. This partnership aims to develop a practical and integrated understanding on the following components.

This report presents key insights gained from the initial assessment phase of this project and the additional contributions from the UNEP FI, making this a unique combination of a local study teamed with a global perspective showing how insurers can help build climate and disaster-resilient communities.

RISK: especially what are the different categories of drivers that underpin the current risk landscape and its evolution over time.

RESILIENCE: how those different categories of drivers can be addressed so as to enhance the resilience of socio-ecological system: and in particular what the role of insurance companies can be in doing so.



We live in a time of unprecedented risk. This has led some social commentators to label our society as the ‘Risk Society’ (Beck 1992, 2006; Matten 2004), a concept founded on the link between growing globalisation and environmental risk (Matten 2004). Global assessments, such as the Millennium Ecosystem Assessment (MEA 2005), provide evidence of dramatic increases in global environmental risk **(Figure 1)** caused by the interaction of a number of systemic factors, including climate change which was identified as the top risk by likelihood and impact combined (World Economic Forum’s Global Risks report 2011).

These increased risks have been associated with the following phenomena:

1. Increased human occupation of localities that are exposed to extreme events, and the increase

in economic value associated with them;

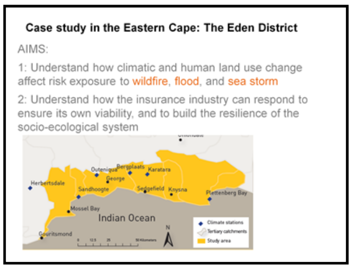
2. An increase in the number of extreme events (as well as so-called slow-onset events), possibly linked to large scale changes to earth

systems (e.g. climate change); and

3. Changes to the regulating ecosystems (e.g. wetlands, riparian zones and natural vegetation)

that provide buffering capacity to extreme events. These changes are primarily linked to rapid

global changes in land cover (MEA 2005)



Given these trends, **it is important that society is able to find means to cope with higher levels of risk.** Insurance, a mechanism by which society pools its resources to cope with risk, is such a means.

Accordingly, the global insurance industry is likely to have a key role to play in this endeavour. And yet, **the insurance industry will itself need to find ways to carefully navigate these turbulent times.** Globally insurers have observed an upward trend in weather-related insured losses due to the increase in frequency and intensity of extreme weather events and the increasing economic cost associated with them.

Furthermore, these weather-related losses have been growing faster than insurance penetration (Mills 2005) while insurance density remains low especially in developing countries.

This is placing pressure on the availability and affordability of insurance, slowing growth in the industry, and most significantly, shifting greater risk exposure onto governments and individuals.

The insurance industry has responded to this challenge by primarily focusing on refining its risk predictions and assessments, with a view to more appropriate pricing and contracting of risks (Mills 2009, Petherick 2011). Unfortunately, a considerable gap still exists between the scale and accuracy of predictions that climate scientists can provide and what is required by the insurance industry (Petherick 2011).

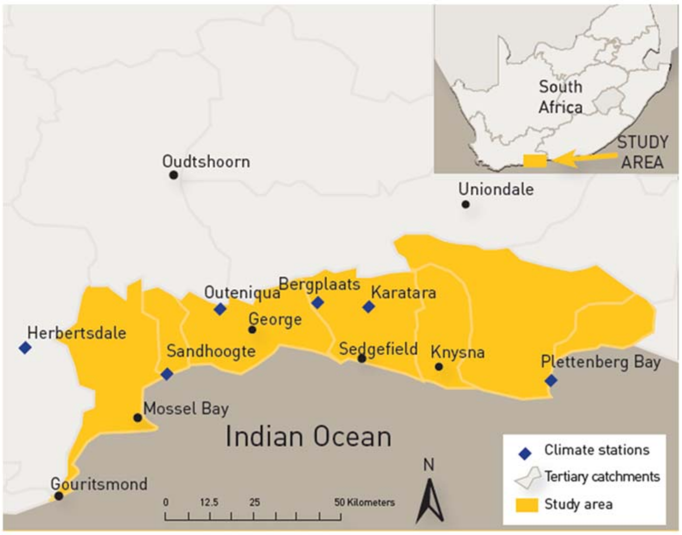
We embarked on a research project with South Africa's largest short-term insurer, Santam, in the Eden District Municipality of South Africa **(Figure 2)** with a view to exploring these issues at a landscape level. The objectives of our study were twofold:

1 To understand how changes in Eden's landscape were affecting current and future risk exposure to wild fire, flood and sea storm;

2 To understand how best the insurance industry could respond to ensure its own viability, as well

as build the resilience of the socio-ecological system as a whole.

Case study in the Eastern Cape: The Eden District



- Government incurred damages exceeding R2.5 billion between 2003-2008
- Santam R60 million
- Damages in rural areas 3.5 times annual household income

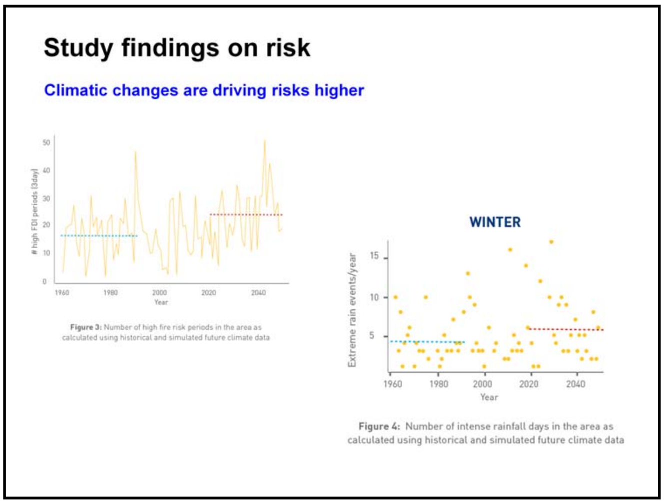
The study area was chosen based on its

varied topography,

the considerable assets underwritten by Santam,

as well as the recent volatile weather conditions that the area has experienced.

Between 2003 and 2008 the Western Cape Province, which geographically includes the Southern Cape region, experienced eight severe storm events resulting in more than R2.5 billion (approx. US$295 million) worth of direct damage (RADAR 2010). More than 70% of this damage occurred in the Eden District Municipality. Almost 80% of the ‘special perils’ losses (relating to storm, wind, water, hail/snow) incurred by Santam in this area since 1996, occurred within the last five years.



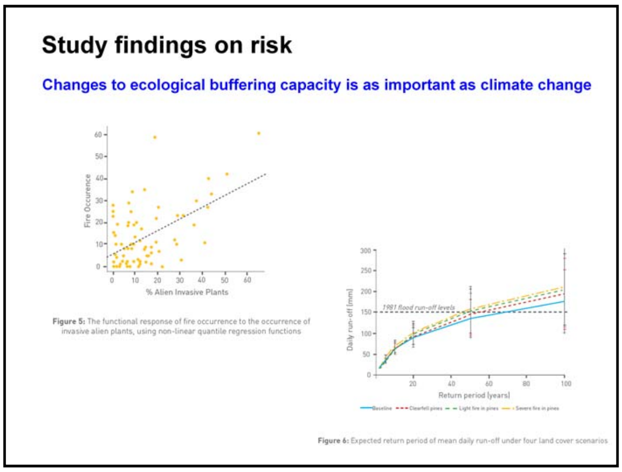
Our study revealed three major findings in relation to changing risks.

Historical data and **high resolution climate simulation models** run by the CSIR (Engelbrecht, 2011) indicate that this area has experienced, and will continue to experience, **significant changes to its climatic conditions**. Among these, changes to local temperatures were most significant. Winter and spring temperatures in this area have increased by about 1.40C over the past century and are predicted to increase a further 10C by 2040.

Using the MacArthur Fire Danger Index or FDI (MacArthur 1966) and input parameters of temperature, wind speed and relative humidity, we were able to show that the **number of high fire risk periods** (more than three days) is likely to **increase by approximately 41%** for the period 2020 to 2050 compared to 1960 to 1990 **(Figure 3)** (Forsyth 2011). **This increase is accentuated in the winter due largely to the significant increases in temperature during this time.**

Furthermore, our climate simulation models demonstrated that the number of **intense rainfall days** (>20mm) per year were predicted to increase modestly by 10% overall for the period 2020 to 2050 compared to 1960 to 1990 (Le Maitre et al. 2011). However, this trend was much more significant in the winter months when a 36% increase was predicted **(Figure 4)**. Again, this was consistent with the historical trend which showed an increase in intense rainfall events between 1960 and 2008.

Finally, sea storm models indicate that the occurrence of extreme wave run-up events, as recently recorded in 2007, is expected to be six times greater due to a predicted sea level rise of 1m by 2100 (Theron et al. 2011).



The second major finding of our study was that local human-induced changes to **land cover** and the **buffering capacity of ecosystems** was of **equal or greater importance in driving increasing risks, when compared to climate change.**

Using historical data, we found that the occurrence **of invasive alien trees** (mostly Pinus sp, Acacia sp, and Eucalyptus sp) was the most important driver of significant wild fires in this region (Figure 5), explaining **37% of the change in fire occurence** (Forsyth et al. 2011). While the naturally occurring fynbos vegetation of this area is also fire-prone, the occurrence of invasive alien trees increased the number of high fire risk areas by between 31% and 37%.

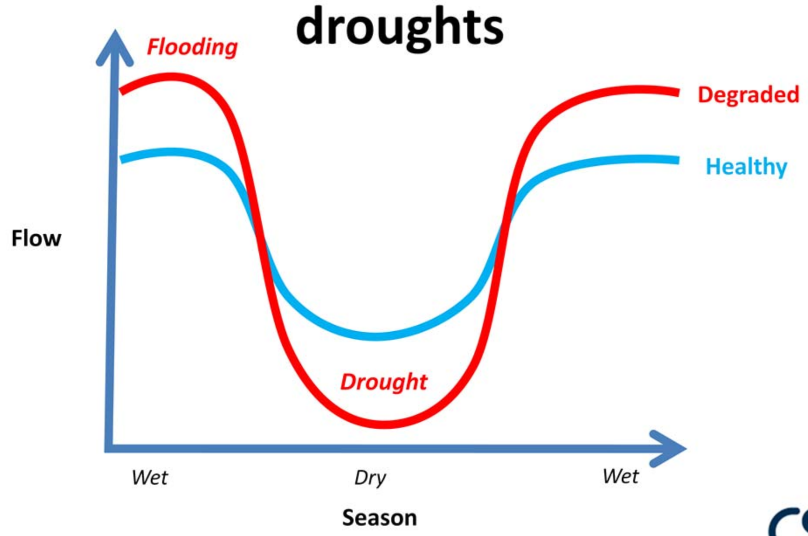
Furthermore, we found that **land cover changes** recorded in this area over the past two decades had
an **equal effect on extreme surface water flows**, as compared to predicted future increases in extreme
rainfall events (Le Maitre 2011).

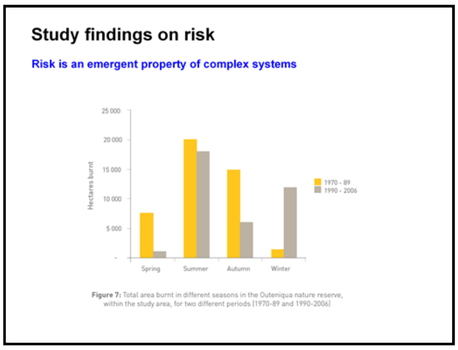
We found that the occurrence of large fires in commercial forestry (Pinus sp.) plantations (recorded in 1996) as well as clear-felling of stands without active rehabilitation, could reduce the return period of an extreme flow event of 150mm per day (the flow recorded during
the 1981 floods) by 40% (Figure 6).

Finally, using a spatial coastal hazard model developed by the CSIR, it was found that the destruction
of coastal foredunes and the hardening of surfaces in this area (leading to increased erosion of these
dunes) was one of the most significant predictors of coastal risk (Theron et al. 2011).

The implications of these findings are significant for two reasons. **First, it points out that human-induced impacts on the ecological buffering capacity of the system have an equal or greater impact on risk, as compared to future climate change predictions. Second, it points out that the proactive management and restoration of these ecological systems has the potential to offset most of the future increases in risk related to climatic changes.**

Healthy ecosystems regulate flow providing a “buffer” against floods & droughts





Our third major finding was that while our models could predict broad changes in risks based on **predicted climatic changes** or **human impacts on ecological buffering capacity, the actual risk to any individual asset was an emergent property of non-linear interactions between the different drivers of risk.**

For instance, we have already shown that land cover changes, as observed over the past two decades, could almost halve the return period of extreme surface flows of water from a 1 in 75 year event to a 1 in 45 year event (Le Maitre et al. 2011).

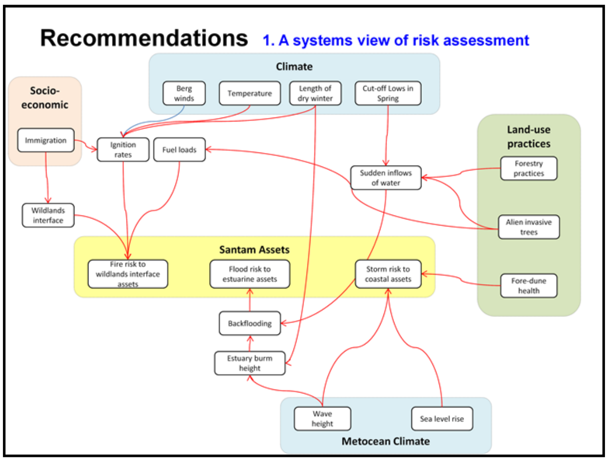
Furthermore, we have shown that elevated winter temperatures are driving a higher incidence of winter fires **(Figure 7)**, and will continue to do so into the future. We have also shown that the incidence of intense rainfall events is likely to increase particularly in winter **(Figure 4). The combination of an intense rainfall event on a recently burnt landscape will greatly enhance run-off and surface flows (DeBano 2000) and, therefore, the risk of flooding. Accordingly, even when only considering climatic changes, one needs to consider the functional relationship between different drivers and how they interact with each other spatially and temporally, to understand the risk to an individual asset.** Under these circumstances, modelling fine-scale 1 in 50 year flood lines based purely on climatic data becomes less valuable in assessing risk.

This finding is significant in that it cautions against the strong pressure from the insurance industry towards ever-finer scale risk assessments to better differentiate and price risks. Within such fast-changing complex systems there is a limit to the power of predictive models and therefore the usefulness of ever-finer scale risk assessments.

- **Land use practices** have just as much impact as climate change
- Poor management of **plantations, wetlands, rivers & estuary berm** can more than **double** the risk of flood
- **Urban development** patterns are putting more properties at risk

- **Climate change** will increase risk of large, hard to control fires by ~40%
- **Clearing alien plants** will decrease areas under high fire risk by almost 35%

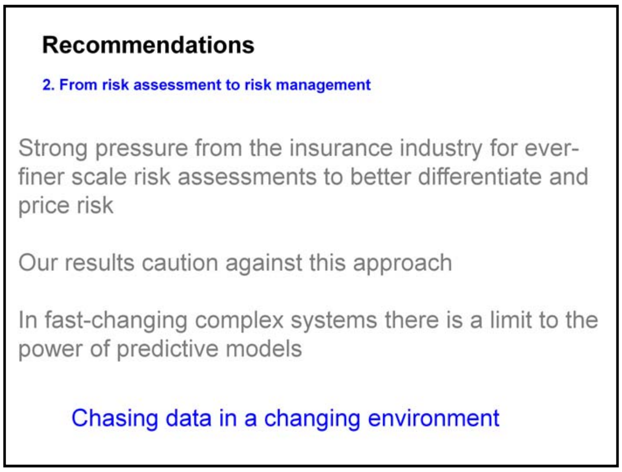
- Mossel Bay coastline retreating at 0.3m / year
- **Increasing sea levels** could triple this by 2050
- Return time of 2007 storm event reduced from ~1:30 years to ~1:5 years
- **Hardening of coastline** and **removal of foredune** increases risk



In **fast-changing complex systems with multiple risk drivers**, as described above, we believe that systems models that **emphasise explanatory power** (i.e. how the system behaves under different scenarios) are more useful than conventional risk assessment models that focus almost exclusively on predictive power. Such systems models will not provide a single neat risk probability, but will rather provide a suite of possible risk probabilities based on different plausible scenarios for the main risk drivers.

At the least, this approach **will deal more explicitly with uncertainty** and avoid the false sense of security that may be provided by predictive models. More importantly, these systems models have the potential of focusing the insurance industry **on the real drivers of risk.** This will allow the industry to complement its risk assessment with effective risk management, targeted at the sources or drivers of risk.

Little influence	**More influence**
Temperatures	Alien plants
Wind	Managing estuary mouth
Sea level	Hardening of the coastline
? Population density	Dune management
? Timber price	Planning regulations
	Implementation of regulations



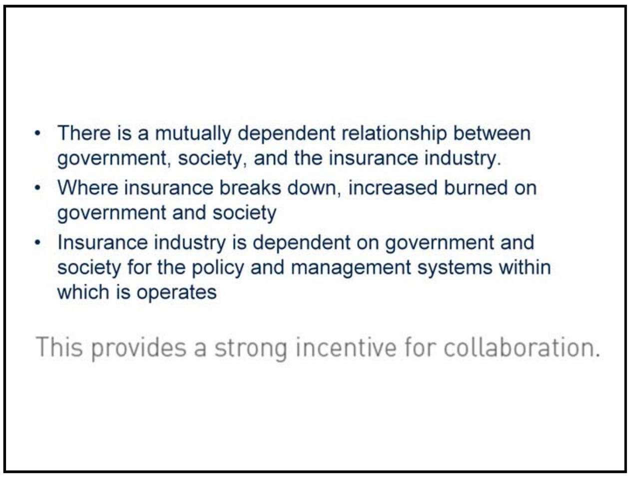
Our findings warn of the **limitations of a strategy that is solely reliant on ever-finer scale risk assessment with the aim of more accurate risk differentiation and pricing**. In our view, the insurance industry would be better served by **complementing its risk assessment with proactive risk management aimed at those systemic drivers of risk that are within its potential realm of influence.**

A very encouraging outcome of our work was that for each of the risks we studied (i.e. wild fires, floods, and sea storms), we were able to identify **drivers of change in the local landscape that had the same if not greater effect on risk, compared to climatic drivers. Proactive management of these local drivers of risk could therefore offset most of the increased risk associated with climate change. This is the basis of 'ecosystem-based adaptation' to climate change** (IUCN 2008).

For wildfires, we identified the occurrence of **invasive alien trees** as a key driver in the local landscape. The control or eradication of these fire-prone invasive trees provides a practical risk management response that has the potential of nullifying future increases in fire risk associated primarily with increased temperatures in this region.

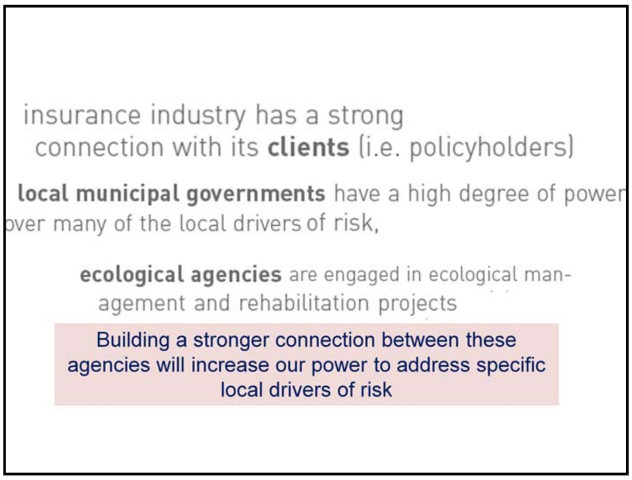
For flooding, we identified **local changes in land cover, specifically clear-felling of large tracts of commercial forestry plantations that were not replanted and large fires within these plantations, as a key driver of risk.** Active rehabilitation of natural vegetation following clear-felling, and improved fire management practices in these areas, are therefore two practical risk management responses. While our study focused on land cover changes related to forestry (due to data availability), it should be noted that other land cover changes such as the degradation of wetlands and river riparian zones could have an equal effect on the risk of flooding. The active rehabilitation of these ecosystems also provides practical risk management responses.

- The insurance industry (and society) would be better served by engaging in risk MANAGEMENT as well as risk ASSESSMENT
- Our results identify local drivers of change that had the same, if not greater effect on risk, as climatic drivers.
- Proactive management of these drivers could offset risk associated with climate change



The absence of a viable insurance industry, or even a reduction in the insured segment of society, will shift greater risk exposure onto governments and societal structures (such as community-based and non-profit organisations). It is therefore in the interest of governments and society that the private insurance industry remains viable and covers as broad a segment of society as possible. Similarly, the insurance industry is dependent of governments and society for the development and implementation of prudential legislation, policies and management systems that are critical to the insurance industry's identification, assessment and management of its risk exposure. Increased risks resulting from climate change and ecological degradation therefore pose a shared risk to the insurance industry, governments and society. This provides a strong incentive for collaboration.

Having acknowledged the existence of a shared risk, the critical question becomes how one moves towards a shared response or, as coined by Porter & Kramer (2011), towards creating 'shared value'. Porter & Kramer (2011) urge corporations to move beyond their schizophrenia of 'maximising profits for shareholders' on the one hand, and 'corporate social responsibility' on the other; to a more unifying concept of creating 'shared value' with society. For clarity, the concept of shared value is not about corporations 'redistributing value' but rather about finding ways of expanding the total pool of economic and social value.



In the context of our case study, we believe that the insurance industry needs to identify and expand connections to key societal nodes within the local landscape that have the greatest potential to create shared value. In selecting these nodes for shared value creation, the insurance industry will need to consider two primary factors:

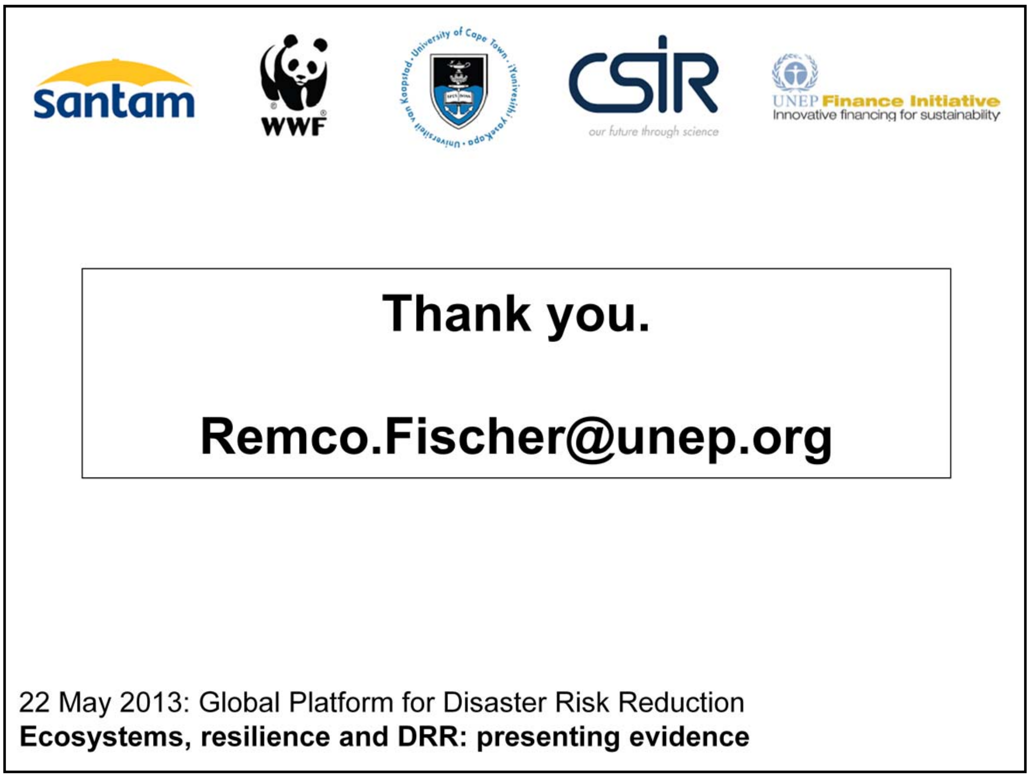
1 The strength of the current **connection** between the insurance industry and key nodes; and

2 The **power** of these nodes to create value or leverage change on
the key local drivers of risk.

The insurance industry can therefore create shared value by providing scientific information on the real systemic drivers of risk in the local landscape, and creating mechanisms that allow and encourage clients to influence the local drivers of risk through a focused and cohesive approach.

Similarly, **local municipal governments** have a high degree of power over many of the local drivers of risk, but the connection between the insurance industry and local municipalities is currently very weak. This is mainly due to the absence of a shared agenda and therefore a shared systemic understanding of how the local drivers of risk, leading to joint response projects, would facilitate the development of a shared agenda and strengthen this connection.

As a final example, there are a number of **ecological agencies** that are engaged in ecological management and rehabilitation projects in the Eden area. These agencies have a high potential power to address local drivers of risk (e.g. control of invasive alien trees, rehabilitation of wetlands and foredunes) but are currently each working according to disparate and narrow mandates, and have no connection with societal risk and the insurance industry. Shared value creation opportunities lie in building a stronger connection with and between these agencies, thereby increasing their alignment and power to address specific local drivers of risk in this landscape.



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