

INSURANCE IN A CHANGING RISK LANDSCAPE

Local lessons from
the Southern Cape of South Africa

A report by the research partnership between
the Santam Group, the WWF, the University of Cape Town
and the Council for Scientific and Industrial Research

In collaboration with the
United Nations Environment Programme Finance Initiative



FOREWORD

FROM THE UNITED NATIONS ENVIRONMENT PROGRAMME FINANCE INITIATIVE

There is widespread agreement that effectively tackling climate change requires not only reducing greenhouse gas emissions, but also adapting social, ecological and economic systems.

With a very high degree of scientific certainty, it is expected that if there is no immediate and significant reduction in emissions, the physical impacts of climate change will be too strong to adapt to. Equally, it is expected that the climate will change no matter how successful governments and the international community are in reducing emissions. This means that certain impacts of climate change are now unavoidable, and that there is an urgent need to adapt to them.

Adaptation is about making livelihoods, communities, societies and economies resilient to the adverse impacts of a changing climate. Essentially, climate change-related risks can be viewed in two categories of environmental change. The first relates to an increase in the frequency and severity of extreme weather events such as floods, storms, hurricanes and droughts. The second relates to ongoing, long-term changes including sea level rise, desertification and the disappearance of glaciers as freshwater reservoirs. To be holistic, adaptation efforts need to address both categories.

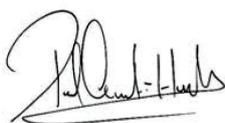
Insurance is a natural form of adaptation to risks. These risks include climate change-related risks, particularly the first category described above. By transferring risks to the insurance industry, individuals, households and businesses obtain a financial safety net in case livelihoods, business operations and other economic activities are impacted by weather-related events. Financial risk transfer is only one form of benefit that the insurance industry brings to its clients. Physical risk management—including the identification, assessment, prevention and reduction of risks—is the bedrock of insurance. Thus, enhancing physical risk management directly underpins the financial risk transfer benefit afforded by insurance coverage. Proactive risk management measures benefit insurance clients and the communities within which such measures are implemented. In other words, reducing risk benefits all parties exposed, be it clients, communities, the insurance industry or governments.

Yet there are constraints to the role insurance can play. So-called slow onset events such as sea level rise, desertification and glacier disappearance pose insurability issues. Insurance is a commercial activity and clients need to have access to and be able to afford insurance. The stark reality is that those most vulnerable to climate change-related risks—low-income communities in developing countries—are those that have hardly access to and least able to afford insurance. For example, Africa is the region with the lowest insurance penetration and insurance density.

These constraints, and the fact that insurance markets are highly regulated and dependent on prudential policy and regulatory frameworks, make a case for public-private approaches to risk management and risk transfer solutions. It is therefore instructive to explore how the insurance industry can work together effectively with local and national governments and the intergovernmental community to develop and implement such solutions, and bring them to scale.

Adaptation efforts stemming from the international level such as the loss and damage work programme of the UN Framework Convention on Climate Change, the climate change and ecosystem-based adaptation work programmes of UNEP, and the Principles for Sustainable Insurance Initiative and climate change work programme of UNEP Finance Initiative; and efforts from the local level such as this report on insurance and the risk landscape in the Southern Cape of South Africa, all have a common thread—they pursue a holistic and integrated approach to risk management in order to build climate and disaster-resilient communities.

The launch of this collaborative report during the 2011 UN Climate Change Conference in South Africa offers a concrete and timely example of how working together can bring about effective adaptation where it makes a real impact—on the ground.



Paul Clements-Hunt

Head

United Nations Environment Programme Finance Initiative

CONTENTS

I.	BACKGROUND	4
II.	INTRODUCTION	5
III.	CASE STUDY FINDINGS ON RISK	7
IV.	RECOMMENDATIONS	11
V.	LOOKING AHEAD	12
VI.	CONCLUSION	13
VII.	REFERENCES	14
VIII.	ABOUT THE PARTNERS	15

THE CONTRIBUTORS TO THIS REPORT

Santam

Vanessa Otto-Mentz, Head, Strategy Unit
Herman de Meyer, Manager, Underwriting
Edmond Lee, Strategy Analyst, Strategy Unit
Donald Kau, Head, Corporate Affairs

Council for Scientific and Industrial Research (CSIR)

Jeanne Nel, Scientist, Integrative Spatial Ecosystem Assessment
Belinda Reyers, Scientist, Ecosystem Services & Risk Assessment
David Le Maitre, Scientist, Flood Risk Modelling
Greg Forsyth, Scientist, Fire Risk Modelling
Andre Theron, Scientist, Coastal Risk Modelling
Sally Archibald, Scientist, Integrative Risk Modelling
Francois Engelbrecht, Scientist, Atmospheric & Climate Change Modelling
Lara van Niekerk, Estuary Scientist
Kristy Facer, Scientist, Sustainability Science & Resource Economics

University of Cape Town (UCT) and its research associate

Clifford Shearing, Director, UCT Centre of Criminology
Tom Herbststein, Senior Research Coordinator, UCT Centre of Criminology
Jan Froestad, Associate Professor, Department of Administration & Organisational Theory,
University of Bergen

WWF South Africa

Deon Nel, Head, Biodiversity Unit

United Nations Environment Programme (UNEP)

Butch Bacani, Programme Leader, Principles for Sustainable Insurance Initiative & Insurance
Commission, UNEP Finance Initiative
Remco Fischer, Programme Officer, Climate Change, UNEP Finance Initiative
Keith Alverson, Head, Climate Change Adaptation & Terrestrial Ecosystems Branch and Climate
Change Adaptation Unit, UNEP
Kaveh Zahedi, Climate Change Coordinator, UNEP

**The compilers of this study wish to thank all those
who assisted and contributed to the finalisation of this report.**

I.BACKGROUND

“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:

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

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.

II. INTRODUCTION

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, 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).

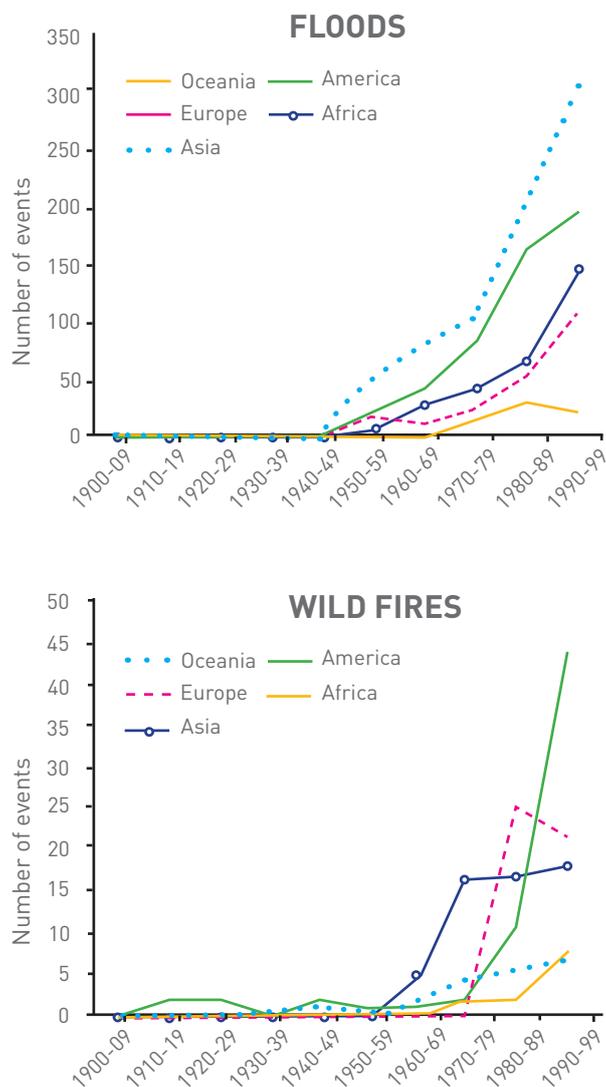


Figure 1: Numbers of recorded floods and wild fires per continent (taken from Millennium Ecosystem Assessment, 2005)

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; and
- 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.



Figure 2: The location of Eden District Municipality, the focus of this study

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.

III. CASE STUDY FINDINGS ON RISK

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

Climatic changes are driving risks higher

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 1.4°C over the past century and are predicted to increase a further 1°C 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.

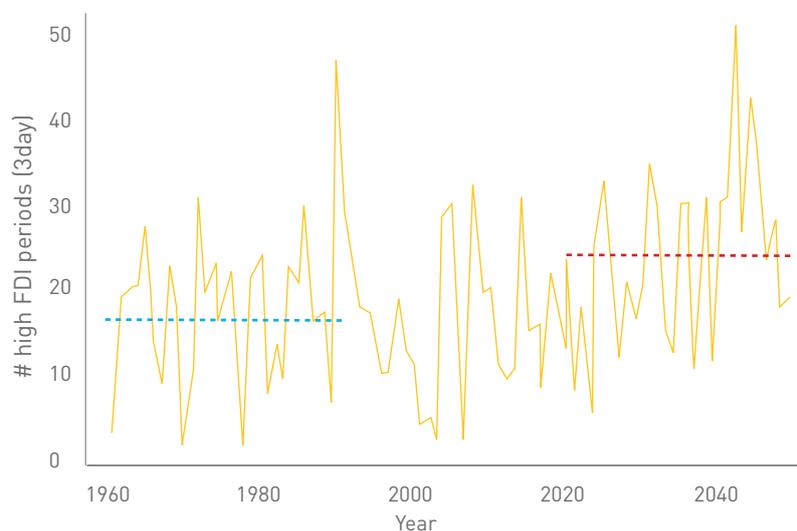


Figure 3: Number of high fire risk periods in the area as calculated using historical and simulated future climate data

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.

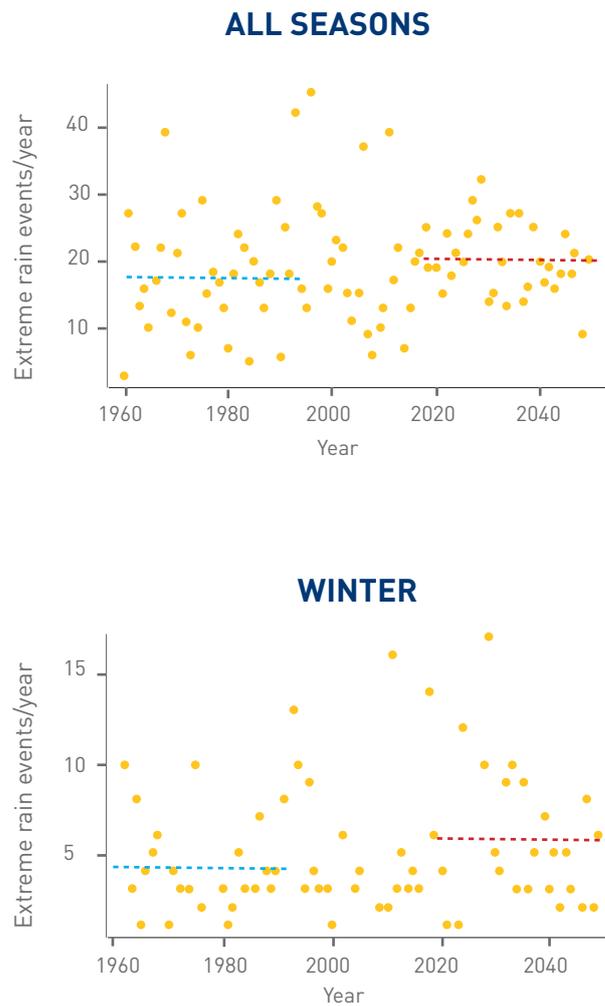


Figure 4: Number of intense rainfall days in the area as calculated using historical and simulated future climate data

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).

Changes to ecological buffering capacity is as important as climate change

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 occurrence (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%.

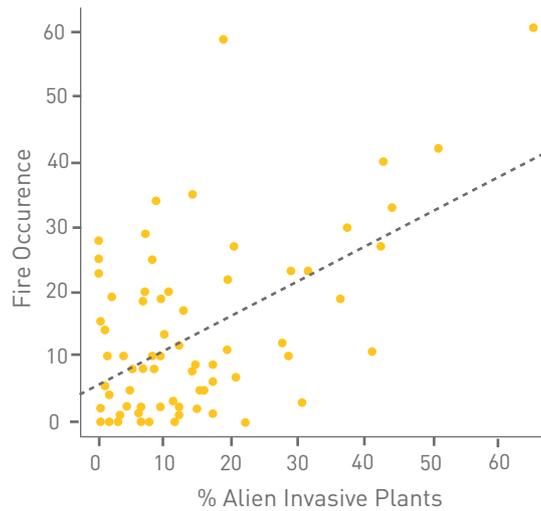


Figure 5: The functional response of fire occurrence to the occurrence of invasive alien plants, using non-linear quantile regression functions

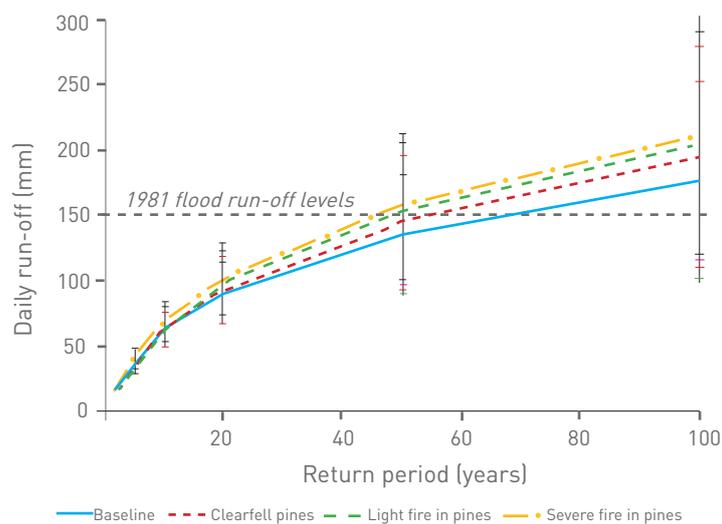


Figure 6: Expected return period of mean daily run-off under four land cover scenarios

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.

Risk is an emergent property of complex systems

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). Under these circumstances, modelling fine-scale 1 in 50 year flood lines based purely on climatic data becomes less valuable in assessing risk. 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.

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.

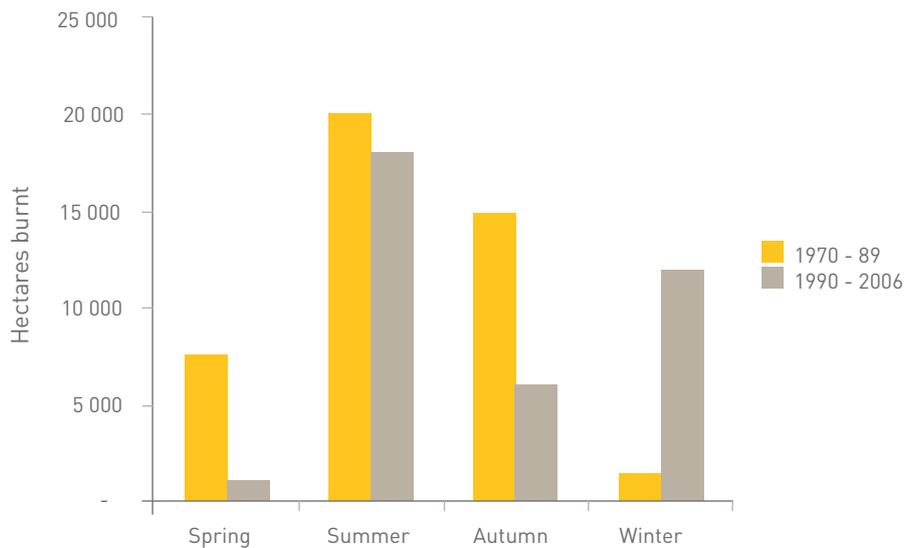


Figure 7: Total area burnt in different seasons in the Outeniqua nature reserve, within the study area, for two different periods (1970-89 and 1990-2006)

IV. RECOMMENDATIONS

1 A SYSTEMS VIEW OF RISK ASSESSMENT

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.

2 FROM RISK ASSESSMENT TO RISK MANAGEMENT

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.

Finally, we found that the degradation of foredunes, the artificial hardening of the coastal area, and the reduction in sand availability, were key drivers of sea storm risk in the local landscape. Active rehabilitation of dune vegetation, stabilisation and rebuilding of foredunes and sand replenishment, as well as reduction of artificial hardening activities, provide practical options for risk management in this coastal zone.

V. LOOKING AHEAD

FROM SHARED RISK TO SHARED VALUE

In order to understand how the insurance industry can effectively move towards more proactive risk management, we need to first acknowledge the mutually dependent relationship between governments, society and the insurance industry. 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. Shared value creation therefore focuses on 'identifying and expanding the connections between societal and economic progress' (Porter & Kramer 2011). Porter & Kramer (2011) suggest that corporations can create value by identifying gaps or failures in the frameworks that connect societal and economic progress, and building these connections.

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.

For instance, the insurance industry has a strong connection with its **clients** (i.e. policyholders) who currently lack the power to leverage change over the local drivers of risk. This is largely due to lack of information and cohesive action. So while this node has high potential power, it is currently unrealised because of these gaps. 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.

VI. CONCLUSION

The insurance industry is the single largest global industry, with premiums amounting to some 8% of the global Gross Domestic Product, and some 11% of global assets under its management (Petherick 2011). It also has a very long reach, connecting social, economic and ecological systems.

As such, the global insurance industry has immense power to address the significant shared risks associated with climate change and ecosystem degradation, and through this be a catalyst for creating shared value.

In this study, we have shown how this may be practically achieved at a local landscape level. We believe this work provides generic lessons as to how this may be achieved at a larger scale, as well as in other industries.

At an international level, one clear yet largely untapped opportunity of creating shared value is linking the risk management and risk transfer expertise and activities of the global insurance industry with the efforts of United Nations agencies, civil society organisations and academia in building the resilience of communities to climate change and ecosystem-related risks. The collaboration of various organisations for this study gives a good indication of how this opportunity can be tapped and expanded.

VII. REFERENCES

Beck, Ulrich (1992) Risk Society: Towards a New Modernity. London: Sage

Beck (2006)

World Economic Forum's Global Risks report – 6th edition (2011)

DeBano L.F. (2000) The role of fire and soil heating on water repellency in wild land environments: a review. *Journal of Hydrology*, 231-232, 195-206

Le Maitre, D. (2011)

MacArthur (1966)

Matten (2004)

Millenium Ecosystem Assessment (2005)

Mills (2005) *Science*

Mills (2009)

Nel, J. et al. (2011) Understanding the implication of global change for the Insurance industry: The Eden case study. CSIR Report:

CSIR/NRE/ECOS/2011/0063/B

Porter & Kramer (2011)

Petherick (2011)

RADAR (2010)

VIII. ABOUT THE PARTNERS

Santam is the leading short-term insurer in South Africa with over 90 years of experience and a market share exceeding 22%. Santam focuses on corporate, commercial and personal markets throughout South Africa and has business interests in other emerging markets such as India, Malawi and Botswana. Santam joined UNEP FI in 2009 and is an active member of its Insurance Commission leading the development of the UNEP FI Principles for Sustainable Insurance, which will be launched at the 2012 UN Conference on Sustainable Development. Santam is also the first African insurer to join ClimateWise and is currently a member of its Managing Committee.

www.santam.co.za

The **WWF** was established internationally in 1961 and has become one of the world's largest and most respected independent conservation organisations, with a global network active in over 100 countries and more than 1300 conservation projects underway around the world. WWF's mission is to stop the degradation of the earth's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

www.wwf.org.za

The **UCT Centre of Criminology** is a research unit of the Department of Public Law, Faculty of Law at the University of Cape Town. The Centre aims to initiate, coordinate and develop research and outreach services within the broad field of Criminology, and to promote interest in all aspects of the discipline. The Centre currently focuses its research efforts in two major domains: physical security where its primary focus is on developments in policing; and environmental security where it is exploring the governance of security in relation to global environmental change, including climate change.

www.criminology.uct.ac.za

The **CSIR** is one of the leading scientific and technology research, development and implementation organisations in Africa. Constituted by an Act of Parliament in 1945 as a science council, the CSIR undertakes directed and multidisciplinary research, technological innovation as well as industrial and scientific development to improve the quality of life of the country's people. The CSIR is committed to supporting innovation in South Africa to improve national competitiveness in the global economy. Science and technology services and solutions are provided in support of various stakeholders, and opportunities are identified where new technologies can be further developed and exploited in the private and public sectors for commercial and social benefit. The CSIR's shareholder is the South African Parliament, held in proxy by the Minister of Science and Technology.

www.csir.co.za

UNEP FI is a partnership between UNEP — the United Nations system's designated entity for addressing environmental issues at the global and regional levels — and the global financial sector. It is the oldest partnership between the UN and the financial sector. Through UNEP FI, UNEP works with 200 insurance companies, banks and investment firms worldwide to understand the impacts of environmental, social and governance issues on financial performance and sustainable development. With a global work programme spanning research, training, events and regional activities, UNEP FI identifies, promotes and realises the adoption of best environmental and sustainability practice at all levels of financial institution operations.

www.unepfi.org

