27th annual INCOSE international symposium

Adelaide, Australia

July 15 - 20, 2017

Environmental Asset Management: Risk Management Systems

B Naude

System Engineering Context

Understanding the strategic operational concept to address the environmental asset risk

Comprehending the aspects and scope of the risk

Cognisance of the external environmental impact on the system

Creating a system solution that will have the desired effects on the risk domain

Cognisance of the system impact on the external environment

Environmental Asset Protection Perspective

Environmental asset protection, a function within environmental asset management

Environmental asset protection focus: conservation, preservation

Eco-systems have complex and often unknown behavioural characteristics

Interaction with human society as a system

Protection of naturally occurring eco-systems

Elements of Environmental Crime

Routine Activity Theory (L E Cohen, M Felson, 1979)

Casual Factors

- **Cultural**
- **Societal**
- **Habitat loss**

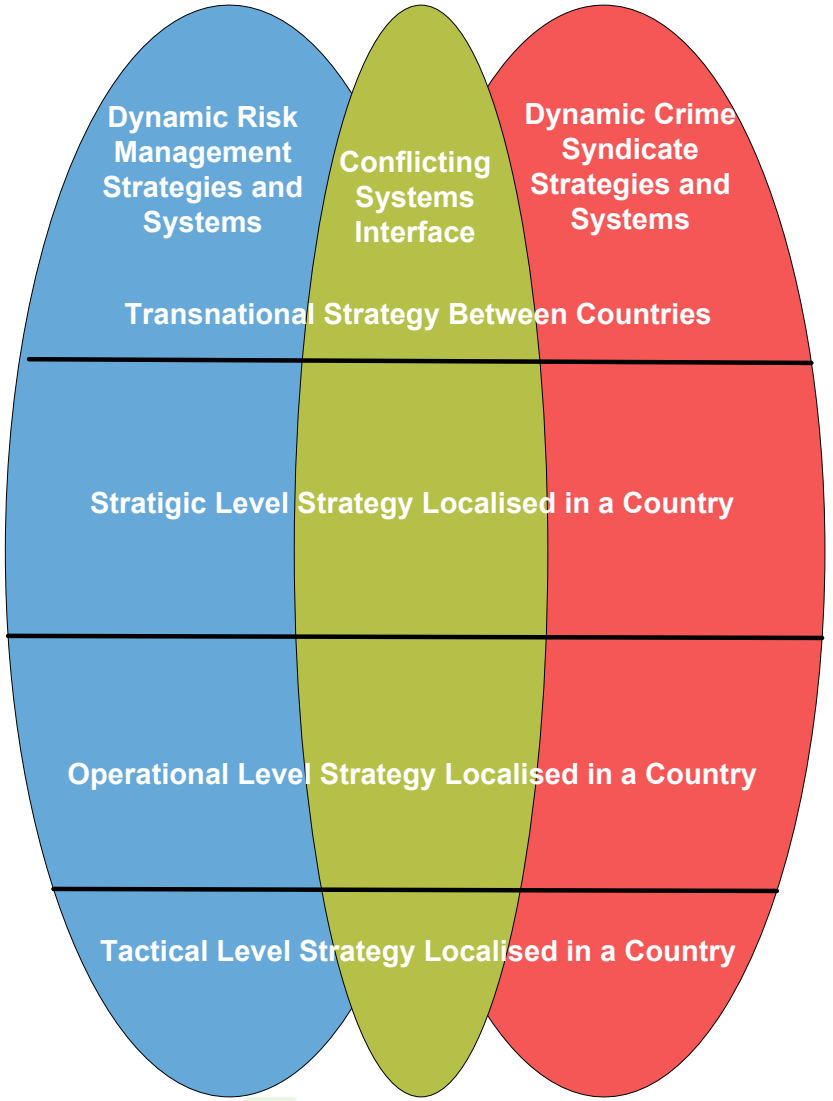
Physical Convergence in Time and Space

Risk Management Strategies

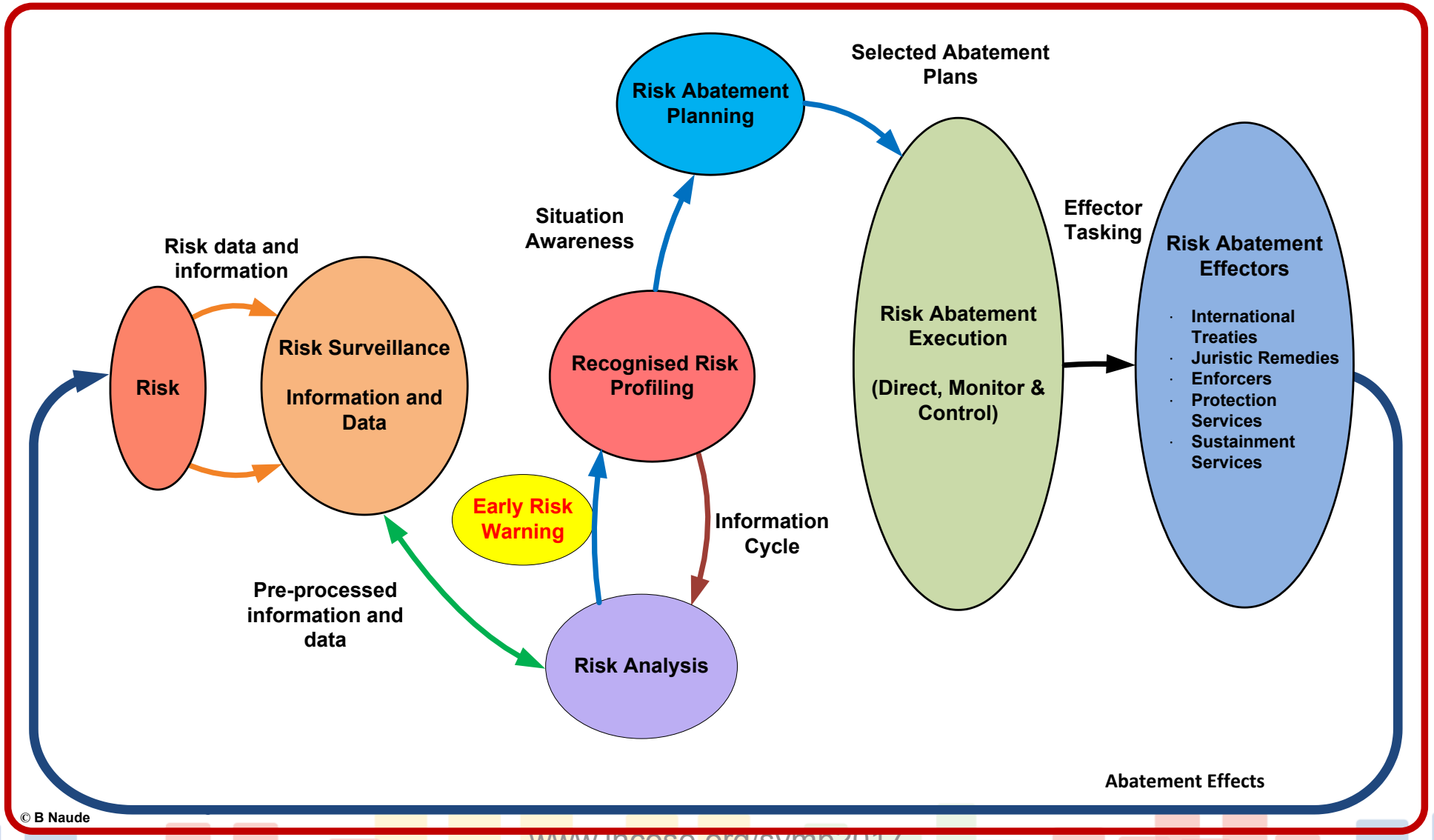
Disruption of criminal activity

Agile to adapt to changes in criminal *modus operandi*

Continuous conflict with criminal strategy



Risk Management Framework



System Design Considerations

International and country specific legislation

Characteristics and dynamics of risk profiles

Risk management strategy objectives

Natural system operating environment

Available infrastructure in the area of interest

Integration and transformation of existing SOP

Human capital available

Interfaces to other external systems

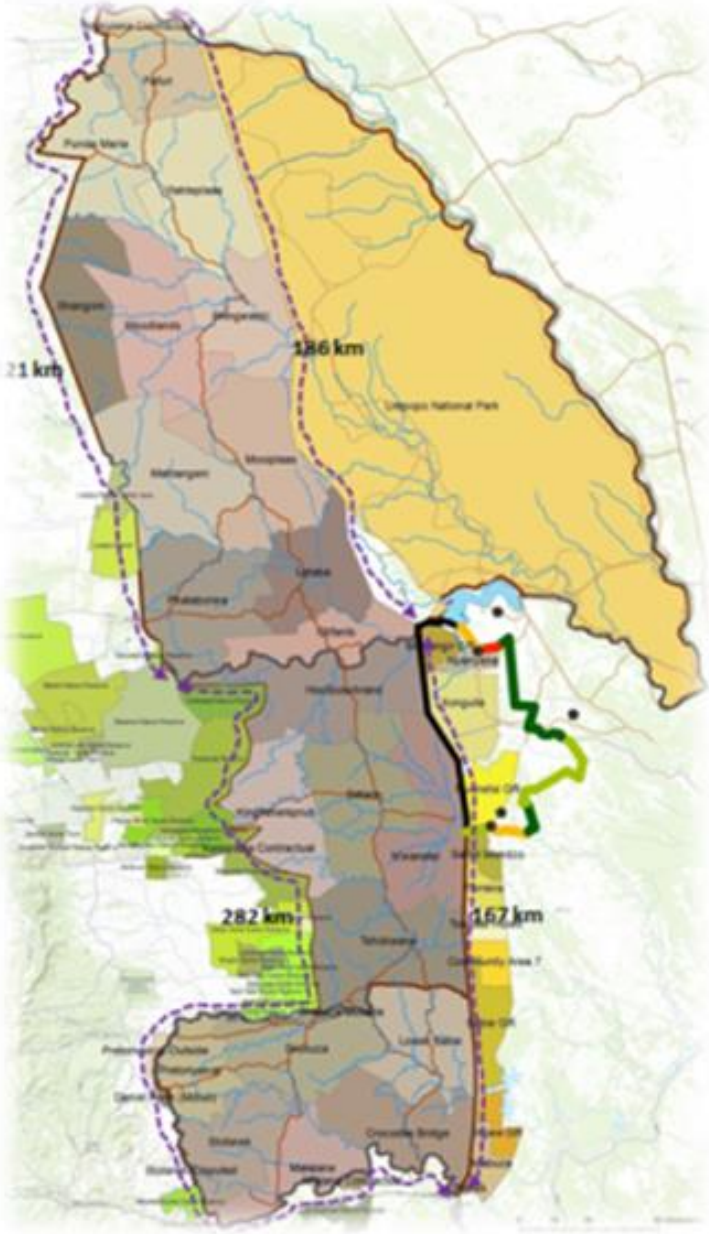
Wassily Kandinsky

Kruger National Park

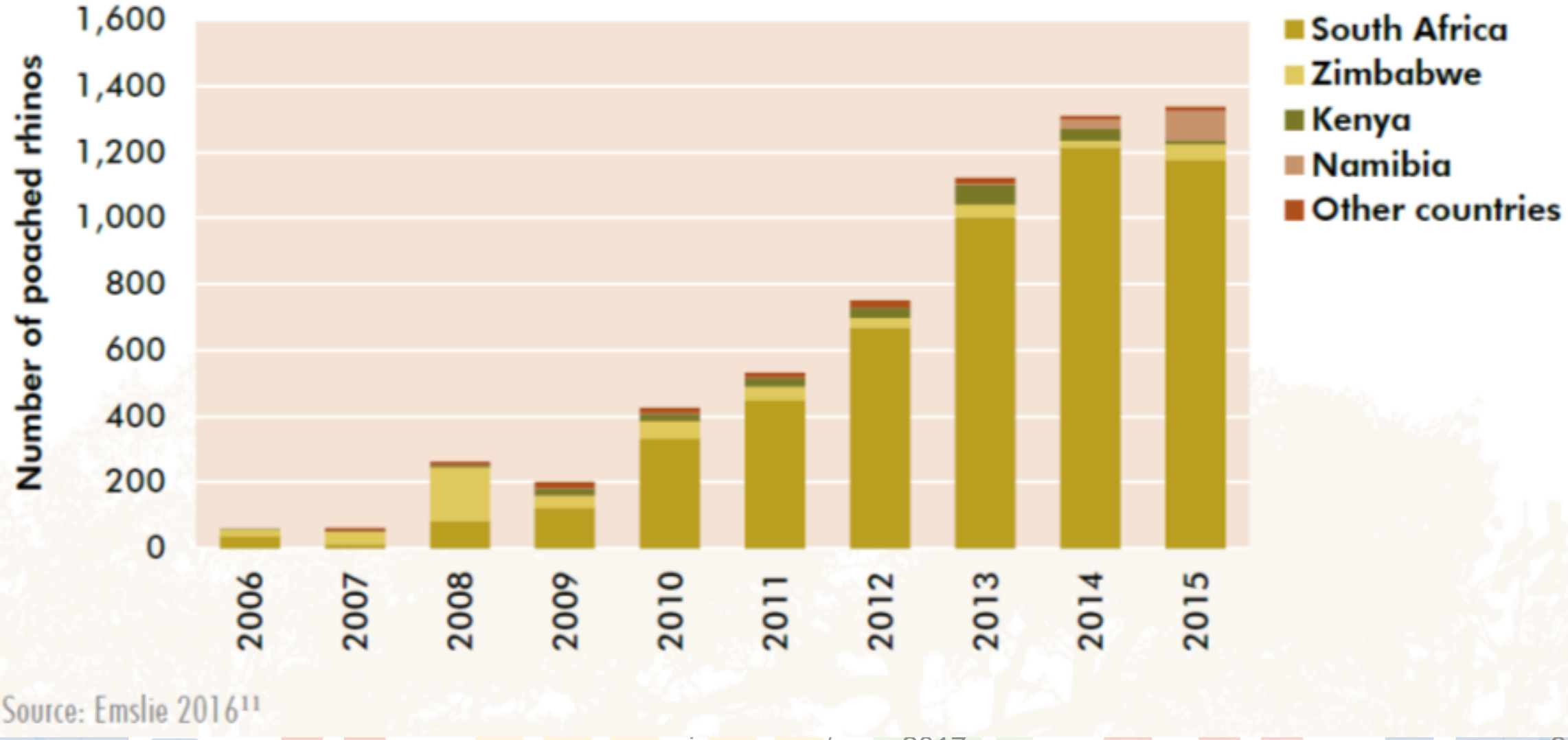
Geographical Context
2000000Ha (380km x 60km)

Environmental Asset Risk

- South Africa is the custodian of 80% of the worlds rhino
- KNP has the largest population of approximately 8400 rhino
- Unprecedented demand for rhino horn @ US$60000/kg
- Poaching is syndicate driven to meet cultural based demand predominantly in Far Eastern countries.

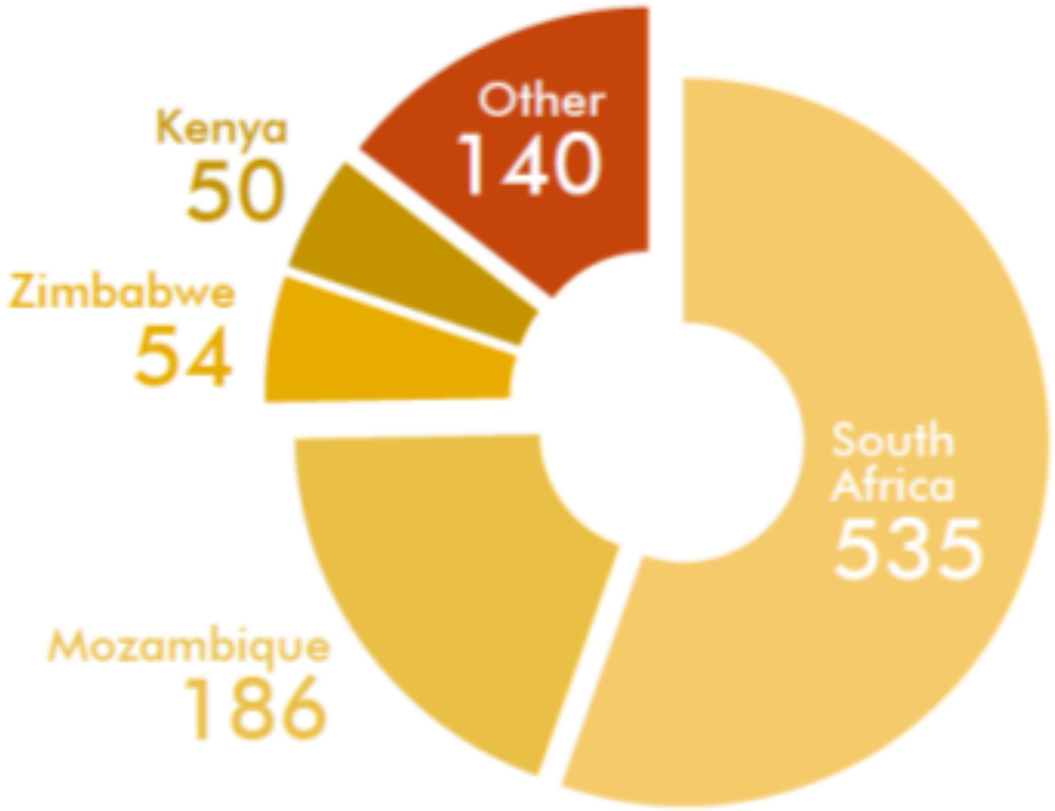


World Data on Rhino Poaching (UNDOC, 2016)



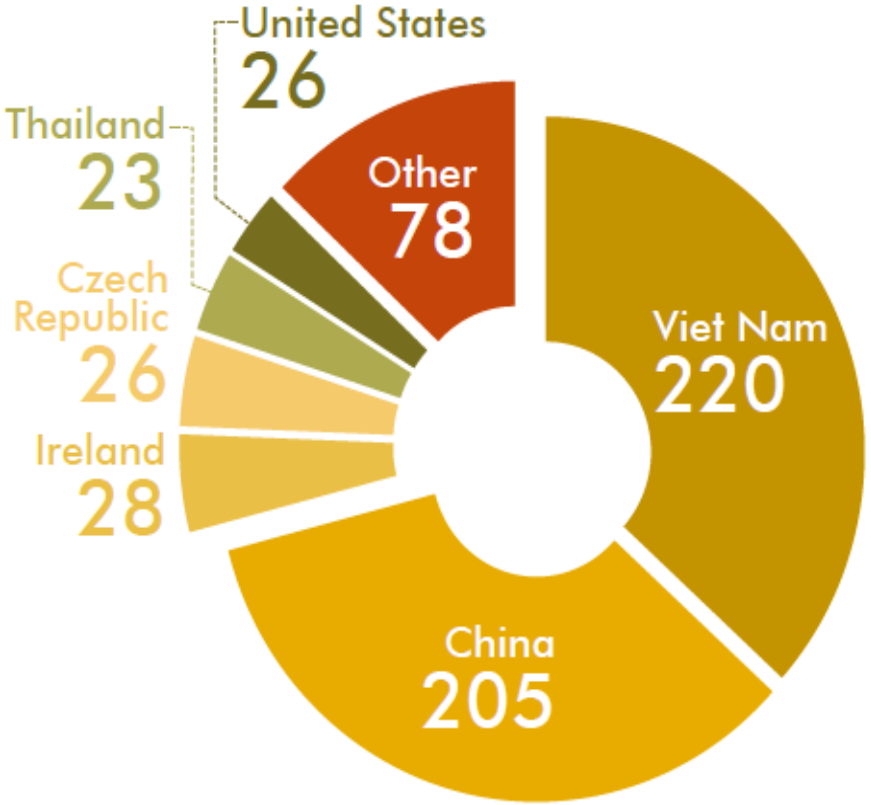
World Data on Rhino Poaching (UNDOC, 2016)

Share of Seized Rhino Horns (kg) by Country Identified as Source (Aggregated 2006-2015)



Source: World WISE, conversions applied

Share of Seized Rhino Horns (kg) by Country Identified as Destination (Aggregated 2006-2015)



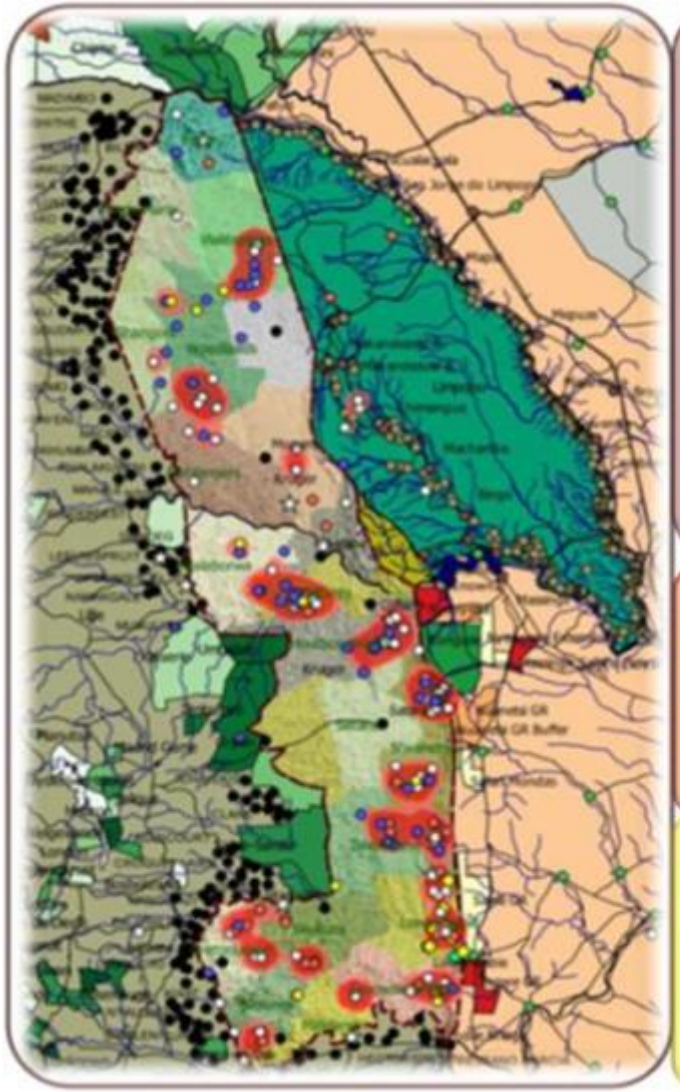
Source: World WISE, conversions applied

KNP Risk Management Strategy

Clear poachers from the outside

Layered protection of the area

Joint inter-government, inter agency/organisation and international approach

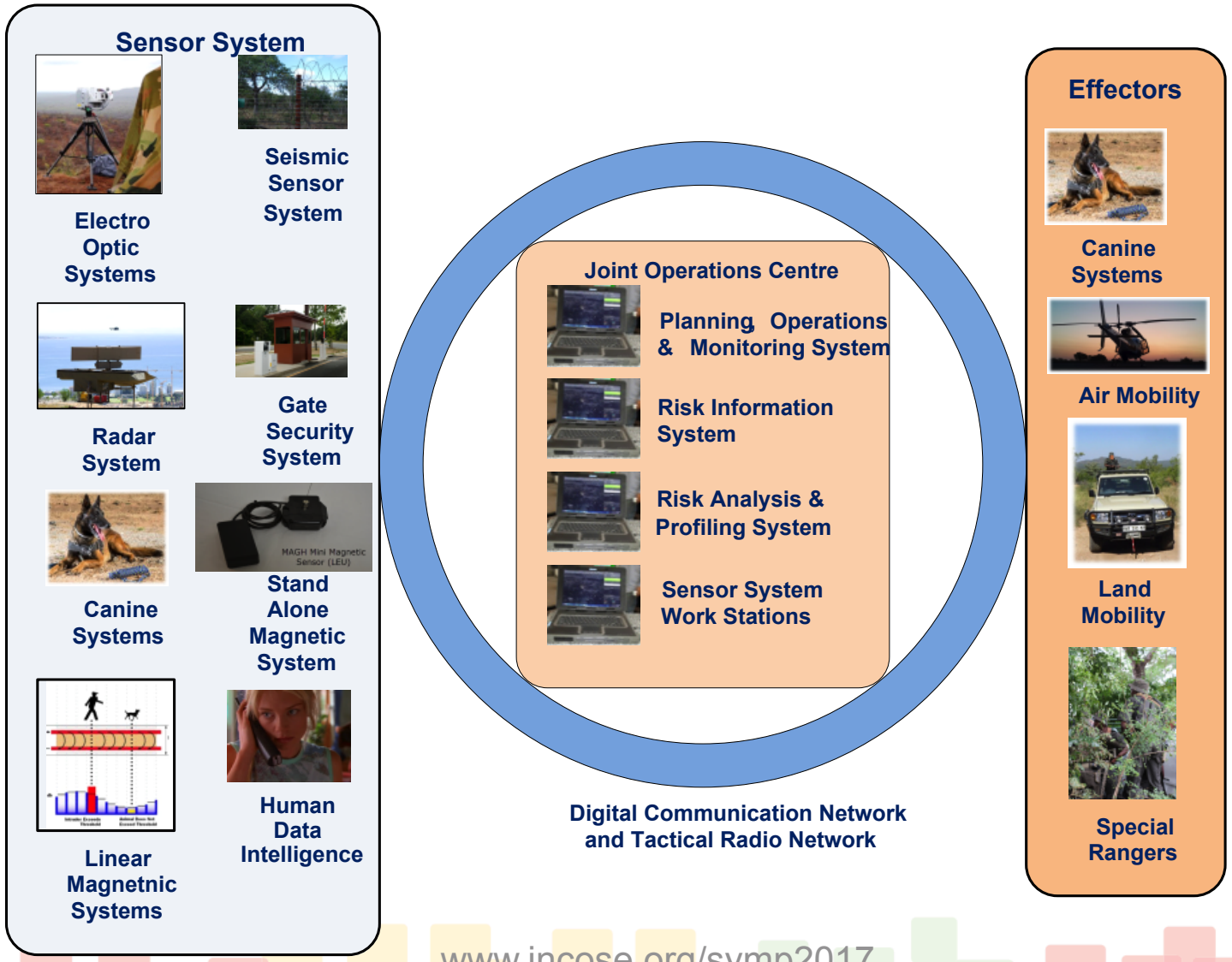


CPZ
Composite Protection Zone
Cross-border co-operation and local community involvement
Rhino guardian approaches

JPZ
Joint Protection Zone
Depend on human intelligence and partner communication

IPZ
Intensive Protection Zone
Use of various Integrated technology-intelligence enablers

Risk Management System



Lessons Learnt by Role Players

Inserting technology into a less technologically mature environment

Installing technology into the harsh bush environment

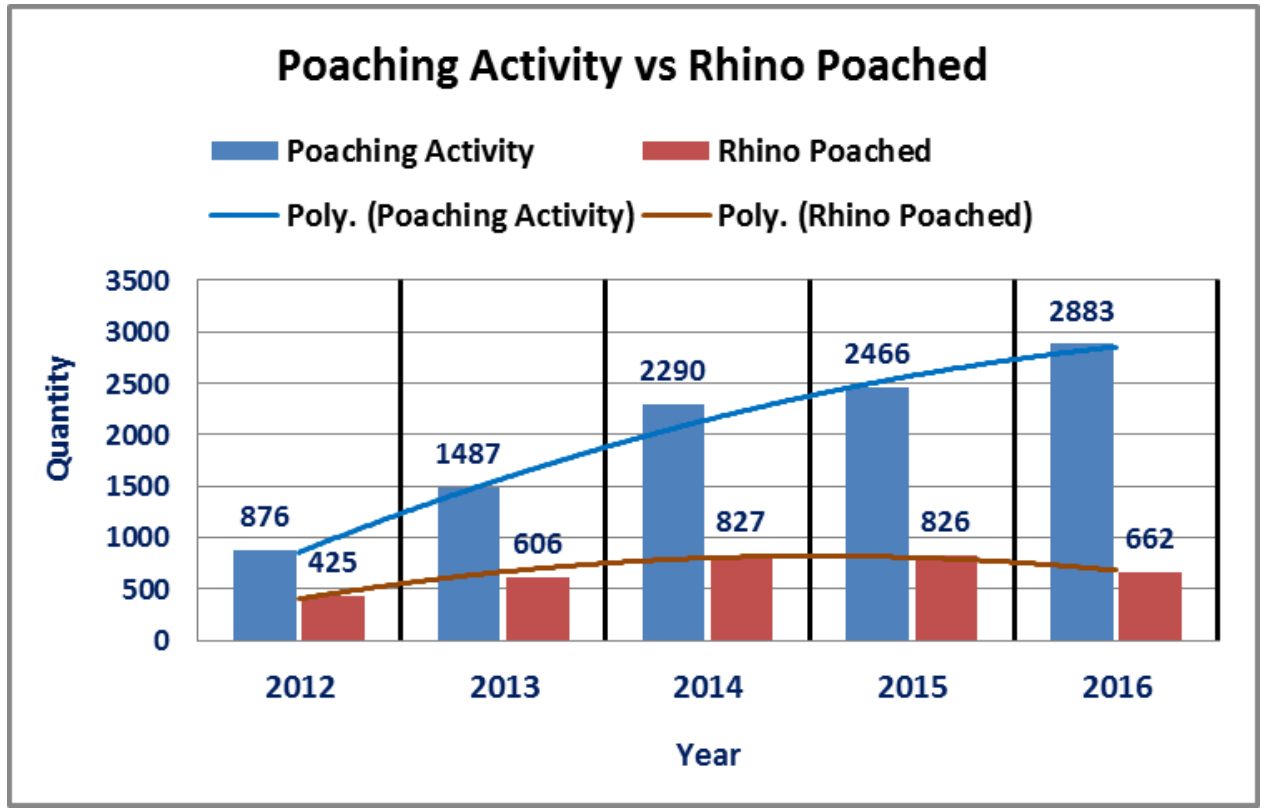
Sensor adaptation to distinguish between humans and animals

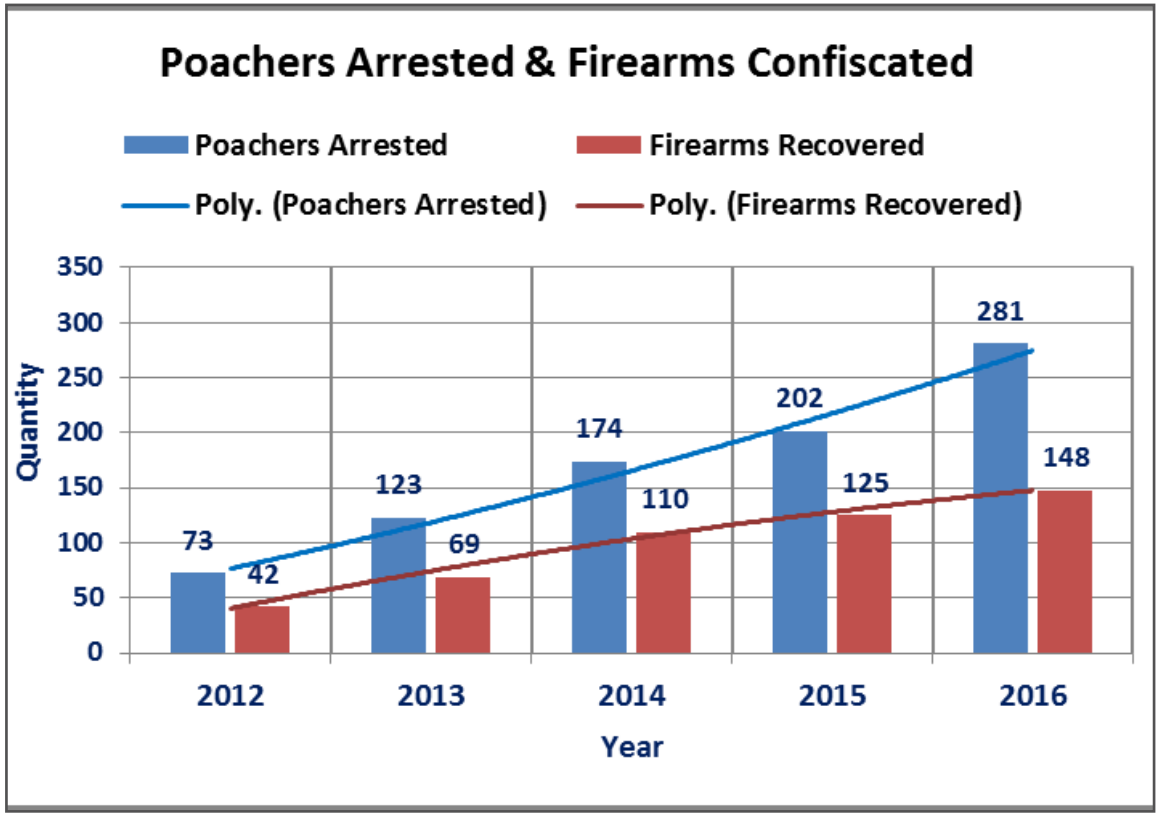
Logistics of operating in a vast wilderness environment

Vendor perceptions of technology contribution to operations

Governance of environment protection

Initial Measureable Effects (KNP)





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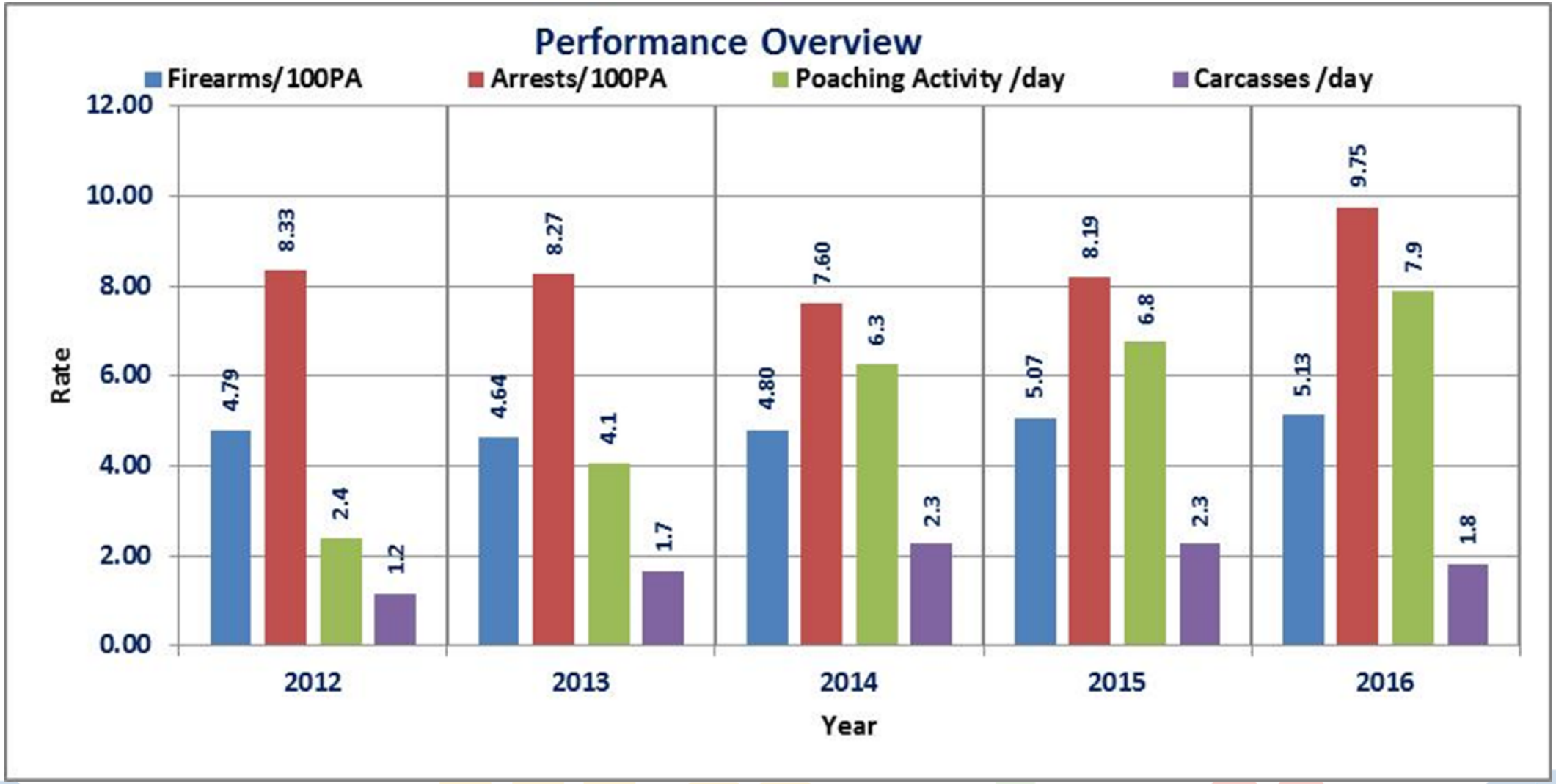

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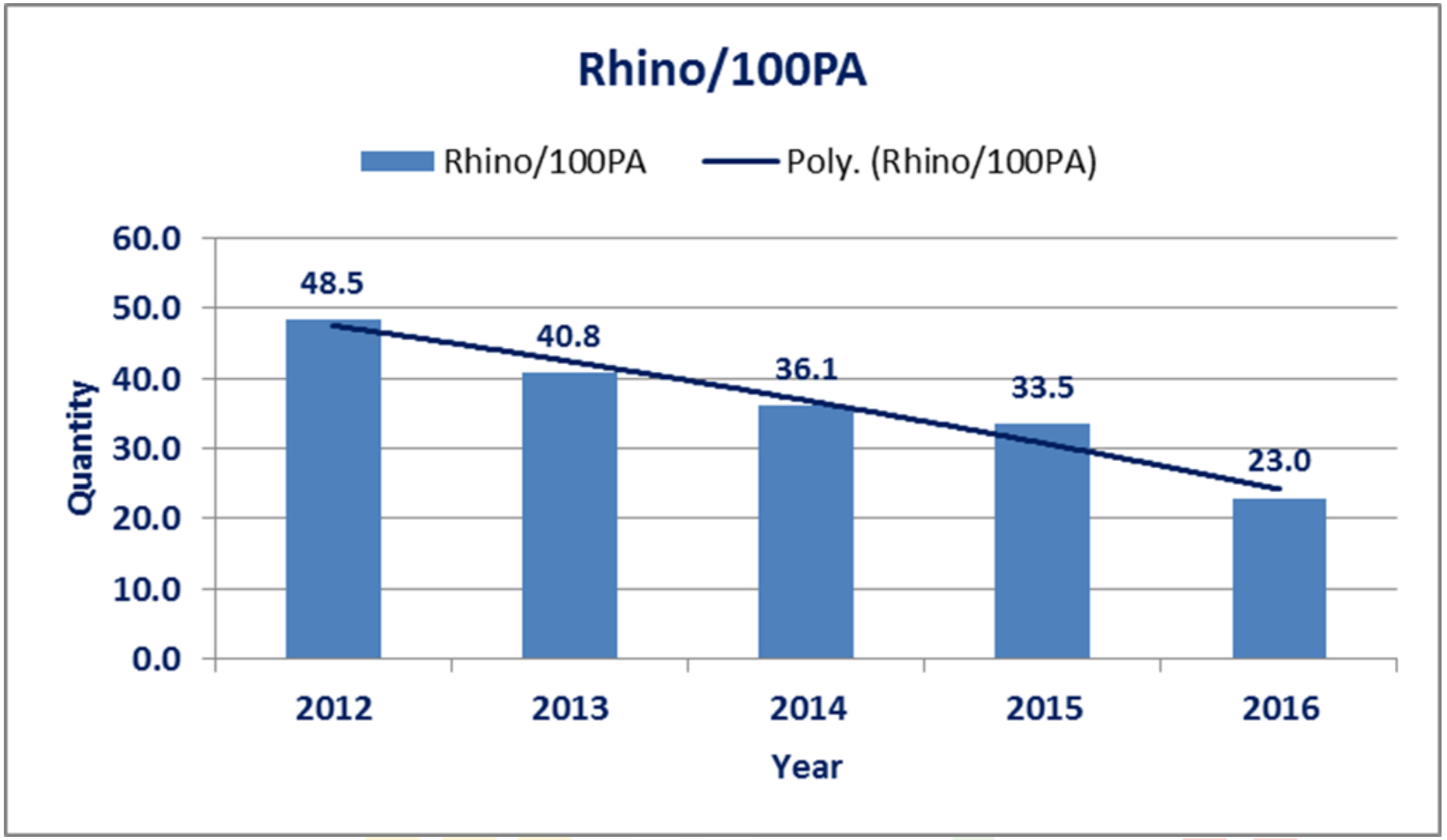

International Measureable Effects

Period 2006 to 2015 ± 5085 rhino where poached in South Africa alone

Translates to 20,34 metric tons of rhino horn (Ave 4kg per horn)

Only 1571kg (all sources) of rhino horn intercepted at ports in the world

Where are the other 18769kgs? Seemingly, mostly in China and Vietnam

Estimated value of the theft, @ current price, is US$1460m

International risk management system failure attributed to lack of will and law enforcement (WWF/Dalberg, 2012)

Concluding Remarks

1. Risk management system as contemplated by CITES at international level is failing dismally.
2. Prohibition as yet to deliver a success story.
3. Drastic demand reduction for rhino horn is required to counter extinction.
4. The KNP risk management system is having positive results and needs to be expanded within the KNP.
5. The risk management system needs to be implemented in other conservation areas to counter poaching of high value assets.

The End

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