Biodiversity intactness, ecosystem health, food production and security:

An assessment of the impacts of major infrastructure projects in South Africa

M. JONAS¹, P. BARNARD²,³,⁴, L. PERUMAL³

¹ International Institute for Applied Systems Analysis, Austria
² Pacific Biodiversity Institute, USA
³ University of Cape Town, South Africa
⁴ University of Washington, USA

Vienna, Austria, 06 April 2017
Outline:

1. The global challenge – Matthias Jonas
2. The African challenge – Phoebe Barnard
3. The study – Lavinia Perumal
The global challenge:

The **Sustainable Development Goals (SDGs)** are a new, universal set of goals, targets and indicators that UN member states will be expected to use to frame their agendas and political policies over the next 15 years.
The global challenge:

Today: CC + Biodiv linearly combined

Future: CC + Biodiv linearly combined

Future: CC + Biodiv nonlinearly combined

CC

Biodiv

regional + short-term

global + long-term

MJ, PB & LP
06 April 2017 – 5
South Africa and Africa

Aridity Zones

A global strategy for road building

William F. Laurance¹, GopalaSamy Reuben Clements¹,², Sean Sloan¹, Christine S. O’Connell³, Nathan D. Mueller⁴, Miriam Goose⁵, Oscar Venter¹, David P. Edwards⁵, Ben Phalan⁶, Andrew Balmford⁶, Rodney Van Der Ree⁷ & Irene Burgues Arrea⁸

Figure 3 | A global roadmap. Shown are priority road-free areas (green shades), priority agricultural areas (red shades), conflict areas (dark shades), and lower-priority areas (light shades). Values of the environmental-values and
PhD overview

Systems approach to quantify and understand natural capital impact of roads and railways in African regions.

Road and rail development

Natural capital and biodiversity intactness

Complex interactions exist between linear infrastructure development and natural capital
PhD expected outcomes

Systems approach to quantify and understand natural capital impact of roads and railways in African regions.

- Catalogue of natural capital impacts of transport infrastructure
- Assessment of the status of natural capital in selected African regions
- Development of a scalable natural capital impact index which incorporates biodiversity intactness
- Modelling the effect of proposed transport infrastructure
- Delineation of natural capital impact under various climate scenarios
- Understanding of how complex scenarios interact across spatial scales

PhD ~ Austria-SA project
Research challenges

• Using **available ecological data** to answer research questions

• Determining appropriate natural capital and biodiversity intactness **indices**

• **Quantifying the magnitude** of infrastructure impact in natural capital

• How fragmentation of habitats through infrastructure development undermines biodiversity intactness and natural capital at different **spatial scales**
Take home messages

There are existing biodiversity and climate concerns

Proposed transport infrastructure development in ecologically sensitive areas providing natural capital and high in biodiversity

There is a complex issue - infrastructure development and ecological sustainability

There are existing planetary boundaries and thresholds to consider

Impacts vary with spatial scale

Large impacts on natural capital, biodiversity and eventually food security
Acknowledgements

• Wei Lui (IIASA) and Mark New (UCT)
• DST, NRF, OEAD and BMWFW
• IIASA
• SASAC NRF
• UCT-ACDI
• GREENMATTER and ACCESS