Connecting researchers and practitioners in transportation ecology

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What is Road Ecology and/or Transportation Ecology?

- Began in 1925 with the first study of roadkill in Iowa USA (Stoner 1925)
- Formalised in 2003 by Forman et al. ‘Road Ecology’
- The study of the interactions between ‘roads/traffic’ and ‘ecology’ (grey and green infrastructure)
  - Living things - wildlife, fish, plants, invertebrates, fungi etc
  - Non-living things – water, soil, rocks, micro-climate etc
- Recently expanded to include all linear transportation – railway, electricity, pipelines, etc
- Applied discipline - impacts and solutions!
Impacts

- Diverse suite of impacts
-Extend 100s to 1000s of m from road
-Many impacts can be avoided and mitigated
-Many impacts remain, are long-lasting and have serious impacts on biodiversity!
Quantifying the impacts of LTI (Linear Transportation Infrastructure) can be done alone.

Shared objective is to achieve an ‘ecologically sustainable transportation network’.

We all need to collaborate to achieve the best possible outcomes.

Fortunately, many networks and resources exist.

I will share numerous resources to help connect researchers and practitioners in transportation ecology.

Transportation Ecology is truly ‘multi-disciplinary’
Handbook of Road Ecology (2015)

- Roads, rail, transmission lines
- Comprehensive: planning, design, construction, operation, evaluation
- International: >100 authors, 25 countries
- For practitioners, NGOs, researcher, engineer, designer, ecologist etc
- [www.handbookofroadecology.org](http://www.handbookofroadecology.org)
Chapter 57

CHINA: BUILDING AND MANAGING A MASSIVE ROAD AND RAIL NETWORK AND PROTECTING OUR RICH BIODIVERSITY

Yun Wang, Yaping Kong and Jiding Chen

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SUMMARY

China is experiencing rapid growth in its economy, human population and transportation network. Environmental protection (e.g. slope stabilisation, vegetation protection and establishment, storm water collection and drainage) is becoming an increasingly important aspect of urban development and infrastructure planning.
30-50% price reduction

Bulk order via Yun Wang
International conferences and networks – can inform and guide BRI projects globally!

- IENE: Infrastructure & Ecology Network of Europe
- ICOET: International Conference on Ecology & Transportation (USA)
- Road Ecology Brazil
- ACLIE: African Congress Linear Infrastructure & Ecology
- GCLIE: Global Congress Linear Infrastructure & Ecology
- ANET: Austral-Asian Network for Ecology & Transportation
Summary of last few years….

– Conferences in 2009 (Queensland), 2014 (NSW), and 2018 (Victoria)
– >250 delegates from 8 countries
– Held in collaboration with the Environmental Inst. Australia and New Zealand
– 2021 conference postponed to 2022, early 2023
– March 2023, New Zealand
– Host smaller focussed workshops and forums
– Keen to hold ANET in Asia
– These forums are urgently needed: World is building its way out of Covid 19 recession!
ABOUT US

Partners from Tanzania, Kenya, China and the UK are coming together to build capacity so development corridor decision-making can be based on sound scientific evidence and effective use of planning tools and procedures.

Funded by the UK Research Council’s Global Challenges Research Fund the Development Corridors Partnership began in October 2017 and will end in December 2021. The Partnership will build capacity to address concerns about development corridors by encouraging scientific collaboration and stakeholder engagement in key issues of corridor planning and management.

DEVELOPMENT CORRIDOR DECISION-MAKING
Linear Infrastructure Safeguards in Asia (LISA)

LISA Project Reports

The LISA Project produced a Final Report summarizing its major findings and recommendations, plus four in-depth Annexes focused on key aspects of the project's research. All reports are available in seven languages.

LISA Project Training Modules

The LISA Project conducted several two-hour virtual Training Modules, and recordings are now available for viewing. In addition, a Training Manual is provided that contains an outline of each Training Module along with numerous online resources for further reading and exploration.
Other useful websites and organisations:

- [www.conservationcorridor.org/ccsg](http://www.conservationcorridor.org/ccsg)
- [Road Ecology Center (ucdavis.edu)](http://www.roadecologycenter.org)
- [IENE: www.iene.info](http://www.iene.info)
- Asian Development Bank and other banks
- Endangered Wildlife Trust – Africa
- Wildlife Institute of India
- Wildlife Conservation Society
- Many researchers, practitioners and funders globally!
Transport Working Group (TWG)

- 110+ Members, 6 continents
- Mobilizing infrastructure ecologists, engineers, transportation planners, academics, infrastructure financiers, and other interested parties

- Objectives
  - Policy
  - Science
  - Finance
  - Culture
  - Practice
  - Resilience
Coming soon! IUCN Technical Report: *Addressing ecological connectivity in the development of roads, railways and canals*

- 25+ contributing authors
- 10 Chapters
- 18 case studies
And hundreds to thousands of peer-reviewed journal articles, reports and other publications each year!
www.TransportEcology.info

Quantifying and mitigating the ecological impacts of linear infrastructure and traffic.

An global open access resource to share information, knowledge and experience in ecologically-friendly transport planning and management.

Our Mission.

Advancing best practice and strengthening partnerships among government, researchers, industry and our community to enhance ecosystem function, wildlife survival and human safety across the world.
Research.

Here you’ll find easy-to-read summaries of scientifically rigorous, evidence-based and peer-reviewed publications from around the world to help you better plan, build and manage ecologically sustainable linear infrastructure.

Best Practice.

Here you’ll find guidance, instructions and methods to help you plan, design, build and manage roads and other linear infrastructure that are ecologically friendly, as well as design surveys and monitoring programs, undertake analyses, and ensure the decisions you make are supported by reliable data and evidence.

Case Studies.

Here you’ll find easy-to-read case studies of real-life projects and experiences from around the world to help you better plan, build and manage ecologically sustainable linear infrastructure. Case studies are written by practitioners working on road, rail, powerline and other linear infrastructure projects and showcase what worked, what failed and lessons learnt.
Objectives

- Provide rapid access to
  - Impact and mitigation case studies
  - Summary of research published in scientific papers
  - Best-practise advise and information
- Global examples and hence truly globally-relevant
- Current and up-dateable
- Rapid publication of short ‘stories’ with diverse supporting material (video, photos, google earth links, etc)
- Articles searchable
Audience

- Global
  - Translations into local languages (2022)

- Professionals
  - Planners, engineers, funders, regulators / approvers, biodiversity specialists, etc

- Decision makers

- Politicians

- The general community and NGOs.
  - Provide information to achieve sustainable infrastructure!
Warning signals triggered by trains increase escape time for wildlife

To reduce wildlife mortality from train collisions, we invented a warning system that emits flashing lights and bell sounds prior to the arrival of a train. A test of the system showed that animals fled earlier from trains in the presence of warning signals.

Stop ignoring the small! Clues for conservation using roadkill data.

This study in Mexico showed that small wildlife experienced high rates of mortality and just like large charismatic species, they also require and deserve actions to avoid extinction.

Where Jaguars Cross Other Will Follow

Jaguars together with other neotropical species only used purpose-built wildlife underpasses under a highway in Mexico, even when "large enough" drainage structures were available. Drainage structures may work as crossings for some species but can’t substitute proper wildlife underpasses.

Could roads be simplifying bird communities?

Great Britain has seen traffic levels increase while bird species are declining but there is limited understanding about this link. This study assessed the spatial associations between roads and birds across Britain.

Roads Threaten Millions of Birds and Mammals in Europe Each Year

Around 900 million birds and 700 million mammals could be killed by roads each year in Europe. This figure could be reduced if effective, affordable measures were implemented.

Arboreal Bridge Trial for Hazel Dormice

The Hazel Dormouse is an arboreal mammal in Europe that may be especially sensitive to habitat loss caused by roads. While the bridge was successful, additional research is needed to fully assess its impact on dormice populations.

Roads Negatively Impact Wolverines

This study examines the impacts that roads have on wolverines in North America. It highlights the need for well-designed wildlife crossings to reduce the number of casualties.

Road Ecology Research in Africa

This research is a review of the road ecology publications and research that have been done in Africa to date to identify the key areas for future studies.
Warning signals triggered by trains increase escape time for wildlife

Animals could avoid train collisions if warned

Wildlife alive in a collision with moving trains and animals may escape more safely if a series of flakers train beacons could detect and avoid collisions more safely, from practical reasons that we can simulate collisions on stage. Certain differences between deterrence to fear train by means that cause no injury to the animals, we found that animals could escape

in fear response to trains, we designed a warning system that provided a warning signal near the track (see photo below). When the train was approaching, it made an audible sound that caused animals to escape. However, the warning systems were effective only if the animals could hear and see the train before it was too late. We used a system to avoid collisions, we found that animals could escape more safely.

Experienced test of our warning system

Our warning system is a system that detects animals that are in the warning path and is effective for collision avoidance (Fig. 5). The system was designed to be effective in detecting and avoiding collisions. We found that the system could be effective in avoiding collisions.

Warning increase escape time for animals

We observed flight response in large and small animals and small birds (Fig. 2). Large animals (e.g., deer and birds) showed a significant fear response to trains. Small animals (e.g., small birds) showed no significant fear response to trains. Our findings suggest that the system could be effective in avoiding collisions.

Arboreal Bridge Design for Hazel Dormice

The Hazel Dormice (Arborolimus, Arteriaria) is a small nocturnal insectivore native to Europe. They have a highly efficient, moving within the tree and shrub canopies and prefer to cross arbororeal habitats rather than using the ground. The Hazel Dormice has particular habitat requirements, including dense trees or shrubs with a thick cover that allows access to the ground. To avoid these requirements, we proposed a system that allows the Hazel Dormice to cross the forest without using the ground. This system could be effective in avoiding collisions and providing a safe crossing for the Hazel Dormice.

For our system, we designed a warning system that provided a warning signal near the track (see photo below). When the train was approaching, it made an audible sound that caused animals to escape. However, the warning systems were effective only if the animals could hear and see the train before it was too late. We used a system to avoid collisions, we found that animals could escape more safely.

In conclusion, we believe that our warning system could be effective in avoiding collisions and providing a safe crossing for the Hazel Dormice.

Additional information

A. Vets, J. Watts, H. G. C. B. J. Afr. Zool. Our system was designed to be effective in detecting and avoiding collisions. We found that the system could be effective in avoiding collisions.

Figure information

A. Vets, J. Watts, H. G. C. B. J. African Zool. Our system was designed to be effective in detecting and avoiding collisions. We found that the system could be effective in avoiding collisions.
Skilled and global editorial team

Website design and management:

Darelle Moffatt  Steve Bega  Kat Aburrow
SHARE YOUR EXPERTISE

Submitting your work will help to shape the future of Transport Ecology and enable us to improve the standards and practices of this expanding area of science across the globe.

Research.

Easy to read summaries of peer-reviewed journal articles and reports that describe research findings. These research summaries will ensure that the key findings of important research are visible and accessible to practitioners, and not hidden behind paywalls and scientific jargon.

Case Studies.

Researchers and practitioners will collaborate and provide detailed yet practical instructions on approaches and methods to assess the impacts of proposed infrastructure, plan and design effective avoidance and mitigation strategies, as well as undertake effective monitoring and evaluation programs.

Best Practice.

There’s no better teacher than real-world examples. Each case study tells a story of collaboration, innovation and lessons learned by sharing expertise and solutions - and just as importantly the failures - in order to enable a culture of continual improvement.

DOWNLOAD SUBMISSION FORM
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Quantifying and mitigating the ecological impacts of linear infrastructure and traffic.

An open access resource to share information, knowledge and experience in ecologically-friendly transport planning and management.

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Get involved!

- Participate in one of the many conferences held each year
- Join the TWG (Transport Working Group)
- Establish a China/BRI collaborative working group?
- Subscribe and/or submit to www.TransportEcology.info
- Access the many free resources online
- Purchase your own copy of Handbook of Road Ecology
- Reach out and collaborate!
Questions and comments?
THE FOLLOWING SLIDES ARE ‘SPARE’ AND UNLIKELY TO BE USED.
• **Vision**: The ecological connectivity of habitats, species, and natural processes is protected from the threats that LTI (primarily roads, railways, and canals) poses, including ecosystem fragmentation, wildlife mortality, and biodiversity loss, especially in Africa, Asia, and South America.

• **Mission**: Serve as the hub of expertise and volunteer collaboration across disciplines and geographies to develop, demonstrate, and implement practical guidance, increase capacity-building, and provide technical support delivering state-of-the-art solutions to foremost avoid, and otherwise mitigate the impacts that LTI has on the environment.
TWG Webpage

- TWG Library (250+ articles, reports, technical papers)
- TWG Resources (Global, regional and national guidelines)
- News updates
- Projects and activities
Download the new AsETWG publication at:

Join WCPA, CCSG and its working Groups at:
https://conservationcorridor.org/ccsg/membership/
Sponsorship opportunities
Invitation and next steps

- Visit www.transportecology.info and subscribe for updates

- Encourage your agency to subscribe

- Submit your research summary, case study or best-practise note via the website

- Email me for more info, make suggestions or offer support: rvdr@unimelb.edu.au
Solution: A global online hub

- A searchable website with guest ‘blogs’ or stories of projects, research and best-practise from around the world
- All types of linear infrastructure
- Includes
  - Summary of published research – increase exposure & uptake
  - Case studies across mitigation hierarchy (success and failures)
    - Small to large projects, in prep, underway and completed etc
    - Evidence-based best-practise notes
- Free to contribute and free to access
- A living resource for practitioners, public, decision-makers, etc
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Source:


*Second year monitoring (only wildlife underpasses):

CCSG Working Groups

CCSG Working Groups provide ongoing specialist expertise and leadership to identify and address challenges and opportunities for advancing connectivity conservation. Members of these groups focus on specific ecosystems, geographic areas, and species that have been prioritized to advance CCSG’s mission. The Specialist Group looks forward to growing these networks and partnerships to advance understanding and innovation based on cutting-edge science, knowledge, and best-practices.

Join WCPA, CCSG and its working Groups at: https://conservationcorridor.org/ccsg/membership/