

Environmental Impact Statement

Effects on the Ecology and Wildlife of a Proposed Commercial Route through the Serengeti National Park

A Petition and Survey from *290 International Scientists from 32 countries*

October 3, 2010

Summary October 3, 2010

- Included in the report are petitioners through September 27. More continue to arrive and will be added in a future report.
- 290 Scientists from 32 countries have petitioned the government of Tanzania to choose an alternate route around the Serengeti National Park, rather than building a highway through it.
- The petition states... *“the road will result in severe, negative, irreversible impacts, with little mitigation possible.”*
- It agrees with warnings by the UNESCO World Heritage Committee and adds... *“The type of road surface matters little. The migration itself could easily collapse, with a devastating effect on all wildlife, the grasslands, and the entire ecosystem.”*
- The petition concludes by asking that an alternative route be found.
- Included in the petition is a survey of likely negative impacts. Most scientists conclude that the collapse of the migration would be likely to inevitable.
- Scientists also give reasons for believing that the Serengeti ecosystem would be in danger, plus background information on their own experience.
- See below for:

Petition Text

Petition Signers

Results of the Survey

Individual Statements from Scientists

SUMMARY OF IMPACTS SURVEY

Included in the petition was a survey about likely negative impacts. Results indicate that scientists believe these to be extremely serious. Many, in fact, concluded that the impacts, including the collapse of the wildebeest migration, would be inevitable. The impacts listed are:

In your opinion, how likely are the following:

Combined % Saying Inevitable, Extremely Likely, Very Likely

Disruption and obstruction of migration routes: **85%**
57% said it would be inevitable. 28% said extremely likely.

Introduction of invasive plants, animals, and disease: **91%**
35% said inevitable. 67% said very likely or extremely likely.

Increased mortality due to wildlife-vehicle collisions: **98%**
67% said inevitable. 21% said extremely likely.

Intensive, organized poaching, especially reintroduced rhino: **88%**
32% said inevitable. 38% said extremely likely.

Loss of habitat from human settlement and agriculture: **87%**
40% said inevitable. 32% said extremely likely.

Eventual collapse of migration: **71%**
54% said very or extremely likely. 17% said inevitable.

PETITION AGAINST SERENGETI HIGHWAY / AND FOR AN ALTERNATE ROUTE

Tanzania can be proud of its heritage as a world leader in conservation. But I agree with many other scientists around the world - building a commercial route through the Serengeti National Park will put this priceless World Heritage in grave danger.

Evidence from other parts of the world, combined with our deep understanding of the Serengeti ecosystem, makes it clear – the road will result in severe, negative, irreversible impacts, with little mitigation possible. As noted in the report by The World Heritage Centre and IUCN, "negative environmental impacts of the North Road include:

- i) restriction on animal movements and migration routes; ii) direct wildlife mortality; iii) habitat fragmentation and modification; iv) increased impact from human activities, including poaching; v) hydrological impacts and soil erosion; and vi) introduction of exotic species.

Moreover, if the road were built, the high number of resulting vehicle-wildlife collisions would lead to consideration of fencing as a mitigation measure, which would create a barrier to the migration of wildebeest and other animals seeking the Mara River, their only water source in the dry season." (34th session, World Heritage Committee)

Natural ecosystems such as the Serengeti can remain healthy only with a clear understanding of how fragile they are, and how easily we can lose them if they are not wisely managed.

The proposed road cuts through a critical wilderness area that is essential to the migration. The type of road surface matters little. The migration itself could easily collapse, with a devastating effect on all wildlife, the grasslands, and the entire ecosystem.

As we know, the government of Tanzania has to work for development and welfare in all areas of the country. But there is no need to sacrifice its most precious wilderness, or its income from tourism, or its heritage of conservation. An alternative can and must be found.

Scientists, government officials, engineers, conservationists, economists, aid and lending institutions - all can study and work together to both protect the environment and help the people. This task is critical for both Tanzania and the world.

PETITION SIGNERS

Countries Represented

Australia	Indonesia	South Africa
Austria	Ireland	Rwanda
Botswana	Israel	Scotland
Canada	Japan	Sweden
China	Kenya	Tanzania
Croatia	Mauritius	The Netherlands
Denmark	Mozambique	UK
Ethiopia	Namibia	USA
Finland	Netherlands	Uganda
Germany	Norway	Zambia
Hungary	Romania	

Scientist	Organization	Country
Edward N. Mwavu	Makerere University, Kampala	Uganda
John Sidle	US Forest Service	USA
Alais Lendii	FZS	Tanzania
Yung En Chee	The University of Melbourne	Australia
Richard Estes	IUCN Species Survival Commission	USA
Hugh Gibbon	UN Industrial Development Organization	Kenya
Bernard W.T. Coetzee	Centre for Invasion Biology	South Africa
Anthony R. E. Sinclair	Serengeti Biodiversity Program	Canada
Kim Olaya	Trinity College Dublin	Ireland
Rosemary Groom	African Wildlife Conservation Fund	Zimbabwe
Nathan Gregory	Princeton University	USA
Peter Laszlo Pap	Babes Bolyai University	Romania
Evanson Kariuki	BEAN	Kenya
Gabor Seress	University of Pannonia	Hungary
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Miranda Muller	University of the Witwatersrand	South Africa
Rebecca Klein	Cheetah Conservation Botswana	Botswana
Claire Spottiswoode	University of Cambridge	UK
Josip Kusak	Veterinary faculty Zagreb	Croatia
Barbara Bauer	University of Potsdam	Germany
Stein R. Moe	Norwegian University of Life Sciences	Norway
Degu Tadie LImenh	FZS	Ethiopia
Sarah Bexell	Chengdu Panda Base	China
Carola Cullum	University of the Witwatersrand	South Africa
Anil Shrestha	Resource Ecology Group	The Netherlands
Patrick Osborne	Harris World Ecology Center	USA
Dr. Sultana Bashir	Independent	UK
Hannah Bemen	Yale University	USA
Jasper Kenter	University of Aberdeen	UK
Sheldon Matthys	Conservation South Africa	South Africa
Michael Holland	Freelance Development Specialist	UK
Aerin Jacob	McGill University	Canada
Julie Stein	Scentmark	USA
Orsolya Rita Molnár	Eötvös Lorán University	Hungary
Anne Axel	University of Michigan	USA
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Kristof Kelemen	Eotvos University	Hungary
Daniel Goedbloed	Wageningen University	The Netherlands
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Vicky Meretsky	Indiana University	USA

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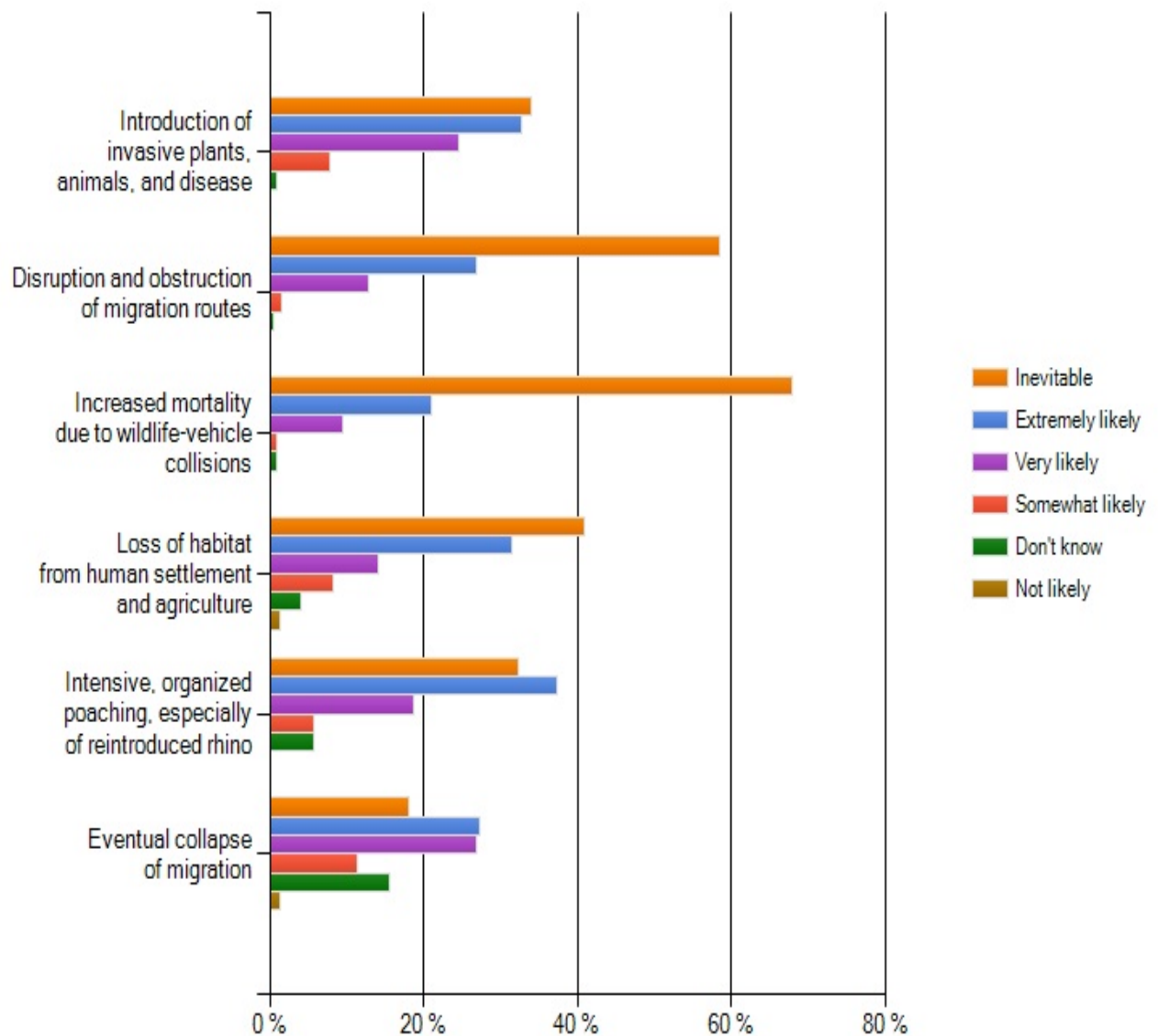
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E.J. Milner-Gulland	Imperial College London	UK
Tim Coulson	Imperial College London	Berkshire
Mebrahtu Ateweberhan	University of Warwick	UK
Anne Treasure	Stellenbosch University	South Africa
Lisa Harrenstien	Oregon Zoo	USA

The remainder of petitioners chose to remain anonymous.

GRAPH OF RESPONSES ON IMPACTS

SURVEY QUESTIONS: In your opinion, how likely are the following?



Statements on Impacts

The following are additional comments from the survey.
[bold added by editor for emphasis]

John Sidle, Wildlife Biologist US Forest Service, USA

The U.S. Forest Service, its partners and others have studied the impacts of roads on wildlife for many years. **I must assume that the government of Tanzania and its consultants have reviewed the large body of literature on this subject. In the United States almost all of the highways were constructed before we knew about the blocking effect that highways have on wildlife. We have a network of roads in the U.S. that has had the unintended consequence of slaughtering wildlife and curtailing seasonal movements.** We now try to mitigate through overpasses and underpasses for wildlife on existing roads. **But it is an expensive and problematic retrofit. I think that Tanzania should take advantage of the lessons learned in the U.S. and find a solution that avoids concentrations of wildlife such as in the Serengeti.**

Dr. Richard Estes IUCN Species Survival Commission, USA

For 47 years the wildebeest of the Serengeti ecosystem has been the focus of my studies of African mammals. In addition to observations of the 1.2 million wildebeest that live on the Serengeti short-grass plains during the rains between November and May, I have followed their movements at the end of the rains, which coincide with the annual rut. In recent years, increasing numbers of wildebeest have headed north instead of west and northwest; **the new road would cut straight across the route of these "armies"**. A recent publication (Estes, R.D. and R. East 2009. Status of the wildebeest in the wild, 1967-2005, Wildlife Conservation Society, Working Paper 37), chronicles the destruction, through human intervention, of all but one of the migratory populations that formerly ranged the SADAC countries (plus Kenya). **The Serengeti population is the last and greatest of all wildebeest populations. The proposed road is a classic example of a development project that puts short-term human interests above the conservation of natural ecosystems, completely ignoring the 1979 UNEP Convention on Migratory Species, which Tanzania ratified in 1999.**

Supporting evidence is detailed in the above-cited country-by-country survey of migratory wildebeest populations (Estes and East 2009). **Fencing the road through SNP could lead to a 90% reduction in the population, as occurred following fencing of Kruger and Etosha National Parks, not to mention the mortality that accompanied construction of veterinary cordon fences in Botswana.**



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Professor Norman Owen-Smith
University of the Witwatersrand, South Africa

A truck highway will not be compatible with the seasonal movements of around a million wildebeest and numerous other ungulates back and forth across this route, and will ultimately lead to the blocking of this northward migration into the dry season range in northern Serengeti and Masai Mara. This will have substantial consequences for the numbers of wildebeest and other species that can be supported within Serengeti National Park, and reduce its supreme international status as a wildlife heritage. Owen-Smith N. (2004) Functional heterogeneity within landscapes and herbivore population dynamics. *Landscape Ecology* 19:761-771.

Professor E.J. Milner-Gulland
Imperial College London, UK

I have had the privilege of visiting the Serengeti ecosystem, and working on a collaborative project (HUNT) researching the conservation and development issues of the region, as well as working with Tanzanian scientists to promote sustainability of this fragile and unique ecosystem. **Based on the many years of research that has been carried out into the dynamics of the ecosystem, it is very clear that the proposed road could do permanent and irreversible damage to this area, which is of critical global importance both for biodiversity and for humanity.** I hope the Tanzanian government will reconsider this proposal.

Anna Estes
University of Virginia, USA

The Tanzanian government has been making claims, in defending this road, that I think need to be addressed. For one, they are saying that they can mitigate the worst effects of this road. Even if that were ecologically possible, which I highly doubt, evidence from Mikumi NP has shown us that we will lack the political will to do so. In Mikumi, ecological concerns lost out to economic ones. TANAPA was at first allowed to have checkpoints at either end of this road, but was made to remove them when the transportation industry complained about delays. Likewise, TANAPA initially had a higher frequency of speed bumps on the road, and was forced to remove some. There is no reason to suspect that the situation will differ at all in Serengeti, considering the potentially much higher volume of commercial traffic. **A study that exists as a government document reported a frequency of one vehicle/minute on the Mikumi road.** In Serengeti, the frequency will likely be much higher, because this road will not only connect western Tanzania to the coast, but will also be opening up access to the other Lake countries. This will be a major commercial transport route. Both the volume of vehicles and the orders of magnitude greater numbers of wildlife make comparisons to road kill in Mikumi, which is bad enough as it is, gross underestimates. Related to the opening up of access to other Lake countries: Serengeti already loses 10's of thousands of wildebeest and zebra to meat poaching every year. This is primarily sold in communities along western Serengeti, because it is cheaper than other forms of protein. **Some other Lake Zone countries consume bush meat because it is preferred, but not necessarily cheaper. Putting such easy access through Serengeti to these countries in my eyes makes it highly possible that we will be opening up Serengeti's bush meat market to countries with greater demand,**



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and that alone could lead to a collapse in the wildebeest population. As regards other kinds of poaching: Ivory poaching in Tanzania is in a major upswing. Easy access of this kind, combined with road crews operating inside park boundaries to build this road, create great potential for larger quantities of ivory to be moved out of Serengeti. Likewise, Tanzania has done a commendable job translocating black rhino back into the park, and this road will pass very near to the rhino re-location area, which just seems to countermand that effort. **Even if no rhino are poached as a result, we know that rhino are very sensitive to vehicle disturbance, even on small tourist tracks in the Crater. This will definitely act as a barrier to their dispersal, and to linking with the rhino populations in northern Serengeti and the Mara.**

One thing that has struck me from the start with this road, is that **even if local communities do make money from this road, Loliondo, in particular, stands also to lose a lot.** Already the pressure on land and resources there has caused a great deal of conflict not only between Maasai and Sonjo, but also been national and local interests. From what we have seen so far, national interests (for example removing Maasai for the Arab hunting block) have won out. Maasailand, which in addition to sustaining a culture and a people is far more compatible with wildlife, is ever diminishing as it gets carved up for farms and other uses. In many of these cases, the Maasai have lost their land to other people. Look, for example, to the increase of agriculture in the Simanjiro area. If we look at the areas between the Lake and Serengeti, and if we look at the areas surrounding Arusha, almost all of the arable land is already taken up. **The land in Loliondo is even more arable than many of these areas, and I can't help but think that once there is easy access to Loliondo, and to markets beyond Loliondo, that there will be a land rush from richer outsiders, and that the Maasai and Sonjo stand to lose a lot more of their land.**

Rebecca Klein, Conservation Cheetah Conservation Botswana

There are certain places in the world that should remain wild, for our heritage and biodiversity. We have to accept development of many areas but there must be a limit. **A road through the Serengeti would be a global conservation tragedy.**

Jorgelina Marino Wildlife Conservation Research Unit, University of Oxford, UK

The negative impacts of a new highway traversing the Serengeti are enlarged by the fact that Serengeti represents one of the few large areas of wilderness where natural processes such as massive migrations still persists. **Opening roads in wild regions bring about a cascade of effects that has been discussed and studied in depth in the modern conservation literature.** In this case it may be possible to predict the direction these impacts may take under possible futures scenarios, as an attempt to measure the biological and economic costs that this road brings, and when compared with the alternative route.

Charlee Glenn Diversity Program, Ecological Society of America, USA

We have been witness to the affects of development in many places before. The disruption that it has on an ecosystem is vast and in most cases irreversible. I have very



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serious doubts that the ends justify the means and the devastation that it will cause. So many of our protected lands are cast aside and laid to waste without serious consideration of the long term negative effects. Please reconsider and or consult experts before committing to this project.

Nicholas Georgiadis, PhD

Bole and Klingenstein Foundation, Greater Yellowstone Ecosystem, USA

I am a professional conservationist, born and having worked in Africa for most of my career. I did research in Serengeti between 1987 and 1999 on elephants, wildebeest, and other large mammals, defining patterns of variation in DNA among individuals from different locations, and using those patterns to reconstruct the history of animal migrations across the Serengeti-Ngorongoro-Manyara-Tarangire landscape over tens of thousands of years. In the Serengeti, Tanzanians have an ecosystem the like of which no one else has, but everyone else craves. Its size and age, combined with exceptional geological, habitat and climatic diversity, make it the most productive savanna on earth, with spectacular migrations by large-mammal concentrations found nowhere else. It is truly unique, a precious treasure. Tanzanians own most of it (but not all – a tenth of the ecosystem is across the national border in Kenya), and so far they have done a terrific job of protecting it in trust not just for Tanzanians, but for the rest of humanity. This is why non-Tanzanians have a say in this issue, and why the governors of Tanzania must be open to opinions from a wider forum of informed professionals who have the interests of Tanzania and Tanzanians at heart. Julius Nyerere acknowledged this in 1961: "In accepting the trusteeship of our wildlife we solemnly declare that we will do everything in our power to make sure that our children's grand-children will be able to enjoy this rich and precious inheritance. The conservation of wildlife and wild places calls for specialist knowledge...and we look to other nations to cooperate with us in this important task – the success or failure of which not only affects the continent of Africa but the rest of the world as well." Yes, Tanzania badly needs development, but constructing a commercial road through the northern Serengeti would be counter-productive, amounting to wanton and pointless desecration of a vital asset. The idea is so obviously wrong-headed – commercially, economically, ecologically, and spiritually – its proponents can only have ulterior and selfish motivations. **Why damage one important asset, which Serengeti undoubtedly is, when the same effect or better can be gained by alternative routes? Superior solutions are available for Tanzanians, and the world as a whole. Copious resources are available to help Tanzania develop in ways that are sustainable, effective, and wise. Building this road would be a colossal mistake.**

In answering these questions, I am thinking about very long term effects - over several generations. This road will be the first of many cascading threats that ultimately and together could well destroy the migration. **Almost by definition, degeneration of natural phenomena like the wildebeest migration, and the integrity and function of an ecosystem like Serengeti, happen slowly enough for individuals not to notice the change. This is why every threat must be averted. These days, we know that development can be achieved in sustainable ways. Tanzanians can benefit from the experience of other countries that lost so much of their natural resources before the importance of this principle was recognized, and now can't recover them.**



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Wolf Naegeli, MS Ph.D.

Senior Research Scientist Emeritus, The University of Tennessee, USA

I read Professor Bernhard Grzimek's book "Serengeti Must Not Die" 49 years ago. I was 14 then. The story about the threat -- at that time -- to the wildlife migrations in the Serengeti-Mara ecosystem provided the impetus for my choice of a career in environmental conservation. My wife and I visited the Serengeti on our honeymoon and our wildlife observations there are among our fondest memories. They have kept motivating us to work with, volunteer for, and support conservation and fair-trade projects in East Africa and around the world.

I wrote my 1982 master's thesis "Environmental Impacts of Tourism: A Study with Special Reference to Natural Areas and Developing Countries" at Cornell University. **I have two key concerns about impacts of the Serengeti Highway, in addition to those listed above:**

- 1) The highway would exacerbate stresses on wildlife populations that are brought about by climate change. Unfortunately, shifting climate patterns are very probable during the current century.** That will present unprecedented challenges for large migrating populations of wildlife because their flexibility to move to other areas has already been greatly reduced from what it was during past millennia. So, while the collapse of migrations as a DIRECT impact of the Serengeti Highway may only be somewhat likely, the odds of such a collapse are greatly increased when considering possible impacts of climate change AND of the Highway together! Regardless of its probability, should a collapse occur, its consequences on the greater Serengeti-Mara ecosystem would be dramatic. **This could not only devastate the region's tourism industry, but also harm the ecological processes that are an important part of the life support systems on which Tanzania's agriculture and many of its citizens directly depend.**
- 2) The highway would bring in large numbers of "convenience tourists," i.e. people who take an opportunity for a little sightseeing detour, who would otherwise not make the effort to come to the Serengeti. Most likely, this would greatly increase pressure on sensitive habitats and disturbances of wildlife populations. These types of tourists tend to spend far less money during their visits than those who plan ahead to make a special trip.** Moreover, the convenience tourists typically will be much less informed about the uniqueness of the area and the wildlife they are visiting. They will have little understanding of vulnerable species and habitats and hardly appreciate their ecological values. Thus the convenience tourists will not be as prepared and willing to take care to minimize their impact as do many, if not most, of the destination tourists. **Also it is well known that increased traffic -- vehicle and human -- will deter tourists who are ready to spend dearly for serenity and an as-authentic-as-possible close-to-nature experience. The term 'destination senescence' has been used to describe the process that affects primarily areas that depend on natural or cultural assets to attract tourists. This is a vicious cycle of unsustainability that is very hard to reverse.** It often ends in ruin for many businesses. It creates economic hardship for the affected communities and their permanent residents. This is how it works: As increasing numbers of visitors degrade the environment, the clientele changes. High-profit-margin businesses fail or have to expand to cater to, and attract, mass-market customers. Over time, visitors (as well as the resident working population) become increasingly transient. Eventually, what once was an attractive resort ends up a decrepit road stop. **In any case, the Serengeti Highway would diminish**

the Serengeti's value and stature as Tanzania's most renowned tourist destination and World Heritage site. It also would tarnish Tanzania's reputation as a country that treasures its natural heritage and takes good care of it.

**Anne Pusey, James B. Duke Professor
Duke University, USA**

The Serengeti is a unique and precious ecosystem - one of the very few large scale migratory systems of large animals remaining on the planet. Films and descriptions of the Serengeti inspired me in my childhood and instilled an awe of nature and the incredible natural wonders of Tanzania. I know that this continues to be true for millions of people across the world. **A road across the migratory routes will devastate the system for all the reasons listed in this letter and survey. The Serengeti ecosystem is one of the wonders of the planet. It must be preserved. I was fortunate enough to live in the Serengeti and study lions in the Serengeti for 10 years. I know the ecosystem well and can therefore answer with knowledge and authority the survey questions below.**

**Professor Johan du Toit
Utah State University, USA**

I have visited Serengeti several times to advise Tanzanian graduate students and participate in research meetings held under the auspices of the Tanzania Wildlife Research Institute (TAWIRI). I also collaborate with several of the ecologists who are deeply concerned about this planned highway. I trust their judgment and I am confident that an alternative plan can be made that will be less damaging to Tanzania's unique wildlife resources. All alternatives must be carefully considered and it is essential that the Serengeti migratory system be protected from further damage. This is not just to conserve a globally important part of biodiversity but also to protect the national pride of, and international respect for, the people of Tanzania. At the same time **I enthusiastically encourage innovative thinking for meeting the reasonable demands of the Tanzanian people for sustainable economic development. A unique and appreciating asset in Tanzania's economic portfolio is the present and potential tourism industry based on the global treasure that is Serengeti, and so it is counterproductive to Tanzania's economic and political development for that asset to be foreclosed - especially when alternative solutions exist.**

If the road were built then the frequency of wildlife-vehicle collisions would be so costly in human life and damage to vehicles that the road would not be a reliable transport route for the first few years, especially in the dry season. Thereafter, the migrating animals would become decimated by collisions and military check-points would be needed to prevent industrial-scale vehicle-mounted poaching. A fence would have to be erected on either side of the highway to prevent collisions, and this would block the migration from reaching the Mara River, which is essential for drinking water. A much-reduced mini-migration might become established between the Southern Plains and the Western Corridor, **but the migration into the Mara Game Reserve would end - immediately bringing Kenya's wildlife tourism industry to its knees and directing international scorn at Tanzania.**



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Traci Birge, Researcher
ARONIA R & D, Finland

The government has an obligation to serve all citizens, and rural residents are a group in need of infrastructural improvements to help them improve their economies and opportunities and help move rural goods to urban centres. **However, the proposed highway route would be devastating for the ecology of the Serengeti, and would have long-term negative effects on local residents, wildlife and ecology and would be a terrible blow for global biodiversity. The highway will both fragment habitats and lead to human encroachment into the Serengeti.** Please find a more sustainable and less environmentally costly alternative to the proposed highway route.

Dr Sarah Durant, Senior Research Fellow
Zoological Society of London, UK

My comments concur with the ZSL statement on <http://static.zsl.org/files/proposed-commercial-road-through-the-serengeti-zsl-statement-1203.pdf> These impacts are outlined in the ZSL statement - web address above. Collapse of the migration will be certain if the road is fenced, and this will happen eventually in order to prevent human deaths from animal vehicle collisions.

Tim Coulson, Professor of Population Biology
Imperial College London, UK

Putting a road through the Serengeti when the alternative route offers so many more advantages is environmentally and economically irresponsible. Tanzania needs both tourism and infrastructure improvement and can have both. **Building a road through the Serengeti will not deliver either. On the contrary, it is likely to severely damage wildlife, and consequently tourism, negatively impacting Tanzania's economy. In addition, it will rob people living South of the Serengeti of an economic lifeline. Tanzania's decision makers must put the interests of their people and their country before their own.**

High speed roads, even with relatively infrequent traffic, always negatively impact wildlife. **The scientific literature is unanimous on the negative consequences of such roads on wildlife.** Any environmental impact assessment that fails to review this literature is not worth the paper it is written on.

Melissa A. Fleming, PhD
Museum of Southwestern Biology, USA

Many of the negative impacts of roads on wildlife are obvious to anyone who has been on a road in a wilderness area, e.g., invasive species, road kills, pollution, abandonment of traditional habitat adjacent to roads. Increased use of an area by hunters and trappers (legal and illegal) is also common in the places where I have studied small carnivores (Alaska, western Canada and the Pacific Northwest of the United States). Also, governments quickly lose the will to limit human use and development in areas where access is made too easy. While overland migrations as massive as those in the Serengeti



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are rare in North America (just caribou come to mind), it is hard to imagine that road traffic, if not the roads themselves, and the additional human development that inevitably comes with roads, will not have multiple negative effects on migratory animals in the Serengeti. **The human need for infrastructure is undoubtedly great in Tanzania, but humans are the most adaptable species under consideration here and personal experience suggests that people will adapt and concentrate their habitation and economic activity where there is road access as opposed to where there is not.** It seems prudent to consider that non-straight line connections between currently populated areas may channel human land use and population growth in new directions in the future, reducing the apparent importance of and need for a road to connect currently populated areas across the easiest straight line distance - thus preserving the Serengeti and its species as world treasures and the quality of tourism they generate today (e.g., numerous guide-led and/or group safaris as opposed to individuals setting out on their own with a rental car, say).

An extensive body of literature on the impact of roads on wildlife and wilderness indicate that roads themselves and the traffic on them disrupt wildlife movements, accidentally introduce non-native species that hitchhike on vehicles, lead to wildlife-vehicle collisions (how could it not?), and greater use of roads for access to wildlife (for any reason - so if there is poaching now, increased poaching is inevitable). The degree to which habitat is lost depends on the laws around settlement and development in the area, but past experience suggest that some loss will ultimately occur due to increased human need (e.g., food, fuel) and opportunity for business. Whether migration will collapse as a behavior in these species before the migrating populations themselves collapse is unclear.

**Dawn Tanner, PhD
University of Minnesota, USA**

I have conducted research on the impacts of roads on wildlife populations and the role of wildlife-crossing structures for wildlife. The possible detrimental effects of this planned road are extreme and should be avoided. Research has clearly documented that road effects on wildlife increase as roads are widened, paved, and built in fragile protected areas. **There is an opportunity for Tanzania to be a leader for the global community and demonstrate commitment to the environment by pursuing an alternative route.**

**Rosie Woodroffe, Senior Research Fellow
Zoological Society of London, UK**

As Serengeti NP welcomes the gradual return of African wild dogs - absent from the park for nearly two decades - it is worth recalling that wild dogs are attracted to roads, which they use for traveling and resting. Wild dogs are therefore highly vulnerable to road accidents. For this reason, the IUCN/SSC Action Plan for African wild dogs includes a recommendation that "...new high-speed roads should not... be routed through protected areas or along their borders...". Of course, the threat to recovering wild dogs involves just one species, and is not as ecologically devastating as damage to the wildebeest migration. Nevertheless, to lose wild dogs once may be regarded as a misfortune; to lose them twice sounds like carelessness.

Penny Spiering Becker
Smithsonian Institution, South Africa

Disruption of animal movement, high incidences of human injury and animal deaths due to collisions and poaching increases (especially of rhino) are apparent in Hluhluwe-Imfolozi Park in South Africa, where a similar road exists. Please take a look at this and many other examples of why this road location is a bad idea and don't make the same mistake.

Michael Rainy, Msc
Consultant, Ecology of Kenya Rangeland, Kenya

IT IS WELL KNOWN THAT THE ECOSYSTEM THAT IS DEFINED BY THE MIGRATORY HOME RANGE OF THE WHITE BEARDED WILDEBEEST. IT INCLUDES THE LOITA AND SERENGETI POPULATIONS AND COMPRISES ~ 20,000 KM² IN TANZANIA AND ANOTHER ~5000 KM² IN KENYA IN THE MARA AND TRANS MARA GAME RESERVES AND ALSO THE MAASAI OWNED GROUP RANCHES NORTH AND EAST OF THE GAME RESERVES. THE WATER OF THE MARA RIVER AND OF THE MUSIARA WETLAND , AS WELL AS THE OLARE OROK, THE NTIAKITIAK AND THE TALEK RIVERS CONTAIN MOST OF THE DRY SEASON WATER FOR THE MIGRATORY WILDEBEEST AND ZEBRA IN THIS SYSTEM. FURTHER IN JUNE -SEPTEMBER ANNUAL DRY SEASON **THE NORTH WESTERN RAINS PROVIDE THE SAME ANIMALS WITH HIGH QUALITY FORAGE. IF THESE RIVERS ARE DRY AND IF THE RAINS FAIL THE MIGRATORY POPULATIONS WILL CRASH TO LEVELS OF ONLY 15-25% OF THEIR CURRENT SIZE. THE SAME THING WILL HAPPEN IF THE PROPOSED COMMERCIAL HIGHWAY IS BUILT** AND RUNS SOME 75 MILES EAST -WEST THROUGH THE MIGRATORY CORRIDOR OF LOLIONDO, THE SERENGETI NATIONAL PARK AND THE KORONGO RESERVE AND OPEING THE AREA TO HIGH LEVELS OF COMMERCIAL LORRY TRAFFIC. I HAVE DONE SOME OF THE LARGEST SCALE HIGH RESOLUTION GROUND COUNTS OF THE GREATER MARA BETWEEN 1988 AND 2002 . IN NOVEMBER 2002 WITH SCIENTISTS FROM ILRI AND NREL WE COUNTED OVER 2500 KM² AT 11.1 Ha . THESE RESULTS ARE AVAILIABLE AT www.maasaimaracount.org

WHEN THE WILDEBEEST POPULATION WAS <250,000 AS IT WAS BETWEEN THE LATE 1880 AND ~1950 THERE WAS NO MIGRATION INTO KENYA. IF THE MIGRATION IS DISRUPTED, THE POPULATION OF WILDEBEEST WILL FALL FROM 1,300,000 TO PERHAPS ~200,000. AND POSSIBLY FURTHER, REVENUE FROM TOURISM SUPPORTING ~ 1,000,000 JOBS IN BOTH TANZANIA AND KENYA WILL BE LOST PROPORTIONATELY AS WILL REVENUES TO STATE AND LOCAL GOVERNMENTS. THE BEST ALTERNATIVE IS TO DEVELOP THE ALTERNATIVE ROUTE IN THE WEST AND THE SOUTH AND LEAVE THE NORTH AND NORTH EAST AS IT IS.

Matthew Smith, Conservation Ecology
Imperial College London, UK

It would be a devastating blow to the natural world should one of the last great migrations be lost or be irrevocably altered. With so little wilderness left it is imperative that those remaining fragments should be kept pristine to act as controls, so that scientists have some point of reference to gauge the effects of global environmental change on pristine ecosystems. Developing nations undoubtedly have the right to



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modernise their infrastructure to improve the quality of life for their citizens and strengthen their economies. However, it is essential that this is done in a sustainable manner that does not threaten the integrity of ecosystems that are crucial to health of the planet, and supply important ecosystem services, that once damaged cannot be replaced. The global community needs to act fast and find a sustainable alternative. A route to the south could potentially offer greater benefits to the Tanzanian people, as well as protect the Serengeti national park.

The planned route will inevitably disrupt migration, and cause further fragmentation of landscapes within the region. This can only have a detrimental effect on the wildlife, ecosystems, and the benefit that these provide the Tanzanian people now, and for generations to come.

Emile Smidt
Frankfurt Zoological Society, Tanzania

There is already a high incidence of Lantana & Parthenium outside the national park & increased access via the road will lead to the establishment of these species in the park where currently there is none. **Parthenium is a particularly aggressive invasive species and has the potential to modify grasslands. The mass movement of migratory species will further spread these invasive species into the core of the park. In addition wilderness areas are becoming more rare in African parks and this road will have a major effect on the wilderness integrity of the northern Serengeti.** Infrastructure development of this nature inevitably will lead to further developments in the future and will have a long lasting negative impact on the Serengeti from both an aesthetic & ecosystem functioning perspective.

Jonathan Green, Economics
University of Cambridge, UK

The smaller and more divided this ecosystem becomes, the higher the risk of irreversible damage to species - and in particular to the ecological processes that sustain species and provide us with ecosystem services. **Fragmentation of this area will likely push tourists away from Tanzania to seek out other - less impacted - areas. With the Serengeti providing such a vast revenue and supporting so many jobs through TANAPA, it seems like an unnecessary risk to jeopardise this.**

Dr. Vicky Meretsky
Indiana University, USA

Serengeti wildlife and the associated impressive migrations are worth consideration by a country that benefits so much from them. **Not only will trucking through this area harm wildlife, but trucking itself can hardly benefit from the first few years of constant conflict with migrating animals. After that, the animals will likely have lost the battle, and trucking can resume,** but it seems that the battle need not be undertaken in order for all sides to benefit.



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Dr. Purchase

Wildlife conservation, Zimbabwe

The Serengeti is critical to the survival of a number of unique species that only occur in Africa today...one of which is the cheetah. Africa can offer to the world an asset which is unrivalled any else on the planet and it seems to lose this asset would be a great shame, especially as alternative routes to the road exist. In all parts of the world where roads are constructed through previously undisturbed habitat, invasive species enter the system, human habitation increases (with associated pollution and use of resources) and if vulnerable species are present, poaching increases as well.

James McNamara, Conservation

Imperial College, Zoological Society of London, UK

Many of the world's unique, natural, wild spaces and the plants and animals that they support are under constant threat from man, both through exploitation of resources and urbanisation. Untouched environments are sadly becoming rarer and rarer and are now the exception rather than the norm. On the other hand man made and man managed environments are increasing at record levels and as a consequence preserving the few wild spaces that we have left must be an absolute priority as the damage done through mismanagement or development may not be reversible for many generations, if at all. The Serengeti represents one of the few "wonders of the natural world" that remain. It is one of the most famous landscaped and ecosystems on the planet and supports some of the most magnificent examples of nature ever to have materialized on this planet. As a result, it is not only the natural heritage that is important, but the ever increasing economic value that this system represents. It is a conduit that over time will only attract more and more interest from a world bereft of such spaces, where economic development is leading to increasing prosperity and those in command of such prosperity will invariably long to behold such natural wonders. It is a rare gem by economic, social and environmental standards and as such protecting what remains is both a rational short term goal and a duty to the global community in the long term.

The disruption of migratory routes and increased exposure to exploitation are the greatest threats and the proposals will effectively lead to the northern area of the park being isolated from the remainder as, over time, the route becomes more and more intensively used.

Tim Davies, Natural Resources Management

MRAG Ltd., UK

I recognise the need for development of the towns and communities to the west of the Serengeti NP, and that an arterial highway provides the necessary infrastructure allowing access to this region. There are as I understand alternative highway proposals which, although more expensive, will route around the south of the National Park. The additional short term costs of this road are likely to be offset by the continued revenue brought in from wildlife tourism with the park. **A highway build through the park promote ever greater volumes of traffic as the western region develops, and the likely negative impacts on the ecosystem (especially the great migrations) will diminish value of tourism in the park, with knock on economic impacts on a national level.**

Dr. Uri Shanas

University of Haifa-Oranim, Israel

Our paper on the possible effect of run off from highways on nearby aquatic ecosystems will soon be published in Environmental Pollution. This is an additional effect of highways that should be considered.

Harriet Davies-Mostert, Head of Science

Endangered Wildlife Trust, South Africa

Wildlife road traffic collisions have a pervasive and negative effect on wildlife populations. The proposed highway is bound to increase collision rates (as has been well-illustrated in many areas where highways cut across conservation areas) and should be stopped. The highway through Hluhluwe-iMfolozi Park in Zululand South Africa is a case in point, where many species are regularly hit and killed by vehicle traveling at high speed through the conservation area. These include animals as large as elephants and rhino, as well as endangered species like African Wild Dogs.

Jenny Leon

NCDA, UK

Published research investigating Saiga migrations in Mongolia have shown that human infrastructure including roads have negatively impacted saiga movements. There is also some anecdotal evidence of this in other areas of the saiga range.

Alais Lendii

Frankfurt Zoological Society, Tanzania

Vehicle traffics through the park cause noises and air pollution , neighboring countries access to illegal bush meat hunting, dangerous weapons due to the availability of transportation. also refugees moving in the country.

Dr. Rosemary Groom

African Wildlife Conservation Fund, Carnivore Conservation, Zimbabwe

There are very few large, wild protected areas left in Africa: the Serengeti is an internationally renowned wildlife conservation area, and this should not be jeopardised by the building of a highway through park. **If this goes ahead - what will happen to the rest of Tanzania's and Africa's parks and reserves if the protected status can be so easily ignored?**