

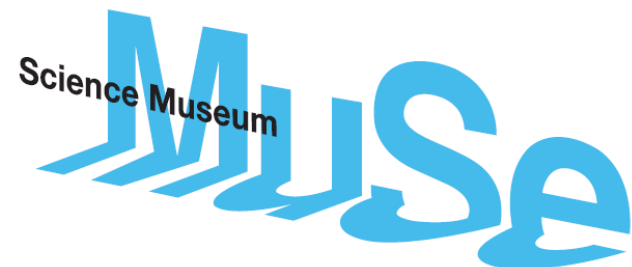
The Tropical Ecology, Assessment and Monitoring (TEAM) Network: an Early Warning System for nature

Francesco Rovero¹ and Jorge Ahumada²

¹Tropical Biodiversity Section, MUSE – Museo delle Scienze, Trento, Italy

²TEAM Network, Betty & Gordon Moore Center for Science and Oceans,
Conservation International, Washington DC, USA

1st Int. Conference on Anticipation, Trento 2015





Science Museum
MUSE

Contents

TEAM Network - an early warning system for life on earth

Why do we need to monitor tropical biodiversity?

The problem: lack of standardized biodiversity data from the tropics - needed to anticipate changes

TEAM protocols with focus on the monitoring of mammals

Examples of results from this protocol at site and global level

Conclusions on the relevance of TEAM for anticipating decisions

Challenges



MISSION

Generate real time data to monitor long-term trends in tropical biodiversity through a global network of field stations, providing an early warning system on the status of biodiversity to effectively guide conservation action.



INTERACTIVE TOUR

Why do we need TEAM?

How TEAM works

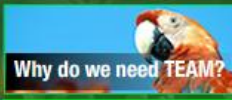
Evolving Network

Products



CONSERVATION
INTERNATIONAL

Acknowledgements & Partners



Why do we need TEAM?

Currently there are well established Early Warning Systems for earthquakes, catastrophic fires, tsunamis, hurricanes, volcanoes and many other natural systems.

However, we do not have an Early Warning System for life on Earth.



TEAM NETWORK

Early Warning System for Nature

Why do we need TEAM?

How TEAM works

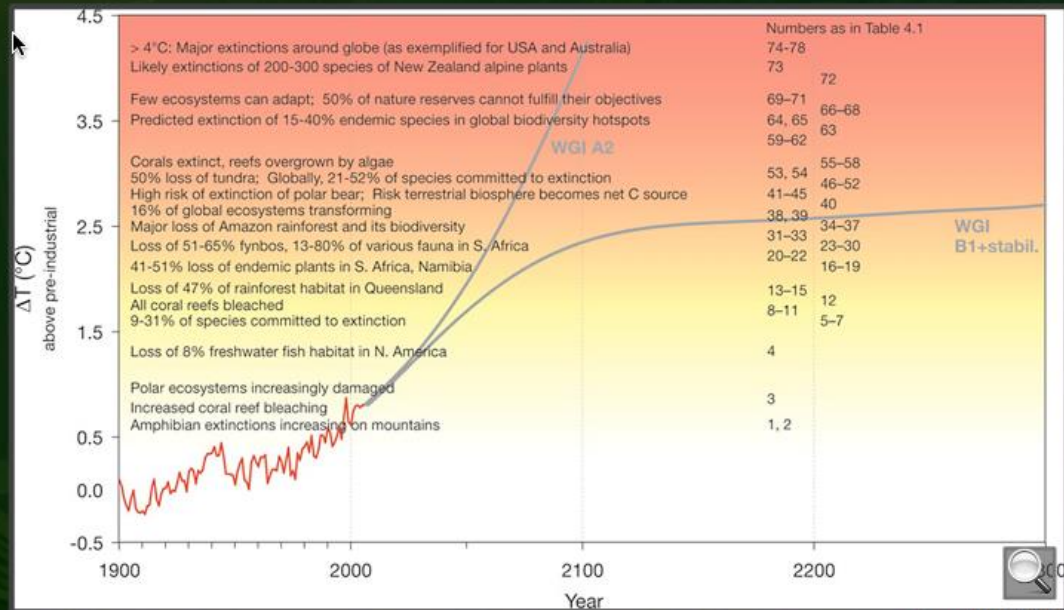
Evolving Network

Products

Why do we need TEAM?

Climate Change

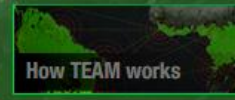
If global average temperatures exceed 2-3 degrees above pre-industrial levels, 20-30% of plant and animal species will be at high risk of extinction and the structure and functioning of terrestrial ecosystems will change substantially (IPCC 2007).



Previous

Page: 1 2 3 4 5

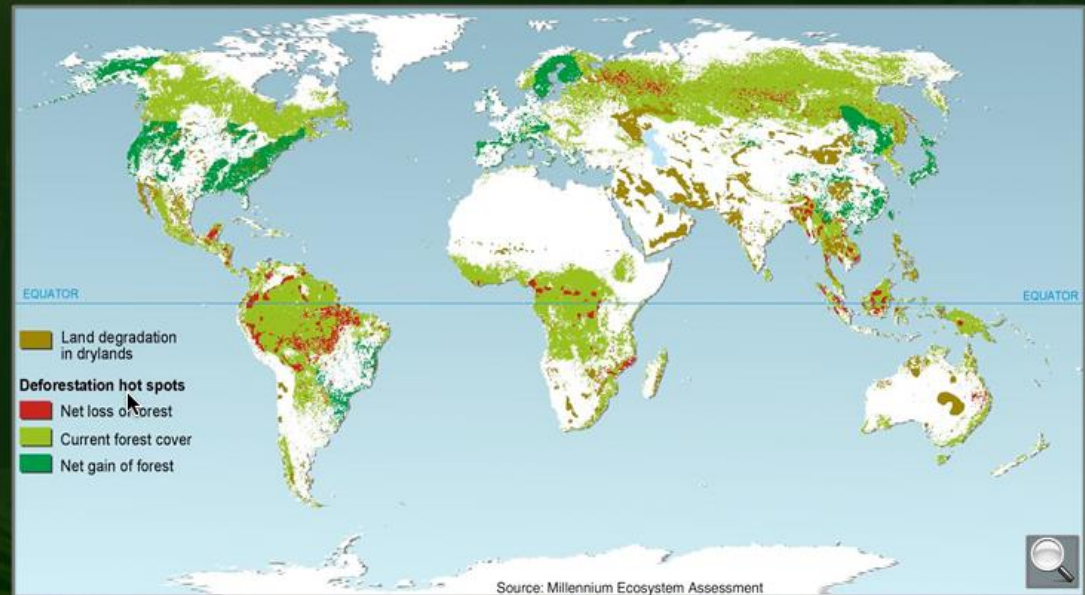
Next



Why do we need TEAM?

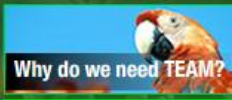
Forest Cover Loss

Most of the current deforestation is happening in tropical forests and is expected to continue in the future.



TEAM NETWORK

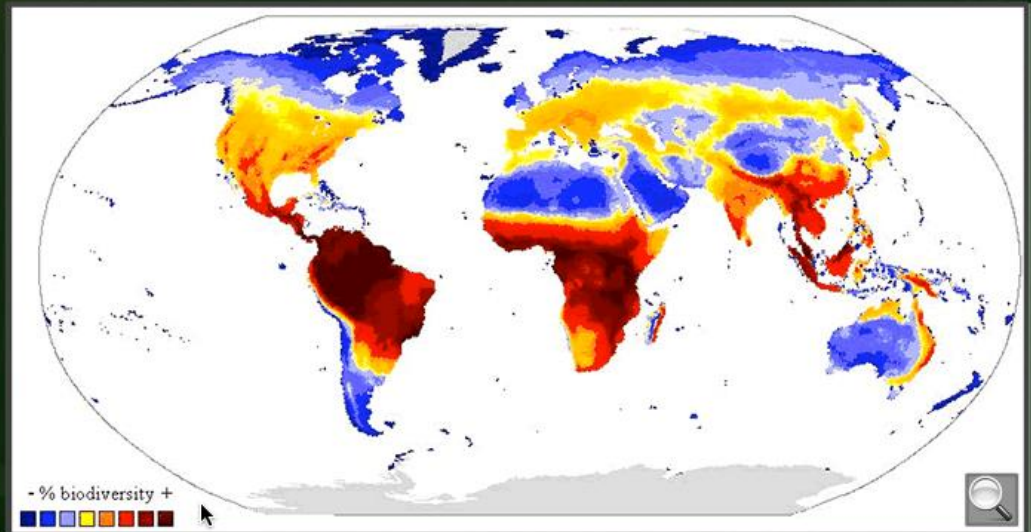
Early Warning System for Nature



Why do we need TEAM?

Why should we care about diversity in tropical forests?

- More than 50% of species described on Earth live in tropical areas.
- Tropical forests play a crucial role in maintaining the global carbon and energy cycles.
- Compared to other natural systems we do not know how changes in tropical forests will affect life on Earth.



Source: Modified from Baillie et al. (2004) Global Species Assessment. IUCN

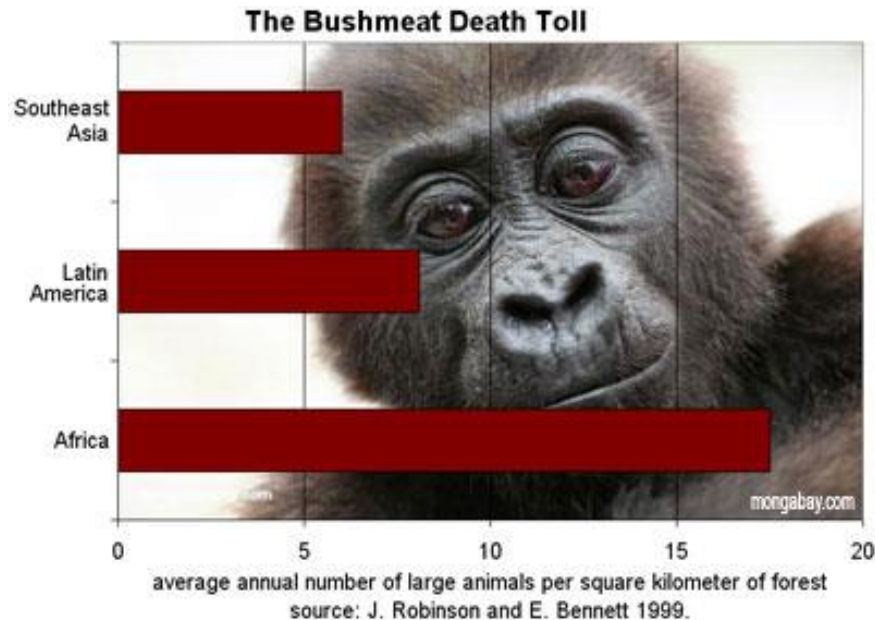
Previous

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Next

Threats to biodiversity call for global efforts

- Local (hunting, selective logging, small-scale disturbance)
- Regional (land use transformation, fragmentation, invasive species)
- Global (climate change, global land demands)



The CBD-Aichi Biodiversity Targets 2011-2020 need standardized data to measure indicators of progress



The screenshot shows the official website of the Convention on Biological Diversity. At the top, there is a navigation bar with language options: العربية | English | Español | Français | Русский. To the right, there are links for 'Sign up for an account' and 'Sign In'. The main header features the Convention on Biological Diversity logo and a search bar. Below the header, a horizontal menu contains links to 'The Convention', 'Cartagena Protocol', 'Nagoya Protocol', 'Programmes', 'Information', and 'Secretariat'. The main content area is titled 'Strategic Plan for Biodiversity 2011-2020' and includes a sub-header 'Global Workshop (Brasilia, March 2012)'. A sidebar on the left lists 'Key Elements' and 'Aichi Biodiversity Targets'. The main text area displays the title 'Strategic Plan for Biodiversity 2011-2020, including Aichi Biodiversity Targets' in green, accompanied by a row of five images: a sunflower, a person planting seedlings, a coastal landscape, a sunset with silhouettes, and baskets of yellow seeds.

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

We lack the data to measure progresses against AICHI targets and hence anticipate changes !!

Target 11: protected areas are effectively managed...

We only have secondary data on PA status in the tropics.

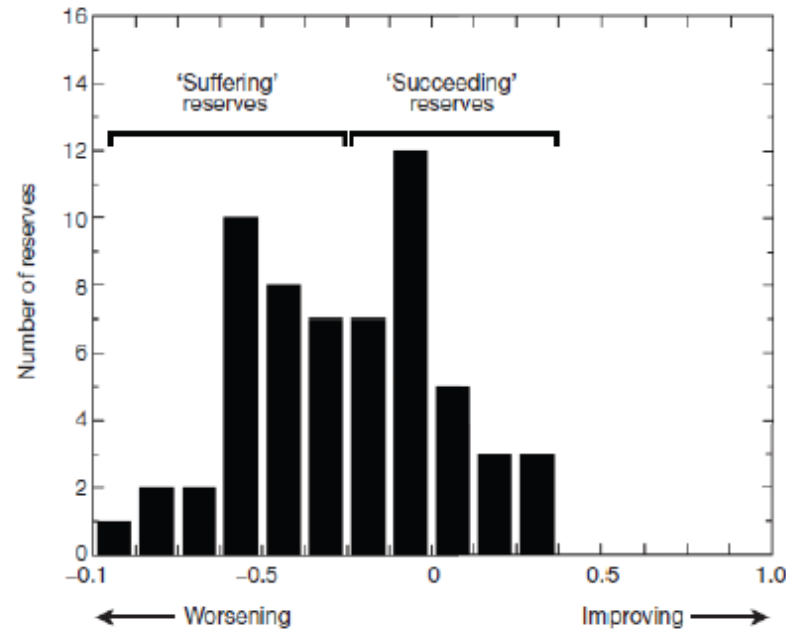


Figure 1 | Distribution of the 'reserve-health index' for 60 protected areas spanning the world's major tropical forest regions. This relative index averages changes in 10 well-studied guilds of animals and plants, including disturbance-avoiding and disturbance-favouring groups, over the past 20 to 30 years.

LETTER

doi:10.1038/nature11318

Averting biodiversity collapse in tropical forest protected areas

A list of the authors and their affiliations appears at the end of the paper.

(Laurance et [215] al. 2012, Nature)

Target 12: decline of species is prevented....

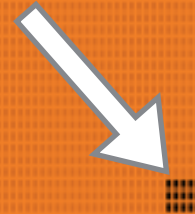
We lack standardized data to assess trends, especially in the tropics.

Target 12: decline of species is prevented....

We lack standardized data to assess trends, especially in the tropics.

Out of 30,000 long-term data sets available
for forests and natural systems, only

15 came from
tropical forests.



TEAM NETWORK

Early Warning System for Nature

Why do we need TEAM?

How TEAM works

Evolving Network

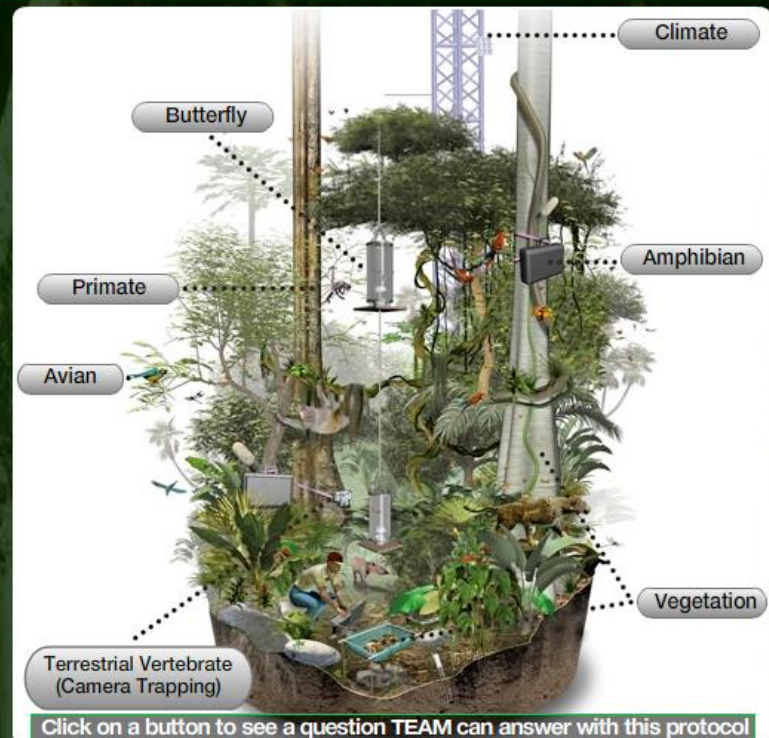
Products

How TEAM Works

The TEAM Network implements standard protocols to monitor biodiversity through a network of tropical field sites. Information is collected in near-real time.



How does forest fragmentation affect the trophic structure of tropical terrestrial vertebrate communities?



Click on a button to see a question TEAM can answer with this protocol

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How TEAM works



TEAM Monitoring Sites



Data are collected according to standardized protocols



Mobile technology facilitates data collection in the field



Data are transferred and stored in servers and databases



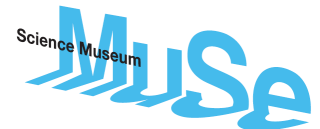
Data are disseminated globally in near-real time using advanced technologies



Data are used by NGOs, government agencies, scientists, educators, etc.

PHOTOS FROM LEFT TO RIGHT: © ROBIN MOORE, © 2011 BENJAMIN DRUMMOND, © 2011 BENJAMIN DRUMMOND, © ISTOCK, © ISTOCK, © ISTOCK

A network of currently 17 field stations in the tropics



TEAM Protocols

Terrestrial vertebrates: uses camera trapping to detect ground-dwelling mammals and birds and hence monitor abundance of populations and communities

Vegetation: uses 1-ha plots to measure carbon stock and assess tree species composition..

Climate: automatic weather station: T, HR, rainfall, solar radiation

Zone of Interaction: uses remote sensing to define and monitor coupled human-natural system surrounding the monitoring sites where changes will directly affect biodiversity at the sites

TEAM Protocols

Terrestrial vertebrates: uses camera trapping to detect ground-dwelling mammals and birds and hence monitor abundance of populations and communities

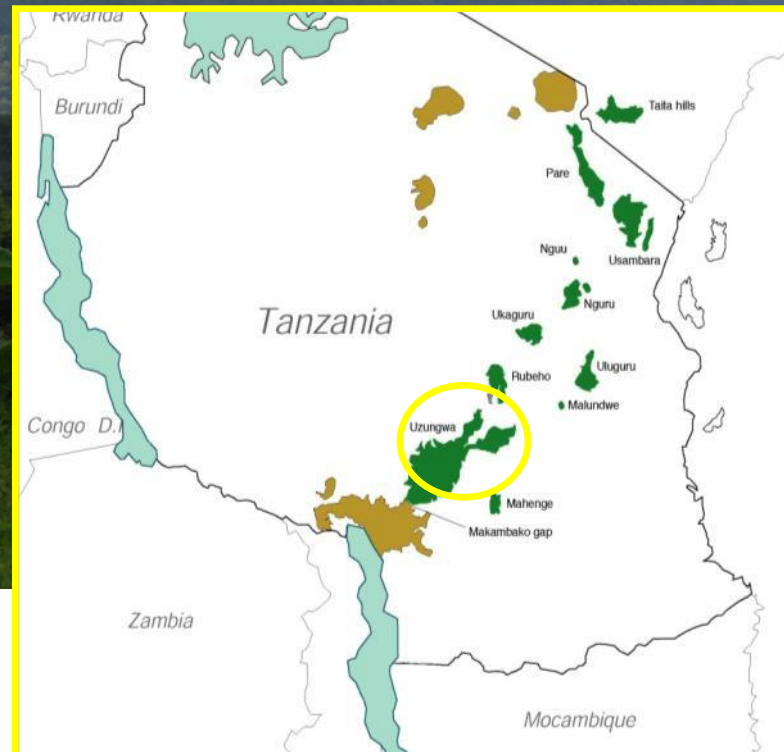
Vegetation: uses 1-ha plots to measure carbon stock and assess tree species composition..

Climate: automatic weather station: T, HR, rainfall, solar radiation

Zone of Interaction: uses remote sensing to define and monitor coupled human-natural system surrounding the monitoring sites where changes will directly affect biodiversity at the sites

MUSE – Science museum's TEAM site: Udzungwa Mountains, Tanzania

A global biodiversity hotspot



Partnership MUSE – Udzungwa Mountains National Park (since 2002)


Udzungwa Ecological Monitoring Centre (UEMC) established in 2006


Firefox | UDZUNGWA ECOLOGICAL MONITO... x | Pagina iniziale di Mozilla Firefox

www.udzungwacentre.org/accommodation.asp


Più visitati | Entra | TEAM | Monte Paschi | Meteotrentino | Outlook Web App | OARE | The IUCN Red List of T... | paga MdS | UEMC | summer school | UNITN | Repubblica | Udzungwa

UDZUNGWA ECOLOGICAL MONITORING CENTRE

 museo delle scienze
the science museum network in Trentino - Italy



HOME ABOUT UEMC AREA ACTIVITIES RESOURCES ACCOMMODATION GETTING THERE CONTACTS



ACCOMMODATION & FACILITIES

UEMC welcomes visiting scientists and students and offers accommodation to a maximum of 36 people (12 in the researchers' houses and 24 in the hostel). Researchers' houses are fully furnished with electricity, running water, self-contained bedrooms, cooking facilities, desks and sitting room. Each house has two double rooms.

The hostel has been inaugurated at the beginning of 2010 and consists of a dormitory with 4 rooms each accommodating up to 6 people. Adjacently is a fully equipped dining and kitchen block.

A large seminar room (150 sq. m) is also available for seminars and workshops by any organization or individual.

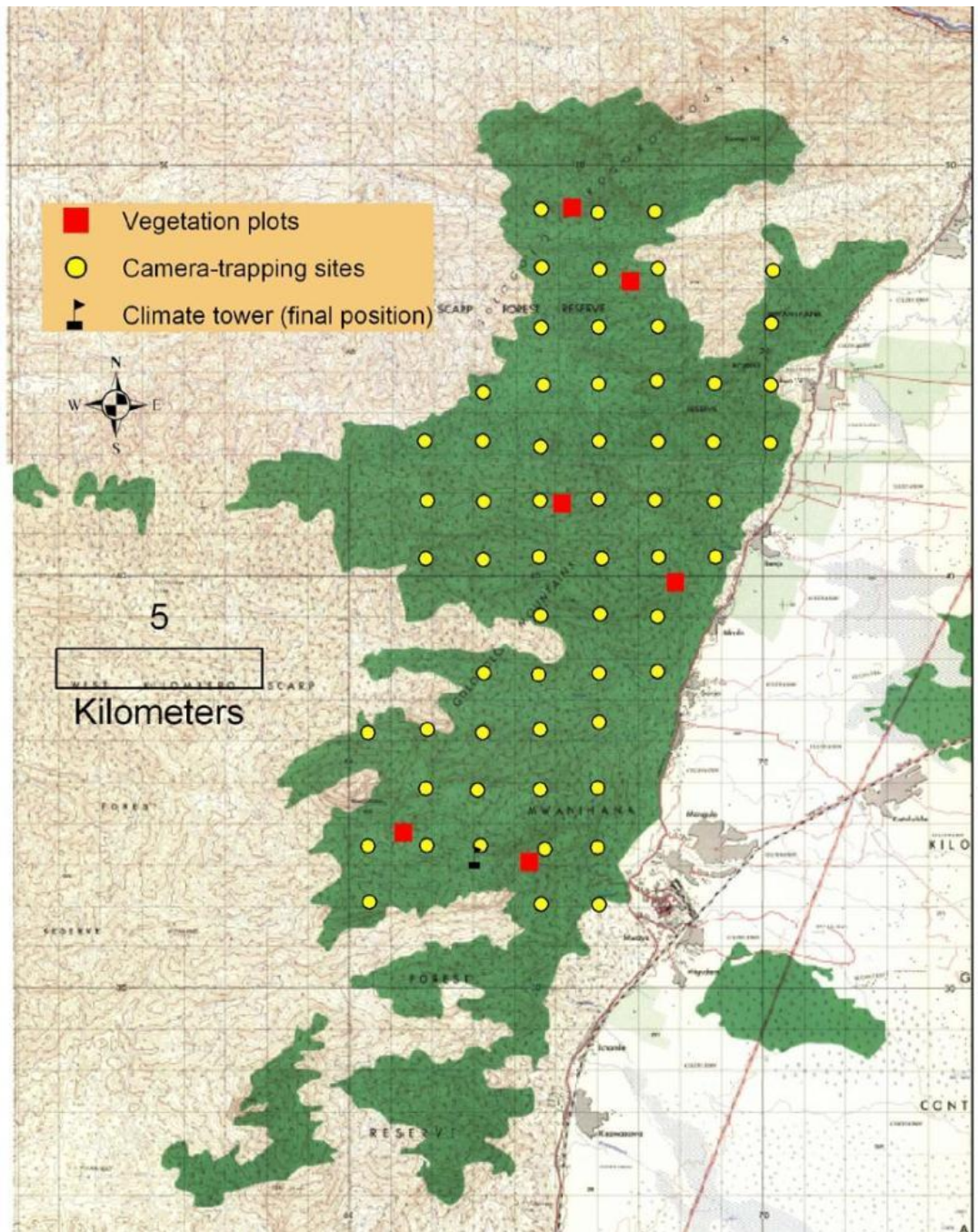
Visiting researchers have access to maps and resources in the office, including a small library and the Udzungwa GIS Database (UGISD). Computer, printing facilities and high-speed Satellite Internet connection are also available on request.

Expand / Minimize

IT | 13:26 | 02/10/2013



Camera trapping
sampling: 60 camera
trap points (one each 2
km²) active every year
for 30 days since 2009



Data (10-15k images per year) processed with dedicated software, and uploaded in TEAM web repository in near real time



DeskTEAM - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://localhost:8080/deskTEAM/index.jsp

Posta-Web-Museo YAHOO UEMC IUCN Red List OARE GECCO: Gestione Ore AFSAT Monte del Paschi TEAM Network Udzungwa book

DeskTEAM 1.0.7 - Udzungwa

New Data Edit Data Export Data Update DeskTEAM Help

Terrestrial Vertebrate

Udzungwa

2009.01

Array1

CT-UDZ-1-02

101-IMG_0001.JPG

101-IMG_0002.JPG

101-IMG_0003.JPG

101-IMG_0004.JPG

101-IMG_0005.JPG

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101-IMG_0019.JPG

101-IMG_0020.JPG

101-IMG_0021.JPG

101-IMG_0022.JPG

101-IMG_0023.JPG

Udzungwa : 2009.01 : Array1 : CT-UDZ-1-02 : 101-IMG_0002.JPG

Single Group

Image Details for 101-IMG_0002.JPG

Sequence Number: M 2/3

Flash: Flash fired, auto mode

Taken Time: 2009-08-12 18:48:02

Temperature: 21 C

Photo Type: Animal

Genus:

Species:

Number:

Identified By: Select a person

☒ Apply to the Group

Update

Camera Trap Data Photo Data

	Sampling Period	Camera Trap Point ID	Camera Serial Number	Memory Card Serial Number	Start Date	Start Time	End Date	End Time	Setup Person	Pick
1	2009.01	CT-UDZ-1-02	12345	6789	2009-08-12	18:48:18	2009-08-28	13:43:24	Emanuel Martin	Frar
2	2009.01	CT-UDZ-1-02	12345	6789	2009-08-12	18:48:18	2009-08-28	13:43:24	Emanuel Martin	Frar

Done

All TEAM data are publicly available at www.teamnetwork.org

Data Query And Download

Map Terrain Satellite

Search Quick Download

Protocols

- ☐ All Protocols
- ☐ Avian
- ☐ Butterfly
- ☐ Climate
- ☐ Primate
- ☐ Terrestrial Vertebrate
- ☐ Vegetation - Litterfall
- ☐ Vegetation - Trees & Lianas

TEAM Sites

- ☐ All Sites
- ☐ Bukit Barisan
- ☐ Bwindi
- ☐ Caxiuanã
- ☐ Central Suriname
- ☐ Manaus
- ☐ Nam Kading
- ☐ Nouabalé Ndoki
- ☐ Udzungwa
- ☐ Volcán Barva

Advanced Options show

Search

Your Data Cart

No site and protocol have been selected.

Download

from www.teamnetwork.org...

Data Set Identifier: TEAM-DataPackage-20100901070318_1450

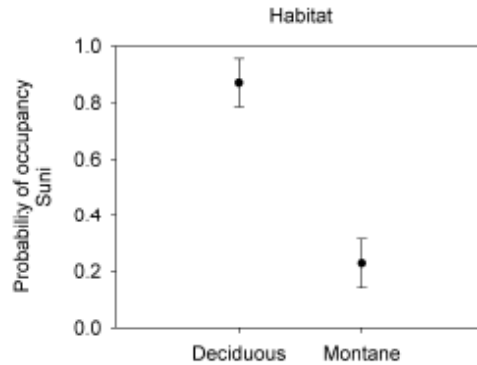
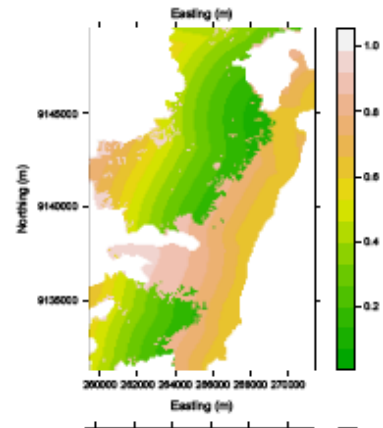
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33450	Udzungwa	CT-UDZ-3-	-7.696.016	36.891.628	2009.01.00	05/11/2009	1608	CT-UD-3-20 011.jpg	http://www. MAMMALI/ HYRACOII Procaviidae	Dendrohyr arboreus						1
33451	Udzungwa	CT-UDZ-3-	-7.696.016	36.891.628	2009.01.00	25/11/2009	720	CT-UD-3-20 127.jpg	http://www. MAMMALI/ ARTIODAC Bovidae	Cephaloph spadix						1
33452	Udzungwa	CT-UDZ-3-	-7.696.016	36.891.628	2009.01.00	25/11/2009	815	CT-UD-3-20 132.jpg	http://www. MAMMALI/ ARTIODAC Bovidae	Cephaloph natalensis						1
33454	Udzungwa	CT-UDZ-3-	-7.696.016	36.891.628	2009.01.00	25/11/2009	305	CT-UD-3-20 107.jpg	http://www. MAMMALI/ PRIMATES Cercopithe	Cercocebu sanjei						1
33456	Udzungwa	CT-UDZ-3-	-7.696.016	36.891.628	2009.01.00	09/11/2009	433	CT-UD-3-20 023.jpg	http://www. MAMMALI/ ARTIODAC Bovidae	Cephaloph spadix						1
33457	Udzungwa	CT-UDZ-3-	-7.696.016	36.891.628	2009.01.00	23/11/2009	303	CT-UD-3-20 087.jpg	http://www. MAMMALI/ ARTIODAC Bovidae	Cephaloph natalensis						1
33458	Udzungwa	CT-UDZ-3-	-7.696.016	36.891.628	2009.01.00	09/11/2009	2105	CT-UD-3-20 048.jpg	http://www. MAMMALI/ ARTIODAC Bovidae	Cephaloph spadix						1
33459	Udzungwa	CT-UDZ-3-	-7.696.016	36.891.628	2009.01.00	09/11/2009	1531	CT-UD-3-20 043.jpg	http://www. MAMMALI/ RODENTI/ Nesomyida	Cricetomys ansorgei						1

1) **Example of results at the site level:** species checklist, relative abundance index and occupancy (probability of presence)

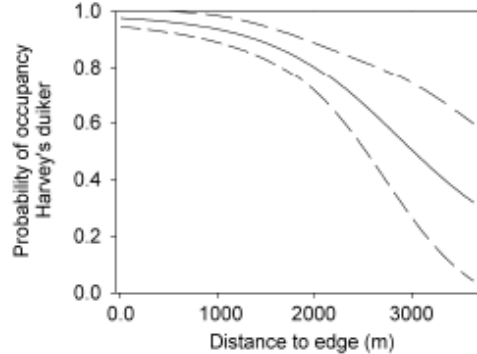
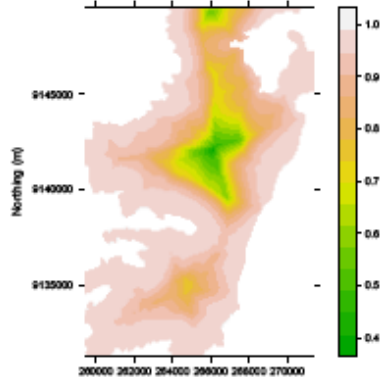
- 10,647 images of mammals in the baseline year (2009)
- 26 species (of a minimum of 30 known to occur)



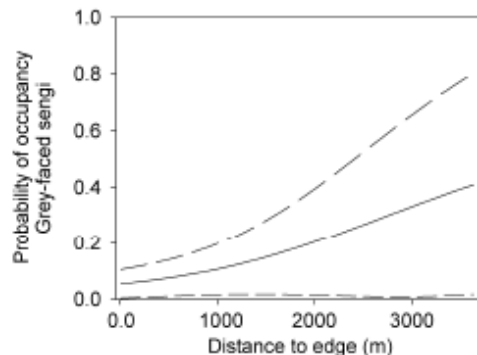
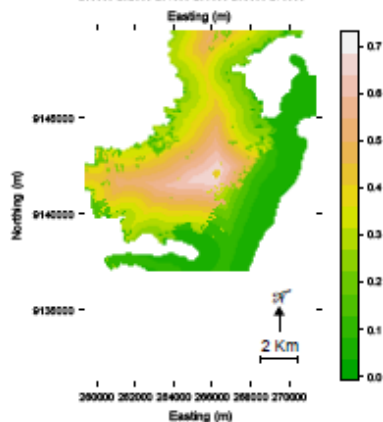
Models predicting occupancy at the fine scale, useful to identify potential drivers of changes (Rovero et al. 2014)



Lowland,
deciduous
forest dweller



Edge-lover



Forest interior
dweller



2) **Comparison between sites with contrasting protection:** effect of hunting and habitat degradation on mammals (Hegerl et al. 2015)

Useful to predict how local human pressure impact the fauna

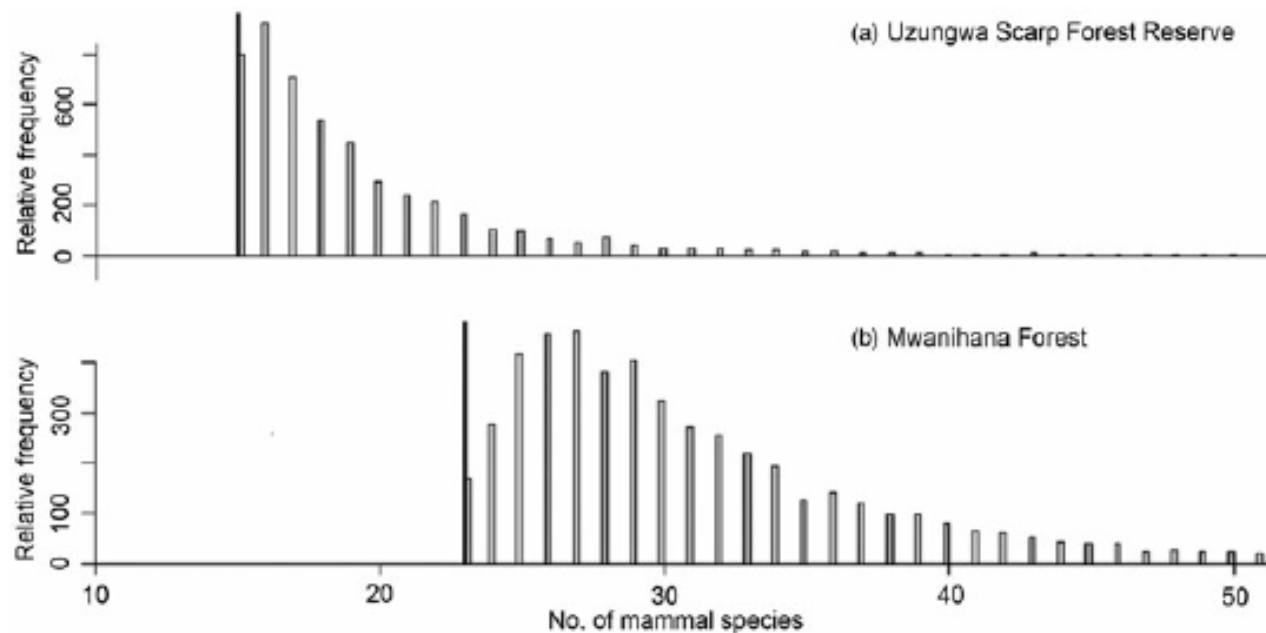


FIG. 2 Bayesian posterior distribution of species richness in (a) Uzungwa Scarp Forest Reserve and (b) Mwanihana Forest (Fig. 1). The analysis follows Dorazio et al. (2006); the vertical black line is the observed species richness, 15 and 23 in the Reserve and Mwanihana Forest, respectively, whereas the estimated median richness is 18 (mean 19.3, highest posterior density interval 15–30) and 29 species (mean 31.5, highest posterior density interval 23–47), respectively.

Example of management decision that was contributed by these data: dissemination of the results helped increasing protection

UZUNGWA SCARP FOREST RESERVE IN CRISIS

An urgent call to protect one of Tanzania's most important forests



December 2010



CRITICAL ECOSYSTEM
PARTNERSHIP FUND

ZSL
LIVING CONSERVATION

museo tridentino di scienze naturali
the science museum network in Trentino - Italy



Anglia Ruskin University



ABOUT US

INITIATIVES

IN THE FIELD

MAKE A DIFFERENCE

Home > News Room > **News Releases**

NEWS ROOM

• Press Release
• CI in the News
• RSS Feeds

NEW REPORT: BUSHMEAT HUNTING DRIVING TANZANIAN FORESTS TO CRISIS

February 4, 2011



Barotsi, Tanzania—The populations of several animal species in southern Tanzania are suffering alarming declines to bushmeat hunting and habitat degradation, and urgent action is needed to prevent the collapse of local biodiversity, a **new report** from Conservation International and international scientists and conservation organizations revealed today.

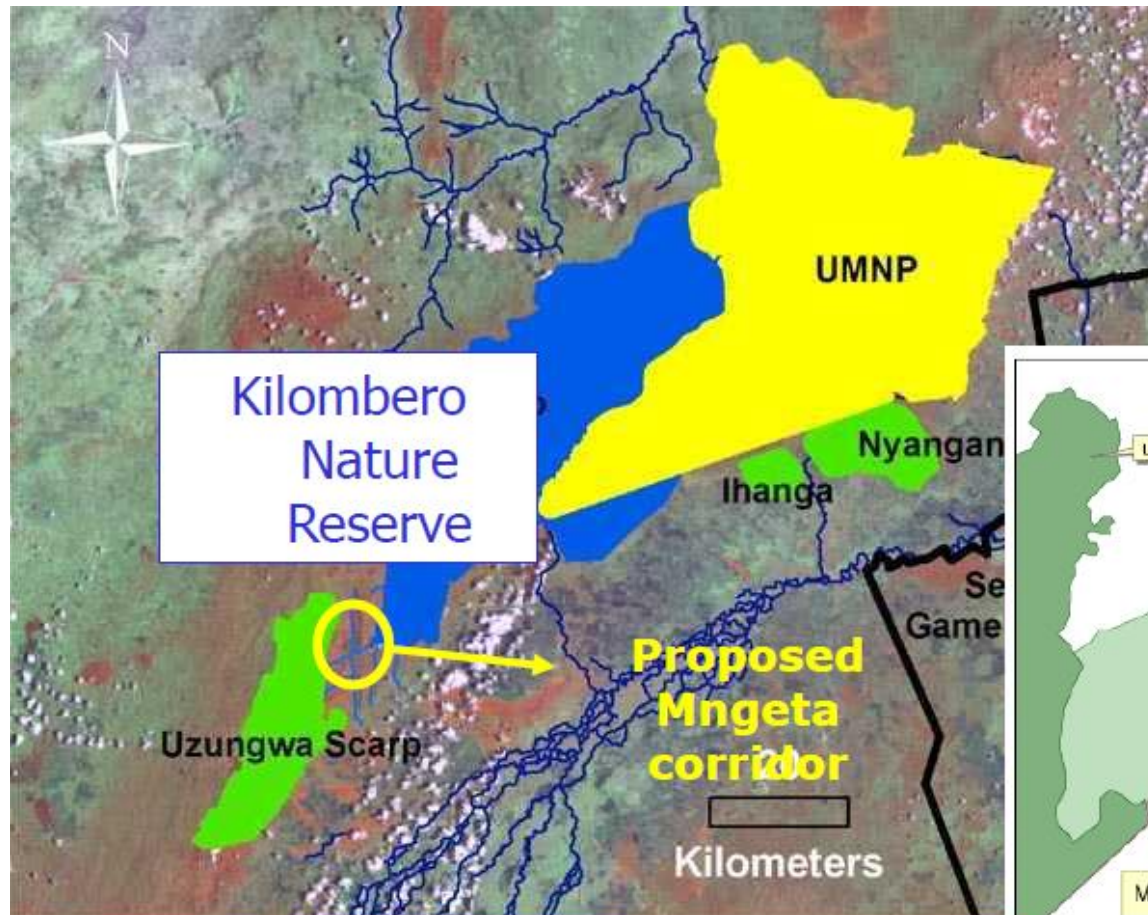
The report describes the results of three separate research projects focused on the threats to biodiversity in Uzungwa Scarp Forest Reserve in southern Tanzania since 2004. Although biodiversity is critical to the health of the ecosystem—which many Tanzanians rely on for water, soil fertility and other services—the report shows Tanzania's wildlife has been hugely impacted by human activity and recommends that action be taken urgently to protect it.

"Some species in this region are on the brink of extinction for their last remaining strongholds, especially the Uzungwa colobus, a monkey species found only in these mountains and nowhere else in the world," said Arati Biju, coordinator of the

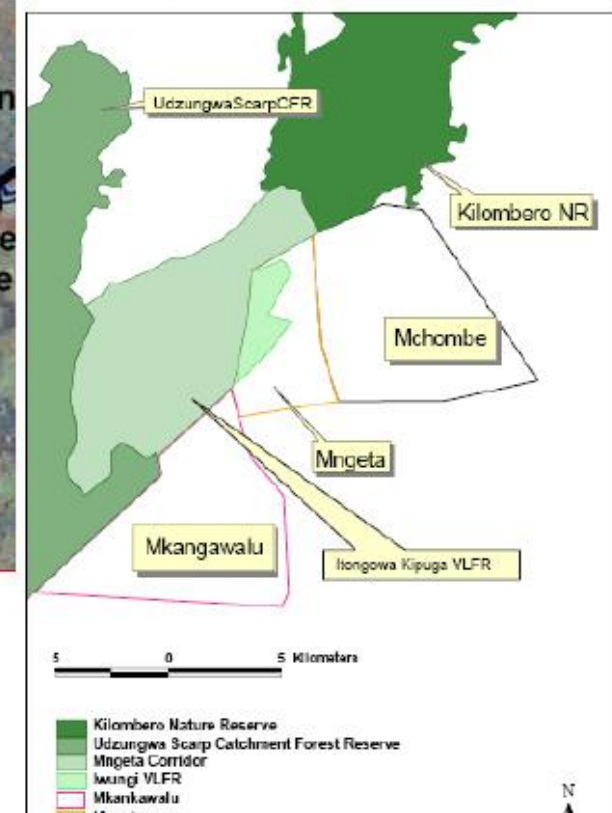
Complete



Government's endorsement of recommendations: Kilombero Nature Reserve and Uzungwa Scarp proposed Nature Reserve, with the proposed Mngeta corridor linking these 2 PAs

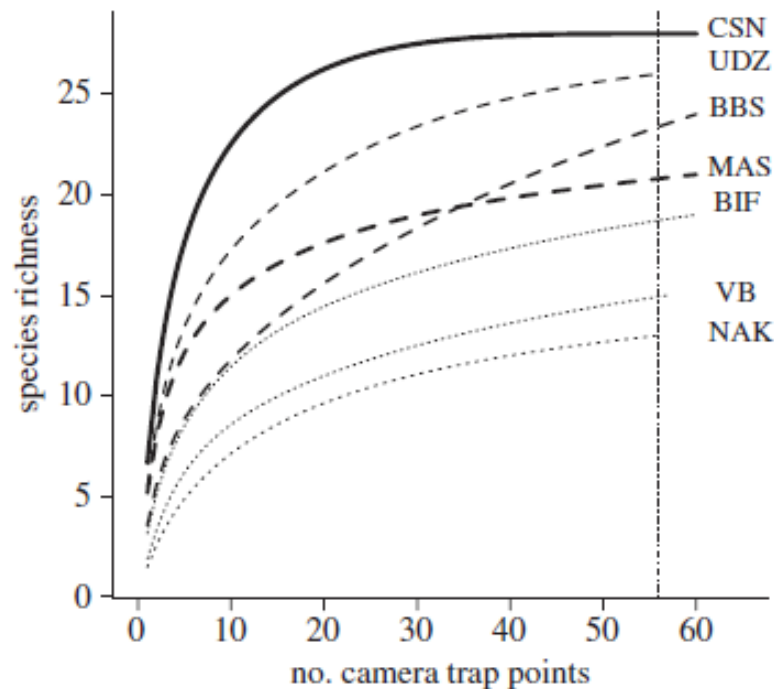


**Greater protection
ensured/planned**

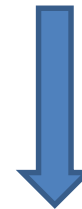


3) **Regional / global analysis:** species richness and the effect of forest fragmentation (Ahumada et al. 2011)

The first analysis ever of this sort, shows how fragmentation impacts community richness, intactness and composition



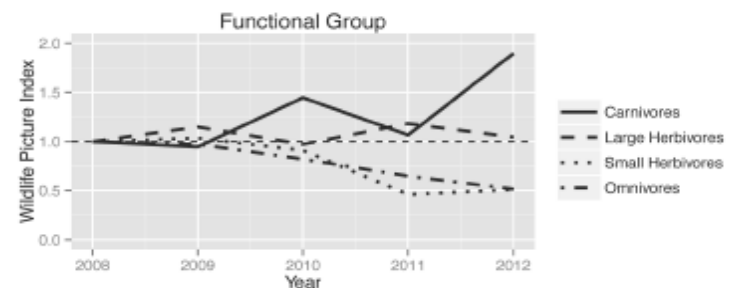
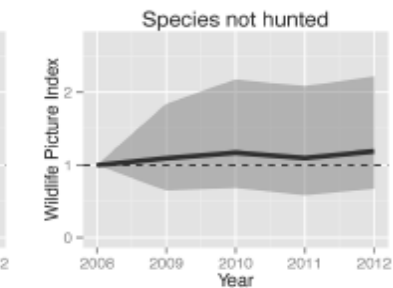
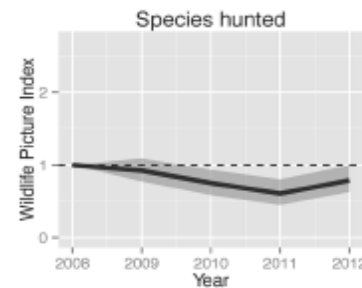
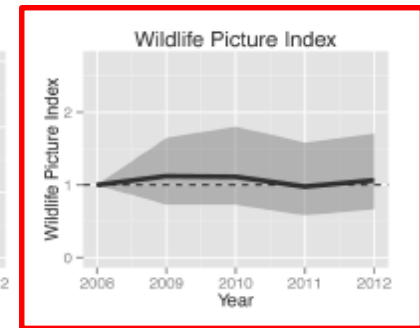
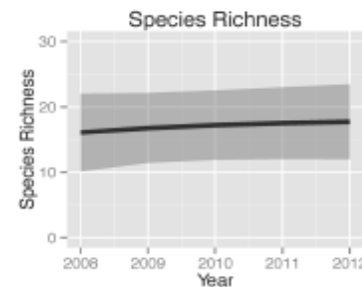
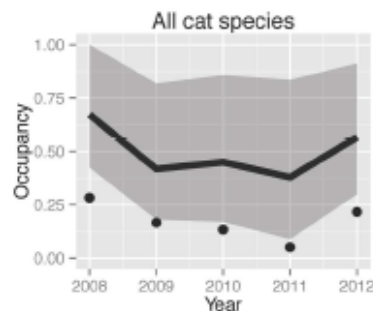
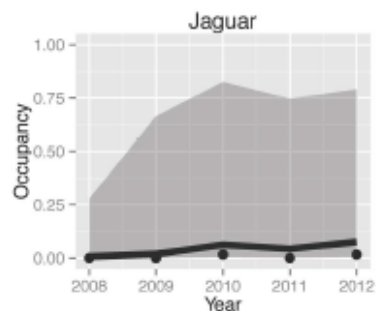
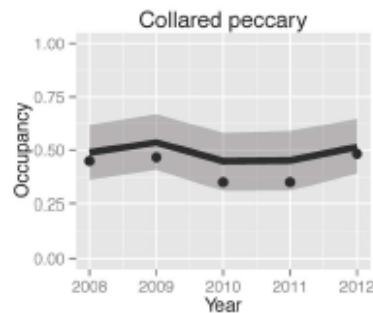
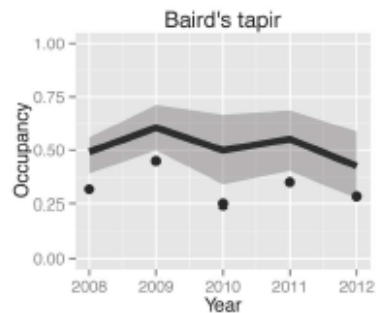
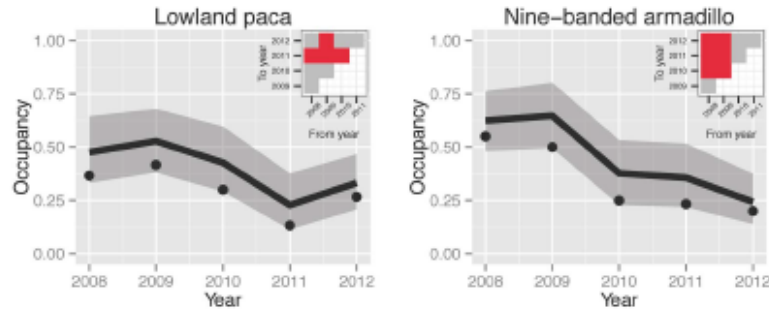
continuous forests



fragmented forests

4) Temporal analysis at site level and the WPI: detecting trends in threatened species and whole communities (5 yrs data from Costa Rica, Ahumada et al. 2013)

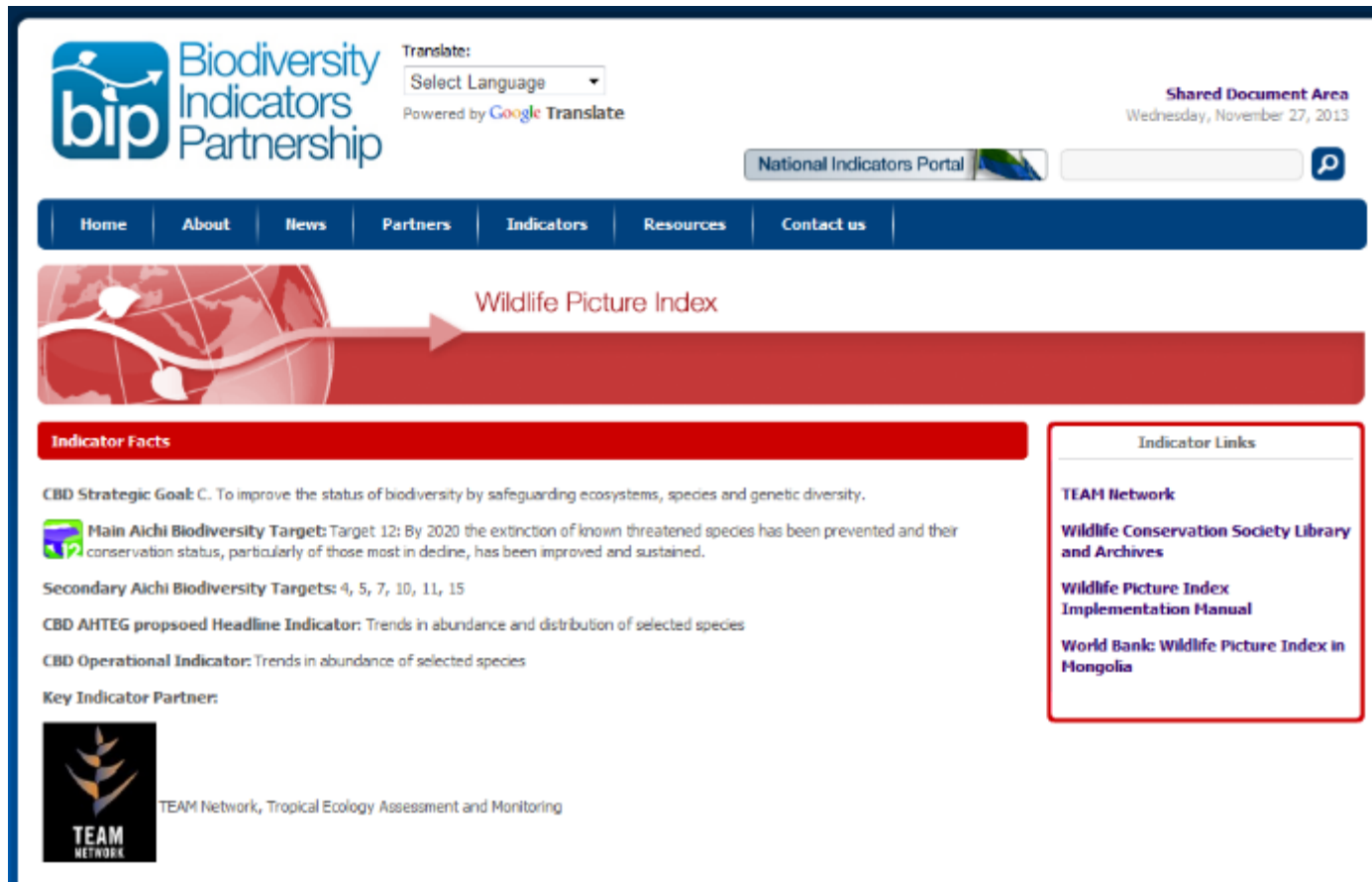
The essential analysis to anticipate changes and monitor Aichi targets



The Wildlife Picture Index to assess temporal trends

WPI is an index for assessing temporal changes of mammal communities derived from TEAM data

Since 2013 WPI is one of the indicators of the **CBD's** Aichi Targets, esp. number 11 and 12: assessing trends and preventing extinction



The screenshot shows the Biodiversity Indicators Partnership (BIP) website. The header includes the BIP logo, a language selection dropdown, and a Google Translate notice. A navigation bar contains links for Home, About, News, Partners, Indicators, Resources, and Contact us. A large red banner features a globe graphic and the text "Wildlife Picture Index". Below this, the "Indicator Facts" section provides details on the CBD Strategic Goal C, the Main Aichi Biodiversity Target 12, Secondary Aichi Biodiversity Targets, the CBD AHTEG proposed Headline Indicator, the CBD Operational Indicator, and the Key Indicator Partner, the TEAM Network. The TEAM Network logo and name are displayed at the bottom left. On the right, the "Indicator Links" section lists links to the TEAM Network, Wildlife Conservation Society Library and Archives, Wildlife Picture Index Implementation Manual, and World Bank: Wildlife Picture Index in Mongolia.

Biodiversity Indicators Partnership
Translate: Select Language
Powered by Google Translate

Shared Document Area
Wednesday, November 27, 2013

National Indicators Portal

Home About News Partners Indicators Resources Contact us

Wildlife Picture Index

Indicator Facts

CBD Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.

Main Aichi Biodiversity Target: Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Secondary Aichi Biodiversity Targets: 4, 5, 7, 10, 11, 15

CBD AHTEG proposed Headline Indicator: Trends in abundance and distribution of selected species

CBD Operational Indicator: Trends in abundance of selected species

Key Indicator Partner:

TEAM NETWORK
TEAM Network, Tropical Ecology Assessment and Monitoring

Indicator Links

- TEAM Network
- Wildlife Conservation Society Library and Archives
- Wildlife Picture Index Implementation Manual
- World Bank: Wildlife Picture Index in Mongolia



Explore WPI

★ Save selection

↺ Reset selection

Year Range Selection
2007-2014



Site Selection
1 Selected

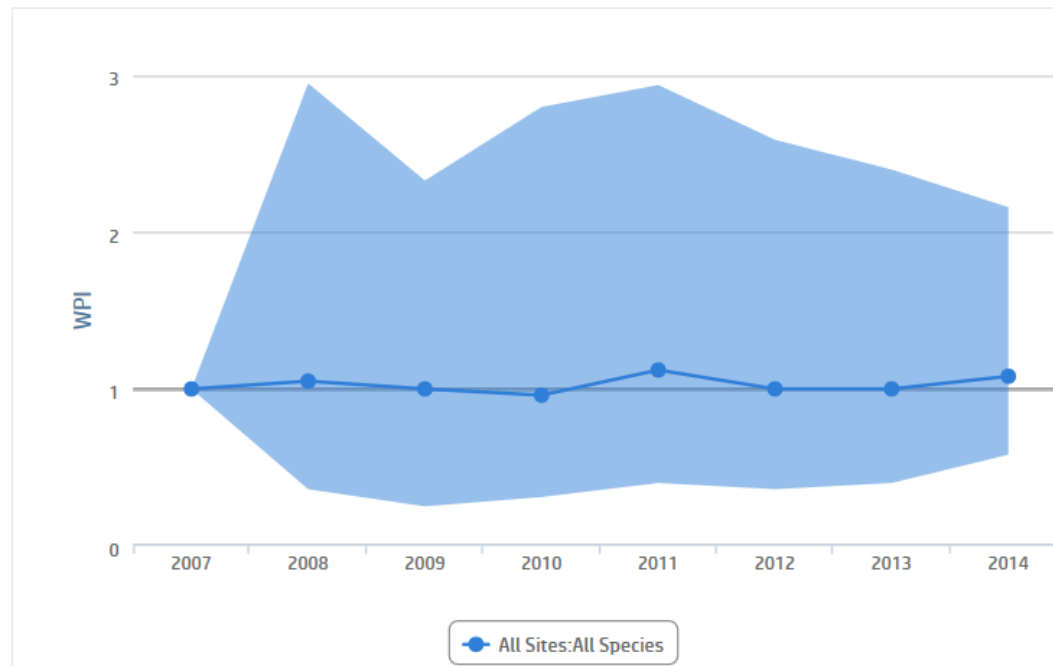


Species Group Selection
1 Selected



Global WPI

Click on WPI line to drilldown

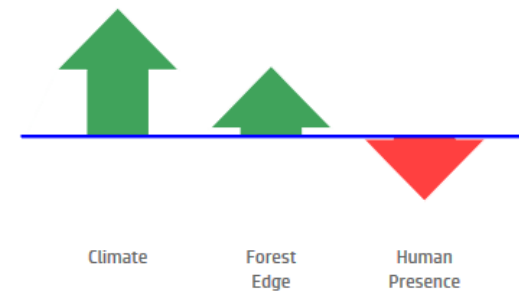


Impact Analysis

All Sites: All Species



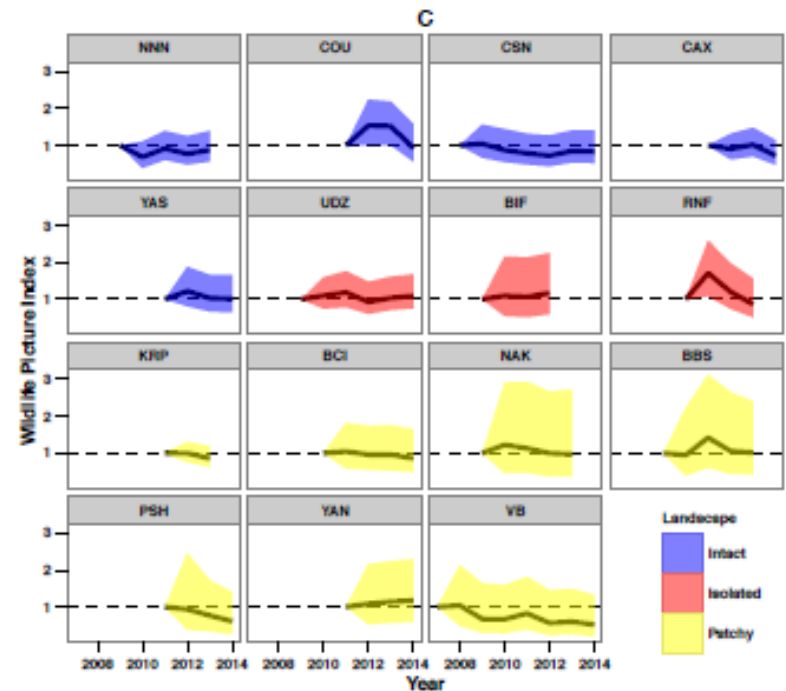
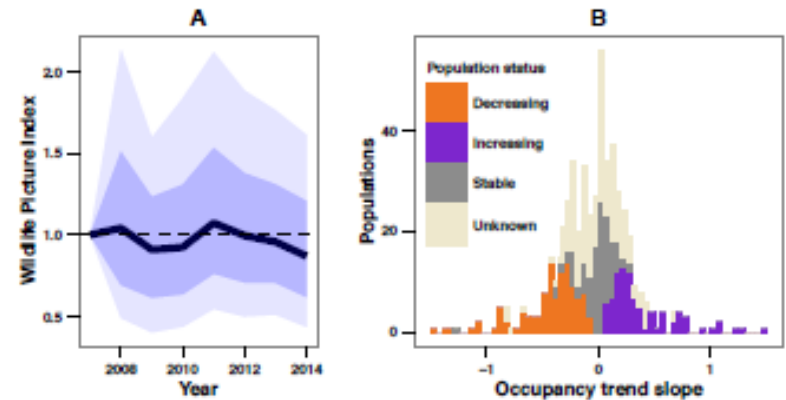
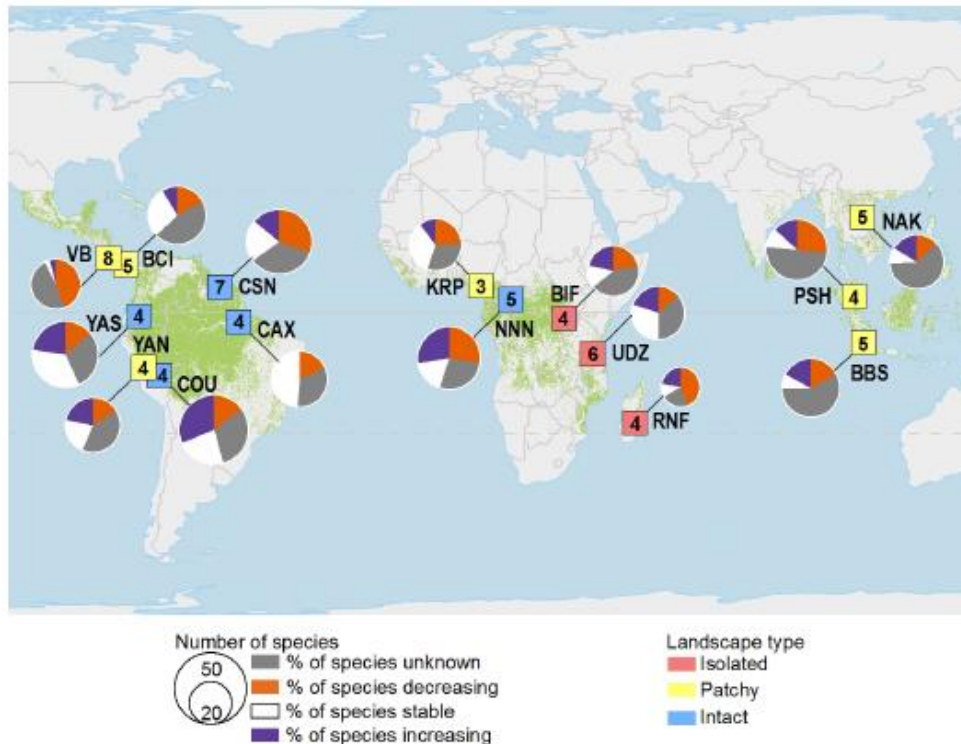
Summary of Impacts



<http://wpi.teamnetwork.org/wpi/dashboard>

5) The first global analysis of temporal trends in WPI (Beaudrot, Ahumada et al. in revision)

- > 2.4M images forming the dataset
- 511 populations of 244 species
- 22% of populations declined, 17% increased, and 22% exhibited no change during the last 3-8 years



Conclusions

TEAM shows the value of standardized and timely data collection to anticipate changes in biodiversity and hence contribute decision-making (the integration of protocols enhances this function ...)

Added value of TEAM vs usual (individual) approach to research in terms of time (several years/decades vs 1-3 years), space (global vs local) and sampling effort (200 km² each site vs few km²)

TEAM potential for influencing decisions:

- Policy level: WPI as official indicator of Aichi target, participation into CBD and other global biodiversity fora
- Protection: new/upgraded status of PAs, species-specific conservation measures, site prioritization, etc.
- Trigger national monitoring systems (capacity building, replication at many sites of standardized monitoring – 1st example in the Alps...)

Challenges

Funding to biodiversity research and conservation remains dramatically limited (threat to long-term monitoring efforts)

In the TV protocol, uncertainty inherent with rarity of species (e.g. 39% of populations detected too infrequently for assessing trends in occupancy in the WPI global analysis)

Academic culture and funding not conducive to long-term efforts (emphasis on 'newsy' or provocative articles in scientific journals, etc.)

Gap between science and local/regional decision-making processes

...

GORDON AND BETTY
MOORE
FOUNDATION

CONSERVATION
INTERNATIONAL 



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Tropical Ecology
Assessment & Monitoring