

DIRECTORATE OF ADVANCED STUDIES
EVENT CATALOGUE
2021

22nd SEMINAR OF DAS EVENTS CALENDAR – 2021

**AMPHIBIAN RESEARCH AND CONSERVATION IN THE
ANTHROPOCENE: SIGNIFICANCE, ISSUES AND THE
WAY FORWARD**



22nd Seminar (Online through ZOOM) of DAS Event Calendar - 2021

**AMPHIBIAN RESEARCH AND CONSERVATION IN THE
ANTHROPOCENE: SIGNIFICANCE, ISSUES AND THE WAY FORWARD**

Thursday, September 16th, 2021, Time: 02:00 p.m. - PKT GMT+5
ZOOM Meeting ID: 955 408 3170 - Passcode: 67890

Speaker:

Dr. Muhammad Rais
Assistant Professor
Department of Wildlife Management

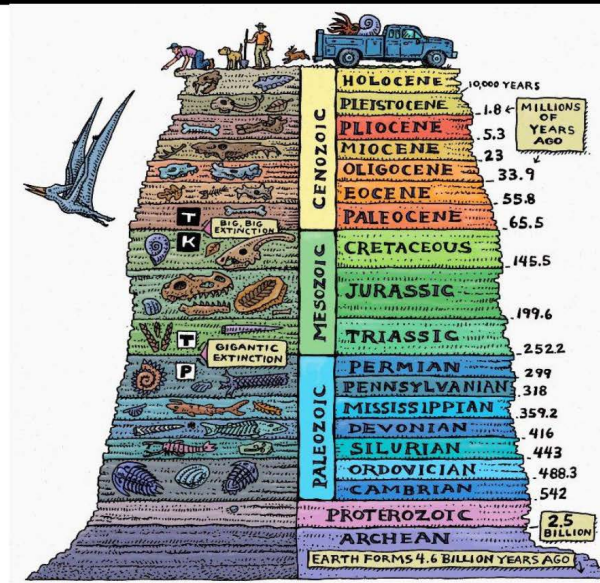
Organizer:

Directorate of Advanced Studies
PMAS-AAUR

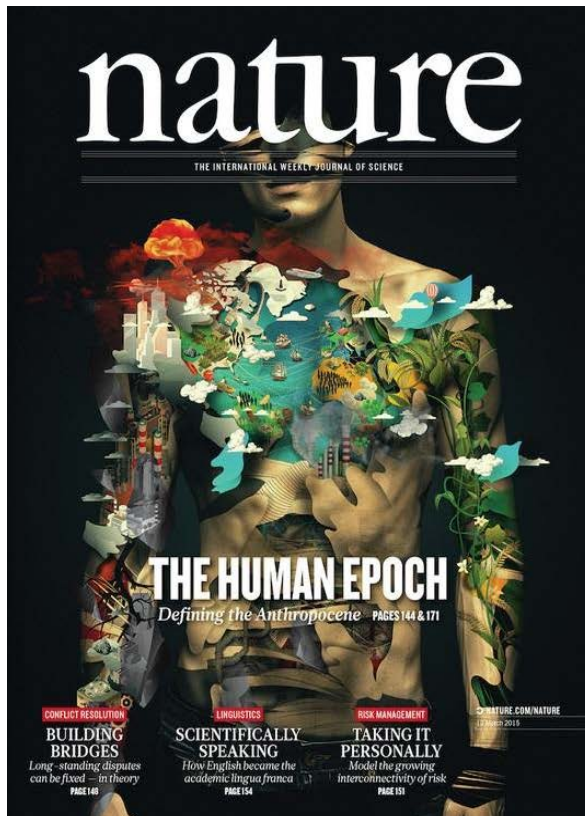
ACTIVITIES



- ☐ Anthropocene- The human epoch
- ☐ Extinction Process
- ☐ Why should we bother about species extinction in Anthropocene?
- ☐ Significance of research and conservation of amphibians
- ☐ Amphibian extinction crisis
- ☐ Conservation options and tools
- ☐ The way forward
- ☐ Our recent efforts and achievements in amphibian research and conservation at PMAS AAUR
- ☐ Documentary: Conserve the unloved.



Geological Time Scale



ANTHROPOCENE

- ☐ Most recent geologic time period
- ☐ Characterized by high human/ anthropogenic influence
- ☐ Based on overwhelming global evidence that atmospheric, geologic, hydrologic, biospheric and other earth system processes are now altered by humans.
- ☐ The Anthropocene, a separate epoch? Beginning?

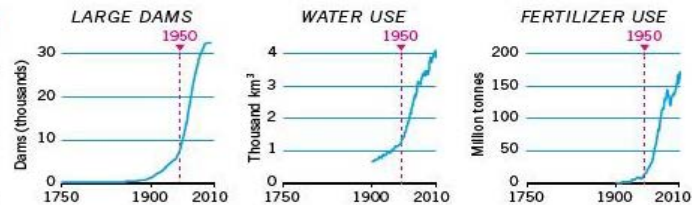


Humans at the helm

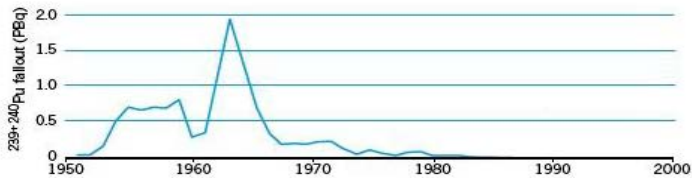
Researchers are studying whether the geological timescale should be modified to include the Anthropocene, a unit of time during which humans became a major force on the planet. Some support starting the Anthropocene in the mid-twentieth century, whereas others propose much earlier dates.

LATE-ANTHROPOCENE PROPOSAL

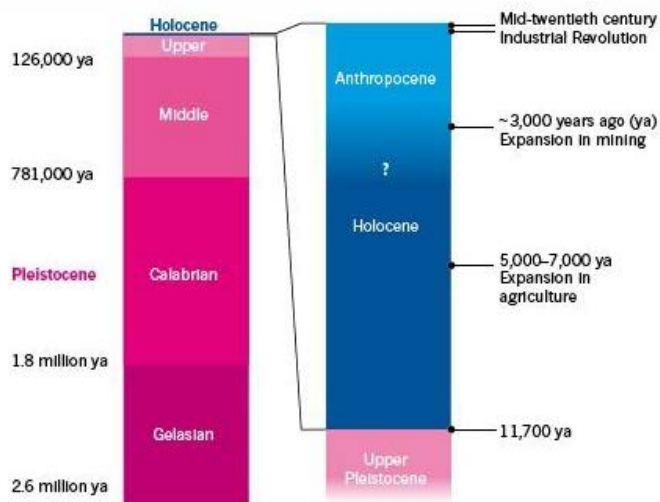
Human impacts on the environment surged in the mid-twentieth century, a trend visible in many records. That time has been called the Great Acceleration.



Radioactive fallout from nuclear blasts peaked in the mid-twentieth century, leaving a signal visible in sediments that has been proposed as a marker for the start of the Anthropocene.



The Anthropocene could be added as a new epoch on top of the Holocene. Or the timescale could remain unchanged, in which case the Anthropocene would function as an informal time unit.



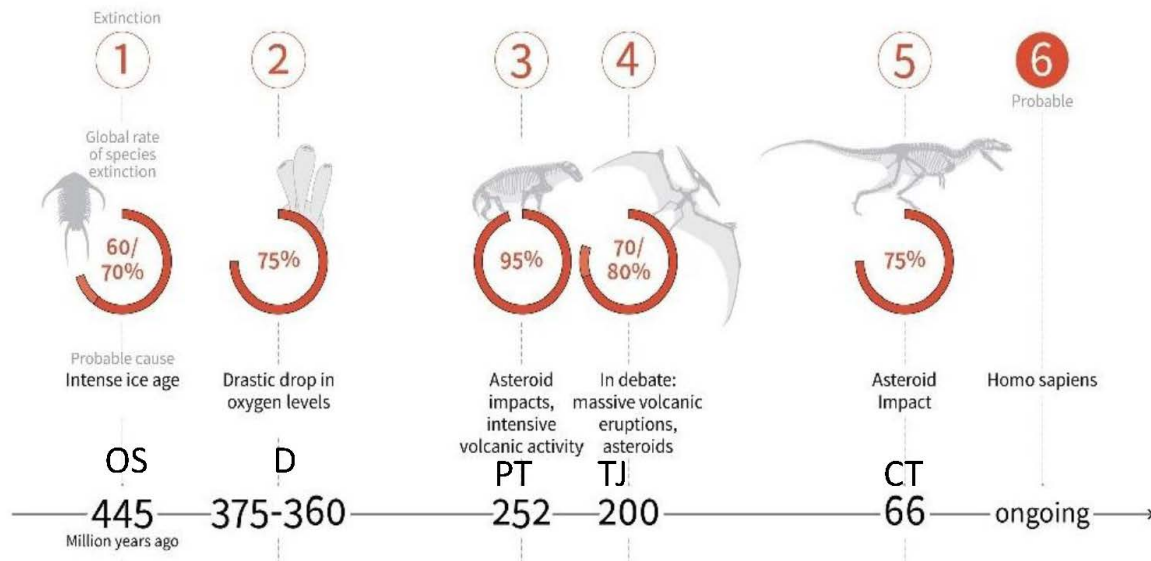
©Nature

<https://www.nature.com/news/anthropocene-the-human-age-1.17085>



Earth's "mass extinctions"

During the last 500 million years, Earth has experienced five periods when at least half the living creatures were wiped out



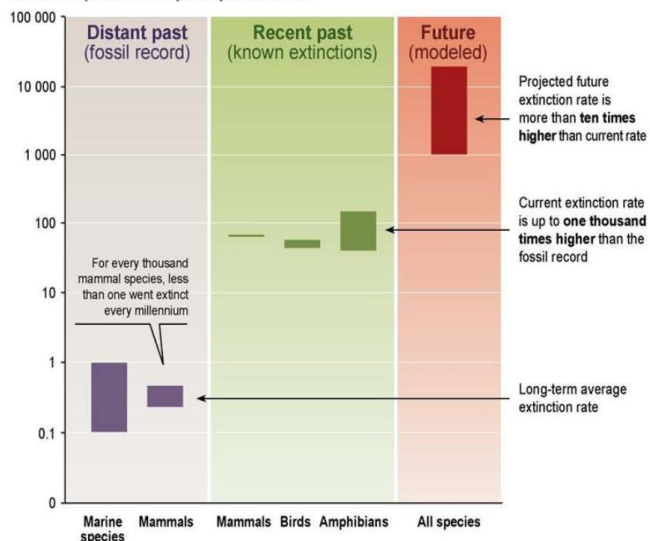
☐ Extinction has been a part of earth's history.

☐ Why should it bother us more, now?

1. Extinction rate is very high
2. Multitude of factors
3. Synergistic effects

Past, Present and Future Projections of Extinction Rate

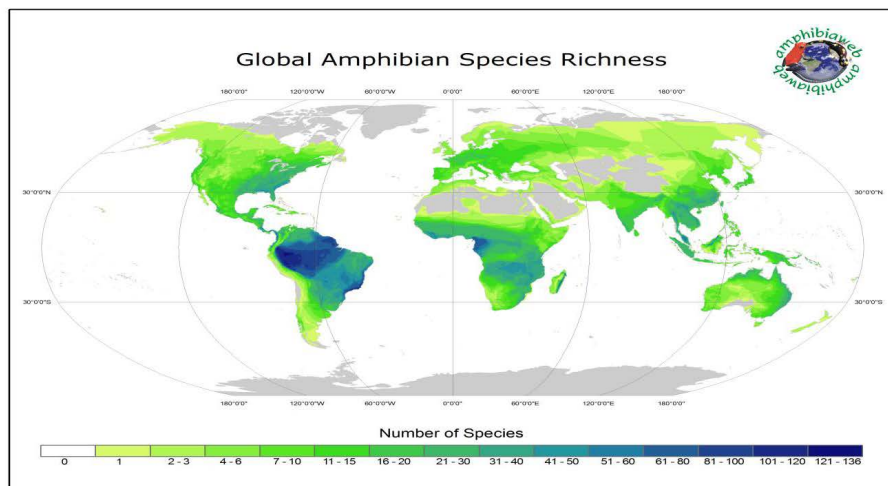
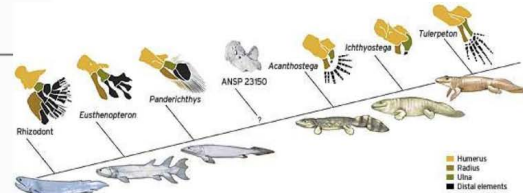
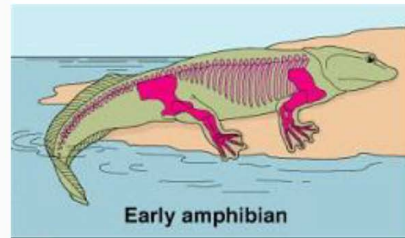
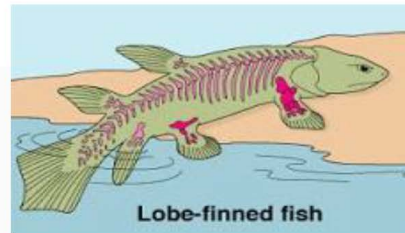
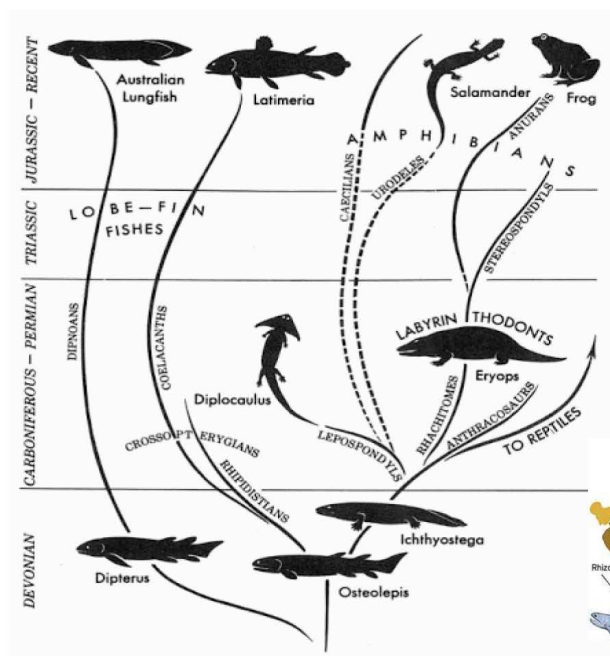
Extinctions per thousand species per millennium



Millennium Ecosystem Assessment (MA)



Amphibians



Anura
7,212 species



Caudata
750 species



Gymnophiona
214 species



Why study/ conserve amphibians?

☐ Common and everywhere

☐ No use

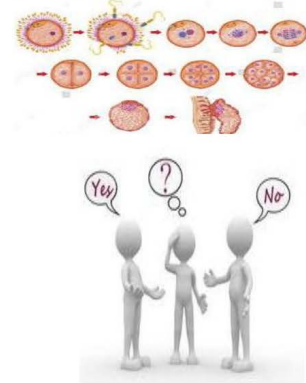
☐ Scientific advancements



Passenger Pigeon (*Ectopistes migratorius*)..... took days to clear the horizon....
Extinct in 1901 (wild) and 1914 (captivity).



Cinchona Tree.....
discovery of quinine in the 17th century...
hundreds of human deaths due to Malaria



Imagine the plight of an embryologist or of an anatomist.....
if herps would have never existed on earth.

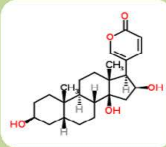


Threatened with Extinction



The group also constitutes a high number (24%) of Data Deficient species.

Least studied



Biogenic amines, bufodienolides (bufogenines and bufotoxines), alkaloids, peptides, proteins

Drugs and Medicines



Frogs and toads are considered, particularly in croplands, and forest as the best biological pest controllers.

Ecological Significance



Sensitive to chemical stressors and contaminants and various other anthropogenic activities

Ecological Indicators



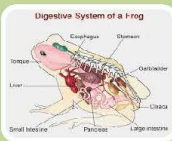
Kept as pets (Frogs from Dendrobatidae and Mantellidae)

As Pets



Frog legs

As Food

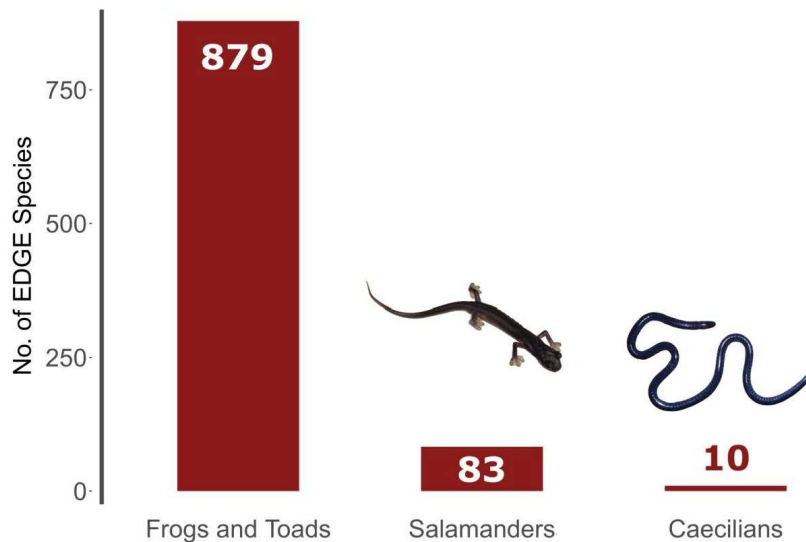


Amphibians are widely used as model animals in anatomy, physiology, drug testing and ecology

As Model Animals



EDGE: Evolutionarily Distinct and Globally Endangered



<https://www.edgeofexistence.org/>



❑ Declining amphibian populations have been a concern of scientists ever since the first World Congress of Herpetology in 1988.

Status and Trends of Amphibian Declines and Extinctions Worldwide

Simon N. Stuart,^{1*} Janice S. Chanson,¹ Neil A. Cox,¹
Bruce E. Young,² Ana S. L. Rodrigues,³ Debra L. Fischman,³
Robert W. Waller³

The first global assessment of amphibians provides new context for the well-publicized phenomenon of amphibian declines. Amphibians are more threatened and are declining more rapidly than either birds or mammals. Although many declines are due to habitat loss and overutilization, other, unidentified processes threaten 48% of rapidly declining species and are driving species most quickly to extinction. Declines are nonrandom in terms of species' ecological preferences, geographic ranges, and taxonomic associations and are most prevalent among Neotropical montane, stream-associated species. The lack of conservation remedies for these poorly understood declines means that hundreds of amphibian species now face extinction.

Stuart, *et al.* 2004. Status and Trends of Amphibian Declines and Extinctions Worldwide. *Science* 306, 1783



Box 2

A selection of actions that have evidence of success for amphibian conservation.

1. Create more suitable habitat (e.g., manage hydrology; Schmidt *et al.*, 2015)
2. Supplement populations (captive rearing or facilitated colonization/translocation; Griffiths and Pavajeau, 2008, Muths *et al.* in press).
3. 3. Reduce the use of pesticides and herbicides in wetland habitat (Lin *et al.*, 2008)
4. Mitigate the effects of roads (e.g., provide culverts underneath, Matos *et al.*, 2017, Smith *et al.*, 2018)
5. Protect habitat (small scale, e.g., exclude or restore grazing at wetlands; Buckley *et al.*, 2014)
6. Remove and control invasive or non-native species (e.g., fish) (Jarchow *et al.*, 2016; Knapp *et al.*, 2016).



CONSERVATION AND MANAGEMENT

- Croplands, Fragmented habitats
- Provision for breeding habitat management and passageways in developmental projects
- Pathogens
- Management of invasive species
- Attempts to change social perception
- Policy and legislation
- Inclusion of amphibians in major wildlife conservation activities

THE WAY FORWARD

EDUCATION

- Inclusion of Herpetology at graduate and post-graduate level
- Field based education, tours, species round-ups
- Short courses, certificate and diplomas

AMPHIBIAN STEWARDSHIP

- Discourage vivisection of wild-caught frogs.
- Do not purchase of wild-caught amphibian pets.
- Reduce pesticide use.
- Avoid polluting water.
- Drive carefully in areas with wetlands during monsoon season.

Herpetology Lab, WLM, PMAS-AAUR

Our achievements (excluding routine publications and theses supervision)

- First comprehensive study on all known amphibian species of Pakistan

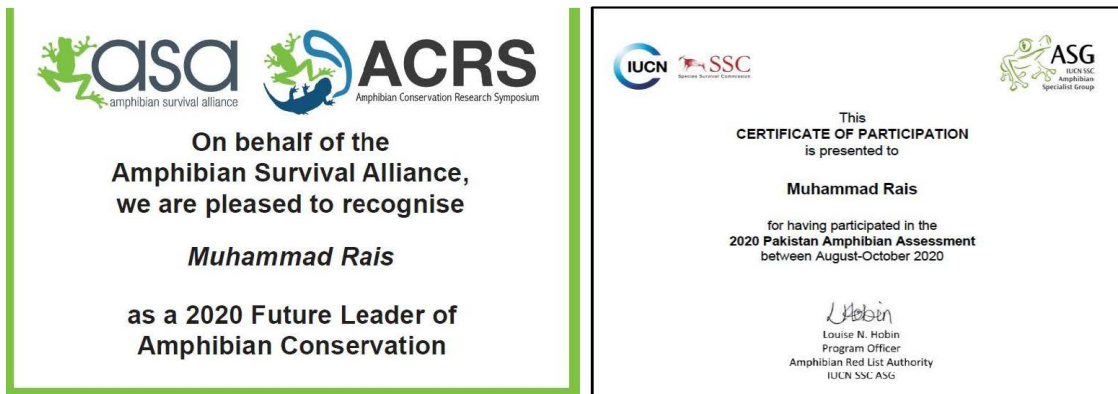
(Rais, M., Ahmed, W., Sajjad, A., Akram, A., Saeed, M., Hamid, HN. and Abid, A. 2021. Amphibian fauna of Pakistan with notes on future prospects of research and conservation. Zookeys.

- Genetic record of 37% amphibian fauna of Pakistan

(Akram, A., Rais, M., Lopez, K., Tarvin, R. D., Saeed, M., Bolnick, D. I., and Cannatella, D. C. 2021. An insight into molecular taxonomy of bufonids, microhylids and dicroglossid frogs: First genetic records from Pakistan. Ecology and Evolution, <http://doi.org/10.1002/ece3.8134>)

- Linkages established with:

1. Amphibians Survival Alliance, UK
2. Zoological Research Museum Alexander König, Germany



Future Leader in Amphibian Conservation Leadership Award by Amphibian Survival Alliance, UK

Red list assessment of 20 amphibian species of Pakistan
(Will be available in January 2022 at IUCNredlist.org)

➤ Grants:

1. Joint meeting of Ichthyologists and Herpetologists (In-person), 21-23 July, 2021, Phoenix, AZ, USA. (1200 USD)



Amphibian Conservation and Ecology I



2. Australia Awards, Professional Development Opportunity for Pakistan (2020), Government of Australia (1108 Australian Dollars)
3. Impacts of reducing environmental water availability on frogs. A case study from Murree, Pakistan, Rufford Foundation (5740 British Pounds) (As a team member)

Amphibian Conservation Awareness Posters



➤ Scientific data and R-Codes:

Rais, M., Saeed, M., Gray, R. 2021. Rise in temperature causes decreased fitness and higher extinction risks in endemic frogs at high altitude forested wetlands in northern Pakistan, Dryad, Dataset, <https://doi.org/10.5061/dryad.rr4xgxd7f>

➤ Documentary on our Lab and work: Conserve the unloved.

