Climate Change Challenges: What zoos can do?

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Today, climate change is the most potentially dangerous environmental threat facing human beings and other life forms. The impact of climate change will be particularly severe in the tropical areas such as South Asia. South Asian countries already face tremendous pressure due to increased population growth, urbanization, industrialization and other economic developments. Climate change is an additional stress on ecological and socioeconomic systems in this region. It is evident that the economy of the countries in this region is closely tied up with their natural resources which will impact dramatically on the global hydrological system, ecosystems, sea level, crop production and related processes. Predictions indicate that all these systems as well as forests, human health, biodiversity and others will be affected due to climate change. Climate change and climatic variability are likely to result in species loss/ extinctions and also constrain the environment and ranges of many plants and animals. Changes in a variety of ecosystems are already being detected at a faster rate than anticipated as a result of climate as well as other factors, e.g., mountain ecosystems (IPCC, 2007). It is very important that policy makers understand the impact of climate change on various natural resources and life forms and ascertain safety on which this regions economy is dependent.

Causes of climate change

Primarily human activities are the main cause of climate change apart from some natural events like large volcanic eruptions. The atmospheric amounts of many green house gases are increasing, especially that of Carbon dioxide which has increased by 30% over the last 200 years. This increase is the result of changes in land use (e.g deforestation) and of burning of coal, oil, and natural gas (e.g. in automobiles, industry, and electricity generation).

The accumulation of green house gases in the atmosphere due to human activities will change the climate by enhancing the natural greenhouse effect, leading to an increase in the Earth's average surface temperature. This warming may be partially offset in certain regions where air pollution leads to high concentrations of small particles in the atmosphere that block sun light.

Predictions on climate change

The Intergovernmental Panel on Climate Change (IPCC) founded in 1988 by the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP), was set up in order to provide an authoritative, International, scientific statement about climate change. The reports by the IPCC provide scientific evidence that climate change is underway and will become more severe. The IPCC assessed all aspects of climate change using the best available information and reported that the average global surface temperature has already increased by 0.3 - 0.6°C in the last 100 years. It also projected that the global mean temperature may increase between 1.4 and 5.8°C by 2100. The current best estimate of the expected rise of globally averaged surface temperature relative to 1990 is 1 to 3.5°C by the year 2100, with continued increases there after.

Main projected impact of climate change on biodiversity and ecosystem in Asia: (IPCC, 2007)

- The per capita availability of fresh water in India is expected to drop from around 1,900 m^3 currently to 1,000m^3 by 2025 in response to the combined effects of population growth and climate change.
- If current warming rates are maintained, Himalayan glaciers could decay at very rapid rates, shrinking from the present 500,000 km^2 to 100,000 km^2 by the 2030s.
- A one-meter rise in sea level would lead to a loss of almost half of the mangrove area in the Mekong River delta (2,500 km^2), Indo-China, while approximately 100,000 ha of cultivated land and aquaculture area would become salt marsh.
- Coastal areas, especially heavily populated mega delta regions in South, East and South-East Asia, will be at greatest risk due to increased flooding from the sea and, in some mega deltas, flooding from the rivers. For a one meter rise in sea level, 5,000 km^2 of Red River delta, and 15,000 to 20,000 km^2 of Mekong River delta are projected to be flooded, which could affect 4 million and 3.5 to 5 million people, respectively.
- Tibetan Plateau glaciers of under 4 km in length are projected to disappear with a temperature increase of 3°C and no change in precipitation.
- Around 30% of Asian coral reefs are expected to be lost in the next 30 years, compared with 18% globally but this is due to multiple stresses and not to climate change alone.
- 120 million to 1.2 billion and 185 to 981 million people will experience increased water stress by the 2020s and the 2050s, respectively.
- More intense rain and more frequent flash floods during the monsoon would result in a higher proportion of runoff and a reduction in the proportion reaching the groundwater level.
- It is projected that crop yields could increase up to 20% in East and South-East Asia, while they could decrease up to 30% in Central and South Asia by the mid-21st century. Taken together and considering the influence of rapid population growth and urbanisation, the risk of hunger is projected to remain very high in several developing countries.
- Agricultural irrigation demand in arid and semi-arid regions of East Asia is expected to increase by 10% for an increase in temperature of 1°C.
- The frequency and extent of forest fires in northern Asia are expected to increase in the future due to climate change and extreme weather events that would likely limit forest expansion.

Extinction:

Extinction is a natural process and research shows that hundreds of thousands of plant and animal species have disappeared over time. However, the extinction rate today may be more than 1000 times the normal biological rate of 1-10 species extinctions per year.

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Species are becoming extinct even before anyone has a chance to discover them. This rapid extinction rate is due to a range of factors, caused by a human population of over 6 billion, including: over-exploitation of natural resources, hunting, introduction of exotic and domestic species, pollution, habitat loss and fragmentation, and global climate change. Many scientists believe the planet is in the midst of a mass extinction event not seen since the dinosaurs were wiped out 65 million years ago.

IUCN and Species Conservation:
IUCN has identified three distinct and focused areas of work where the zoo and aquarium community should incorporate to meet the likely effects of climate change.

Species Risk Assessment: Climate change dynamics must be more effectively incorporated into the conservation risk assessment processes, including modeling tools and workshop methodology.
Zoo and Regional Collection Planning: Taxon advisory groups need to ensure that taxa threatened by predicted climate change impacts are given enhanced consideration in collection planning reviews at institutional and regional levels.

***Zoo Community Commitment to Climate Change Mitigation*:** The global zoo and aquarium community should assume a leadership role, through exemplary daily operational activities, in environmental sustainability, particularly in achieving a sustainable reduction in greenhouse gas emissions. The global zoo and aquarium community should also initiate and sustain a long-term, worldwide education campaign that focuses on issues of environmental sustainability, in particular climate change.

CBSG
The climate change issue was brought to the forefront of CBSG consciousness by Paul Pearce Kelly, Invertebrate Conservation Centre, London Zoo, who urged CBSG to take active interest. CBSG responded immediately by organising a Working Group on climate change at their Annual meeting.

CBSG and WAZA have taken initiatives to meet the challenges of climate change and passed resolutions on climate change to reduce global warming, reduce the global greenhouse gas emissions generated by zoo and aquarium operations and to raise awareness about global warming.

CBSG proposed a draft Statement of Concern for Consideration by WAZA 'Given the severity of the climate change threat facing species, habitats and biomes around the world: *"We urge the international zoo and aquarium community to prioritize commitments to reducing the global warming threat as a key focus of its public education programs. To this end, a WAZA-led campaign to increase awareness of the global warming threat to biodiversity and to reduce global greenhouse gas emissions is urgently required.'*

WAZA Resolution on Climate Change
Accordingly WAZA brought out a resolution on Climate change, committing to increase the quantity and quality of its actions to reduce global warming; committed for a long-term, WAZA-led campaign to reduce the global greenhouse gas emissions generated by zoo and aquarium operations, and to significantly increase awareness of the threats to biodiversity from global warming.

Zoos Commitment to Climate Change Mitigation.
The Zoo community should take up a leadership role by introducing a model daily operational activities in environmental sustainability, so as to achieve reduction in greenhouse gas emissions. Zoos can also initiate and sustain an education campaign that focuses on sustainability in particular climate change.

What zoos can contribute to mitigate... SAZARC Delegates (2008) opinions
Zoos can create awareness and conduct education on lobbying for good practices leading through examples in activities such as:

- Use of alternative use of energy-solar lighting, cooking, water heating, different electrical materials
- Use of battery operated van
- Use of biogas for kitchen
- Promote tree plantation
- Substitute process material with natural materials-eg. Making signage using waste granites
- Discontinue use of CFC releasing materials
- Reduce in Green house gas management by good practices like soil/waste management
- Reduce consumption by using energy efficient application CFL etc.,
- Discourage use of plastics

Understanding climate change impacts and the mitigating measures to face the problem is critically important. Realizing the need to create awareness among people ZOO/WILD and its networks with the support of London Zoo and with the technical support of Paul Pearce-Kelly has initiated a project to bring out a guide to teach Challenges of Climate Change. The objective of the project is to educate zoo visitors and others which form zoo target groups about climate change and its impact on human and animal life and the state of the earth. ZOO has evolved a methodology for teaching and for convincing non-traditional as well as traditional educators to adopt new techniques which are more effective in influencing comprehension, retention and behavioural change.

The methodology is a combination of educational tools and techniques responding to South Asian conditions and problems. It involves a combination of tools, a teaching guide, a series of guidelines booklets, educational packets, a drama kit posters, booklets, stickers, etc. that are useful in teaching different target audiences.

South Asian Zoos which attended SAZARC committed to join this movement and attempt to make their visitors aware of the immediacy and seriousness of the problem. We hope other South Asian zoos will do so as well. ZOO/WILD/SANIZE, also taking help from the taxon and thematic networks and others such as Paul Pearce Kelly, will create materials which will be meaningful to zoo visitors of this region and make them available to whomever wants to take on this crucial educational initiative.