

## Climate Change Working Groups

SAZARC participants formed country-based working groups of India, Bangladesh, Sri Lanka, and Nepal with Afghanistan, Pakistan and Bhutan working together. The groups assessed animals in their own zoo collections to ascertain which species were more vulnerable to climate change with a focus on education and conservation.

### Nepal Working group

How susceptible to climate change are the species in your collection?

#### GHARIAL SENSITIVITY TO CLIMATE CHANGE

##### Specialized habitat:

- Found in running fresh water river banks. Effect of flood, pollution, pesticides

##### Narrow environment tolerance:

- Specific niche/habitats

##### Environmental triggers:

- If temperature varies, sex ratio alters
- Early flooding: Sweeping of nesting habitat
- Extreme flooding: Sweeping of small babies from very turbid water of flood. Babies cannot withstand the turbid water of landslide

**Interspecific interaction:** less availability of fish

**Rarity:** only 81 wild individual, in scattered population in Nepal.

##### POOR ADAPTABILITY

##### Poor dispersal ability:

- Only running fresh water
- Construction of dams
- Disturbance from people

##### Poor evolvability:

- High alteration in sex ratio
- Inbreeding

##### EXPOSURE TO CLIMATE CHANGE

The Uneven sex ratio without alteration of temperature  
Early flooding



Species sensitivity to climate change -  
Nepal working group

#### Species that will be increasingly important for conservation.

##### India Working Group

Members: Amitabh Agnihotri, R.K. Sahu, Jasbir Singh Chauhan, Anil M. Anjankar (Presenter), Karunapriya, Markandaiah, B.A. Daniel

Species	Sensitivity	Unadaptability	Exposure
<b>Snow Leopard</b>	High reaches of Himalayan ranges. Narrow environment tolerance Food source –prey base affected due to change in vegetation & habitat	Very sensitive to temp. Hence poor dispersal ability	Temperature sensitive
<b>Hoolock Gibbon</b>	Highly endemic –Arunachal Pradesh. Mainly arboreal. Prefer dense and continuous evergreen forest	Due to fragmentation of habitat-barrier to its dispersion	-
<b>Nilgiri Tahr</b>	Confined to high altitudinal ranges of Kerala and Tamil Nadu. Prefers open grasslands.	Since confined to high altitude, it has low dispersal ability	Temperature sensitive

##### Afghanistan Working Group

Members: Mahtabudin Ahmadi, Rahila Kohistani, Aziz Gul Saqib (Presenter), Abdul Qadir Bahawi, Najibullah Nazary, Kuenzang Gyeltshen, Md. Monsoor Qazi, Wendy Foden (Facilitator)

Species	Sensitivity	Unadaptability	Exposure
Griffin Vulture	Deforestation & drought	-	War
Pelican ( <i>Pelicanus Onocrotalus</i> )	Migratory bird	-	War has disrupted migration
Demoisselle Crane	Drought	-	Temperature sensitive

**Bhutan Working Group**

Members: Kuenzang Gyeltsheng (Presenter), Md. Monsoor Qazi, Mahtabudin Ahmadi, Rahila Kohistani, Aziz Gul Saqib, Abdul Qadir Bahawi, Najibullah Nazary, Wendy Foden (Facilitator)

Species	Sensitivity	Unadaptability	Exposure
Black-necked crane	Number is decreasing every year Migratory bird		
House sparrow	Human habitation, Dispersal ability, Physiological stress		Human intervention decreasing population
Griffin Vulture	Deforestation		Diclophenic acid excessive pesticide use. e.g. malaria control

**Bangladesh Working group:****List of Susceptible Species of Wildlife due to Climate Change**

Members: Abdur Razzaque, Shakif-Ul-Azam (Presenter), ABM Shahid Ullah, Annanda Mohon Dharm, Zillur Rahman, Ashim Kumar Das, BA Daniel (Facilitator)

Species Name	Sensitivity	Unadaptability	Exposure
Hoolock Gibbon ( <i>Hoolock hoolock</i> )	Loss of Habitat-Deforestation Scarcity of Food Human Animal conflict- Deforestation not in proper manner Physiological stress	Maximum dispersal distance Dispersal barrier Low Reproductive out-put	Rise of Temperature Floods
Bengal Vulture ( <i>Gyps bengalensis</i> )	Scarcity of Food-Due to hygienic measures carcass are not available Loss of Habitat Human Animal conflict	Low reproductive output More unknown cause Loss of breeding place	Heat stress
Gharial ( <i>Gavialis gangeticus</i> )	Loss of Habitat Siltation of river Scarcity of Food Human Animal conflict-Due to over catching of fishes	Destruction of breeding places	Change in river flow Drought Flood
Marsh Crocodile ( <i>Crocodylus palustris</i> )	Loss of Habitat Siltation of river Scarcity of Food	Destruction of breeding places Human Animal conflict.	Change in river flow Sea level rise Flood

**Sri Lanka Working Group**

Members: Dammika Malsinghe, Chamila Denagama, Prasad Soyza, Chandani Ganga Wijesinghe (Presenter), Sanjay Molur (Facilitator)

Species Name	Sensitivity	Unadaptability	Exposure
Giant Squirrel	Canopy – deciduous, evergreen and montane forests; Changes observed from disturbances;	Low maximum dispersal ability	Precipitation change unpredictable
Mouse deer	Deciduous, evergreen and montane forests; Invasive plants could change the food source;	Low maximum dispersal ability	Mild T increase; Precipitation change unpredictable
Asian Elephant	Deciduous, evergreen and montane forests; Invasive plant could change the food source	Barriers to dispersal; Long generations	Precipitation change unpredictable
Golden Palm Civet	Canopy – deciduous, evergreen and montane forests;	Low maximum dispersal ability	Mild T increase; Precipitation change unpredictable
Sloth Bear	Deciduous and evergreen forests;	Barriers to dispersal	Precipitation change unpredictable
Rusty spotted cat	Deciduous and evergreen forests		Precipitation change unpredictable
Leopard	Deciduous and evergreen forests;	Low maximum dispersal ability	Precipitation change unpredictable
Fishing Cat	Marsh lands; Narrow environment tolerance; Changes in food sources		Precipitation change unpredictable

### Pakistan Working Group

Members: Md. Monsoor Qazi (Presenter), Mahtabudin Ahmadi, Rahila Kohistani, Aziz Gul Saqib, Abdul Qadir Bahawi, Najibullah Nazary, Kuenzang Gyeltshen, Wendy Foden (Facilitator)

Species	Sensitivity	Unadaptability	Exposure
Tortoise <i>Testudo horsfieldi</i>	Hibernating disruption (narrow hibernation period)	Gender disruption (temperature sensitive)	Physiological stress from heat threatened in Pakistan
Pelican ( <i>Pelicanus Onocrotalus</i> )	Migratory bird – climate	-	Highly threatened
Black bear	Hibernates – disruption - highly threatened	-	Poaching concern (common)

### Good examples in the collections to use for climate change education

Pakistan
<p>Tortoise <i>Testudo horsfieldi</i></p> <ul style="list-style-type: none"> <li>-popular with kids</li> <li>threatened in Pakistan</li> <li>-hibernating disruption (narrow hibernation period)</li> <li>-physiological stress from heat ,narrow tolerance range</li> </ul>
<p>Pelican (<i>Pelicanus Onocrotalus</i>)</p> <ul style="list-style-type: none"> <li>- Migratory bird, Temp migratory times</li> <li>- Highly endangered</li> </ul>
<p>Black bear <i>Ursus thibetanus</i></p> <ul style="list-style-type: none"> <li>-hibernates</li> <li>-habitat destruction</li> <li>-poaching concern (common)</li> <li>-highly threatened</li> </ul>



Indian Climate Change working group



Sri Lanka Climate Change working group



Bangladesh Climate Change working group



Afghanistan, Bhutan and Pakistan Climate Change working group

## Teaching about climate change: demonstration for SAZARC participants

BA Daniel\* and R. Marimuthu\*\*

A demonstration of teaching techniques focused on biodiversity and climate change was delivered following Dr Wendy Foden's presentation entitled 'Climate change Update 2010'. An educational packet on climate change called 'Live More Simply' (LMS) had been developed by Zoo Outreach Organisation for Wildlife Week 2010 and was selected for demonstration to compliment Dr. Foden's presentations.

This session being a demonstration, the SAZARC participants were asked to imagine themselves as children and the entire subject of Climate change and its impact on biodiversity was delivered to them as if teaching children of age group 14-17.

To start with the demonstration, the title of the session was explained. The title had two key words 'biodiversity or biological diversity' and 'climate change'. When they were asked to explain the word biodiversity, enthusiastic volunteer participants gave different definition for biodiversity. A simple definition given in the LMS booklet was explained to them and one of them read the definition aloud: 'Biodiversity means the variety and variability of life on earth'. Then they were told that there are about 19 Lakhs (18,97,000) species that are known to science and, for our convenience, scientists grouped them into five Kingdoms. What are the Kingdoms? The five kingdoms are Monera, Protista, Fungi, Plantae and Animalia. The 5 kingdom cards in the LMS packet conveyed simple information about the kingdoms of life. They were asked to take out the cards from the packet and to read the information given in the card. The card has information about the general description of the kingdom, an example of the kingdom, and total number of species known to science. For example, Kingdom Fungi (mushroom, yeast) occurs in a wide variety of sizes and shapes. Fungi get their food from other sources since they cannot convert the sun's rays into energy like plants do. So far 72,000 fungi are known to science.

At the end of the demonstration, a simple test was conducted by asking simple questions from 5 kingdoms to test their memory and learning skills. The Circle of Life diagram by E.O. Wilson in the LMS booklet was used as a supporting document to explain the kingdoms. Then, after explaining the basics of biodiversity in a way that youngsters could understand, the interaction and interdependency and of biodiversity and the association between species was explained. One of the important points to get across to youngsters, while they are young is that human beings are just one species of all the myriad living things on the earth. The earth was formed about four + billions of years ago; the first life appeared on earth about three+ billions of years ago but man appeared only about 1+ millions of years ago. In the evolutionary process many species appeared and disappeared proving that extinction is a natural process. But the present rate of extinction has been accelerated many times and it is overwhelmingly man-made due to various threats. There are a number of reasons for biodiversity loss and climate change is one of the biggest threats for loss of species. It has been accepted by scientists that Climate change is real and it is ongoing. In the last 100 years due to various human-induced activities, the earth has been warmed by 0.6° C.

At this point the participants were asked to tell 'What is climate change?'. Again many definitions came from the audience. They were asked to refer to the simple definition given in the LMS booklet that is 'alteration in the regular



**Mansoor Qazi, Karachi Zoo Director, appreciates E.O. Wilson's Wheel of Life which shows the comparative percentage of different groups of organisms that make up Life on Earth**

weather sequence due to warming up in earth's climate system'. Some of the key words that one has to understand before going into the details of Climate change are, weather, climate and the sequence of events in climate change and how alteration of gases in the atmosphere leads to climate change? LMS booklet was used to show participants how to understand and convey to youngsters three important sequences, and the terminology of Climate change that is often misunderstood. They are:

*Green house gases (GHG)* - a class of gases that can trap heat near Earth's surface.

*Global warming* - refers to an average increase in the earth's temperature. The GHGs increase in the atmosphere leads to Global warming due to trapped extra heat.

*Climate Change* - The global warming in turn places pressure on Earth's climate system that leads to climate change. Climate change represents a change in long-term weather patterns.

A booklet entitled 'The Greenhouse Gas Guardian and the Greenhouse Gas Ghost' for very young children was demonstrated. Greenhouse gases support all life by maintaining the warmth of the earth (greenhouse gas guardian), but also transform into a gas that is a threat for life on earth (Greenhouse gas Ghost). This is achieved by causing the extreme weather we are experiencing now - frequent cyclones, tornados, floods, higher temperature etc.

Greenhouse gas effect was explained. The Sun keeps our planet warm by sending rays into earth's atmosphere. The gases in the atmosphere such as carbon dioxide, nitrous oxide, methane, called as greenhouse gases, are transparent to shortwave radiations from the sun. The radiation from the sun reaches the earth surface and some of the rays are reflected back to the atmosphere as longer infrared radiation. These longer infrared radiations are absorbed by the greenhouse gases, which help the earth to keep warmer. This is very essential for keeping earth's temperature at the right levels for all life forms such as animals, plants and humans on earth to survive. They act much like a blanket, keeping in warmth from the sun. If there were no greenhouse gases the earth would be -18°C cooler than the present atmospheric temperature. The same greenhouse gas is also responsible for climate change.



### **Why do we blame Greenhouse Gases for Climate change?**

A comparison was given to illustrate how good gases become bad. The greenhouse gas phenomenon is very much like eating sweets. When we eat a small amount of sweets, we enjoy fully and it is not harmful also. But if we eat too many sweets, bad things happen to us. Similarly if the composition of greenhouse gases in the atmosphere is maintained, it is useful to all life. If it is altered, however, by liberating huge amounts of greenhouse gases by way of human activities, it will cease being useful by warming earth's atmosphere that result in climate change. Who is to be blamed for excess greenhouse gases and alteration of greenhouse gas composition in the atmosphere? It is us, human beings. Today's problem is that human beings are releasing too much of greenhouse gases, by overuse of natural resources, which are absorbed by the atmosphere and create a thicker layer of gases around our planet. This result in trapping heat below the atmosphere that leads to global warming that ultimately influences the earth's climate.

### **How are biodiversity and climate change are linked?**

We could hardly believe when scientists, two decades ago, claimed that climate change could have drastic impact on biodiversity. The average person is stubborn about the existence of climate change; they do not want to believe or to understand the link between climate change and biodiversity. This stubbornness may be caused by reluctance to change! Now it has been accepted by scientists that climate change and biodiversity are interconnected and climate change is a new threat to the biodiversity. If biodiversity is affected, it will bring negative impact for human wellbeing – who wants to hear, or believe, that? Managing and conserving biodiversity has now become essential; biodiversity help mitigate climate change through its ecosystem services. For example, if forests are conserved, they can remove carbon dioxide from the atmosphere, thus helping to address climate change by storing carbon. Participants listed out indications of climate change: Frequent storms, droughts, floods, fire, increased carbon dioxide in atmosphere, in ocean, extreme rainfall, change in rainfall pattern, temperature extremes, sea level rises, changes in seasons etc.

### **In what way does climate change affect species?**

Changes in species distribution ranges, loss of habitat, death of species due to increased stress etc. are some impacts of climate change on species.

The present cause of Climate change is man made. Excess use and over-exploitation of natural resources through industrialization, land use pattern, deforestation, large scale farming of domesticated animals, etc .are the main causes of global warming that leads to climate change. Now we see enhanced Greenhouse gas effect and global warming. Towards the end of the session participants were asked to take out the booklet 'what you can do to live simply'. The best approach is to 'Live More Simply'. Mahatama Gandhi advocated living simply before the concepts of Loss of biodiversity and Climate change even came about. It is not hard to guess what might have been the beginning of what we only now admit has been an orgy of consumption, of overuse of all our natural resources, animals, vegetables, and **everybody** minerals.

At the end of the session all participants were asked to wear 'global warming' spectacles and participant in a "march" through the conference hall while chanting slogans advocating living more simply.



**If the Big Boss is such a good sport to wear global warming spectacles, everybody should wear them**



**and everybody did**



**Participants joined a mock "march" while wearing their global warming glasses, their red cross arm bands and carrying their small placards. Hopefully some of them will organise programmes on climate change for school children visiting their zoo**