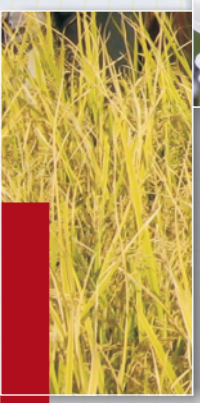

United Nations
Educational, Scientific and
Cultural Organization

PSCST
PUNJAB STATE COUNCIL FOR SCIENCE & TECHNOLOGY

Report

International Conference

on

"Climate Change, Biodiversity and Food Security in the South Asian Region"

3rd & 4th November, 2008

Organized by | Punjab State Council for Science & Technology

In collaboration with | United Nations Educational, Scientific & Cultural Organization

जहाँ है हरियाली ।
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Acknowledgements

The Punjab State Council for Science & Technology wishes to place on record its sincere acknowledgements to the support provided by UNESCO for organizing this conference.

The council also takes this opportunity to thank all experts, delegates and participants for their active participation and contribution in form of opinions and presentations.

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Organizing Team

Background

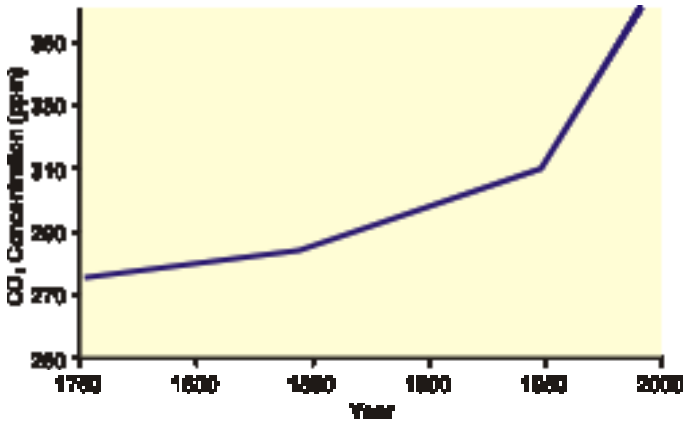
Climate change (CC) is the single biggest challenge facing our planet today. Scientific reports indicate that global average air temperature near the earth's surface rose 0.74 ± 0.18 °C during the 20th century. Climate models referenced by the IPCC project that global surface temperatures are likely to increase by 1.1 to 6.4 °C between 1990 and 2100. The present atmospheric concentration of CO_2 is about 383 ppm by volume and in future CO_2 levels are expected to rise from 541 to 970 ppm by the year 2100 due to ongoing burning of fossil fuels and land use change. The IPCC concludes, "most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas (GHGs) concentrations" via the greenhouse effect.

Climate change issues are making political, social and economic headlines everyday and in the past few years the debate has moved beyond academic circles to the main stream and corporate policies. Economists have estimated that climate change is expected to reduce the global GDP by at least 5% each year, which, for some countries could be as high as 20%. Hence, serious attempts are underway throughout the world to design and implement projects and programs which could address climate change concerns. In the world of business and finance especially, climate is no more a fringe concern focusing on a company's brand and/or its corporate and social responsibility alone, but has become a central topic for strategic deliberation and decision making by executives and investors.

It is well documented now that the earth is warming largely due to anthropogenic emissions and that this warming is likely to prove as a major force which can change the economic landscape. It is also recognized that autonomous adaptations may not ameliorate the adverse impacts. Further, even strict implementation of Kyoto protocol may not avert this change. Hence, the need to consciously adapt to these changes through planned interventions. Policy planners feel that 'it would be cheaper to act now rather than to wait for a later date'.

In the context of the South Asian region, climate change will have a major impact on the biological resources of the region, including agricultural biodiversity and availability of water. A 2 ˚C temperature rise and 7% increase in precipitation is estimated by scientists to cause 3% loss in net farm revenues. Scientists estimate that rice production in Asia could decline by 4% due to altered timing and magnitude of rainfall leading to drought or flood in-

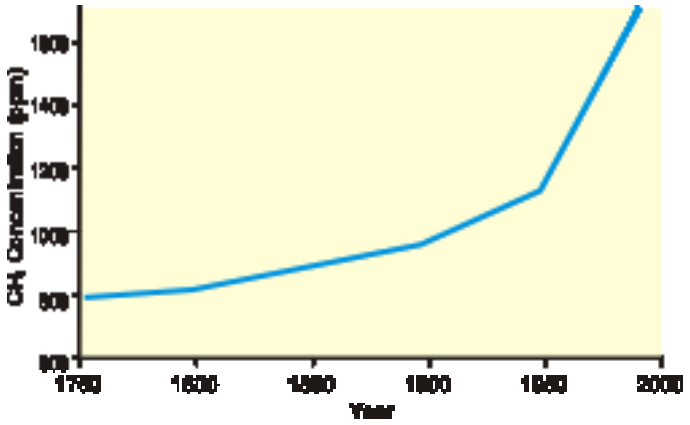
Status of CO_2 over past years



CO2 is steadily increasing at the rate of about 1 ppm

Source: www.envirolink.org/orgs/edf/sitemap.html

Methane is on the rise since 1750



Rate of increase is about 10 ppb per year. However, since 1 CH_4 molecule is worth 25 CO_2 molecules, the equivalent growth rate in terms of CO_2 is 2.5 ppm

Source: www.envirolink.org/orgs/edf/sitemap.html

jury to rice crop. Further, since wheat is also a temperature dependent crop, reduction in agricultural productivity in wheat growing areas is also expected. This can seriously undermine the economy of the South Asian region.

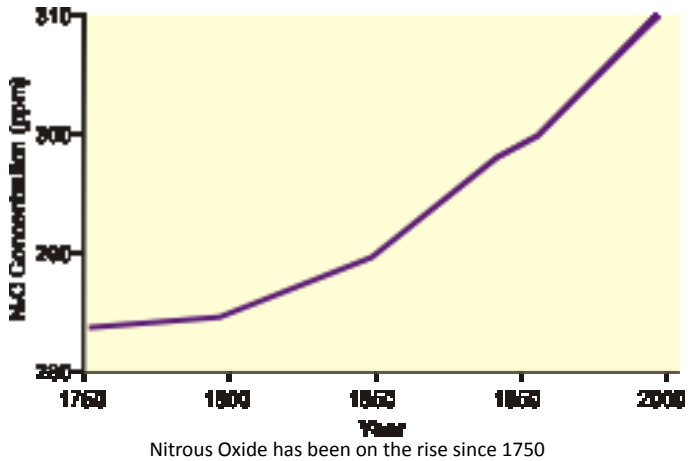
National governments, therefore, need to gear up to cope with deteriorating natural resources, changing ecosystems and falling agricultural revenues. Increase in temperature could cause drier conditions in many areas leading to water stress conditions. On the other hand, extreme precipitation events could lead to flash floods, hurricanes and other natural disasters, and governments need to adequately prepare themselves to address these issues. Hence, taking rational decisions about safe location of new infrastructural facilities like, houses, major industries, roads, hospitals, etc. in areas safe from intense storms and floods could be a good strategy. Further, developing new crop varieties which are more suitable to drier conditions in northern regions and varieties adaptable to water logging for longer duration in coastal areas, could be a priority for agricultural research. Furthermore, changing climate could also increase incidence of heat related and infectious vector borne diseases forcing governments to plan for better health facilities and development of new and improved drugs and vaccines. Climate Change can, therefore, potentially affect ecosystems, socio-economic conditions and sustainable development efforts. The challenges are many and varied.

At the same time, however, climate change challenges also offer business opportunities. Countries need to develop and adopt technologies which are more efficient, have lower operating costs and can reduce emissions. Also, promoting technologies which can help developing countries avail carbon credits could be a good policy.

The response of the international community to the problem of climate change is organized under the United Nations Framework for Convention on Climate Change (UNFCCC), adopted at the 1992 Rio Earth Summit. As the name indicates, the UNFCCC is an intuitional framework for a multilateral response to climate change. The highest decision making body of the convention is the Conference of the Parties (COP). All states that have ratified or acceded to the convention are parties to the UN. The COP meets annually, with its two attendant bodies – the Subsidiary Body for Scientific and Technological Advice, and the Subsidiary Body for Implementation – meeting between sessions.

The IPCC is currently headed by Dr. R.K. Pachouri, a renowned environmental scientist and economist. The IPCC shared the Nobel Peace Prize with Al-Gore (for his film 'An Inconvenient Truth') in 2007.

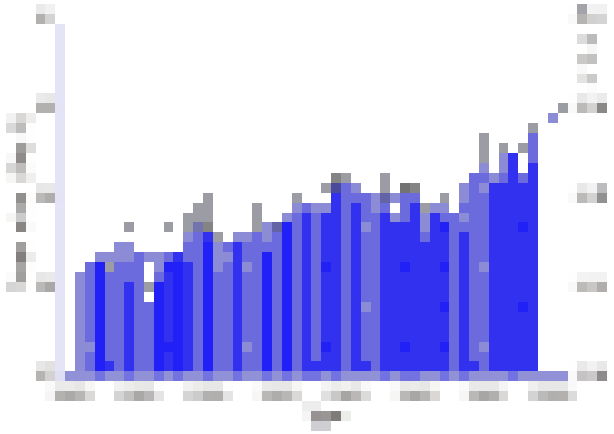
Status of Nitrus Oxide since 1750



Nitrous Oxide has been on the rise since 1750

Source: www.envirolink.org/orgs/edf/sitemap.html

Rise in Temperature over time



Average yearly temperature rise: 1860-1998

Source: www.envirolink.org/orgs/edf/sitemap.html

What is required today is a strategic vision. The task is not easy and the challenge is to main stream the common social goal of maintaining a safe life support system into political agendas of countries. The present conference was organized, in collaboration with UNESCO, to promote a debate on the issue and obtain view points of scientists, industrialists and policy planners in the government & outside, program implementers, economists from India and abroad on critical aspects of climate change science and potential impact on biological and non-biological resources including impact on agriculture, economy and sustainable development initiatives.

More than 100 papers were received out of which 93 abstracts were selected for publication in the abstract book. This included 43 oral presentations and 32 poster presentations. More than 150 scientists from Bangladesh, France, Germany, India, Pakistan & Sri Lanka, attended the conference. Important international organizations which were represented at the conference, besides UNESCO, included IUCN (World Conservation Union), SACEP (South Asia Cooperative Environment Program), Council for Agricultural Research Policy, Sri Lanka, National Science Foundation, Sri Lanka, Bangladesh Agricultural Research Institute, etc. Important national organizations included Ministry of Environment & Forests, Govt. of India; NBPGR (National Bureau Of Plant Genetic Resources), New Delhi; ISRO (Indian Space Research Organization), Hyderabad; BARC (Bhabha Atomic Research Centre), Mumbai; NBA (National Biodiversity Authority), Chennai; IARI (Indian Agricultural Research Institute), New Delhi; SACON (Salim Ali Centre for Ornithology & Natural History), Coimbatore; GB Pant Institute of Himalayan Environment, Almora; FRI (Forest Research Institute), Dehradun; ZSI, Dehradun & Solan; Central Pulp & Paper Research Institute, Saharanpur; etc. Important universities included University of Moratawa, Sri Lanka; University of Chittakong, Bangladesh; Punjab Agricultural University, Ludhiana, Banaras Hindu University, Varanasi; GB Pant University of Agriculture & Technology, Pant Nagar; Annamalia University, Tamil Nadu; University of Horticulture, Nauni; Himachal Pradesh University, Shimla; Panjab University, Chandigarh; Punjabi University, Patiala & Guru Nanak Dev University, Amritsar. Important NGOs included TERI (The Energy & Resources Institute), New Delhi; Gene Campaign, New Delhi; Kheti Virasat Mission, Punjab; Institute of Ecology & Environment, Pathankot; etc. Industry was represented by Secretary-General, PHD Chamber of Industry & Commerce, New Delhi; EnviTech Biogas Pvt. Ltd., Germany and several other local industries. The judiciary was represented by Sh. M.C. Mehta, Senior Advocate, Supreme Court of India. Besides this, several senior Central & State Government Officers from the states of Punjab, Haryana, Himachal Pradesh, Uttar Pradesh, Manipur and the Union Territory of Chandigarh participated.

Conference Objectives

In view of the far reaching consequences of climate change in the South Asian region in general, and India, in particular, the present International Conference was organized to address the following:

- Identify and debate upon the effect of climate change on ecological & socio-economic systems with a focus on biological diversity and food security in the South Asian region.
- Provide a platform to scientists, researchers, policy planners and implementers for sharing experiences and best practices.
- Create awareness at regional level on issues related to climate change to prepare the society to cope with impacts of climate change, particularly on biodiversity, food security and livelihood.
- Discuss conservation issues vis-à-vis climate change with respect to Protected Areas, Biosphere Reserves and Heritage Sites and look for location specific solutions.
- Identify research priorities for region specific studies, especially with respect to mechanisms to promote ecologically compatible development, food security and mitigation of negative impacts of climate change.
- Identify actions which can be promoted at grass root level to address climate change and associated biodiversity and food security issues, and devise appropriate management plans & programs
- Provide inputs to regional bodies and national governments for developing region specific policies & strategies to address socio-ecological and economic issues linked to climate change.
- Help forge associations and alliances to meet future challenges.
- Facilitate networking at government and non - governmental level.

Inaugural Session

The conference commenced on 3rd November, 2008 with a brief introduction of the issue by Dr. Neelima Jerath, Organizing Secretary.

Er. M.S Jaggi, ED, PSCST welcomed the participants and the dignitaries. The conference was inaugurated by Mr. Bikram Singh Majithia, Minister, Department of Science, Technology and Environment, Govt. of Punjab. His inaugural address focused on the impact of temperature rise on agriculture which is the backbone of economies of the South Asian countries. He said that as per various reports, temperature of the earth could increase by 1° C to 6° C

As per various reports, temperature of the earth could increase by 1° C to 6° C in 50 to 100 years and every 1° C rise in temperature could reduce global wheat production by four to five million tonnes adversely affecting availability of food especially in the developing nations. He further emphasized that changes in temperature and humidity could also affect production and quality of vegetables, fruits, basmati rice and medicinal plants in north Asian regions and crops like tea, coffee and spices in southern regions.

Media interaction session

in 50 to 100 years and every 1° C rise in temperature could reduce global wheat production by four to five million tonnes adversely affecting availability of food especially in the developing nations. He further emphasized that changes in temperature and humidity could also affect production and quality of vegetables, fruits, basmati rice and medicinal plants in north Asian regions and crops like tea, coffee and spices in southern regions. He suggested that governments needed to gear up to meet the situation in socio-economic context of their respective states.

He informed that the Government of India had prepared an action plan on climate change and eight national missions were being set up to mitigate the impact of climate change in India and that governments at the state and local levels would need to reassess their policies and adjust their programs accordingly.

Mr. N. S Kang, Principal Secretary, Department of Science, Technology and Environment, Govt. of Punjab delivered the introductory remarks. He emphasized that a mass movement, political will and innovative approach was needed to tackle the issues related to climate change. He said that awareness, education, laws and regulations could have a major impact on the green house gas emissions because they could affect business behaviour and public habits. Sh. A.A. Boaz, Director General, South Asia Corporative Environment Program, Sri Lanka highlighted climate change issues relevant to the South Asian region. Ms. Cecelia Barberi, UNESCO, New Delhi , in her presidential address, highlighted global importance of the subject especially following the global economic meltdown and urged states to act to prevent economic crises which could result in damage to natural resources due to excessive anthropogenic pressure on the environment. Ms. Minja Yang, Director, UNESCO, New Delhi could not attend the program personally due to hospitalization.

Dr. Ram Boojh, Program Specialist, UNESCO emphasized on the need of capacity building and commitment of UNESCO in this regard to combat climate change. The various initiatives taken up by Government of India to address climate change issues were highlighted by Dr. S.P Sharma, Advisor, Ministry of Environment & Forests, Govt. of India.The inaugural session was followed by 'meet the Press' session.

TECHNICAL SESSION - I

Policies & Perspectives

Chairperson: Ms. Cecelia Barbeiri, UNESCO, New Delhi
Co-Chair: Dr. A. Boaz, Director-General, South Asia Cooperative Environment Program, Sri Lanka
Repporteur: Ms. Nidhi Sarin, UNESCO, New Delhi

Climate change is a manifestation of the changes in the land use, land cover, vegetation fraction, heat flux which has a feedback loop with the regional climate. The influence of climate change on the Land use and land cover and vice versa has lead to inclusion of the complex parameter of anthropogenic factors in the physical models of the regional climate. Till date most of the climate models have taken into account only the geo-physical parameters to model the global and regional climate. The need of the hour is to first model the human dimension of climate change using a combination of space based and field data incorporating socio-economic, vegetation, hydrological, and ecological database in a geospatial domain. The human dimension of climate change involves estimation or modeling of the human footprint on the biosphere at regional level

Initiating the session, Ms. Cecelia Barbeiri presented a brief analysis on the linkages of climate change with prevalent life styles. She spoke about the grim future which had been predicted by experts but the irony was that most of the damage was self inflicted, and unless countries were prepared to make a radical and enlightened change in their ways of living and consumption, the situation would turn grimmer. She emphasized that countries had no time to be complacent. Dr. A. Boaz, Co-chair brought out that climate change would affect developing countries more as these were struggling for survival and economic development. He highlighted the plight of South Asian countries in this regard. He cautioned that climate change was threatening all the ecoystems and would have wide ranging implications for the poor who derived their sustenance from nature.

The session initiated with a presentation by Dr. S.P. Sharma, Advisor, Ministry of Environment & Forests, Govt. of India. In his paper he made an attempt to assess alternative situations of likely climate change and its impact in the South Asian region in general, and in India, in particular with respect to food security. He highlighted that India had a crucial role to play for maintaining food security in the South Asian region and protection of environment and conservation of biodiversity had to be given due priority to maintain this food security. He also discussed important aspects of the National Action Plan on Climate Change. His presentation evinced passionate discussions amongst the delegates regarding maintenance of food stocks by

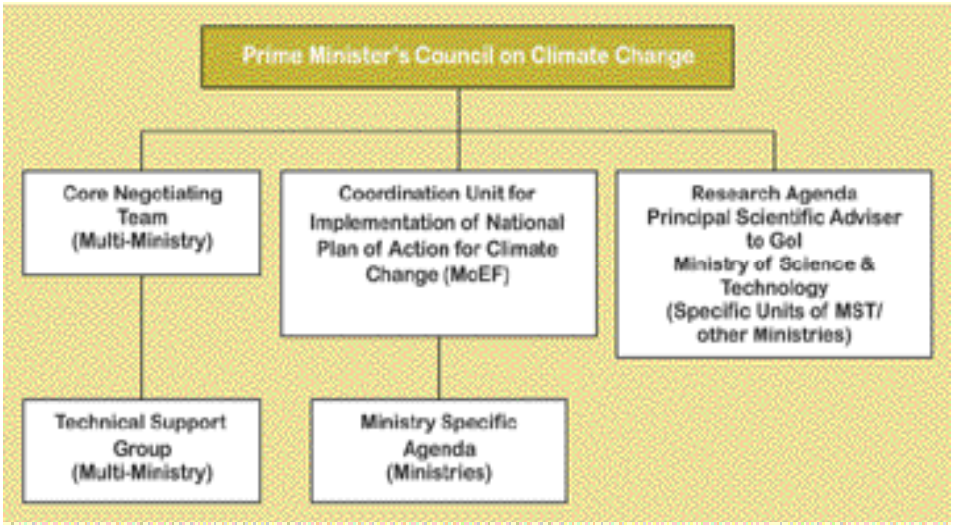
countries, impact of climate change on productivity of various crops and crop insurance programs in context of climate change. Dr. H.S. Dhaliwal from Punjab Agricultural University, Ludhiana pointed out to the need of educating farmers especially with respect to adopting crops adapted to vagaries of nature.

Dr. P.S. Roy , Deputy Director, National Remote Sensing Centre, Indian Space Research Organization, Department of Space, Hyderabad, in his presentation "Human Dimensions of Climate Change" pointed out that the challenge today for global climate change modelers was to accurately predict changes in future land use and land cover to enable nations to undertake remedial actions before it was too late. He presented the work of ISRO with respect to human dimensions of climate change in 14 major river basins of the country to understand the influence of social, economic & energy consumption patterns using multi temporal satellite data for over four

The Indian National Action Plan on Climate Change identifies measures that promote the country's developmental objectives, as well as, address climate change issues. It outlines a number of steps for effective adaptation and mitigation programs. The following eight national missions form the core of the National Action Plan:

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a Green India
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change

These mizssions will be institutionalized by the respective ministries and will be organized through inter sectoral groups which would include representatives from related Ministries, Ministry of Finance, Planning Commission, experts from industry, academia and civil society. The government has also created an Advisory Council on Climate Change, chaired by the Prime Minister, with broad based representation from key stakeholders.



decades. He also discussed the details of Earth Observation System for global climate studies i.e. water quality, CO2, moisture, etc. to understand their role in the environment. He informed that ISRO was generating database on land use, land cover (eg. snow pattern, aerosols, forest degradation, foliar activity, etc.) which was to be updated statewise every five years. He presented case study of Pennar River basin. Mr. Kanwar Raj, BARC, Mumbai sought information on various measuring instruments.

Sh. M.C. Mehta, Senior Advocate, Supreme Court of India, spoke on "Climate Change and Legal Issues". In an extremely eloquent talk, he brought out that though a number of laws related to environment existed in many countries but none addressed climate change issues adequately especially issues like protection of rights of climate change refugees. Although during discussions, several participants felt that more than enacting new laws, implementation of existing laws was more important, however, Sh. Mehta brought out that the presence of appropriate laws always strengthened the hands of governments and individuals for implementing well mearing projects.

Ms. Aditi Mehndiratta from IUCN, New Delhi, in her joint paper with Mr. J.S. Rawat, pointed out that the most pressing and immediate concern for developing nations was the mounting threat from climate change especially in context of decreasing crop yields. As per the report of International Panel for Climate Change, Asia was most vulnerable. She pointed out to the need of adopting an integrated approach to provide sustainable solutions and informed about IUCN's "Livelihood and Landscape Strategy" as a concerted effort for integrating biodiversity conservation and livelihood security. Her paper provided an insight into policy and institutional arrangements advocated by IUCN in this context.

Ms. Huma Beg from Pakistan brought out that environment protection had largely being deemed as a peripheral issue and de-prioritized in national development plans of her country. However, the present situation called for immediate action and the worst could be averted if effective responses are developed and implemented. She also highlighted the role of media in this context. Participants suggested that building up a sound database was important in this context and that the media needed to project accurate data for information of the general masses.

TECHNICAL SESSION - II

Climate Change & Biodiversity Issues in South Asia

Chairperson: Dr. P.S. Roy, Deputy Director, NRSC, Deptt. of Space, Govt. of India
Co-Chair: Mr. B.C. Bala, Principal Chief Conservator of Forests, Govt. of Punjab,
Ms. Anusha Amarsinghe, National Science Foundation, Sri Lanka
Repporteur: Dr. A.K. Sidhu, Scientist-C, ZSI, Dehradun

Climate change issues were of global concern but major challenges for South Asia and required regional mitigation and adaptation responses. The human dimension of this change, especially disruption in economic and social life, had still not been studied properly. Climate change could cause ecosystems boundaries to move, allowing some ecosystem to expand into new areas while diminishing the size of others as climate becomes inhospitable to native species. This could seriously affect agricultural areas throughout the world.

Dr. P. S. Roy, Chairperson invited experts from India, Sri Lanka & Bangladesh for their presentations on various biodiversity issues in South Asia. He pointed out that all South Asian countries were aspiring for economic development and passing through a phase of transition from pre-dominantly agrarian to an 'agrarian-cum-industrial' economy and were also facing the challenge of global competitiveness. Ms. Anusha Amarsinghe pointed out that most technological developments in these countries were through technology transferred from developed na-

tions, irrespective of assessment of its impact on local environment. Hence, the challenges to conserve and secure local biodiversity.

Dr. Ram Boojh, Programme Specialist, UNESCO, New Delhi in his presentation "Addressing climate change & biodiversity issues in the South Asian region" pointed out that though climate change issues were of global concern but they posed major challenges for South Asia and required regional mitigation and adaptation responses. The human dimension of this change, especially disruption in economic and social life, had still not been studied properly. He also pointed out that UNESCO's report on Climate Change and World Heritage which reports 26 case studies (out of 830 sites facing environmental danger), outlines threats posed to natural and cultural sites, like the effect of melting of Himalayan glaciers on habitat of snow leopard in Sagarmatha National Park, Nepal. He also brought out that climate change could cause ecosystems boundaries to move, allowing some ecosystem to expand into new areas while diminishing the size of others as climate becomes inhospitable to native species. This could seriously affect agricultural areas throughout the world. Besides discussing MAB's response to climate change he also discussed the CLICK Initiative (Climate Change Knowledge Partnership).

Dr. Frank Niranjan, Sri Lanka Council for Agricultural Research Policy, Sri Lanka spoke on "Vulnerability to Climate Change in Sri Lanka ". He informed that Agro ecological maps for Sri Lanka had been developed in 1975 (indicating 26 climatic zones) which had been revised in 2003 (indicating 46 climatic zones). The study brought out the positive/negative impacts of climate change on various food and cash crops in the region. He also suggested adaptation strategies in his paper.

Dr. K. Venkatraman, Secretary, National Biodiversity Authority, India gave an overview of the richness of biodiversity in the country and importance of its conservation in all the ten bio-geographic zones and 26 biotic provinces in context of three major biological realms i.e. Indo –Malayan, Eurasian and Afro-tropical. He advocated for strong policy initiatives.

Dr. M. Al-Amin from Institute of Forestry & Environmental Sciences, Chittagong University, Bangladesh, spoke on 'Impact of climate change on tree species diversity of hill forests of Bangladesh'. He informed that the composition of tree species was changing and climate change could be one of the causative factors.

During discussions, Dr. Bala Prasad from Manipur Biodiversity Board also endorsed the observations of Dr. Al-Amin citing Indian examples from the North Eastern region. Delegates sought specific information of certain species, both native (like Ras Kadli variety of banana) and alien species (eg. certain fishes) from Dr. Venkataraman. Ms. Patricia Jung discussed natural adaptation of certain species to environmental changes.

TECHNICAL SESSION - III

Climate Change, Agriculture & Food Security

Chairperson: Sh. J.S. Rawat, ICUN, New Delhi
Co-Chair: Ms. Huma Mustafa Beg, Pakistan
Repporteur: Dr. S.K. Chahal, PAU, Ludhiana

Agro ecosystems are characterized by high diversity at both, the species & gene level, and have much greater potential to adapt to climate change. It is imperative to manage agro biodiversity in a sustainable way and to use it systematically to cope with environmental challenges.

Introducing the speakers Dr. J.S. Rawat, IUCN highlighted that Agricultural Biodiversity in the Indian subcontinent was unique as it had evolved over millions of years due to diverse farm practices and climatic conditions. Its importance in food security and agriculture had been widely recognized. Dr. Beg endorsed his views with regard to the need to conserve agricultural biodiversity.

Dr. Suman Sahai, Gene Campaign, in her lead lecture on "Agrobiodiversity, Climate Change and Food Security" discussed the impacts of climate change on agro ecology. She pointed out that a loss of 23% of grain production in some parts of the world

but a gain of 20% in other parts was predicted. However, South Asia and parts of Africa are expected to face maximum negative impacts whereas North America, Northern Europe and East Asia (like, China) were likely to be benefited with respect to production of cereal crops. Further, shifts in agro climatic zones would mean that certain crops being cultivated in particular areas would no longer be suitable for those regions. She pointed out that one of the most important ways of coping with impact of climate change on food security was to maintain diversity of crop plants and their wild relatives. This will not only protect from total crop failure but also this gene pool could be used by plant breeders to develop new varieties adapted to changing climate. She informed about the work of Gene Campaign in setting up farmer level Gene-Seed Bank in Jharkhand to conserve the genetic diversity of rice and other cereals. Delegates sought information on setting up of seed banks and training of local communities for their maintenance.

Dr. J.C. Rana, NBPGR in his presentation on « Impact of Climate Change on Agricultural Biodiversity », spoke on uniqueness & richness of biological diversity in Indian subcontinent, especially with respect to wild relatives of agricultural crops. He emphasized that gene sources from traditional varieties and breeds and their wild relatives were required to be tapped using techniques like, allele mining and development of genomic resources for specific traits of interest (e.g. resistance to high temperatures, photo insensitivity, low respiration and higher photosynthetic rate, resistance to drought/ flood/salinity/pests, etc.). He suggested that formal institutional systems based on gene banks (ex-situ conservation) must be broadened to an integrated management system that includes farmer based (in-situ) conservation.

Dr. Anita Choudhary, Senior Scientist, Division of Environmental Sciences, IARI, New Delhi, presented results of simulation studies on Impact of Climate Change on various crops throughout the country. She pointed out that though 1° C rise in min temperature would not have any significant impact on potential yield of grain crops, however, 2° C rise could reduce grain yields by 15-17% in most places in the country. In Rajasthan, 2° C rise could reduce production of Pearl Millet by 10-15%, in Madhya Pradesh it could reduce Soyabean yield by 5% and productivity of mustard oil seed in Haryana could also be affected. She projected that India would loose out in food production to countries like, Russia, China, Canada & Argentina which could have alarming impacts on our per capita food availability. Delegates sought information on efforts being made by Government and institutions like, IARI for capacity building of farmers in this respect. Dr. Choudhary informed that specific capacity building exercises needed to be taken up. Serious decline in productivity of agriculture produce was also pointed out by Dr. Yogesh Gokhle, The Energy & Resources Institute, New Delhi, in his presentation "Banking on traditional crop varieties for tackling concerns of food security due to climate variability". He informed that TERI was working towards value addition and documentation of traditional crop varieties in context of resilience to local climatic variations. It had facilitated revival of two traditional crop varieties (minor millets Chaini and Kauni). Further, it had documented 32 traditional crop varieties for identification of their important features. He suggested developing databases for such varieties. His views were endorsed by Dr. A.S. Sidhu, IARI and many other agricultural scientists.

TECHNICAL SESSION - IV

Climate Change & Biodiversity: Local Issues

Chairperson: Dr. S.P. Sharma, Advisor, Ministry of Env. & Forests, Govt. of India
Co-Chair: Dr. Frank Niranjan, Council for Agric. Research Policy, Sri Lanka
Ms. Aditi Mehandiratta, IUCN
Repporteur: Dr. Balwinder S. Sooch, Lecturer, Punjabi University, Patiala

Biologically diverse ecosystems apart from providing basic ecosystem services like climatic stabilization and carbon sinks are also a vital resource for technological development in agriculture, pharmaceuticals and other technological innovations. The loss of biological diversity reduces the ecosystem's ability to adapt to change.

Inviting various speakers of this session for their presentations, Dr. Sharma, Chairperson pointed out to the need of addressing local challenges to address the entire gamut of climate change and biodiversity. Dr. Frank Niranjan also discussed local level initiatives in Sri Lanka.

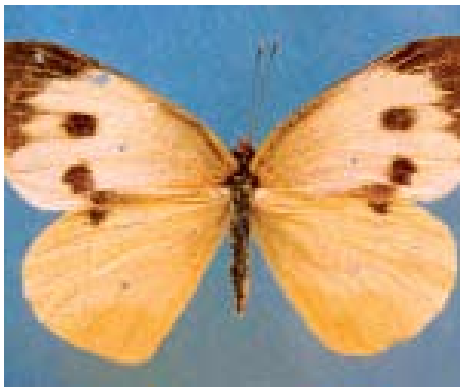
Dr. R.K. Kohli, Professor, Department of Botany and Head, Centre for Environment & Vocational Studies, Panjab University, Chandigarh, spoke on biological invasion especially in the tropics and the associated environmental problems. Such invasions get facilitated by change in climate and have a direct bearing on dependent

The ecological footprints of man have permeated to most of the regions of the earth and are expected to increase as a result of climate change due to dwindling of the resources. The loss of forest cover as a result of climate change along with deforestation is systematically increasing the ecological foot print of the humanity as the ecological benefits of the deforested area have to be taken up by the remaining vegetated areas.

flora and fauna and thus overall biological diversity. His presentation dealt primarily with invasion of Lantana camara, Parthenium hysterophorous and Ageratum conyzoides in the Shivaliks which had resulted in replacement of native grasses, habitat destruction and loss of local fodder species. Responding to questions from delegates he informed that almost 18% of Indian flora was non-native. In the Shivaliks, about 95% flora was native in 1985 which has decreased to 90.63% in 2003. Dr. Sudhir Mahotra from Institute of Ecology & Environment wanted to know about the management practices suggested by scientists to address this issue. Experts suggested that introduction of insect pests, bamboo plantation and keeping land under cover of native grasses were some of the available options.

Dr. Arjit Roy, National Remote Sensing Centre, Indian Space Research Organization, Department of Space, Govt. of India, in his presentation titled "Impact of Climate Change on Biodiversity: The Human Dimensions" informed that national level biodiversity characterization at landscape level were being carried out by Department of Biotechnology and Department of Space to map areas of potential biological richness using a combination of satellite based vegetation type maps and geo-spatial modeling. He informed that presently about 15000 geo-spacially tagged phyto-sociological records had been collected across different vegetation types covering approximately 80% of forested area of the country. This database would serve as a baseline data for future studies to understand the impact of climate change on biodiversity. He suggested establishing ecological corridors to connect fragmented landscapes for protecting biodiversity.

Dr. A.K. Sidhu from ZSI, Solan spoke on the role of butterflies in natural ecosystem with special reference to butterflies in Pangi Valley, a remote and beautiful valley of Chamba district of Himachal Pradesh located between Pir Panjal and the Greater Himalayan Zanskar ranges. Since butterflies are extremely sensitive to any changes in the environment, their diversity is an indicator of ecosystem health. Her presentation prompted several questions on butterfly farming from delegates.



Dr. A.N. Rizvi from ZSI, Dehradun spoke on "nematodes as Bioindicators of Climate Change". She informed that since Nematodes react immediately to micro climatic conditions, like, heat & soil moisture, they are potentially good bioindicators.

On similar lines, Dr. M. Vijay from ZSI, Dehradun spoke on "Winter Fluctuation in Ruddy Shelduck popu-

lation of Asan Conservation Reserve, Dehradun". He informed that the area attracted 6000 individuals of 78 species of water birds. The fluctuation in atmospheric temperature during winter months of 2006 to 2008 had led to decline in their population.

Dr. Archana Bahuguna, Scientist-B, ZSI, Dehradun spoke on "Habitat deterioration of fresh water turtles in Banganga in Uttrakhand". Fresh water turtles could be flagship species which could help preserve natural habitats for dolphins, otters, crocodiles, wetland birds and endemic fish species. She recommended re-introduction and nest protection for which appropriate training be provided to veterinary personnel. Dr. Kumkum Kohli desired to know the critical factors for turtle conservation. Dr. Bahuguna informed that DO level >6mg/l was important for their survival.

TECHNICAL SESSION - V

Regional Issues and Sustainable Agricultural Development

Chairperson: Dr. Suman Sahai, Gene Campaign, New Delhi
Co-Chair: Dr. M. Al-Amin, Institute of Forestry & Environmental Science, Bangladesh
Ms. Patricia Jung, Consultant, France
Repporteur: Dr. R. Jaishankar, UNESCO, New Delhi

Being the main substrate of photosynthesis, increasing CO2 in the atmosphere may cause enhancement in photosynthesis and biomass production but CO2 mediated increase in atmospheric temperature may offset positive effects on crop productivity by shortening the grain filling period, increase in vector borne diseases and adverse impact on water availability. It is suspected that espisodes of high temperature stress would be more frequent in the changing future climate scenario

The IPCC report on 'Effects of Global Warming in geographical regions' confirms change in agricultural yields and predicts socio-economic turbulence thereafter. In this context Dr. Suman Sahai, Chairperson of the session, lauded the efforts of the Punjab State Council for Science & Technology and Punjab Government for initiating a timely debate on Climate Change, Agro-biodiversity and Food Security. Dr. Al-Amin and Ms. Patricia Jung also highlighted the role of National Governments in developing countries for capacity building on the issue to ensure food security of marginalized populations in the region.

Dr. Ram Boojh, UNESCO in his presentation on "The Impact of Climate Change and the Himalayas in the local context" pointed out that change in climate could have direct biological and socio economic implications with adverse impact on the agricultural sector besides degradation of forests. He presented a case study of Nanda Devi Biosphere Reserve which included 37 villages and three major towns, Hemkund Sahib, Badrinath and Joshimath.

Dr. Izrar Ahmad, Post Doctoral Researcher, UNESCO spoke on "Impact assessment of climatic change in highly cultivated tracts of Central Ganga Plains". The area is one of the highly cultivated region of India with 70% population directly relying on agriculture for livelihood. The area is extremely sensitive to melting of glaciers and occurrence of rainfall which maintains perennial flow of water in rivers like Ganga & Yamuna. His study has indicated that the occurrence of rainfall has become scanty and erratic over time and its unpredictability has triggered over-exploitation of groundwater. He presented data on groundwater flow modeling and discussed the mathematical model developed by him to simulate hydro-geological conditions. The combined impact of increase in abstraction rate by 20% and reduction in rainfall by 20% was taken into consideration which showed a drawdown of 10 m leading to installation of deeper tubewells. He

Besides food security, nutritional security is a major concern. A global survey report estimates that more than 200 million children in developing countries suffer from malnutrition. Leafy vegetables are rich reservoir of vitamins and minerals, root and tuberous vegetables are good source of carbohydrate and leguminous vegetables are good source of protein.

Besides this, vegetables contain a large number of non nutritive pytochemicals, which help in prevention of many deadly diseases. The prominent protective vegetables are bitter gourd, bottle gourd, garlic, onion, tomato etc. For proper well being, an adult of moderate work style requires 2500 kcal. Consumption of 300g vegetables comprising 125 g leafy vegetables, 100g root and tuber vegetables and 75 g other vegetables have been recommended by ICMR and NII, Hyderabad. Vegetables being labour intensive generate lot of employment opportunity also. The profit from vegetables by way of fresh sale, processed product sale, export and seed business is higher than other crops.

concluded that the high cost of farming was causing migration of poor farmers to other sources of livelihood.

Dr. Madan Pal, IARI, New Delhi spoke on "Impact of rising temperature and carbon dioxide concentration on growth and yield of crops". He presented data based on 12 year studies on magnitude and duration of high carbon dioxide and temperature exposure on grain setting in crops like, wheat, rice, chickpea, mungbean and sunflower.

Dr. A.S. Sidhu, Division of Vegetable Science, IARI, New Delhi in his presentation on "Vegetable crops for food, nutrition, security and improving livelihood" discussed the impact of global climate change on productivity of vegetables and pointed out that these crops were safe options for diversification of cereal based cropping system to ensure food, nutrition and livelihood security. He suggested that vegetable farming was one of the best options for small farmers and all local varieties needed to be preserved and popularized.

Similar studies on fruit crops were discussed by Dr. P.P.S. Gill, Department of Horticulture, Punjab Agricultural University, Ludhiana, in his presentation on "Impact of Global Warming on Fruit Industry – a Review". As per IPCC, 2007, the period from 1995 to 2007 ranked amongst the 12 warmest years on record since 1850 affecting weeds, pests and pathogen pressure. His studies indicated that high temperature had resulted in reduction of yield of almonds, cherries and apricots, bud dormancy in Japanese pear and adversely affected fruit quality of apples and grapes by impairing colour development. He informed that wine grape growing throughout central valley of California had already been affected.

Dr. M.S. Hadda, Department of Soils, Punjab Agricultural University, Ludhiana discussed "Sustainable agricultural development in rainfed submontane region: The case for a paradigm shift in land husbandry". He emphasized on the need of promoting R&D in rainfed agricultural systems especially with respect to multi cropping potential and low input agricultural practices.

The issues highlighted by various speakers were discussed keenly by the delegates.

TECHNICAL SESSION - VI

Panel Discussion – Policies, Programs & Best Practices

Chairperson: Dr. A. Boaz, Director-General, SACEP, Sri Lanka
Co-Chair: Mr. Kanwar Raj, Head, Nuclear Recycle Group, BARC, Mumbai
Repporteur: Dr. Chander Parkash, Khalsa College, Amritsar

Need to make younger generation aware of climate change by including such issues in existing curricula so that the future generation is better equipped to deal with challenges. Increasing in awareness, farmers had started responding to government initiatives and had started contributing towards environmental conservation.

The expert panelists were Dr. S.P. Sharma, Statistical Advisor, Ministry of Environment & Forests, Govt. of India; Dr. K. Venkataraman, Secretary, National Biodiversity Authority, Chennai; Dr. Anul Perera, International Professional Engineer/Former Head of Department, Department of Chemical and Process Engineering, University of Moratuwa, Moratuwa, Sri Lanka. Dr. Ram Boojh, Programme Specialist, UNESCO, New Delhi, Sh. J.S. Rawat from IUCN, Sh. Jatinder Sharma and Dr. A.S. Sidhu.

Initiating the Panel discussion, Dr. A. Boaz pointed out to the need of disseminating information on key issues and recommendations proposed in the IPCC report on Climate Change for information of general public. He also highlighted the need of learning from traditional knowledge developed by societies based on years of experience and amalgamating it with scientific knowledge. He appreciated the concern expressed by governments of many Asian countries to address the issue. Sh. Kanwar Raj stated that while addressing climate change, the issues of both, food security and energy security were equally important to ensure sustainable development of societies. Both issues called for appropriate management of wastes. He also appreciated the early warning system set up in Bangladesh in response to cyclones and suggested increased South-South dialogue to ensure emulation of best practices.

Dr. Anul Perera informed that the Sri Lankan government had taken up data collection initiatives especially after the tsunami in the area. Dr. Ram Boojh informed about UNESCO's initiatives to address climate change concerns as stated by Sh. Ban Ki-Moon, UN Secretary-General, UNESCO, while outlining future UNESCO programs. UNESCO had already initiated damage assessment studies on recent cyclones, floods and droughts in some countries.

Dr. S.P. Sharma pointed out to the need to promote small scale enterprises through incentives & subsidies and scientific research on traditional knowledge based products/practices. He advocated policy initiatives and strengthening of research in dryland agriculture, oil seeds and coarse grain crops. He also pointed out to the need of developing appropriate policies for risk management and use of biotechnology for human benefit. Dr. K. Venkataraman pointed out to the need of appropriate implementation

of existing policies, promoting best practices in ecosystem conservation and capacity building at grass root level. Sh. J.S. Rawat from IUCN spoke on sustainable ecosystem management as a tool to ensure livelihood security.

Sh. Jatinder Sharma highlighted the need of making younger generation aware of climate change by including such issues in existing curricula so that the future generation is better equipped to deal with challenges. He also informed that with increasing awareness, farmers had started responding to government initiatives and had started contributing towards environmental conservation. Though Punjab had only 3.6 area under forest cover, however, 20 million cum wood was presently standing in farmers' fields which could be harvested on a 10-year cycle. It was not only a source of biomass, but also a means of carbon sequestration. He advocated the need of setting up a biosphere reserve in Punjab as recently Indus water Dolphin & Saras crane had been sighted in the state besides wild black buck and new species of deer.

Dr. A.S. Sidhu pointed out that horticulturists needed to be aware of climate change issues and its consequences so that they can take up remedial actions in advance. He said that kitchen gardens could play an important role in ensuring nutritional security.

Discussions hovered around impact of climate change in countries like Maldives (which was only 1.2 m above msl), Nepal and Bhutan (where glacial lake outbursts were expected). Dr. Chandra Prakash raised the issue of organic zfarming and branding of organic products. Dr. Boaz discussed the need of using ICT for climate change dynamics. The impact of global financial crisis on biodiversity marketing was also discussed.

The panel discussion was also attended by Mr. Bikram Singh Majithia, Minister, Science, Technology & Environment, Govt. of Punjab.

TECHNICAL SESSION - VII

Poster Session

The Poster Session also evinced a keen response and detailed discussions between delegates and presenters. In all 33 posters were presented.

Sr.No. & Title of Poster

1. There is No Other Earth by Garima Mahajan*, Dhiraj Sud, Tanuja Srivastva, SLIET*, Longowal and BGI of Engg. & Technology, Sangrur
2. Climate Change, Mitigation and Adaptation by S.K. Chahal, G.S. Bains & L.K. Dhaliwal, Department of Agriculture Meteorology, PAU, Ludhiana
3. Impact of Climate Change on Agricultural Production in India by L.K. Dhaliwal, G.S. Bains, S.K. Chahal, Department of Agriculture Meteorology, PAU, Ludhiana
4. Characterization of Hydro-thermally treated buckwheat (*Fagopyrum esculentum*) starches by Shatabhisa Sarkar, N. Jindal, D.C. Saxena, Rajiv Sharma* & C.S. Riar, SLIET, Longowal and CIPHET*, Ludhiana
5. Climate Change – Perception on reasons, effects and corrective measures by Kumkum Kohli, Govt. College for Girls, Chandigarh
6. Abhishek Industries – Continuing Growth in Harmony with Environment by Harpal Bansal, Vineet Sharma & Sachin Jain, Abhishek Industries, Barnala
7. Future Research Issues for Sustainability of Punjab Agriculture by H.S. Dhaliwal, Ravinder Kaur Dhaliwal & Harpreet Kaur, Department of Extension Education, PAU, Ludhiana
8. Effect of optimally inclined reflective north wall on the green house crop drying by V.P. Sethi & Sadhana Arora*, Department of Mechanical Engg. and Department of Processing & Food Engg*., PAU

9. Vermistabilization of the paper mill sludge using exotic earthworm (*Eisenia foetida*) Savigny by Arvinder Kaur, Jaswinder Singh*, Pushpinder J. Rup and Adarshpal Vig, GNDU, Amritsar and Khalsa College*, Amritsar
10. Vermistabilization of bio-sludge of beverage industries using exotic earthworm (*Eisenia foetida*) savigny by Jaswinder Singh*, Arvinder Kaur, Adarshpal Vig & Pushpinder J. Rup , GNDU, Amritsar and Khalsa College*, Amritsar
11. Quantitative and qualitative analysis of riparian vegetation at Uttarkashi, Garhwal Himalaya, India by Radhey. S. Gangwar*, B. D. Joshi**, K. K. Gangwar*** & Deepali, CEE*- Baramulla, Gurukul Kangri Univ.**, Haridwar, ICT, Pvt. Ltd***, Delhi, PSCST
12. Medicinal plant diversity among the some selected sites of Uttarakhand by K. K. Gangwar*, Radhey S. Gangwar**, Deepali*** & B. D. Joshi, ICT, Pvt. Ltd*, Delhi, CEE**- Baramulla, PSCST***, Gurukul Kangri Univ., Haridwar
13. Biodiversity, Medicinal Plants & Ayurveda with reference to Dhar Block, Distt. Gurdaspur by Sudhir K. Mahotra, Institute of Ecology & Env., Pathankot
14. Organic Farming as a window to Food Security – a case study of Punjab by Surinder Singh* & Chander Prakash, Kheti Varasat*, Patiala & Department of Zoology, Khalsa College, Amritsar
15. Calcium induced Thermotolerance in relation to carbonhydrate metabolism in wheat seedling by Surekha Bhatia & Bavita Asthir, Department of Processing & Food Engineering, Department of Bio-chemistry, PAU-Ludhiana
16. Seed Storage for Food Security by Namrata Gupta, R.C. Sharma, G.S. Mahal & Navdeep Jindal*, STC, PAU and SLIET*, Longowal
17. Biotechnology for Cleaner Environment : a special focus on pulp & paper sector by V.V. Thakur, R.M. Mathur & T.K. Roy, CPPRI, Saharanpur
18. Agrowaste utilization: Extraction of ß-Carotene from carrot agrowaste by B.S.Sooch & Jaspreet Singh, Department of Biotech, Pbi Unv, Patiala
19. Revival of Kvic Type Biogas Plants – a Case Study by S.S. Sooch, Ritesh Jain & Urmila Gupta*, Department of Civil Engineering and School of Energy Studies*, PAU, Ludhiana
20. Impact of Climate Change on the Biodiversity of Mango (*Mangifera Indica* L.) in Punjab, India by Neelima Jerath, Nav Prem Singh*, Gurharminder Singh & Harminder Kaur*, Punjab Biodiversity Board, PSCST and Deptt. of Horticulture*, PAU, Ludhiana
21. Optimization of water requirement in solid state Janta Biogas Plant by Urmil Gupta, N.K. Khullar and Ritesh Jain, School of Energy Studies for Agriculture, Punjab Agricultural University, Ludhiana
22. Kuntbhyog Lake: Biodiversity, Conservation and its designated use by R. Jindal & R. Thakur, Department of Zoology, Panjab University, Chandigarh
23. Wetland and Climate Change by Anish Dua & Chander Prakash, Department of Zoology, GNDU
24. Okra cultivation in winter season: some considerations by Mamta Pathak & S.S. Bal, Department of Vegetable Crops, PAU, Ludhiana
25. Bagasse: A potential substitute of wood for paper making by A.K. Dixit, A.V. Janbade, B.P. Thapliyal, R.M. Mathur & T.K. Roy, CPPRI, Saharanpur

26. Mitigating Climate Change: Policy Issues for promoting Organic Farming by Arshinder Kaur, Organic Farming Council of Punjab
27. Transgenic Crops Effects on Biodiversity by Sarita Sharma*, Sanjiv Sharma & A.K. Nath, PSCST* & Y.S.P. University of Horticulture and Forestry, Solan
28. Impact of Climate Change on Surface and Ground Water Resources – Some observations from Northern India by K.P. Singh & N.S. Tiwana, PSCST
29. Open Field straw burning in Punjab: Causes, Ecological concerns and Sustainable Aleternatives by N.S. Tiwana, Neelima Jerath & Gurharminder Singh, PSCST
30. Impact of Climate Change on Wetlands of Punjab by N.S. Tiwana, Neelima Jerath, S.K. Saxena & Vivek Sharma, PSCST
31. Impact of Climate Change on Fish Production in India by Onkar Singh Barriach & Satnam Singh Ladhar, PSCST
32. Impact of Climate Change on Antartica by K.S. Dhillon and K.S. Bath, PSCST
33. Impact of awareness programs on mitigative & adaptative public response towards climate change by Satnam Singh Ladhar, PSCST

TECHNICAL SESSION - VIII

Economic Challenges and Climate Change

Chairperson: Dr. . L.M.S. Palni, Director, GB Pant Institute of Himalayan Studies, Almora
Co-Chair: Dr. Ram Boojh, Programme Specialist, UNESCO, New Delhi
Repporteur: Ms. Divya Kaushik, PSCST

Ignoring climate change could turn out to be the most costly of all possible choices for us and our future generations. year, with an additional release of approximately 11 million tons of carbon from disturbed mangrove soils every year.

Referring to the 'Stern Review', Dr. L.M.S. Palni, Chairperson, was of the opinion that the impact of climate change on economies was of key concern to governments, business houses and many other stakeholders. Further, the economics of climate change was fundamentally about the economics of risk assessment and mitigation. However, it was only recently that science has been able to predict changes in greenhouse gas concentrations associated with temperature rise or fall. Dr. Ram Boojh highlighted the concerns of UN bodies in this regard.

In the first presentation of the session, Dr. Sandeep Kapoor, Associate Professor, Department of Business Management, Punjab Agricultural University, Ludhiana, in his presentation titled "Economic Challenges of Climate Change" discussed the impact of climate change on food availability (production, distribution, export/ import), food access (affordability, preferences and allocation) and food utilization (nutritive value, social value and food security) in context of socio-economic conditions of communities. He also discussed Global Environment Change (GEC) and the impact of exporting particular types of food crops (like, rice) on local climates. He informed that presently economic costs of climate change were not being reflected in current accounting processes and there was a need to develop mechanisms to build-in these costs in present and future programs and projects during cost benefit analysis. He also provided information on WRAP (Worldwide Responsible Accredited Production) which is an independent, non-profit organization dedicated to the certification of lawful, humane and ethical manufacturing throughout the world. He recommended setting up of global environmental audit facility for evaluating cost of GEC, creating awareness on WRAP certification and Green Banks, setting up global impact assessment councils and motivating corporates to adopt clean trading policies especially with respect to food

processing industries. Dr. Anul Perera sought information on WRAP certified organizations. Ms. Huma Beg provided information on Green Banks and WRAP certification facilities in Pakistan. Dr. Anita Choudhary, IARI, suggested that environmental accounting should be extended to the farming sector in addition to the industrial sector as certain farming practices were major contributors to climate change.

Dr. V.K. Choudhary, Associate Professor, Department of Basic Sciences, University of Horticulture & Forestry, Nauni, Solan, spoke on "Mathematical models based on climatic factors for estimating influence of climatic change on crop production". His presentation highlighted that statistical relationship between crop yield and main climatic factors were vital for use in developing forecasting models. He discussed crop growth models, crop phenology models, yield forecasting models and disease/insect-pest forecasting models based on regression technique and other statistical techniques to analyze stress factors and future forecasting. In response to questions from delegates, Dr. Choudhary informed that at least 10-year data was required for developing a good regression model.

Sh. Krishan Kalra, Secretary General, PHD Chamber of Commerce and Industry, New Delhi, in his presentation on "Projections of Climate Change impact in South Asia" informed that the frequency of natural disasters in Asia was increasing over the years leading to both, environmental damage and economic loss. Scientists had predicted severe water scarcity in South Asia after 2025. He suggested developing new institutions and modifying existing ones to promote adaptation to climate change. He also suggested macro & micro strategies for management of sectors which were more sensitive to climate change. Dr. J.S. Rawat discussed the issue of economic loss in agriculture in context of suicides by farmers and sought information on the initiatives taken up by the PHD Chamber of Commerce & Industry to address the issue. He was informed that the Chamber and industry was taking up sensitization programs.

From the Department of Entrepreneurship Development and Industries Coordination, National Institute of Technical Teacher Training Research, Chandigarh, Dr. D.D. Sharma spoke on "Green Entrepreneurship for sustainability". He suggested that entrepreneurs need to incorporate 'Greenness' in their work as consumers were becoming increasingly aware of environmental issues and getting drawn to green businesses and investments and the governments were also forcing green issues. He also suggested small business owners to inform general public about their green efforts. He discussed strategies and opportunities for green entrepreneurship in small and medium sector.

Ms. Shubh Kiran, Haryana Environment Department spoke on "Climate development mechanism & carbon credit mechanism" and pointed out that efforts needed to be made at all levels to reduce greenhouse gas emissions.

TECHNICAL SESSION - IX

Climate Change & Sustainable Development Issues

Chairperson: Dr. K. Venkataraman, Secretary, National Biodiversity Authority, Chennai
Co-chair: Dr. Babu Ram, Member Secretary, Punjab Pollution Control Board
Repporteur: Dr. R. Jaishankar, UNESCO

The poor have the minimum resources and capacity to escape the cost of climate change.
We need to use science & technology at the grassroot level and identify local solutions to this global problem.

Inviting the speakers of this session for their presentations, Dr. K. Venkataraman mentioned that several species of bacteria, fungi, algae, plants & animals were being used as raw material in the industry and with increasing industrialization, many of these species were being over-exploited and decreasing at an alarming rate. Dr. Babu Ram, co-chair mentioned that many biological species were providing low cost solutions for mitigating the pollution problem in the industry.

Dr. A. Boaz, Director-General, South Asian Cooperative Environment Program, Sri Lanka, presented a case study on "Government facilitated

community initiatives in central Asia for Innovative participatory forest management approach for climate management". He advocated sustainable utilization of biological resources (like, wood, bio-fuels, non-timber forest produce, etc.) over non-renewable resources which needed industrial processing, thus contributing towards climate change. He provided examples of JFM approach in Madhya Pradesh & Chhattisgarh states of India where better utilization of forest debris had enhanced food productivity leading to enhanced food security at local level. Information on climate management strategies based on sustainable forest management in Chhattisgarh was also provided. Dr. K. Venkataraman pointed out that over emphasis on some of these resources (like, bio-fuels from Jatropha species) was leading to ecological problems (as Jatropha was an exotic and invasive species). He, therefore, suggested promotion of only native species.

Dr. L.M.S. Palni Director, GB Pant Institute of Himalayan Studies, Almora, in his presentation "Responding to the challenges of climate change - mountain specific issues" discussed the suspectability of Himalayan mountains to impact of climate change due to their young and fragile nature coupled with sharp biophysical gradient. He mentioned that hotter & drier summers were expected to increase evaporation and the risk of forest fires. It could also enhance the survival rate of forest pests. Further, as global temperatures rise, treelines are expected to advance upslope, shrinking the alpine environment (e.g. invading alpine meadows) and fragmenting wildlife habitats. Thus owing to global warming, forests could experience both quantitative and qualitative changes. The resulting reduced biodiversity could influence both, biophysical functions and flow, governing environmental stability, thereby making the economy and survival strategies of people more vulnerable to risks. The implications of these impacts could be seen on the livelihoods of people of this region who depend on forest resources. His presentation also focused on forest–water–agriculture–socio-economic interface of mountain environment and suggested in-depth studies for initiating suitable imitative strategies.

Mangroves are defined as assemblages of trees and shrubs which grow in the intertidal regions of tropical and sub tropical coastlines, in the areas where river water mixes with sea water. They have several ecological, socio-economical and physical functions that are essential in maintaining the biodiversity and protecting human populations. Mangroves are also one of nature's best ways for combating global warming because of their greater capacity for sequestering carbon. According to the latest study, the current rate of mangrove loss is around 1% per annum or around 150,000 ha of new mangrove area loss per year. This translates to around 225,000 tons of carbon sequestration potential being lost each year, with an additional release of approximately 11 million tons of carbon from disturbed mangrove soils every year.

Dr. T.J. Purakayastha, IARI, New Delhi presented his paper on "Enhancing potential of soils for carbon sequestration in mitigating climate change". His studies indicate that it is possible to sequester large amount of carbon through appropriate soil management practices, like, intensive use of cover crops, crop rotation, reduced tillage, etc. In semi-arid sub tropical India, the shift to high fertility treatment in maize-wheat-cowpea cropping system might sequester 1.83 Tg C per year corresponding to 1% of fossil fuel emissions by India. Further, alternate land use systems like, agro-forestry, agro-horticulture & agro-silviculture are more remunerative and improve overall soil quality.

Dr. Nikhil Raj from Salim Ali Centre for Ornithology and Natural History, Coimbatore, Tamil Nadu, presented "Analysis of the general rainfall trend using historical data: a case from Palakkad plains of Kerala. His study examined the general trend of rainfall in Palakkad plains, an important rice cultivating area of Kerala and showed significant decreasing trend.

"An assessment of Mangroves, the natural carbon sequestration systems to combat global warming: Indian scenario after Tsunami" was presented by Dr. K. Sivakumar of Centre of Advanced Study in Marine Biology, Annamalai University, Tamil Nadu. His studies indicated that destruction of mangrove forests from Tsunami in Andhra Pradesh, Gulf of Mannar and Palk Bay area of Tamil Nadu and parts of Kerala was lesser though in Andaman & Nicobar Islands, 30% to 80% of mangrove stands were adversely affected. Since mangroves have great capacity to sequester carbon from the atmosphere, conserving existing mangroves and restoring degraded areas would be a wise decision to help combat global warming.

Mr. Bala Prasad, Member Secretary, Manipur Biodiversity Board spoke on "Policy for sustainable forest development for increasing carbon sink and mitigating climate change". His paper carried a comprehensive policy analysis and suggested additional components in existing forest policies. He advocated setting up of a carbon fund.

TECHNICAL SESSION - X

Climate Change and Energy Issues

Chairperson: Sh. Krishan Kalra, Secretary General, PHD Chamber, New Delhi
Co-chair: Dr. B.S. Yadava, General Manager, NABARD, Chandigarh and
Mr. Balaur Singh, Director, Punjab Energy Development Agency
Repporteur: Ms. Nidhi Sarin, UNESCO

Without the near-term introduction of supportive and effective policy actions by governments, energy related GHG emissions, mainly from fossil fuel combustion, are projected to rise by over 50% from 26.1 GtCO2eq (7.1 GtC) in 2004 to 37–40 GtCO2 (10.1–10.9 GtC) by 2030. Mitigation has therefore become even more challenging

Sh. Krishan Kalra, Chairperson pointed out that energy was a major driving factor for development of economy of any country. However, Global dependence on fossil fuels had led to the release of over 1100 Gt of CO2 into the atmosphere since the mid-19th century (IPCC Third Assessment Report). Currently, energy-related GHG emissions, mainly from fossil fuel combustion for heat supply, electricity generation and transport, account for around 70% of total emissions including carbon dioxide, methane and some traces of nitrous oxide. To continue to extract and combust the world's rich endowment of oil, coal, peat, and

natural gas at current or increasing rates, and so release more of the stored carbon into the atmosphere, is no longer environmentally sustainable. Countries, therefore, needed to identify alternate sources of energy.

Dr. B.S. Yadav, Co-chair pointed out that there were regional and societal variations in the demand for energy services. Though the highest per-capita demand was by OECD (Organization for Economic Co-operation and Development) economies, but currently, the most rapid growth was in many developing countries. Sh. Balaur Singh, Co-chair pointed out that the Govt. of India was highly conscious of the need to switch to renewable resources of energy and the Ministry of New and Renewable Energy was promoting solar, wind, micro hydel and biomass power in all states. In the State of Punjab also, a separate Punjab Energy Development Agency had been set up under the Department of Science, Technology

> *No single policy instrument will ensure the desired transition to a future secure and decarbonized world.* Policies will need to be regional specific and both energy and non-energy co-benefits should be taken into account

& Environment and Non Renewable Energy to look into the issue.

Mr. Geoff Cartwright, Chief Operating Officer, EnviTech Biogas, Germany, in his presentation "Anaerobic digestion of paddy straw – Positive impact on climate change" mentioned that the emission of methane, carbon monoxide, nitrous oxide and other oxides of nitrogen was estimated to be 110, 2306, 2 and 84 Gg, respectively in the year 2000 from rice / wheat straw burning in India using satellite images. Scientists had shown a large potential for use of rice straw as a bio-energy feed straw. In Punjab alone, 70 to 80

million tons residues were available for use as fuel. He discussed an anaerobic digestion process using a German technology which generates biogas (which can be used to generate heat / electricity), fiber (which can be used as a nutrient rich soil conditioner) and liquor (which can be used as a liquid fertilizer). He also discussed benefits

to rural economy and positive impact on ecology through this process. Responding to queries from delegates, he informed that anaerobic digestion was the preferred method of waste utilization as it helped to decrease the release of methane (which has a high ghg potential) by converting it into carbon dioxide.

Mr. Kanwar Raj, Head, Nuclear Recycle Group, Bhabha Atomic Research Centre, Mumbai discussed "Climate change and nuclear energy: Radioactive waste management practices in India". His paper outlined the national framework, basic philosophy, R&D, processes and technologies for treatment and methodology for disposal of various types of radioactive wastes. He pointed out that nuclear energy, when properly handled, was most suited to combat climate change while meeting energy requirements as there was no release of any greenhouse gas during the energy production process. Delegates sought information on various nuclear energy producing units in the country and per unit cost of energy production.

Dr. Anul Perera, International Professional Engineer/Former Head of Department, Department of Chemical and Process Engineering, University of Moratuwa, Sri Lanka spoke on "Delta-D Technology – A patented technology that could be used to prevent emission of greenhouse gases from urban solid waste, agricultural waste and farm waste". He informed that in Sri Lanka around 2.3 million tons of rice was produced annually and around 4 million tons of straw and paddy husk were produced as byproduct which were burnt haphazardly by the farmers. His technology rapidly digested all types of biomass into mineral rich organic fertilizer within one to three days depending upon quantity of Delta-D used. After digestion, mineral powders such as rock phosphate, dolomite, calcite, mica, etc. were used to neutralize Delta-D. The process had been tested with market waste, slaughter house waste, poultry farm waste, cattle farm waste, etc. successfully.

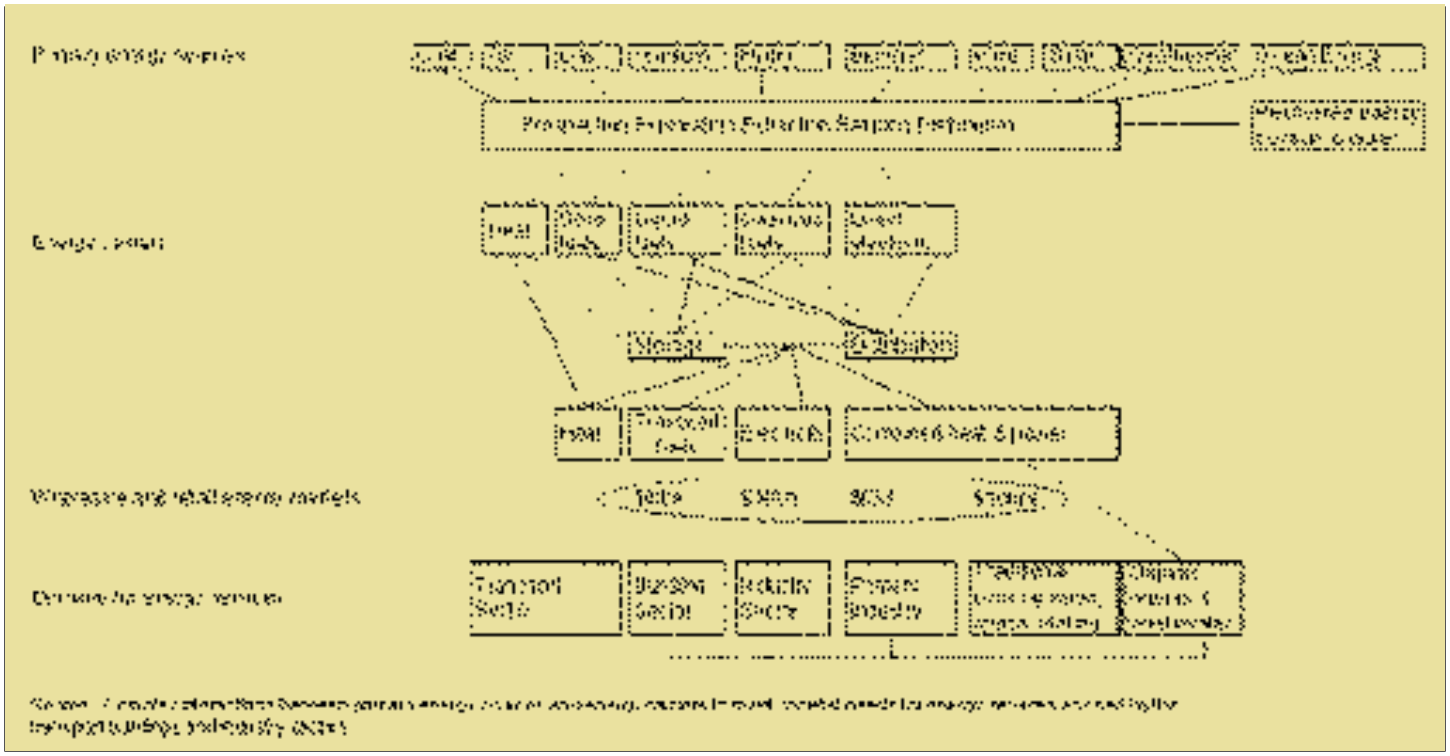
Sh. M.P. Singh from Punjab Energy Development Agency, Chandigarh presented case study of "Climate change and biomass based

energy production in Punjab: High rate biomethanation power project for recovery of energy from the dairy waste at Haibowal, Ludhiana". He also discussed the existing Carbon Credit Mechanism and its status in Punjab.

Dr. R. Soni, Associate Professor, School of Energy Studies for Agriculture, Punjab Agricultural University, Ludhiana, presented a paper on "Decentralized energy generation via biomass gasification". Parameters for designing throatless gasifiers for gasification of rice husk and performance evaluation results of wood and rice husk gasifiers for thermal and mechanical/electric power generation were discussed.

Dr. B.P. Thapliyal from Central Pulp & Paper Research Institute, Saharanpur spoke on "CO2 mitigation in Indian paper industry". He informed that only 20% of the total paper produced in India was being recycled as compared to 40% in the world. Further, studies have shown that there is a scope of 15-20% energy savings which could result in mitigation of 2.41 million tons of CO2 per annum.

Sh. O.P. Ratra, Plastics Chintak, Reliance Industries, New Delhi, spoke on "Sustainable local solution providers for resource use via Plastic waste management: issues debated and corrective measures". He discussed various practices/issues related to plastic waste management and climate change.



TECHNICAL SESSION - XI

Panel Discussion: Future Research and Development Agenda

Chairperson: Dr. Ram Boojh, Programme Specialist, UNESCO, New Delhi
Co-Chair: Dr. R.S. Khandpur, Director General, Pushpa Gujral Science City
Repporteur: Dr. Anita Chowdhary, Indian Agricultural Research Institute, New Delhi

Several participants suggested setting up of a strong database on natural resources and their availability so that climate change impact could be monitored and time series data generated, especially with respect to ecosystem functions & structure, water availability & table depth and biodiversity, in both, protected areas and outside it.

The expert Panelists were Dr. Frank Niranjan, Sri Lanka; Dr. L.M.S. Palni, GB Pant Institute of Himalayan Studies, Almora; Dr. S.S. Marwaha, Chief Executive Officer, Punjab Biotechnology Incubator, Mohali; Dr. R.K. Kohli, Panjab University, Chandigarh; Dr. Ram Boojh, Programme Specialist, UNESCO, Delhi; Ms. Patricia Jung, France and Ms. Huma Beg, Pakistan.

Initiating the discussions Dr. Ram Boojh highlighted the need to create awareness on the issue especially for policy makers. Dr. R.S. Khandpur highlighted the need of developing long term research agenda with a focus on mitigation of climate change. Ms. Huma Beg stressed on adopting the Gandhian philosophy for achieving development which is sustainable. Dr. R.K. Kohli recommended that all South Asian countries including India should join ILTER (International Long Term Ecological Research programs) as short term research programs would have a limited scope. Dr. S.S. Marwaha suggested use of biotechnology for developing drought resistant crop varieties, especially rice, it being the staple food in many South Asia nations. Dr. Frank Niranjan stressed on the need to develop integrated strategies and joint research programs in the South Asian region. He called for adopting a holistic view to address socio-economic problems associated with climate change in the region. Dr. L.M.S. Palni called for launching a pictorial website for general public awareness so that the impact of climate change on ecosystems could be understood by masses through visual assessment. Ms. Patricia Jung recommended enhanced support to renewable energy projects on agricultural waste utilization.

During general discussion, several participants suggested setting up of a strong database on natural resources and their availability so that climate change impact could be monitored and time series data generated, especially with respect to ecosystem functions & structure, water availability & table depth and

biodiversity, in both, protected areas and outside it. Experts from PAU, Ludhiana suggested integrated rain water harvesting and modified cultivation practices. Dr. Siva Kumar, Annamalai University, recommended continuous monitoring of marine ecosystems in the region and enhancing food security in the respective countries' oceans and exclusive economic zones. Dr. Anul Perera suggested focused joint

research initiatives and establishment of research networks in the South Asian Region.

Recommendations based on deliberations during the conference through panel discussions and paper presentations were also drawn and discussed in the open house.

Valedictory Session

The valedictory session of the conference on 4th November, 2008 was attended by Mr. N.S Kang, Principal Secretary, Science, Technology & Environment, Govt of Punjab, Mr. Gurdip Singh, Joint Secretary, Science, Technology & Environment, Govt of Punjab, Mr. Yogesh Goel, Chariman, PPCB, Mr. T.P.S Sidhu, Chief Executive, PEDA, Dr. Ram Boojh, UNESCO, Com. Narinder Singh, Advisor (Retd), Ministry of Renewable Energy and Er. M.S Jaggi, ED, PSCST. Dr. Neelima Jerath presented a brief report of the conference & Dr. Ram Boojh presented major recommendations.

Mr. N.S Kang, Principal Secretary, read the valedictory address on behalf of Sh. R.I. Singh, Chief Secretary, Punjab. He applauded the efforts made by the organizers and emphasized on the need to take effective steps to implement various recommendations of the conference. He said that the conference had helped to highlight actions which were required to be taken by governments for mitigating climate change especially to ensure food security and maintain agricultural productivity.

Sh. T.P.S. Sidhu, mentioned that small initiatives could make big differences. He informed about some of the initiatives of Punjab Energy Development Agency especially with respect to co-generation. Mr. Yogesh Goel, informed about the initiatives taken by Punjab Pollution Control Board towards reduction of carbon emissions by industries (especially brick kilns) and crop residue burning. Com. Narinder Singh in his special remarks mooted for a concrete action plan for promoting energy efficient technologies in the country in general, and Punjab, in particular. He suggested taking existing thermal power plants to co-generation mode and designing new plants in combined mode, developing large scale cold storage facilities on absorption cycle using waste heat as process steam and promoting energy efficiency in small scale industry. Er. M.S Jaggi, ED, PSCST proposed a vote of thanks.

Recommendations of the Conference

The major recommendations which emerged after discussions and deliberations during various technical sessions and panel discussions are as below:

1. Climate change is a complex biophysical process extending beyond geo-political boundaries. Hence, a concerted regional effort/ mechanism needs to be put in place to collectively address the issue. International organizations like, UNESCO and other UN bodies be identified to moderate the South Asian Climate Change Initiatives. Amongst national bodies, India could play a leadership role by promoting Gandhian values.

2. A two pronged strategy needs to be adopted by governments to address the issue of climate change: this includes strategies to adapt to climate change impacts, as well as, strategies to mitigate ghg emissions through innovative technologies.

3. Development and maintenance of a database on earth observatory systems for capturing change dynamics is a key component to address the issue. Trans boundary partnerships need to be established for exchange and sharing of data, especially satellite data. Use of remote sensing for identification of hot spots needs to be promoted. The Department of Space, Govt. of India could play a lead role.

4. Early warning mechanisms for climate change induced disasters need to be developed. A participatory approach between data generators/scientists and

users also needs to be promoted. Hotlines between countries for exchange of such information could be established.

5. Special ecological zones need to be identified for conservation of both, wild & farm biodiversity. Long term ecological research needs to be promoted especially in/around biosphere reserves in the South Asian region which are repositories of biological resources.

6. Food and nutritional security needs to be ensured by all governments. The agriculture sector needs to develop new cropping systems which have a potential to better adapt to changing climates. The focus of agricultural research needs to be on evolving stress resistant crop varieties, advocating crop diversification (both, between species & varieties), assessing economic loss to agricultural sector due to climate variations and its impact on national and regional economies, exploring possibilities of use of ICT and biotechnology for promoting sustainable agriculture and compiling and disseminating indigenous traditional agrarian knowledge.
   The Agricultural Universities in the region and Agricultural Research bodies need to take up collaborative projects for simultaneous crop testing in various ecosystems in the South Asian region. SACEP could play a lead role in developing & nurturing such alliances/projects. Further, research on dryland agriculture, oil seeds and coarse grains be promoted as these crops have a vast potential for adaptability to change climate.

7. Since forests are a large source of carbon sequestration, maintaining and expanding forest cover needs to be taken up on priority. This will automatically conserve biological diversity. Governments are already to this issue but existing programs need to be strengthened. SACEP could also play a lead role in this area.

8. Coastal and marine ecosystems need to be protected by developing, marine biosphere reserves and enhancing food security in the oceans' exclusive economic zones.

9. Special focus also needs to be given to mountain ecosystems especially the Himalayas, to protect perennial water resources.

10. Education and research are a key factor in adapting to and mitigating climate change. The gap between social and ecological science be bridged and local populations be empowered to manage local resources. Regional and local government to take proactive action for capacity building of masses in this respect.

11. Green industry, eco-finance and energy efficiency needs to be accorded high priority in all sustainable development initiatives. Co-generation projects and appropriate biomass utilization needs to be promoted.

12. UNESCO needs to moot the setting up of "Global Impact Assessment Council" to map effects of climate change. Countries also need to assess and monitor health impacts of climate change through appropriate epidemiological studies and take appropriate preparatory actions.

13. Policies, programs and best practices need to be developed, implemented and disseminated. Punjab, which has attained worldwide recognition for successfully implementing the green revolution in the area, can play a leadership role in this direction.

14. Networking of policy planners, program implementers, researchers, NGOs, academicians and grass root workers in the SACAM region needs to be promoted to ensure exchange of information and ideas. UNESCO could play a lead role in this direction.

15. International efforts to address the threat of human induced climate change have grappled with respective roles and responsibilities of developed and developing countries. Though the Kyoto Protocol calls for differential responsibilities, yet developing countries need to become active partners in looking for solutions to the problem.

Organizing Committee

Dr. Ram Boojh, Programme Specialist, UNESCO
Dr. Neelima Jerath, Additional Director-Environment, PSCST

Local Organizing Committees

Convener
Dr. Neelima Jerath

Scientific Program
Prof. R.K. Kohli
Dr. S.S. Ladhar
Dr. S.K. Saxena
Ms. Nidhi Sarin

Publications
Dr. Ram Boojh
Dr. Neelima Jerath
Mr. Gurharminder Singh
Ms. Nidhi Sarin

Reception & Registration
Dr. Neelam Gulati Sharma
Dr. K.S. Bath
Ms. Ravleen Singh

Accommodation
Dr. S.S. Ladhar
Mr. Gurharminder Singh
Mr. Subhash Chand

Food & Administration
Mr. Harish Raj Rai
Dr. Onkar Singh

Transport
Dr. S.K. Saxena
Mr. Vivek

Hall Management
Er. Pritpal Singh
Ms. Divya Kaushik
Ms. Reena Uppal

Poster Session
Mr. Pradeep Garg
Mr. Gursharan Garg

Finance
Mr. Avdesh Kaushik
Mr. Rakesh Grover
Mr. Vikas Sharma

Press & Media
Dr. S.S. Ladhar
Er. Pritpal Singh

Program Outline

DAY-I - Monday, 03.11.2008

Inaugural Session

Registration	:	10.00 – 10.05 AM
Welcome by Er. M.S. Jaggi, Director, Consultancy, Punjab State Council for Science & Technology	:	10.05 - 10.10 AM
Introductory Remarks by Principal Secretary, Science, Technology & Environment, Govt. of Punjab	:	10.10 - 10.20 AM
"About the Conference - UNESCO's commitment to capacity building for combating climate change" by Dr. Ram Boojh, Program Specialist, UNESCO	:	10.20 - 10.30 AM
"Addressing Climate Change issues in South Asian Countries" by Dr. A. A. Boaz, Director-General, South Asia Cooperative Environment Program (SACEP)	:	10.30 - 10.45 AM
Inaugural Address by Sh. Bikram Singh Majithia, Science, Technology & Environment Minister, Punjab	:	10.45 – 11.00 AM
Presidential Address by Ms. Cecelia Barbeiri, UNESCO office in Delhi	:	11.00 – 11.05 AM
Vote of Thanks by Dr. Neelima Jerath, Organizing Secretary	:	11.05 – 12.00 noon

High Tea & Media interaction

Technical Session-I (12.00 noon – 1.50 PM)

Policies and Perspectives

Chairperson: Ms. Cecelia Barbeiri, UNESCO
Co-chair: Dr. A. Boaz, Director-General, South Asia Cooperative Environment Program, Sri Lanka
Repporteur: Ms. Nidhi Sarin, UNESCO

"An Assessment of Alternate scenarios of Climate Change & its impact and opportunities in Food Security " by Dr. S.P. Sharma, Advisor, Ministry of Environment & Forests, Govt. of India	:	12.00 – 12.20 PM
"Human Dimensions of Climate Change" by Dr. P.S. Roy, Deputy Director, National Remote Sensing Centre, Indian Space Research Organization, Department of Space, Hyderabad	:	12.20 – 12.40 PM
"Climate Change & Legal Issues" by Sh. M.C. Mehta, Magsasay Awardee, Leading Supreme Court Advocate	:	12.40 – 1.00 PM
"Livelihoods and landscape strategies providing sustainable solutions to biodiversity conservation and climate change adaptation issues in South Asia" by Ms. Aditi Mehndiratta and J.S. Rawat, IUCN, New Delhi	:	1.00 – 1.20 PM
"Climate Change and Developing Nations" by Ms. Huma Beg, Managing Director, Serendip Productions, Pakistan	:	1.20 – 1.40 PM
Discussion	:	1.40 – 1.50 PM
Lunch	:	1.50 – 2.30 PM

Technical Session-II (2.30 – 4.00 PM)

Climate Change & Biodiversity Issues in South Asia

Chairperson: Dr. P.S. Roy, Deputy Director, NRSC, Deptt. of Space, Govt. of India
Co-chair: Mr. B.C. Bala, Principal Chief Conservator of Forests, Govt. of Punjab
Ms. Anusha Amarsinghe, National Science Foundation, Sri Lanka
Repporteur: Dr. A.K. Sidhu, ZSI, Dehradun

"An Assessment of Alternate scenarios of Climate Change & its impact and opportunities in Food Security " by Dr. S.P. Sharma, Advisor, Ministry of Environment & Forests, Govt. of India	:	12.00 – 12.20 PM
"Human Dimensions of Climate Change" by Dr. P.S. Roy, Deputy Director, National Remote Sensing Centre, Indian Space Research Organization, Department of Space, Hyderabad	:	12.20 – 12.40 PM
"Climate Change & Legal Issues" by Sh. M.C. Mehta, Magsasay Awardee, Leading Supreme Court Advocate	:	12.40 – 1.00 PM
"Livelihoods and landscape strategies providing sustainable solutions to biodiversity conservation and climate change adaptation issues in South Asia" by Ms. Aditi Mehndiratta and J.S. Rawat, IUCN, New Delhi	:	1.00 – 1.20 PM

"Climate Change and Developing Nations" by Ms. Huma Beg, Managing Director, Serendip Productions, Pakistan	:	1.20 – 1.40 PM
Discussion	:	1.40 – 1.50 PM
Lunch	:	1.50 – 2.30 PM

Technical Session-III – Concurrent Session (2.30 – 4.00 PM)

Climate Change, Agriculture & Food Security

Chairperson: Mr. J.S. Rawat, IUCN, New Delhi

Co-chair: Dr. Huma Mustafa Beg, Pakistan

Repporteur: Dr. S.K. Chahal, PAU

"Biodiversity, Food Security & Climate Change" by Dr. Suman Sahai, Gene Campaign	:	2.30 – 2.50 PM
"Impact of Climate Change on Agricultural Biodiversity" by Dr. S.K. Sharma & Dr. J.C. Rana, National Bureau of Plant Genetic Resources, New Delhi	:	2.50 – 3.10 PM
"Climate change & food security in India" by Dr. Anita Choudhary & Dr. P.K. Agrawal, Division of Environmental Science, Indian Agricultural Research Institute, New Delhi	:	3.10 – 3.30 PM
"Banking on Traditional Crop Varieties for Tackling Concerns of Food Security Due to Climate Variability" by Dr. Yogesh Gokhle, Dr. G.R. Gargya & Dr. Lokhendra Singh, The Energy & Resource Institute, New Delhi	:	3.30 – 3.50 PM
Discussion	:	3.50 – 4.00 PM
Tea	:	4.00 – 4.15 PM

Technical Session-IV (4.15 – 5.45 PM)

Climate Change, Agriculture & Food Security

Chairperson: Dr. S.P. Sharma, Advisor, MoEF-GoI

Co-chair: Dr. Frank Niranjan, Council for Agric. Research Policy, Sri Lanka

Repporteur: Dr. Balwinder S. Sooch, Pbi. Univ.,Patiala

"Ecological threats from Alien Invasive Plants in Himachal Pradesh, India" by Dr. R.K. Kohli, Dr. Daizy Batish & Dr. H.P. Singh, Department of Botany, Panjab University, Chandigarh	:	4.15 – 4.30 PM
"Impact of Climate Change on Biodiversity: The Human Dimensions" by Dr. P.S. Roy and Dr. Arjit Roy, National Remote Sensing Centre, ISRO, Department of Space, Hyderabad	:	4.30 – 4.40 PM
"Role of butterflies in the natural ecosystem with special reference to High Altitude (Pangi Valley, Himachal Pradesh)" by Dr. Avtar Kaur Sidhu and Dr. H.S. Mehta, ZSI, Solan	:	4.40 – 4.50 PM

"Shisham Mortality and its Correlation with Climate Change" by Dr. A.N. Shukla, FRI, Dehradun	:	4.50 – 5.00 PM
"Nematodes as bioindicators of climate change" by Dr. A.N. Rizvi & P.T. Bhutia, ZSI, Dehradun	:	5.00 – 5.10 PM
"Winter fluctuation in ruddy shelduck (*Tadorna ferruginea*) population of Asan conservation reserve, Dehradun, Uttarakhand" by M. Vijay & P.T. Bhutia, ZSI, Dehradun	:	5.10 – 5.20 PM
"Habitat deterioration of Freshwater turtles in BanGanaga (Haridwar and around, Uttarakhand, India) – a case study" by Dr. Archana Bahuguna, ZSI, DehraDun	:	5.20 – 5.30 PM
Discussion	:	5.30 – 5.45 PM
Break		

Technical Session-V – Concurrent Session (4.15 – 6.30 PM)

Regional Issues and Sustainable Agricultural Development

Chairperson: Dr. Suman Sahai, Gene Campaign, New Delhi

Co-chair: Dr. M. Al-Amin, Institute of Forestry & Environmental Science, Bangladesh

Ms. Patricia Jung, Consultant, France

Repporteur: Dr. R. Jaishankar, UNESCO

"The Impact of Climate Change and the Himalayas in the local context" by Dr. Ram Boojh, Programme Specialist, UNESCO, New Delhi	:	4.15 – 4.35 PM
"Impact assessment of climate change in highly cultivated tracts of Central Ganga Plain" by Mr. Izrar Ahmed & B.R. Neupane, UNESCO, New Delhi	:	4.35 – 4.55 PM
"Impacts of rising temperature and carbon dioxide concentration on growth and yield of crops" by Dr. Madan Pal, Dr. S. Khetrapal & Dr. Pramod Kumar, Indian Agricultural Research Institute, New Delhi	:	4.55 – 5.15 PM
"Vegetable crops for food, nutritional security and improving livelihood" by Dr. A.S. Sidhu & Sabina Islam, Indian Agricultural Research Institute, New Delhi	:	5.15 – 5.30 PM
"Impact of Climate Change on Fruit Industry" by P.P.S. Gill, .K. Jawandha, Nav Prem Singh & Anita, Department of Horticulture, Punjab Agricultural University, Ludhiana	:	5.30 – 5.40 PM
"Sustainable agricultural development in rainfed sub mountain region: The case for a paradigm shift in land husbandry" by Dr. M.S. Hadda, S. Arora, Dr. K.L. Khaira & Dr. T.S. Khatra, Department of Soil, Punjab Agricultural University, Ludhiana	:	5.40 – 5.50 PM
Discussion	:	5.50 – 6.00 PM
Break		

Technical Session-VI (6.45 – 7.45 PM)

Panel Discussion : Policies, Programs & Best Practices

Chairperson: Dr. A.A. Boaz, Director General, SACEP

Co-chair : Mr. Kanwar Raj, Head, Nuclear Recycle Group, BARC

Repporteur: Dr. Chander Parkash, Khalsa College, Amritsar

Panelist Team : Dr. S.P. Sharma, Advisor, MoEF-GoI, Dr. K. Venkataraman, NBA, Dr. Anul Perera, Sri Lanka
Dr. Ram Boojh, UNESCO, Dr. J.S. Rawat, IUCN, New Delhi
Mr. Jatinder Sharma, CCF, Punjab, Dr. A.S. Sidhu, IARI

Technical Session-VII Poster Session (7.45 – 9.00 PM)

Posters will be put up by Presenters during lunch time and will be available up to 9.00 PM. However, presenters would be available along with posters for questions from 7.45 – 9.00 PM. The session will be concurrent with conference dinner which begins at 8.15 PM

Conference Dinner (8.15 PM)

DAY-II - Tuesday, 04.11.2008

Technical Session-VIII (9.00 – 11.30 AM)

Economic Challenges and Climate Change

Chairperson: Dr. L.M.S. Palni, Director, GB Pant Institute of Himalayan Studies, Almora

Co-chair: Dr. Ram Boojh, Programme Specialist, UNESCO

Repporteur: Ms. Divya Kaushik, PSCST

"Economic Challenges of Climate Change" by Dr. Sandeep Kapoor, Associate Professor, Department of Business Management, Punjab Agricultural University, Ludhiana	:	9.00 – 9.20 AM
"Mathematical Models based on Climatic Factors for Estimating Influence of Climate Change on the Crop Production" by Dr. V.K. Chaudhary , Department of Basic Sciences, University of Horticulture & Forestry, Nauni, Solan	:	9.20 – 9.40 AM
"Climate Change and Biodiversity: Impressions from Iran" by Ms. Mehrasa Mehrdadi, Technical Expert for Natural Environment & Biodiversity, IUCN Focal Point, Department of Environment, Tehran, Iran	:	9.40 – 10.00 AM
"Projections of Climate Change Impact in South Asia" by Mr. Krishan Kalra, Secretary General, PHD Chamber, New Delhi	:	10.00 – 10.20 AM

"Green Entrepreneurship for Sustainability " by Dr. D.D. Sharma, Head, Department of Entrepreneurship Development & Industrial Coordination, National Institute of Technical Teachers' Training and Research, Chandigarh	:	10.20 – 10.40 AM
"Climate Development Mechanism & Carbon Credit Mechanism" by Ms. Shub Kiran, Haryana Env. Deptt. , Chandigarh	:	10.40 – 10.50 AM
Discussion	:	10.50 – 11.20 AM
Tea	:	11.20 – 11.30 AM

Technical Session-IX (11.30 AM – 1.30 PM)

Climate Change & Sustainable Development Issues

Chairperson: Dr. K. Venkataraman, Secretary, NBA, Chennai

Co-chair: Dr. Babu Ram, Member Secretary, PPCB

Repporteur: Dr. R. Jaishankar, UNESCO

'Innovative Participatory Forest Management Approach For Climate Management - A Case Study of Government Facilitated Community Initiatives In Central India' by Ms. O. Boaz and Dr. A. Boaz, Director-General, SACEP, Sri Lanka	:	11.30 – 11.50 AM
"Responding to Challenges of Climate Change: Mountain specific issues" by Dr. L.M.S. Palni, Director, G.P. Pant Institute of Himalayan Environment & Development, Almora	:	11.50 – 12.10 PM
"Enhancing Potential of Soils for carbon sequestration in mitigating climate change' by T.J. Purakayastha, Division of Soil & Agriculture Chemistry, Indian Agricultural Research Institute, New Delhi	:	12.10 – 12.25 PM
"Analysis of the general rainfall trend using the historical data: a case from Palakkad plains of Kerala" by Dr. Nikhil Raj and Dr. P.A. Azeez, Salim Ali Centre for Ornithology & Natural History, Coimbatore	:	12.25 – 12.40 PM
"Mangroves, the natural carbon sequestration systems to combat global warming: Indian Scenario after Tsunami" by Dr. K. Sivakumar and T. Thangaradjou, Centre of Advanced Studes in Marine Biology, Annamalai University, Tamil Nadu	:	12.40 – 12.50 PM
"Policy for Sustainable Forest Development for increasing carbon sink and mitigating climate change" by Mr. Balaprasad, Manipur Biodiversity Board, Manipur	:	12.50 – 1.00 PM
Discussion	:	1.00 – 1.30 PM
Lunch	:	1.30 – 2.30 PM

Technical Session-X Concurrent Session (11.30 AM – 1.30 PM)

Climate Change & Energy Issues

Chairperson: Sh. Krishan Kalra, Secretary General, PHD Chamber

Co-chair: Dr. B.S. Yadava, General Manager, NABARD, Chandigarh

Mr. Balaur Singh, Director, PEDA, GoP

Repporteur: Ms. Nidhi Sarin, UNESCO

"Anerobic digestion of paddy straw-positive impact of climate change" by Geoff Cartwright, Envi Tech Biogas Pvt. Ltd. Germany	:	11.30 – 11.50 AM
"Climate Change and Nuclear Energy: Radioactive Waste Management Practices in India" by Mr. Kanwar Raj, Distinguished Scientist & Head, Nuclear Recycle Group, Bhabha Atomic Research Centre, Mumbai	:	11.50 – 12.10 PM
"Delta-D Technology – A Patented Technology That Could Be Used To Prevent Emission Of Green House Gases From Urban Solid Waste, Agricultural Waste And Farm Waste" by Dr. Anul Perera, Department of Chemical and Process Engineering, University of Moratuwa, Sri Lanka	:	12.10 – 12.30 PM
"Climate Change and Biomass Based Energy Production in Punjab and case study on High Rate Biomethanation Power Project for Recovery of Energy from the Dairy Waste at Haibowal, Ludhiana" by Mr. M.P. Singh, Punjab Energy Development Agency	:	12.30 – 12.50 PM
"Decentralizrd Energy Generation Via Biomass Gasification" by Dr. A.K. Jain and R. Soni, Head, Energy Research Centre, PAU	:	12.50 – 1.00 PM
"CO2 mitigation in Indian Paper Industry" by Dr. A.K. Goel, Dr. B.P. Thapliyal, R.M. Mathur & Dr. T.K. Roy, Central Pulp & Paper Research Institute, Saharanpur, U.P.	:	1.00 – 1.10 PM
"Sustainable Local Solutions Providers for Resource use via Plastics Waste Management" by Sh. O.P. Ratra, Plastic Chintak, Reliance Industries	:	1.10 – 1.20 PM
Discussion	:	1.20 – 1.30 PM
Lunch	:	1.30 – 2.30 PM

Technical Session-XI Panel Discussion (2.30 – 3.30 PM)

Future Research & Development Agenda

Chairperson: Dr. Ram Boojh, Programme Specialist, UNESCO, New Delhi

Co-chair: Dr. R.S. Khandpur, Director-General, Science City

Repporteur: Dr. Anita Choudhary, IARI, New Delhi

Panelist Team : Dr. Frank Niranjan, Sri Lanka, Dr. L.M.S. Palni, Almora, Dr. S.S. Marwaha, CEO, PBTI
Dr. R.K. Kohli, Professor, Panjab University, Ms. Huma Beg, Pakistan,
Ms. Patricia Jung, France

Summing up & drafting of Recommendations To be coordinated by Dr. Ram Boojh and Ms. Nidhi Sarin, UNESCO	:	3.30 – 4.00 PM

Valedictory Session

Welcome and Presentation of Conference deliberations by Dr. Neelima Jerath, Organizing Secretary	:	4.00 – 4.05 PM
Presentation of Conference Recommendations by Dr. Ram Boojh	:	4.05 – 4.15 PM
"Addressing Climate Change concerns through improved technologies in Punjab" by Mr. Yogesh Goel, Chairman, Punjab Pollution Control Board	:	4.15 – 4.25 PM
"Initiatives in Punjab to address Climate Change issues" by Mr. T.P.S.. Sidhu, Chairman, PEDA	:	4.25 – 4.35 PM
Remarks by Secretary, Science, Technology & Environment, Govt. of Punjab	:	4.35 – 4.45 PM
Valedictory Address by Principal Secretary to Govt. of Punjab, Department of Science, Technology & Environment	:	4.45 – 5.00 PM
Vote of Thanks	:	5.00 – 5.10 PM
Tea & Dispersal	:	5.15 PM

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