

SATNET Regional Workshop on: Climate Resilient Small Holder Agricultural Farming Systems in South Asia

24-27 June 2013, New Delhi, India

Workshop Report



The Network for Knowledge Transfer on Sustainable Agricultural Technologies and Improved Market Linkages in South and Southeast Asia (SATNET Asia) aims to support innovation by strengthening South–South dialogue and intraregional learning on sustainable agriculture technologies and trade facilitation. Funded by the European Union, SATNET facilitates knowledge transfer through the development of a portfolio of best practices on sustainable agriculture, trade facilitation and innovative knowledge sharing. Based on this documented knowledge, it delivers a range of capacity building programmes to network participants.

SATNET Asia is implemented by the Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA) in collaboration with the AVRDC – The World Vegetable Center, the Asian and Pacific Centre for Transfer of Technology (APCTT), the Food Security Centre of the University of Hohenheim and the Trade and Investment Division of UNESCAP.

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Executive Summary

The SATNET Regional Workshop on Climate Resilient Smallholder Agricultural Farming Systems in South Asia was held in New Delhi from 24-27 June 2013. The workshop, which was organized by the Asian and Pacific Centre for Transfer of Technology (APCTT) in collaboration with the United Nations Disaster Management Team (UNDMT-India) including UNICEF, reviewed the latest global and regional developments in the area of Climate Change Adaptation (CCA) and strengthened the capacity of key stakeholders for promoting climate resilient farming systems for the benefit of smallholder farmers. The event comprised of a South Asia Regional Consultation on CCA led by UNICEF and UNDMT-India that examined recent policy discourses and priorities on CCA in the context of the post-2015 sustainable development agenda with a focus on resilience. The consultation brought together over 170 experts in the field of Disaster Risk Reduction (DRR) and CCA as well as other representatives from national governments, civil society organizations, academia and the United Nations.

The consultation focused on good practices in CCA policy and implementation from across the region. Among the key messages that emerged from the consultation was that successful adaptation to climate change requires extensive efforts from all stakeholders, and that CCA needs to become an integral component of overall development processes.

The next two days of the event were dedicated to a training programme on 'Climate Resilient Smallholder Agricultural Farming Systems' led by APCTT. The training addressed ways to increase agricultural productivity in the context of CCA, and strengthened the awareness and knowledge of participants on climate resilient farming practices. The training programme delivered intensive lectures on topics such as high yielding and stress tolerant varieties of cereals, improved cereal-based cropping systems, water resources management, integrated soil health management, biological control of pests and diseases, post-harvest management practices, and examples of agri-business models. About 45 experts from government agencies, research institutions and civil society from Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka, as well as from some international organizations participated in the training.

The training content, which had been designed in a participatory and demand-driven procedure involving intensive prior consultations with SATNET Associates, provided a broad-ranging yet systematic coverage of the theme. In their feedback, the participants commended the quality of the workshop and reaffirmed their plans to actively apply the training upon returning to their host organizations in order to promote climate resilient agriculture. Effective linkages with the resource persons as well as amongst the participants themselves were established for future collaboration in areas such as access to improved cereal crop varieties and sourcing of better quality inputs.

South Asia regional Consultation on Climate Change Adaptation (SACCA) & SATNET Regional workshop on: Climate Resilient Small holder Agricultural Farming Systems in South Asia

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Introduction

SATNET is working with institutions that share knowledge on sustainable agricultural technologies and improved market linkages in the region. Funded by the European Union, this initiative facilitates knowledge transfer through the development of a portfolio of best practices on sustainable agriculture, trade facilitation and innovative knowledge sharing. It also delivers a range of capacity-building programmes to network participants to enable them to transfer this knowledge to those who need it most i.e. smallholder farmers and small-scale entrepreneurs.

Climate change is occurring more rapidly than anticipated and associated increases in extreme weather events and increased variability in climate cause severe disruptions in agriculture. Existing technologies and current institutional structures may not deliver the abatement needed to mitigate climate change and at the same time meet the needed food security, livelihood and sustainability goals. It is necessary to identify actions that are science-based, utilize knowledge systems in new ways, and support the resilience of food systems and ecosystems in agricultural landscapes.

Organized by the Asian and Pacific Centre for Transfer of Technology (APCTT) in collaboration with the United Nations Disaster Management Team (UNDMT-India) including UNICEF, the “Regional Workshop on Climate Resilient Small Holder Agricultural Farming Systems in South Asia” comprised of two parts. The “South Asia regional Consultation on Climate Change Adaptation (SACCA)” held from 24-25 June, 2013 gathered a broad range of stakeholders from South-Asia and focused on climate change adaptation in the context of Disaster Risk Reduction and improved resilience for communities. The objective of the consultation was to introduce the stakeholders to broader issues regarding climate change adaptation, to enable exposure to best practices in South Asia and to allow them to share their experiences and provide inputs to the discussions. The Consultation also reviewed the latest global and regional developments in the area of climate change adaptation.

The consultation was followed by two day training on “Climate Resilient Small Holder Agricultural Farming Systems in South Asia” from 26-27 July, 2013. The training aimed to:

- Strengthen the capacity of key stakeholders for promoting climate resilient farming systems for the benefit of smallholder farmers.
- Highlight good practices and key success factors.
- Enable intra-regional learning of good practices through South-South cooperation.

This Meeting Report comprise of two components: 1. Report of the South Asia regional Consultation on Climate Change Adaptation (SACCA) 2. Report of the Regional Workshop on Climate Resilient Small Holder Agricultural Farming Systems in South Asia.

Meeting Report

SOUTH ASIA REGIONAL CONSULTATION ON CLIMATE CHANGE ADAPTATION (SACCA)

'MANAGING RISK FOR RESILIENCE',

24-25 June 2013, New Delhi, India

The South Asia Regional Consultation on **Climate Change Adaptation: Managing Risk for Resilience** was organized on 24th and 25th June 2013 at the Oberoi Hotel in New Delhi. The objective of the convention was to review the policy and practices of Climate Change Adaptation, identifying key priority actions for South Asian countries with actions related with disaster reduction and management in the most sustainable fashion. The consultation commenced with lamp lighting followed by a welcome note addressing various delegates representing countries of the South Asian region.

Inaugural Session

1. *Mr. David McLoughlin*, UNICEF

At the outset, Mr. McLoughlin stated that it is an opportune time to discuss climate change and related risks and resilience. In the light of Uttarakhand floods, he said that we need to act collectively, engage and collaborate to deal with the problems pertaining from climate change. The global climate is now rapidly changing with observed consequences on social and environmental conditions across all continents. Over the past century, the earth's surface has on an average warmed by more than 0.8 °C, with 75% of that warming occurring rapidly in the past three decades.

Despite good intentions, global greenhouse gas emissions continue to rise every year having significant impact on food, water, and social and economic bases of societies all over the world and particularly in developing countries. Failure to anticipate, prepare for, and prevent climate related losses and damages will compromise sustainable development prospects and will be costly.

Over the last quarter of the century, despite all progress, South Asia remains home to four out of every 10 of the world's poor; 600 million of South Asia's 1.5 billion people live on less than \$1.25 per day. Almost half the children below five are underweight, accounting for more than half of the world's undernourished children. Imbalances in economic growth, inequality among castes, classes, between genders, and a region beset by disasters, have added to the suffering of the poor and those most vulnerable and marginalized.

Climate change is predicted to have severe consequences for South Asia, particularly in agriculture, which employs more than 60 per cent of the region's labor force. Some of the predicted impacts of climate change include increased variability in both monsoon and winter rainfall patterns; increase in average temperatures, with warmer winters; increased salinity in coastal areas as a result of rising seas and reduced discharge of major rivers; weakening ecosystems; the recession of glaciers in the Himalayas; and increased frequency and/or severity of extreme weather events (floods, cyclones, and droughts)

Children play a reduced role compared to adults, as consumers of energy and resource intensive goods and services, but are recognized as the most vulnerable population that will bear the brunt of damages and lives lost due to climate change. Climate change impacts are not only inequitable, but will further exacerbate existing vulnerabilities and inequities, and make climate-sensitive development issues, particularly health, nutrition, and WASH, harder and more expensive to deal with. In this context it is our obligation to look at the generations to come.

Scientific evidence observes and estimates significant negative impacts of climate change on children— particularly child nutrition, health, safety, and equity – as alterations in water and agricultural systems, extreme weather, and various forms of environmental degradation play out around the world.

WHO estimates that since the year 2000 climate change was already responsible for an additional 127,500 avoidable child deaths each year due to climate exacerbated malnutrition, diarrheal diseases, and malaria alone. Estimates for nutrition; project that by 2050 there will be an 8.5% to 10.3% increase in the number of malnourished children in all developing countries. Other studies show up to a 29% increase moderate stunting in developing countries, and regionally up to a 62% increase in South Asia, compared to a world without climate change. Acute and chronic under-nutrition, including micronutrient deficiencies are expected to rise along with long and short-term food insecurity in coming decades. Climate induced flooding; drought, salinization, and plant diseases threaten future food security, particularly in areas dependent on rain-fed agriculture. Food insecurity that can drive population displacement and malnutrition is increasing the risk of acquiring and dying from infectious diseases.

The population at risk of increased water stress in Africa is projected to be between 75-250 million additional people by the 2020s, and 350-600 million by the 2050s. Higher water temperatures and changes in extremes, including floods and droughts, are projected to affect water quality and exacerbate many forms of water pollution. Climate change is already increasing, and will continue to increase disaster risk in many countries, as more vulnerable people and assets including schools and health centers are exposed to weather extremes. Children may be forced to miss or drop out of school as a result of destruction of schools or related infrastructure or to help their families recover from extreme events. Population displacement and stress are predicted outcomes of climate change and induce multiple challenges for the protection of children, particularly as stressful events such as loss of family members or livelihoods can trigger negative coping mechanisms like violence, child trafficking, child labor and early marriage.

Responding to climate change is not only about reducing risks. Slowing climate change requires a social transformation of values through relevant learning and education systems, application of innovative sustainable technologies to shift global consumption and production to sustainable low-emission pathways, reductions in inequalities and strong inclusive local governance.

Addressing climate change calls for investment to support the most vulnerable families and communities to cope with and respond to unavoidable impacts. Two key **approaches** can build resilience to climate change:

(1) Climate Change Adaptation (CCA) aiming to reduce the negative impacts of climate change by applying knowledge about changing climate patterns into local decisions and investments, and modifying development programming to incorporate climate change adaptation and reduce climate risks.

(2) Climate Change Mitigation (CCM) aiming to reduce greenhouse gas emissions causing climate change.

Information and knowledge management are key to building capacity and competency in climate change adaptation. Similarly there is a need to pursue a community-oriented multi-sectoral approach to simultaneously address both adaptation and mitigation needs.

There is a need to further build evidence based on climate related impacts, needs, and concerns especially in regard to the generations to come. There is also need to build the capacity (through sustainable formal and non-formal education approaches) and critical skills of children, youth, adolescents and their families so they can adapt to climate change and climate change impact and become resilient. There is also a need to develop technical capacity and partnerships to access and use climate information in order to adequately understand risks. Of essential importance in the process of achieving resilience and adapt to climate change is to support and partner with young people to foster their leadership in Environmental Stewardship and decision making processes as well as to increase the advocacy and policy visibility of children's issues in national and global climate policy and networks.

Climate change is a global phenomenon that exacerbates current local problems. It will bring both longer-term changes and short-term surprises to society, and is thus both a development and humanitarian issue. Climate change adaptation therefore requires preparing for short term impacts of climate variability such as extreme flood events, as well as for gradual long term impacts such as increasing climate warming which will gradually reduce water availability or make areas currently free of malaria or dengue more favorable for vector breeding and disease transmission. Looking forward, a vast range of specific climate-related risks to children is expected to increase.

Investment in adaptation or mitigation is not an 'either/or' option. Both climate change adaptation and climate change mitigation are necessary strategies to prevent negative and mitigation efforts are an investment in intergenerational equity and preventing children in the future from being born into a dangerous and unhealthy world.

Although climate change is a new area of work with specific new tools, information, financial mechanisms, and areas of engagement, it presents opportunities to build strong linkages between sectoral programs, and development and humanitarian action in three ways: (1) Development advances strengthen communities to deal with future climate crises; (2) CCA and CCM are cross-cutting approaches that enhance existing programs to manage specific climate risks, build climate resilience, and sustainability in those areas; (3) Climate risks are not the only risks children face -- climate change will exacerbate social, biological, disaster, and possibly also conflict risks.

Mr. McLoughlin concluded his opening address by hoping that the following two days of intensive discussions will provide opportunity for exchange and brainstorming amongst South Asia Countries on the issues related to Climate Change Adaptation and will bring forward essential common points for joint agenda and action in South Asia so as to achieve an enhanced resilience of communities to climate and disaster induced shocks and achieve equitable, sustainable growth today and for the generations to come.

2. Ms. Lise Grande, UNDP

Ms. Grande initiated her address by stating that climate change and global poverty have attracted considerable attention in recent years as key global justice challenges of present times. Both are serious challenges to the future health and prosperity of our planet. They must be combated simultaneously and we cannot take care of one without addressing the other.

Climate change cannot be dealt effectively; without considering the rising energy needs of poor people and countries, nor can the global poverty be addressed without accounting for the impacts of climate change on agriculture, disease patterns and severe weather events, all of which particularly impact the poorest countries.

In recent years the development community has become increasingly concerned about the adverse effects of climate change on poverty reduction and sustainable development. Climate change presents significant threats to the achievement of the Millennium Development Goals (MDGs) especially those related to eliminating poverty and hunger and promoting environmental sustainability. An increasing body of evidence points to the disproportionate negative impact that climate change will have on the poorest countries that, ironically, have contributed least to the problem.

Climate change is expected to increase the frequency and intensity of severe weather events and many poor countries lack the infrastructure necessary to respond adequately to such events. As a consequence, diseases such as malaria are likely to expand in range, impacting more people in the poorest regions of poor nations that are already most affected by such diseases. Changing rainfall patterns could devastate rain-fed agriculture on which so much of the population in poor countries depends to survive.

Currently over two billion people in the world lack access to a reliable energy source. Reducing poverty, expanding health services, promoting economic growth, and meeting the MDGs in poor countries will be predicated on significantly increased energy supply. Whether this energy comes from fossil fuels or renewable sources will have tremendous ramifications on global greenhouse gas emissions and climate stability.

Scientists warn that if we are to avoid the most dangerous climate change impacts, worldwide emissions of greenhouse gases will have to peak around 2015, and decline sharply thereafter. This means that the energy path that poor countries follow will have a significant bearing on the prospect of the most extreme climate change. How these countries grow and address poverty will affect climate change. Similarly, increased incomes and education in the poorest countries (part of MDGs 1 and 2) will increase the financial and human capacity of these countries to respond to climate change impacts.

During the past century the global climate warmed by about 0.7°C because of human activities, with accompanying changes in rainfall patterns, extreme weather events, and sea levels, and another 1.4°C–5.8°C temperature rise is projected in the next hundred years. The impacts of higher temperatures, more variable precipitation, more extreme weather events, and sea level rise are already being felt and will continue to intensify. Although aggressive mitigation of greenhouse gas emissions is crucial if dramatic long-term changes are to be averted, most of the changes projected for the coming decades can no longer be avoided.

The consequences of such changes include decreased water availability and water quality in many arid and semiarid regions; an increased risk of floods and droughts in many regions; reduction in water regulation in mountain habitats; decreases in reliability of hydropower and biomass production in some regions; increased incidence of vector- and waterborne diseases such as malaria, dengue, and cholera; increased heat stress mortality; threats to nutrition in developing countries; increased damages and deaths caused by extreme weather events; decreased agricultural productivity with almost any warming in the tropics and subtropics; adverse impacts on fisheries; and adverse effects on many ecological systems. Developing countries, and particularly the poorest people in these countries, are most vulnerable to such changes. Their economies depend heavily on agriculture, forestry, fisheries, a reliable water supply, and other natural resources. They also have limited human capacity and limited access to technology and capital to invest in risk reduction.

The increasing risk of weather extremes comes against a backdrop of rising losses from natural disasters and increasing numbers of people affected. The occurrence of country level disaster has increased from 400 in 1990 to close to 900 in 2005. The economic and human impact of disasters has increased dramatically in the last 12 years resulting in US\$ 1.3 damage, 2.7 billion people affected and 1.2 million people killed. Some of these increases can be explained by population growth and the fact that more assets are at risk, but they also reflect mal-adaptation—an increasing exposure to extreme events as a result of investments and settlement in hazardous locations. Sadly, instead of improving our capacity to withstand the extremes of a changing climate, many development efforts may well be contributing to a rise in vulnerability.

Climate change will hamper the achievement of many of the United Nations Millennium Development Goals (MDGs), including those on poverty eradication (MDG1), child mortality (MDG2), combating HIV/AIDS, malaria, and other diseases (MDG6), and environmental sustainability (MDG7). Several studies have suggested that in the absence of adaptation, the annual costs of climate change impacts in exposed developing countries could range from several percent to tens of percent of gross domestic product (GDP) in exposed developing countries. Much of this damage would come not gradually and incrementally through the years but in the form of severe economic shocks. In addition, the impacts of climate change will exacerbate existing social and environmental problems and lead to migration within and across national borders.

Climate change is clearly not just an environmental issue but one with severe socioeconomic implications, particularly in developing countries. The poverty experienced by millions of women and men is shaped by inequalities that discriminate against and marginalize certain social groups by denying them their right of access to resources, opportunities, and power. The most pervasive of these inequalities, and the one which affects all communities, is gender inequality. A gender inequality is a fundamental issue related to women's human rights, as well as a major barrier to sustainable development. Across the world, women tend to hold less power and to have control over fewer resources than men, at every institutional level. Women's disadvantage – their unequal access to resources, legal protection, decision making and power, their reproductive burden, and their vulnerability to violence – consistently render them more vulnerable than men to the impacts of climate change and disasters. Understanding how gender relations shape women's and men's lives is therefore critical to effective Climate Change.

Women tend to be more vulnerable to the effects of climate change and are affected in their multiple roles as food producers and providers, as guardians of health, as care-givers, and as economic actors. Drought, saline intrusion into water sources, and erratic rainfall all cause women to work harder to secure resources such as food, water, and fuel. They mean that women have less time to earn an income, to access education or training, or to participate in decision-making processes. This, in addition to the fact that women make up the majority of the world's poor, means that climate change and disaster are likely to have disproportionately negative effects on them, potentially increasing their poverty and unequal status.

However, women are not just victims. They demonstrate extraordinary powers of resilience during disasters and they can also be powerful agents of change. Women have repeated initiatives to adapt to the impacts of climate change, and their knowledge and responsibilities related to natural resource management have proven critical to community survival. The skills, experiences, and capacities of women need to be harnessed alongside those of men by those implementing Adaptation and Risk Reduction programmes

Climate change is no longer an issue for the distant future. It is already taking place, and the South Asian countries, particularly the poorest people, are most at risk. The impacts of higher temperatures, more variable precipitation, more extreme weather events, and

sea level rise are felt in South Asia and will continue to intensify. Such impacts result not only from gradual changes in temperature and sea level but also, in particular, from increased climate variability and extremes, including more intense floods, droughts, and storms. These changes are already having major impacts on the economic performance of South Asian countries and on the lives and livelihoods of millions of poor people.

The Intergovernmental Panel on Climate Change Fourth Assessment report (IPCC) provided specific information for South Asia region concerning the nature of future impacts, some of which include:

- Glacier melting in the Himalayas is projected to increase flooding and will affect water resources within the next two to three decades.
- Climate change will compound the pressures on natural resources and the environment due to rapid urbanization, industrialization, and economic development.
- Sea-level rise will exacerbate inundation, storm surge, erosion and other coastal hazards.

The consequences of such environmental changes on South Asia's poor include:

- Decrease in water availability and water quality in many arid and semiarid regions; an increased risk of floods and droughts in many regions;
- Reduction in water regulation in mountain habitats;
- Decrease in reliability of hydropower and biomass production; Increase in incidence of waterborne diseases such as malaria, dengue, and cholera;
- Increase in damages and deaths caused by extreme weather events;
- Decrease in agricultural productivity;
- Adverse impacts on fisheries;
- Adverse effects on many ecological systems.

As a result of these changes, climate change could hamper the achievement of many of the MDGs, including those on poverty eradication, child mortality, malaria, and other diseases, and environmental sustainability.

Much of this damage would come in the form of severe economic shocks. In addition, the impacts of climate change will exacerbate existing social and environmental problems and lead to migration within and across national borders. In sum, climate change is clearly not just an environmental issue but one with severe socioeconomic implications in South Asia.

Climate change directly affects the MDG goal of eradicating poverty and also puts at risk many projects in a wide range of sectors, including infrastructure, agriculture, human health, water resources, and environment. The risks include physical threats to the investments, potential underperformance, and the possibility that projects will indirectly contribute to rising vulnerability by, for example, triggering investment and settlement in high-risk areas. The way to address these concerns is not to separate climate change adaptation from other priorities but to integrate comprehensive climate risk management into development planning, programs, and projects.

Beyond the traditional categorization of climate change as an environmental issue, it is clearly also a development issue; a poverty reduction, food security, economics, health, human rights, governance and equality issue. It is an MDG issue. In order to mitigate the most severe development-related impacts of climate change, new approaches must be adopted, such as vigorous adaptation to improve resilience of vulnerable communities during the next few decades. The implementation of climate change adaptation actions needs to be done on the basis of:

- Climate scenarios and economic impact assessments;
- Financial needs assessments;

- Capacity building and risk management strategies;
- Integration of adaptation actions into sectoral and national planning;
- Development of risk management and risk reduction strategies; including insurance, and disaster reduction strategies;
- Support to design of policies that are appropriate for a world of uncertainty, change and surprise.

Mainstreaming climate change adaptation and mitigation through greater focus on local adaptive capacity, community engagement and participation is therefore of utmost importance. Ms. Grande mentioned that addressing climate change presents unique opportunities to:

- Advance sustainable development;
- Encourage a more inclusive approach to economic growth;
- Invent cleaner technologies to reduce greenhouse gas emissions while promoting growth;
- Counter the worst environmental catastrophe;

Her address concluded on the note that all efforts require a shared understanding of long-term goals, effective leadership and an ability to build and facilitate concerted action among all players and at every level.

3. Mr. Shashidhar Reddy, Honorable Vice Chairman, National Disaster Management Authority

Mr. Reddy commenced his address by welcoming various participants and delegates. He offered his condolences to the families of all those who lost their lives in the recent disaster that struck Uttarakhand. He stated that the assembled delegates are here to discuss about events like the one witnessed a week ago. It certainly is an example of the extreme weather events that we all are concerned about. Therefore, we need to make this a serious effort to understand the implications of such disaster to which South Asia is highly vulnerable.

Extreme weather events are on a rise. In the year 2005 Mumbai received 944mm rainfall in just 24 hours; which demonstrates that nature can be so overwhelming. Even countries like Japan, which is one of most prepared countries in the world could not help but get devastated in various natural calamities. Such disasters have a negative impact on the economy of the country and lives of people. There is an additional dimension in the South Asia context, where there is tremendous growth in population and a rising trend of urbanization. India is all set to go past China in the next couple of decades in terms of population growth. This is the reality and we all have to factor in all our efforts for climate change adaptation considering these two dimensions.

The growing trend of urbanization is a matter of serious concern, and the fact that coastal population would be the most affected with the impact of climate change is also inevitable. Presently we are experiencing sea level rise, extreme weather events and increased number of cyclones. This has a direct impact on the agricultural production, as has been mentioned earlier by the first two speakers. Climate change is a continuous process and has been witnessed from times of evolution. The pace of climate change has put a challenge on all of us.

One of the gaps in Uttarakhand floods was the lack of appropriate weather monitoring and forecasting capability. If these systems had been in place several lives could have been saved. We need to leverage science and technology to avoid such calamities. There were number of pilgrims visiting pilgrimage sites in Uttarakhand this summer. There has been growth of religious tourism in the hill state area. It has proved to be a source of livelihood for many, but the systems were not capable

of dealing with managing a disaster for such large proportion of people. With the possibility of closing down of pilgrimage we can imagine that it will also impact the livelihood options of so many people.

In India, the need is to focus on disaster risk reduction; which should be an integral part of the five year developmental plans. It should also be integrated with flagships plans which reach out to millions of people. Mr. Reddy wrapped up his address by thanking the organizers for facilitating this forum which would create opportunities to discuss and dialogue. This in his view would certainly contribute to collaborative learning from each other's experiences.

Session I: Setting the Context – Post 2015 Priorities

1. Mr. G. Padmanabhan, UNDP, India

Mr. Padmanabhan laid the context for the conference by sharing a few slides which highlighted some of the emerging concerns related to disaster risk reduction and climate change adaptation at global and regional level. First and foremost he talked about the Hyogo Framework for Action (HFA), highlighting its five key priority areas which are as follows:

1. Ensuring that disaster risk reduction is a National and local priority with a strong institutional basis for implementation.
2. Identifying, assessing and monitoring disaster risks and enhancing early warning.
3. Using knowledge, innovation and education to build a culture of safety and resilience at all levels.
4. Reducing underlying risk factors.
5. Strengthening disaster preparedness for effective response at all levels.

Thereafter he shared the progress achieved in various priority areas. He mentioned that most progress has been achieved in priority areas 1 and 5, whereby the capacity to respond to disasters has improved. There is also an increased investment in corrective disaster risk reduction; but that has not been very well documented. Progress has been attained in overall preparedness which has resulted in subsequent decline in the mortality risks. However, the progress attained for priority area 4 of HFA is considerably low.

He further went on to discuss the emerging priorities from the global consultations. First and foremost there is a pivotal need to strengthen the local capacities to undertake risk reduction activities by involving people and local leaders. Unless action at this level is made inclusive, effective risk reduction cannot be achieved. Secondly, there is a need to promote a holistic approach that recognises disaster risk reduction and climate risk management as fundamental to poverty eradication and sustainable development. This also implies that the key sectors such as health, education, infrastructure, agriculture should address disaster risk reduction concerns in its development decision making process and programme implementation. Finally, there is a need to understand disaster risk in totality and use that information for prioritising investment pertaining to risk reduction. Countries need to invest in strengthening data systems, enhancing capacities, improving governance systems (including accountability) and ensuing robust monitoring.

Moving on he discussed the national recommendations post HFA; which have been enlisted below:

- There is a need to strengthen the institutional structures and legal instruments.
- A set of relevant regional targets must be postulated (in addition to the global targets)

- Considering the rapid growth of urban areas Urban Risk Reduction must be flagged as a key area of importance.
- It is imperative to integrate disaster risk reduction and climate change concerns to sustainable development goals (SDGs)
- Focus should be on promoting governance and political will to build resilience
- Quality of life indicators should be highlighted

He also summarized the key learning(s) from the Global Platform for DRR; where there were around 3500 participants from over 172 countries. There is an urgent need to target the root cause(s) of risk (like: poverty, disease, violence and so on). Development agendas need to be integrated with sustainable development and environmental protection. Tremendous economic losses result as a result of disasters and calamities. There is a growing concern to fully understand the urban risks. Appropriate frameworks at global, regional and local level need to be in place, which will help create an enabling environment. Also the solutions have to be sought at the local level. The need is also to steer the private sector's investment towards greater resilience. Also initiatives must be taken up to strengthen the scientific and technical support systems. There is an unmet demand for data, tools, methods and guidance on implementing risk reduction, and a shortage of specialists educated and trained for the task. There is a critical need to include disaster risk across all disciplines starting from the school curriculum itself.

Towards the end, Mr. Padmanabhan shared his observations and analysis of climate change events; which have been enumerated below:

- Extreme events are on a high
- Hazard profile changing (e.g., cloudburst in Uttarakhand)
- Primary hazards are triggering secondary hazards
- Capacity development is occurring at a slow pace
- Enabling environment exists in terms of policies and laws, but unable to do anything due to inadequacies of capacities of institutions and functionaries.
- Lack of knowledge management
- Lack of monitoring

Session II: Global and Regional Priorities of Climate Change Adaptation

A. Climate Change Adaptation- An Overview

1. *Dr. Ashok Khosla*, Development Alternatives on Effective governance on Managing Risk for Resilience

Mr. Khosla began his presentation by stating that the key to resilience and a safer future lies in adaptation. Large parts of the country near the Himalayan range have known to be prone to disaster. Enormous floods in the Northwest part of the continent have occurred in 2010, which affected 20 million people (with more than 2000 deaths); and, in the following years 2011 and 2012, 470 and 422 persons died affecting 9 and 4.7 million people respectively. In the aftermath of the recent floods in 2013 where the deaths are estimated to be more than 5000 (on paper), he posed the question of what is it to be expected and how ready are we for other impending disasters?

In the context of South Asia especially, the integral question that needs addressing is if there is anyone in charge. It is well known that the consequences of Climate Change are huge, ranging from food insecurity, water insecurity, and disappearance of glaciers, desertification and drought-like

conditions, to increased incidence of floods, forest fires, vector borne diseases, and species' extinction. There has known to be eventual massive displacement of communities for securing jobs and livelihoods.

This dismal situation of the consequences of climate change is primarily due to callousness among most governments and unchecked development with little or no concern for the environment. Natural disasters in India have been increasing exponentially as is evident by the following figures. According to National Disaster Management Authority (NDMA), the disasters in India between 1990 and 2005 have impacted human lives (30 million people affected) and incurred financial losses to the tune of 12% of the Central government's revenue.

It was henceforth recommended that there is a need to see through the scientific lens and arrive at strategies which can be translated into policy and practice. From the climate change perspective, there is a growing need for resilience building, disaster risk mitigation and reduction of vulnerability. Relief and reconstruction can be for immediate need; while rehabilitation should be the longer term approach, he said.

Building resilience requires a lot of hard work in terms of proactive thought and action. Approaches to deal with climate change are as follows:

- Risk Mitigation (energy efficiency, clean fuel, lower consumption to reduce carbon emission)
- Adaptation (change in cropping patterns, healthcare, skill building, community resilience)

'Risk management' offers the best of both these approaches together. Further, other adaptation measures could help build resilience, and these include ecosystem-based planning, ecological restoration, creating robust infrastructure, building codes, emergency shelters, emergency medics and most importantly, a proactive system of governance.

2. Mr. Mihir Bhatt, All India Disaster Mitigation Institute on Key Highlights of IPCC Special Report

In his address, Mr. Bhatt shared the key highlights of a Special Report by the Intergovernmental Panel on Climate Change (IPCC) on 'Managing the Risks of Extreme Events and Disasters to advance Climate Change Adaptation'. The report cited 14 case studies, and Mr. Bhatt discussed the connections between the case studies through a well-defined matrix. He then shared his inputs in the case of cyclones and the need for enabling policies and responsive institutions for community action. The significant differences in the quality of governance and investments made in the area of cyclone preparedness and reforestation were appreciated. The work of volunteers and cyclone shelters was found to be praiseworthy, as many deaths were averted and much evacuation work was carried out successfully at the time of the cyclone Sidr. The effectiveness of ecosystem based mechanisms in reducing storm surge, such as the Sunderbans was also mentioned.

Next, he discussed the case of coastal megacities, such as Mumbai. In July 2005, Mumbai recorded a rainfall of 994 mm, leaving more than a thousand people dead, and mostly its slum residents. Other statistics indicate that Mumbai has the largest population exposed to coastal flooding. In such context and the metropolis being the economic capital of the country, such disasters pose considerable threat to life and property.

He further talked about the concept of Small Island Developing States (SIDS). It is known that small islands are most vulnerable to the effects of extreme events, sea level rise and other climate changes. Since these are largely dependent on agriculture, fisheries and other small economies, the

challenge of adaptation is therefore much higher. Maldives presents a case where the tsunami in 2004 caused economic damage as large as 62% of the country's GDP.

Lastly, the case of risk transfer was introduced. It was said that the role of insurance and other risk transfer instruments in Disaster Risk Mitigation and Climate Change Adaptation is significant in developing countries. Also, investing in education, training and public awareness initiatives in the context of climate change can get positive results.

In summary, the synthesis of all lessons learnt point towards the following strategies:

- Need for improving international cooperation- and investments in forecasting, Early Warning Systems (EWS) at regional as well as local levels for disaster preparedness
- Investment in preventive based DRR plans and strategies, instead of response to disasters
- Risk transfer: Include this in public and private programmes
- Invest in knowledge building about DRR and CCA at all levels of education

B. Climate Change Adaptation and post MDG Agenda

3. Ms. Sunita Narain, Centre for Science and Environment

Ms. Narain began her address by contextualizing the discussion against the backdrop of the flood situation in India. Gathering from this, the one thing which she said was inevitable was that climate change is bound to make the world more disaster-prone.

In the context of Uttarakhand floods in the past week, it was mentioned that though the extreme rainfall may not appear to be directly linked to climate change, there has been a definite intensification of rainfall in the region-- a process which requires immediate attention. The recent tragedy in Uttarakhand meant an enormous human loss, more so due to its timing; in the month of June when most people and families are out for holidays, said Ms. Narain. It must be clear from the beginning that the Himalayas are extremely ecologically fragile areas and are the youngest mountain range. Climate change is bound to make the areas surrounding them even more risky and hazardous. The present situation shows that moderate rainfall events have been decreasing and extreme rainfall events have been on the rise.

All of this points to one fact very clearly, that we are now living in an era which is going to make our world more disaster prone; which leaves us with the question 'What do we need to do at the global level?', said Ms. Narain. The only way to address this is for all countries and governments to join hands together for collective action. Although much of what we see today is the consequence of the past, it also needs to be understood that climate change is linked to growth, and we need to secure the interests of the developing countries, which have contributed the least to it. For an effective climate deal, there must not be any compromise on the principle of equity.

In India, there admittedly is a lack of disaster preparedness, but this must not be at the huge cost of occurrence of one disaster after another, added Ms. Narain. The developmental principles being followed in India are not eco-friendly; and it is on this account that the country is beginning to see more disasters in vulnerable areas. Ms. Narain stressed that the Uttarakhand disaster must be seen as much man-made as it is a natural disaster. Setting up of 70 hydroelectric projects one after the other in the region, along with illegal mining, indiscriminate building of roads and infrastructure did much damage to the ecological balance of the area. A development strategy which does not take the ecosystem into account will only become the cause of more disaster. Other countries such as Bangladesh with better disaster preparedness systems could guide India's strategy. She concluded

by stating that the need of the hour is now translation of all the theory about climate change adaptation into action.

C. Climate Change Adaptation in South/South-East Asia

4. Mr. Manu Gupta, SEEDS

Increase in the incidence and scale of disasters presents a great challenge in addressing humanitarian crises. One of the goals of HFA for 2015 was a global reduction in loss of human lives due to climate change; which disappointingly has only increased, said Mr. Gupta. There is also the suddenness of catastrophic events and an increasing complexity of disasters; and this means even lesser preparation, such as what happened in the tsunami and earthquake disaster in Japan recently. The biggest challenge that the world faces is the lack of recognition of these climate related changes and hence subsequent inaction on the issue.

Mr. Gupta stated that the 5th Asian Ministerial Conference on Disaster Risk Reduction held in Indonesia was in effect, an accelerator to the HFA. There, the International Federation of Red Cross and Red Crescent Societies (IFRC) called on governments to commit more resources to support disaster risk reduction initiatives at the local level. Relevant strategies mentioned in the conference are listed below:

- Need to enhance local governance and local level adaptation
- Management of barriers in disaster areas
- Resource mobilization- with extra budgetary provision for disasters
- Inclusion of key stakeholders in the preparedness training
- Partnerships between private and public systems- which are inclusive and multi-sectoral
- Social protection in disaster management, with focus on women, children and especially persons with disability
- Increased public accountability, with education and awareness

Apart from the above, Mr. Gupta stressed on key points for climate change adaptation, which include bringing focus on resilience building (from humanitarian perspective in terms of long term recovery) and identification of efficient systems to deal with disaster and up scaling them.

5. Mr. Sanjay Vashist, Climate Action Network South Asia (CANSAs) on Assessment of South Asian Climate Policy and SAARC declarations

Mr. Vashist presented the assessment of South Asian Climate Policy and SAARC Declarations. The review and assessment of 103 organizations in South Asia highlighted the following facts:

- There is much vulnerability in countries of South Asia in terms of disasters
- All countries are vulnerable to sea level rise, increased intensity of floods and droughts and temperature rise, and need robust intergovernmental policy
- The South Asian countries do not have a large carbon footprint, but there is a need for caution for the future. The current emissions are mainly related to development, and not luxury and lifestyle reasons
- SAARC Declarations: It took 2 years to convert broad points of the policy into specific policy statements (from 2008 to 2010) but even now, with the passage of 3 years, very little has happened on ground

- Knowledge sharing among SA nations must be promoted, as there is a lot the other countries may learn from Bangladesh's model

The major challenges and bottlenecks in the SAARC climate agenda are that there is limited coordination between countries, huge funding gap and information gap and lack of regional cooperation to develop environment-friendly technologies. These challenges can be dealt with creation of knowledge platform and products, institutional coordination, efficient strengthening mechanism and resource mobilization.

In terms of the declarations, not much has been happening on ground, followed by poor monitoring and evaluation. In Mr. Vashist's opinion, the key is to create institutional linkages for knowledge sharing and capacity building, and establishment of a South Asian institute for research and development on the subject. Finally, to tackle the issue of significant trust deficit, there is a need to facilitate coordination and cooperation among the South Asian countries.

6. Mr. Erik Kjaergaard, UNICEF Regional Office EARPO and ROSA on Putting children at the heart of climate change adaptation

Mr. Kjaergaard's presentation focused on placing children at the centre for climate change adaptation. In his opinion, one of the most effective ways to achieve this can be through building synergy and consensus amongst various UN agencies. He stressed on three reasons for focussing on children:

1. Demographic status: South Asia has a large proportion of the world's children (28% of the global total). Their vulnerabilities are much higher and they will definitely feel the full force of climate change.
2. Child rights: All the South Asian countries are signatory to the United Nations' Convention on the Rights of the Child (UNCRC). It is a known fact that rights of children (to food, shelter, education) are highly compromised in the incidence of disasters; with even schools becoming temporary shelters. Several thousands of children in South Asia have been known to bear more gender- based violence, child labour, disability and barriers to learning after disaster strikes, due to lower priority to child protection measures.
3. Policy support: At present, there is low visibility of children in policies related to climate change; however, including perspectives of children and incorporating relevant issues can go a long way in ensuring children their rights.

With children, there is much which can be learnt; even after a disaster strikes, there is beauty in how they can communicate across language and other barriers. The need then is to redefine the identity of the youth from victims of disaster to empowered individuals. Instead of viewing them as passive recipients of assistance, children should be recognized as being able to contribute to climate change adaptation through their participation in:

- Analysing risk
- Communicating risks
- Mobilizing action and resources
- Developing social networks
- Applying scientific knowledge to reduce disaster risk

In terms of advocacy, there has been the creation of the UNICEF's Children's Charter for Disaster Risk Reduction (to raise awareness of the need for a child-centred approach to DRR and for stronger commitment from governments, donors and agencies to take appropriate steps to protect

children and utilise their energy and knowledge to engage in DRR and climate change adaptation) and SAARC Framework for Care, Protection and Participation of Children in Disasters (to reduce the vulnerabilities of children and to provide a comprehensive set of guidelines for national and local governments, international agencies and regional organisations, to address the special needs of children in disasters).

Mr. Kjaergaard further showed statistics from a Geneva study, with multi-hazard vulnerability mapping. Once there is overlay of vulnerability data with child vulnerability, it will help build evidence and child risk in a pro-active way. In this regard, social protection needs to be informed by climate change adaptation and risk management. The need is to ensure that this floor is well-informed and there are targeted social activities, such as swimming lessons, education for empowered citizens, for which concerted action between humanitarian actors and developmental planners will be necessary.

Finally, he summed up his presentation stating the following recommendations:

- Acknowledge the rights of children and young people as a priority in climate change adaptation
- Ensure enhanced agency for children and young people to adapt to climate change
- Ensure adequate, new and additional climate finance towards adaptation of the most vulnerable groups
- Prevent catastrophic climate change through a legally binding treaty for climate mitigation

At the end of the session, Ms. Tileva thanked all panelists and summarized the discussion.

Session III: Examples of Adaptation to Climate Change in South Asia

South Asian Countries Experiences- Community Resilience through Adaptation

Ms. Elizabeth Colebourn, Project Manager, Asia CDKN chaired the third session. She laid the backdrop of the session as one focussing on the realities and challenges from five countries and the adaptive capacities developed by each of these countries to deal with risks associated with climate change and unsustainable developmental agendas. She mentioned that there is disconnect between policies at global and regional level. This session therefore attempts to identify and unravel best practices from various countries and the way forward to adaptation.

1. *Mr. Gehendra Gurung*, Practical Action, Nepal on Community Based Early Warning System in Nepal

Mr. Gurung started his presentation by sharing how the Early Warning System (EWS) worked in case of rising water levels of river Karnali during pre monsoon showers in the third week of June, 2013. He shared the newspaper clippings depicting the flooding conditions in India and Nepal. There has been massive destruction and loss of lives and properties in case of Uttarakhand. The figures reporting the loss are on continuous rise in India. However in Nepal, there has been destruction but there has been no news item on human causality. He attributed this to the 'Early Warning System' which was in place.

Following the continuous rainfall and rising of river level on June 17, 2013 the gauge reader, Ms. Parbati Gurung made a telephone call to the district authorities, stakeholders and communities to

inform them that the river level has reached approximately 9 meters, which is quite close to the dangerous mark. The authorities, stakeholders and the community prepared for evacuation.

After a few hours Ms. Gurung again made another telephone call that the river level has reached the dangerous level mark (10 meters). The community blew their first siren. Local authorities prepared the rescue force. Within a span of few hours she again informed that the river was at warning level (10.8 meters). The community blew their second siren and moved out of the houses. Local authorities mobilized the rescue forces. Communities marshaled all their local teams.

Thereafter Mr. Gurung explained how the early warning system works at the field level. It involves four steps. The first one is participatory risk and capacity assessment; which includes social resource and risk mapping. The community works together to prepare the social, resource and risk map. Participatory risk assessment includes:

1. Review of historic timeline of floods (date and time floods/site of floods/estimated losses and so on)
2. Visiting upstream river gauge centre (tallying community record and record in gauge station on particular date(s) and time(s))
3. Estimating lead time
4. Setting warning levels (first, second and third)

The second step in early warning system is monitoring hazard and risk which entails keeping a check on rainfall and flood monitoring in the upstream. Third step is communicating and disseminating the risk information to communities and stakeholders. The river gauge system provides information through telephone, SMS and internet to various stakeholders (CDO, Police officials, Red Cross officials, FM radio channels and regional media channels) and local communities (chair of VDMC task forces, households). The communication is planned in a parallel fashion.

The fourth and the final step is to build the capacities of the community, authorities and stakeholders. Capacity building initiatives should be geared towards enhancing preparedness; and response capacity and preparedness at all levels must ensure that there is:

- Identification and improvement of evacuation routes
- Identification and improvement of temporary shelters
- Establishment of community emergency centre(s) – equipped with rescue equipment and materials
- Preparation of community task forces for response
- Trainings of the local communities

Moving on, Mr. Gurung in the context of present times briefly enlisted the implications of climate change. These include:

- Frequent and intensive flood and landslides compared to past
- Off-seasonal floods and landslides; which is increasing uncertainties and casualties
- Communities are unaware of the changes and hazards resulting from climate change
- Traditional knowledge and practices are inadequate to respond to climate change and its impacts
- EWS can be used as one of the strategies to strengthen the capacity of the communities for preparedness and responding to climatic uncertainties

While concluding his presentation, Mr. Gurung discussed the way forward and shared a set of recommendations which can assist in creating a framework for action.

- Establish EWS on potential river systems
- Enhance the knowledge and understanding of changing hazards (intensive rainfall, extreme floods, landslides, loose debris mass in the foothills of the Himalaya, glacier lakes, etc.) by establishing effective monitoring stations
- Enhance collaboration between cross border and regional EWS; by formulating and implementing national, bilateral and regional EWS strategies
- Strengthen the weather forecasting system technology at local, national and regional levels for enhancing effective EWS
- Enhance climate resilient development since EWS cannot serve for the protection of immobile assets – settlement, roads, etc.
- Enhance the capacities of communities, authorities and stakeholders to adopt EWS and climate resilient development

2. Mr. Arif Rahman, LEAD Pakistan on Integration between DRM and CCA: Pakistan

Mr. Rehman commenced his presentation on the limitations in Local Adaptation Plan of Action (LAPA) in Pakistan's social, economic and political context. He admitted that the most pertinent factor that impedes the developmental trajectory of Pakistan is the fragile political situation of the country; coupled with disproportionate funding where the defence sector takes up most of the finances and the funding for the social sector remains marginalized and grossly neglected. It is also a well understood fact that poverty and vulnerability constitute a vicious cycle.

To begin with he shared that there have been observable gaps and inconsistencies in formulation of LAPAs. This was supported by evidences from Punjab Disaster Management Authority (PDMA) and Balochistan High Court (BHC). These gaps are attributable to political and structural inconsistencies in policy making in Pakistan.

He revisited the policy context of Pakistan; backtracking it from the 1970s when policies on nationalization were formulated. The 1980s witnessed the depoliticizing of the Pakistani society. Economic and political stability since then has remained elusive. However, the current democratic setup is like a symbol of hope for the times to come. The need is to rectify the disproportionate funding and the high levels of corruption in the government system. In the recent times; there has been devolution of powers; and with the coming in of the Local Government Ordinance (2001) and the 18th Amendment of the constitution; an impetus has been given to local autonomy. He went on to discuss the climate change policy and the role of LAPA; which has created a space for manoeuvring within the local government system.

The importance of LAPAs has increased because the slow federal policy making in the context of climate change can be offset by district level adaptation measures. Additionally, the plans created locally consider both the local contextual needs and constraints. Following the floods of 2010, the Government of Pakistan (GoP) initiated a consultative process which necessitated creation of district wise contingency plans for carrying out rescue and relief operations. Protocols for monitoring of the flood levels and early warning signs were put together. But these actions did not address the intrinsic risks that the communities face; like creation of safe houses, securing food and seeds, creation of formal microfinance institutions and so on. This leaves a void in the climate change policy thinking and planning.

Further on, there are capacity gaps in planning and implementation. The district government lacks financial, physical and human resources required for disaster relief activities. The government is hard pressed to release funds for such activities. The local government official; popularly known as the '*patwari*' is responsible for holding the details of land records and is also the one who prepares the evacuation plan for communities. But the capacities of these officials are not developed to deal effectively during disaster situations. The department of irrigation and the district government have raised financial demands in the past; which has remained mostly unmet. There is also a conflict of understanding between the roles, responsibilities and policy mandates between the department of irrigation and the district government. The responsibility is shared and both the agencies need to work in consonance with each other. Capacity issues thus point primarily towards lack of disaster mainstreaming into policy implementation and budgetary planning.

On the other hand, he talked about the adaptation initiatives that local communities carry out autonomously. The communities move away from the river banks during monsoonal flooding. Moving away they create soil and pebble embankments on a self help basis. But these initiatives are not enough to deal with catastrophes associated with climate change. The communities which move away lack the social capital and other necessary resources. Though there is a possibility of availing private credit; it's largely available through unrealistic collaterals.

Mr. Rehman summed up his presentation with a set of pointers highlighting the "lessons learnt and the way forward" to deal with CCA. These have been enumerated below:

- Defining a unit of area for 'local adaptation' to capture local sensitivities to climate change
- Capacity building to educate and remove confusion over mandates, jurisdiction and responsibilities issues
- Initiating interactions between community and policy makers
- Streamlining CCA planning with national policies. LAPAs designed through consultative process is a valuable learning tool
- Creating bottom-up demand for adaptation related resources will ensure plans formulated at the district level are backed up by resources for adaptation
- Capacity building of local communities is required to develop an understanding of CCA

3. *Dr. Kazi Matin U. Ahmed*, University of Dhaka, Bangladesh on Operational Research on Managed Aquifer Recharge in Salinity Affected and Disaster Prone Coastal Bangladesh

First and foremost, Mr. Ahmed gave a brief introductory context of water availability in coastal areas of Bangladesh. His presentation was largely pictorial, through which he described the initiative to provide perennial water supply in disaster prone coastal region of Bangladesh.

Through the Cyclone Preparedness Programme (CPP); the death rate during disasters had certainly come down but providing safe drinking water to disaster affected population remained a big challenge. There is water scarcity in the coastal regions as the ground water is saline and also has high level of arsenic. To address this issue, an initiative was launched in the year 2009 with the support of UNICEF and University of Dhaka; which took a lead role as a research partner. Other institutions that collaborated in this venture were the government run Department of Public Health Engineering (DPHE), 'Acacia Water' a technical support organization from Netherlands and a number of local NGOs.

Mostly people rely on pond water or the seasonal rainfall water; but at the times of disaster these two sources are not usable. The biggest challenge at hand was to provide safe drinking water to people affected by disasters. The first towards assuring a continuous supply of safe drinking water to people in disaster prone area was to gain the data on overall water supply. With the help of GIS maps the team identified sites with brackish water in the coastal region.

The aim of this initiative was to create a fresh water buffer zone below the ground level. Unlike conventional rain water harvesting system; which usually saves the rain water at ground level tanks and ponds; the plan was to create a reservoir of fresh water in the aquifer containing brackish water. This involved three aspects:

- Source of fresh water
- Mechanism of transferring the water underground
- Mechanism for abstraction of fresh water

As a fresh water source, pond water (which contains accumulated rain water) and rain water collected from roof tops was used. Before transferring the water underground; pre-treatment was carried out using sand filters. To transfer the treated water underground, mechanical pumping and injection wells coupled with gravitational forces were used. For installation of such kind; the site structure is extremely important. Both surface and subsurface conditions are critical in selecting the site. Sub surface exploration is carried out using local/hand drilling techniques. In this way target aquifers are identified; where the stored rain water would be transferred. After a while, water from these sites is tested for salinity, iron and arsenic content.

For this process infiltration wells with large diameters (about 22 inches) were used. The local dealers did not have any idea about this, and neither did they have any prior experience like this. Therefore the research team trained the local dealers. Locally available materials were used to create the screens. This helped in bringing down the cost of construction.

An important facet of this research venture was monitoring. The monitoring process involved four key targets, namely:

- Reducing salinity levels
- Creating a buffer of fresh water
- Reducing the level of arsenic in water
- Reducing the iron content of water

The local community was also involved in the process of monitoring the water on the aforementioned parameters. Local NGOs and other community based organizations also participated in this process. The data was collected everyday and periodic visits were made by the research team.

It was observed by the research team that the local community had started using the water even before it was formally announced that the water is now safe to be used for drinking purposes. The electrical conductivity of water was checked and it was found to be very low; which proved that the salinity levels had reduced considerably. Initially only two such sites had been created; but when the success story was shared with the country head of UNICEF Bangladesh he encouraged to set up more such units across various coastal regions of the nation. Over the past three years; 20 such sites have been created and they are being regularly monitored. Out of these 20 units; 14 are being used on a regular basis.

Another pertinent concern that arose as part of this initiative was the management of abstraction of water from such sites. Local area communities were formed which took care of the

overall management and maintenance of these sites. The research team encouraged the local community to take charge of the Managed Aquifer Recharge (MAR) system to ensure sustainability. Mr. Ahmed shared the results of water testing; and it was found:

- Salinity levels had gone down significantly;
- Arsenic levels in most cases came within the permissible levels as per Bangladesh's standards; and in some cases they were well within the limits of WHO standards;
- Iron content of water had reduced considerably;
- Microbiological quality of water is good as it contains low bacteriological count.

While concluding the presentation Mr. Ahmed suggested that MAR could be a good choice for schools; as they have large roof tops from where rain water could be stored and processed for future use. In this way children could have access to safe drinking water all year round.

4. Ms. Vositha Wijenayake, Climate Action Network South Asia (CANSA), Sri Lanka on Focussing on Adaptation through Policy and Practice: Sri Lanka

Ms. Wijenayake began her presentation with a quote from the National Climate Change Policy of Sri Lanka, which has been cited below:

“Being a developing island nation subject to tropical climate patterns, Sri Lanka is highly vulnerable to climate change impacts. Extreme weather events such as high intensity rainfall followed by flash floods and landslides, and extended dry periods resulting in water scarcity are now becoming common occurrences in Sri Lanka. Any adverse changes in already volatile weather patterns are likely impact adversely on the socio-economic activities in the country. Therefore **urgent action is necessary to take adaptive measures to build resilience of the country to face the adverse impacts of climate change. While taking adaptive measures as the priority**, Sri Lanka will actively involve in the global efforts to minimize the greenhouse gas emissions within the framework of sustainable development and principles enshrined in the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol (KP)”.

With this introduction Ms. Wijenayake moved on to discuss the focus areas of adaptation in Sri Lanka's context; which includes: food production and security, conservation of water resources and biodiversity, human settlement and land use planning, infrastructure design and development and coastal resource management.

She stated that “Sri Lanka is a negligible contributor to global warming. However, as a nation, we are highly vulnerable to the impacts of climate change”. The implications of climate change in the national context include:

- Increase in the frequency and intensity of disasters such as droughts, floods and landslides
- Variability and unpredictability of rainfall patterns
- Increase in temperature
- Sea level rise

Ms. Wijenayake concluded her presentation by sharing the National Climate Change Adaptation Strategy (2011-2016); which highlighted the sectors that are extremely vulnerable to climate change. The most susceptible sectors include:

- Agriculture and fisheries

- Water
- Health
- Urban development
- Human settlement and economic infrastructure
- Bio diversity and eco system services

Therefore, the adaptation strategies should appropriately address the needs of each of these sectors.

5. Mr. Lam Dorji, Royal Society for Protection of Nature, Bhutan on Climate Change Experiences in Bhutan

Mr. Dorji initiated his presentation by requesting the participants to ponder over the fact that the environment that we use is a Common Pool Resource (CPR) and we owe our existence to it. In our race for development; we are causing much harm to our environment and its devastating repercussions are evitable across the planet. In context of the present times; climate change remains the single most threat to life of various forms of life.

The global agenda to address climate change has come into being since 1992. However, the progress on addressing issues related to climate change has progressed at a slow pace. This is mainly attributable to the fact that there is a lack of cohesion among and within various regions and groups. Political and economic protectionism and competition has lead to slow progress. Various reports suggest the GHG reduction is lagging far behind the level required to prevent global warming. As the IPCC projects climate change will lead to changes in the geophysical, biophysical and socio economic systems; therefore the need to address climate change concerns is of utmost importance.

Moving on, Mr Dorji gave a succinct description of Bhutan, which is part of the South Asian sub-continent. Bhutan is located in one of the most ecologically sensitive and fragile areas in the world. The Himalayas is regarded as a hot spot for climate change. Majority of its population live in communities that almost entirely depend on the fragile ecosystems. Further, livelihoods of billions of people depend on rivers that originate in the Himalayas. Bhutan falls in the South Asia sub-continent defined by 5N, 64E to 50N, 100E (IPCC, 2007). Based on IPCC projections for South Asia Sub-Continental region, increase in average temperatures may lead to relatively warmer weather at higher altitudes. During the dry season the average annual precipitation may relatively increase. This will lead to an increase in the wet season and a decrease in the dry season. Also there will be continued spatial variation in temperatures and precipitation due to complex local topography (IPCC).

Climate change evidences in Bhutan are largely based on ground events rather than long term data interpretation. Weather stations were introduced in Bhutan only in the early 1970s. During the time period of 1990–2002 the available data pointed to an increase in precipitation variability across the country. In the period from 1998–2003, the mean temperatures recorded were higher than the mean temperatures recorded for the 1990–2003 period, pointing to an overall warming trend (National Environment Commission, Royal Government of Bhutan 2000). The evidence of vulnerability and adaptation to climate change is most prevalent in places where warming has been the greatest and in systems that are more sensitive to temperature

Climate change will have significant impact on various sectors like agriculture, hydropower, health and infrastructure. This will have implications on the livelihood and economic development of the country. Developmental reforms are the need of the hour, but these must be planned in a sustainable fashion.

Bhutan, as a nation has taken up several policy initiatives and mandates addressing both mitigation and adaptation; which have been enumerated below:

- Working towards a carbon neutral economy
- Mainstreaming environment, climate change, and poverty in various projects and in the five year plans of the government (current one being the 11th five year plan)
- Incentivising adaptation to climate change; an example of this being the Local Climate Adaptative Living Facility (LoCal) piloted in Phobji, Trong and Bjoka
- Formulating human settlement guidelines keeping in mind the climate, environment, and poverty perspective

The Government of Bhutan has initiated several adaptation plans and projects. The adaptation projects are based on the assessment of the situation. For example; to reduce the climate change induced risks and vulnerabilities from glacial lake outburst floods in Punakha and Chamkha the levels of Thorthomi lake have been reduced. To respond to emergencies, an EWS has been created. Apart from this emergency medical services have also been created. The capacities of schools and local communities are also being built to deal and tackle with the emergency situation. They are being trained for rain water harvesting and drought management; along with landslide management and flood prevention.

Communities are also coping with the climate change by a spontaneous process. The ground reality is that communities are not prepared to adapt and they are left with no other choice but to cope with climate changes. Adaptation efforts are isolated and small scale. For example; in times of water scarcity the communities use the water saved during rains. Also traditional water sharing is practiced during such times. As landslides threaten settlements; communities practise plantation.

While concluding the presentation Mr. Dorji stated that at local level it is difficult to tell if communities are adapting to climate change or are simply coping with it. Regionally, the extent to which the Himalayas are resilient has a large bearing on the extent to which risks can be reduced in South Asia. Resilience of upland areas prevents adaptation needs of lowlands. Adaptation at local level have spill over benefits. Though, climate change is an increasingly difficult issue to address the exacerbating factors (primarily linked with development efforts) are within the reach of governments to manage and plan in a sustainable fashion.

Session IV: Examples of Adaptation to Climate Change (Plenary Session) - Continued

The session on sharing examples of adaptation to climate change continued with **Mr. Harjeet Singh** in the chair.

1. *Mr. Ali Shareef, Ministry of Environment and Energy, Maldives on Climate change issues in Maldives*

He began by sharing the geographical expanse of Maldives, with the total land area being only 300 sq.km. spread over 1102 islands/atolls with habitation. The elevation of the over 80% land area of Maldives is just 1 metre above the mean sea level, and the sea level has been threateningly rising by 3.3 mm/year, which is considerably intimidating. In light of such circumstances, disasters cause much infrastructure damage and the accompanying economic costs are high (most of the infrastructure is near coastal area, and hence is more vulnerable to damage). Then, there are issues

which get exacerbated, such as that of food security and water resources (with lower ground water availability and contamination), causing detrimental effects on human health (higher cases of dengue, malaria, chikangunya), depletion of stored water, damage to agriculture, land loss and heavy import dependency. These disasters may also cause considerable harm to coral reefs and tourism, one of the most important revenue-generating industries of the country.

Adaptive measures: In such circumstances, the government has tried to bring in policies and strategies to deal with issues of climate change. Some of the projects formulated have been as follows:

- National Adaptation Program for Action (2007) to build community resilience,
- Integrated approach for water management,
- Development of Resilient Island Concept,
- Establishment of Maldives Green Fund.

However, funding for these adaptation projects is a huge challenge, with investments in such adaptation projects being negligible or low. Other adaptation projects are also being experimented such as building Male's sea walls, but these appear as very expensive projects. There is hence a need to find cheaper alternatives, such as economic diversification to reduce the dependency on tourism.

2. Ms. Ghazala Sheikh, Development Alternatives, India on Experiences of Radio, Bundelkhand

Bundelkhand has been known to have a fragile climate sensitive area and has been facing acute water shortage, decreasing agricultural production, poverty and general socio-economic issues. The need for CC communication was felt due to extreme low climate change perception and adaptation options among the community. Thus began the journey of the project "*Shubh Kal*" in 2008 which aims at educating rural community about CC and adaptability measures, and thus bring about behaviour change increasing participation and disaster risk preparedness of the community. Needs assessment was carried out, and to inform about the risk of climate change and possible adaptation measures. The alternatives/options were generated from within the community itself.

The community radio which initially had the cover of 10 sq.kms. was enlarged to cover a wider geographical expanse after they tied up with 3 other radios for better outreach. Their idea was to deliberate solutions for climate change adaptation with the community using participatory tools, and disseminating positive messages. Towards this end, they used a combination of traditional folk media and mass media. Among other projects, a rural reality show was conducted engaging rural women and youth, where discussions on ideas of climate change adaptation were discussed and their replication was also deliberated upon. Through this effort, they were able to reach more than 1,00,000 people in 100 villages, and were able to mobilize 25 climate change agents among these.

The current focus of the programme is on:

- Strengthening understanding of Climate Change Adaptation among communities and communicators
- Linking community voices with the scientific voices/knowledge, i.e. sharing feedback from the scientific community to the farming community, and also connecting with policy and decision makers

The impact of this programme has been that the communities are now much more aware about Climate Change Adaptation strategies. It was shared that people felt that community radio could be a very effective communication tool in sharing critical information related to climate change. During the progress of this project, the challenge they faced was in presenting information in a simplified manner to the community.

3. Mr. P.S. Vijay Shankar, Samaaj Pragati Sahyog, MP, India on Water and Climate Change Vulnerability in Central India

Mr. Shankar began by sharing a brief background of the grassroots-based voluntary organization. It is located in the central drought-prone region of the country and experiences extreme climate conditions– high as well as low. He shared the fact that rain-fed dry lands of India have a huge problem of rainfall failure every 2nd or 3rd year. Within the framework of climate change, most efforts are geared post-facto; however, there is a higher need to focus on risk reduction and reducing vulnerability.

Tribal communities form the most neglected and vulnerable population, and more so in the area covered by the organization. The focal point of climate resilient agriculture is water, said Mr. Shankar. Evidence based on research shows that there has been a modest decline of mean rainfall in the region. Further, rainfall has been highly variable through the years, and has also displayed spatial variation. Under such circumstances, the challenge was to make the rainwater received for only 50 days available round the year (or at least for 180 days).

Sharing practical examples from the field, Mr. Vijay Shankar said that they used approaches of land management and built water harvesting structures, such as stop dam, farm bunding, earthen naala bunding and tree plantation. For improving soil fertility, use of compost, liquid manure (livestock waste and plant waste) was carried out; and other techniques such as multiple cropping and crop management were done to utilize available water. Video clips on how to make/create structures as above were shared with the community. The program outputs showed that there was strengthening of community based organizations (such as SHGs) and the watershed treatment work was taken on a large scale.

4. Mr. Prasad, Regional Centre for Development Cooperation, Odisha, India on Flood management

Mr. Prasad discussed about the project Prayas, being implemented in Puri district of Odisha, which aims at achieving climate change adaptation through water management. Since many rivers and their tributaries run through this area, flooding remains a major concern. The same area experiences both excess and lack of water; and henceforth, a sizeable population has migrated to other places. The water quality also becomes poor, and is known to be contaminated with high chloride and iron content.

The Prayas project sought to assess this situation, conduct vulnerability assessment and differential impact on gender, and mobilize the community to drive the policymakers to take action. The issues were flagged at the Prayas project committees (at hamlet level); beyond which the immediate authorities at the village level and at the gram panchayat level were approached. The recommendations generated from the people are listed below:

- Improving the drainage system for fast & effective drainage of flood water avoiding water-logging
- Rain Water Harvesting Structures for irrigation & drinking purposes
- Renovation & deepening of water bodies for drinking water, irrigation and pond-based farming
- Pond-based farming for effective economy in lean season
- Regularize Kharif compensation (inclusion of share croppers)
- Increasing vegetative coverage improving soil texture & water absorption
- Using scientific knowledge such as that of Central Rice Research Institute (CRRI) for production of crops using flood resilient variety (e.g., paddy seeds which are flood resilient)

5. *Mr. Michael DiGregorio, Institute for Social and Environmental Transition, Vietnam* on Planning for Climate Resilience: Lessons from the grassroots

Mr. DiGregorio initiated his presentation by sharing the background of the massive flooding in Ha Thanh river delta of Vietnam in 2009. Showing the satellite image of the area affected by the floods, he mentioned the project which was carried out with a grassroots approach. The purpose of the research was to examine whether and how recent changes in the landscape had contributed to the severity of the flood.

He tried to study the flooding process chronologically, and therefore held open discussions with people regarding flood cycles, agriculture, adaptation, the chronology of the 2009 flood, personal losses, and probable causes for the flood's severity. When asked about the timing of the first time they saw the flood waters rising, most people mentioned that there were no warnings about the flash floods through the mass media; only some were warned by messages from friends upstream. Some of them disbelieved the warnings which had no backing.

Infrastructure and infillings: Since 2003, the roads have been raised and dikes have been put up. However, conversations with people (shown in video clips) bring to light the problems with the redeveloped infrastructure. Roads and dikes have become barriers in the floodplain that limit drainage of floodwater and raise its height. Villages too have had to bear the brunt of urban development, as the raised foundation on which urban construction is done is above the flood plain and this shifts flood water to the villages. There is thus a need for a better drainage system and revisiting the development plans.

In summary, Mr. DiGregorio shared the lessons learnt from this research, which are as follows:

- Extreme climate events offer a means of understanding how urban development may increase the impacts of climate change
- Beginning at the grassroots provides researchers with both a historical understanding of the local ecology and insights into the impacts of physical change
- A grassroots analysis also gives offers researchers an antidote to sectoral and ministerial approaches that often identify problems based on the solutions they will propose
- Official datasets and hydrological modeling can be used to support community insights, dispel them when they are incorrect, and inform communities of the differences
- Early warning systems are not a substitute for better urban and watershed management.

6. Mr. Mirwais Ashna, Organization of Human Welfare, Afghanistan on Impact of Climate change in Afghanistan

Mr. Ashna in his address mentioned how climate change had affected the agriculture and societal structure of Afghanistan. A significantly large population gets affected by drought conditions every year, he added. Further, the environment presents a harsh and difficult working climate for women and children, with decrease in food quality and quantity, increased family violence, and malnourishment amongst children becoming more common. There is increased displacement, food scarcity, and loss of livestock, property and resources, and mass migration of farmers to urban areas for job opportunities, all of which can be traced to the drought conditions exacerbated by climate change.

7. Mr. Harjeet Singh, ActionAid, India on Resilience/ Underlying causes of vulnerability

The chair of this session, Mr. Singh addressed the participants by drawing their attention to the concept of resilience. He defined resilience as the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. While discussing the 5 priority areas of HFA, there is a need to focus on resilience. Placing people's vulnerabilities at the centre and tackling key underlying causes that make individuals and communities vulnerable and reinforce inequalities could be seen as a solution and empower the people. The underlying causes of vulnerability that Mr. Singh listed are as follows:

- social exclusion,
- lack of assets and secured access to natural resources, and
- lack of skills, access to basic services and economic opportunities.

Unequal and unjust power, lack of governance and unjust social attitude are other factors which further perpetuate inequality and injustice. This entire situation can be turned around to a positive picture by inverting the reasons for vulnerability, concluded Mr. Singh.

As the last session drew to a close at the end of the day, **Ms. Margarita Tileva**, Chief Emergency at UNICEF thanked the participants and finally summarized the day's proceedings (Annexure 1).

Adolescents perspectives on CCA:

Sharan, Joshua, Abigail and Nicaia presented their opinions at the end of the day. The main themes they discussed were:

- Factors to understand climate change can be categorised into economic, social and political
- Efficient and good governance has its roots in communication. Platforms for deliberations and discussions with various stakeholders (such as Government, NGO partners) should become a regular feature
- International cooperation and spirit must be preserved. Agencies as SAARC and more robust institutions are needed.
- Stronger emphasis should be on education, risk management, and to move beyond rescue and relief.

Session V: Mainstreaming Adaptation in Development – National Policy Making

Ms. Margarita Tileva chaired the fifth session of the 2-day consultation, recapitulating the discussions from the first day and sharing the plan for the upcoming sessions in the day. She welcomed the panelists, and after a brief description of each, invited them for their respective presentations.

1. **Mr. Tarik ul Islam, Bangladesh** on Mainstreaming Climate Risks

Mr. Islam began by elaborating the context of Bangladesh and its demographic profile. As was already stated in previous presentations about the country, Bangladesh has been known for a high magnitude of disaster risks. Add to this, the enormous limiting factor of very high population density of the country, which strains the resources and exacerbates the challenge. The population density is as high as more than 1200 per sq.km., he mentioned.

To make matters worse, there is the potential disaster from the unpredictable river flow from the 2 rivers- Brahmaputra and Ganges, which causes a crashing impact from both the Northern and Southern region. Dhaka has been identified as one of the most earthquake-prone areas in the world. It is in this context that climate change adaptation strategies and sustainable practices must be evolved in the country.

Among all such bleakness, the good news comes in the form of the volunteers' network which is a very strong force in Bangladesh. When the Bhola cyclone hit the country in 1970, it wiped out 5,00,000 people in one night alone- one of the biggest tragedies that the world had seen. The country had also been witness to other disasters such as the floods of the 80s and the cyclone Gorki in 1991 in which 1,38,000 people lost their lives. Other cyclones such as Aila and Sidr have also ravaged the country in the recent past. In the wake of one tragedy after the other, disaster management came into existence. Finally, after three decades, the Ministry of Relief was converted to Ministry of Disaster Management, and a Department of Disaster Management was also created. There was a paradigm shift from relief to risk reduction. The Disaster Management Act (2012) was also enacted, which has enabled for preparedness for Climate Change. It was also felt at that time there needs to be climate mainstreamed into all agendas and discussion in the larger national planning framework.

With the introduction of the Comprehensive Disaster Management Framework, there has been a significant shift from post-disaster to pre-disaster planning. There has been strengthening of institutional mechanisms, expanding mitigation, preparedness and response systems, and efforts have been made to include all actors, sectors and stakeholders.

Amongst the various stakeholders which play a role in disaster management, community is an integral player. At the local level, *community based risk assessment and Risk Reduction Action Plan* were formulated, whereby each community assesses the disaster and climate risk and then evaluates strategies for action, in case disaster strikes. The need was felt not to follow the template, but to make the process simpler, all the while giving power to the local community.

Mr. Islam also spoke about the concept of climate financing. There is a need to have planning professionals, who understand climate change from a wide approach and can mainstream this issue

in the larger discourse. The Ministry of Finance and Planning should also be included in the process. Government of Bangladesh spends about 6% of its annual combined budget on climate sensitivity (about 1% of GDP). However, for the purpose of Disaster Risk Reduction funds are needed to address baseline disaster risk additional to the need of funds for Adaptation and Mitigation.

Finally, Mr. Islam summarized the key lessons and challenges from the Bangladesh model:

- Climate mainstreaming is a long and complex process involving multi stakeholders.
- Climate fiscal framework will provide the financial management system and institutional structure that would guide the structure of expenditure.
- Huge knowledge gap between local and global, which needs to be addressed.
- Private sector engagement is minimal, although opportunities are many. The private sector needs to be called on board.

2. Ms. Lucy Faulkner, Independent researcher on Monitoring and Evaluation (M&E) Strategy for CBA (Community based adaptation)

Ms. Faulkner discussed that within the concept of CBA, the main idea is that we lack consensus on what constitutes this approach. If we look at some emerging tensions within the arena of M&E for CBA, it is evident that M&E practice is not straight forward. This is in part due to the fact that adaptation is a relatively new concept that is operating under uncertainty and changing climate contexts rendering understanding of what needs to be adapted to be unclear. Moreover, there is little agreement on what actually constitutes successful adaptation and therefore what to measure and how to measure it. Furthermore, there is a lack of consensus around which ‘success’ should be defined by.

If M&E for CBA is to provide critical support to the long-term process of identifying ‘what works’, the question of ‘who’ does M&E of adaptation work for, needs to be raised. The concern that arises is whether M&E for CBA should be driven from the bottom up and be inclusive of local scale for investment. However many M&E approaches largely dominating the current CBA landscape set M&E adaptation priorities that are often inappropriate to local community needs.

However, those households and communities that the presenter has been working with on the ground, are not the only stakeholders engaged in the CBA landscape. Adaptation does not happen in a vacuum, but in an institutionally rich context. There are multi-stakeholders and audiences seeking different information needs on what successful or effective CBA ‘looks like’. Therefore, M&E approaches that take a ‘one size fits all’ viewpoint are unlikely to work in the context of CBA. This is why the ARCAB (Action Research for Community Adaptation in Bangladesh) M&E for CBA approach has devised a multi-track methodology designed to respond to the information needs of these varied audiences, while simultaneously setting M&E adaptation priorities that focus on the needs of the poorest and most marginalised.

ARCAB programme set in Bangladesh is gaining rapid recognition and uptake by the international community. The framework’s practicability and accessibility to stakeholders in different adaptation contexts is currently supported through its use in CBA projects across differing ecosystem and livelihood zones not only in Bangladesh and but also in numerous countries. She also mentioned about the Theory of Change (TOC) says if people have the capacity and the enabling environment to adapt, they can/will.

For effective CBA, four interlinking pathways of change are needed:

- i. Resilience is scaled up: This means that resilience has been successfully built across governance scales, from local to international level.
- ii. Resilience is scaled out: This means that effective CBA for climate change risk has been successfully expanded to reach more people.
- iii. Resilience is beyond development and DRR: This means 'doing things differently' - that the implications of climate change have been taken into account in development programming.
- iv. Resilience is sustainable over time: This means that sustainable resources and institutions are in place in order to facilitate delivering adaptation benefits.

Ms. Faulkner elucidated the concept of Transformed Resilience (TR), which essentially means using locally-generated information on what's going on, what's the vulnerability context, what's the adaptation context, what matters to local people. So, new knowledge is bringing together scientific information with locally-generated information to create some kind of new knowledge that all stakeholders can use. This process is transformational not because it's bringing in new CC information, but is forcing us to re-think the way we do environmental and development planning.

Another transformational aspect about CBA is its rights-based approach which empowers communities to do the adaptation process themselves. Adaptation as a process is now done by communities themselves, through CBA facilitation. Moreover, CBA ensures continuity even after the project is over. It also creates forums for learning and deliberation.

Finally, Ms. Faulkner mentioned about the strategies to measure effectiveness of CBA. One of these strategies is through assessing institutional and service accessibility and inclusiveness, including the knowledge and capacity of these institutions to deliver adaptive benefits, to integrate and manage climate risk management into existing planning and provision. Further, adaptive behaviour indicators, such as use of climate risk information, shifting strategies from coping to adaptation, diversifying livelihoods could also be used.

3. Prof. Dr. M. Alimullah Miyan, Bangladesh on Public Private Sector Engagement for CCA

At the outset, Mr. Alimullah expressed condolence on the Uttarakhand disaster in India, and mentioned that his country too had very recently faced the disaster wherein collapse of a building (garment factory) killed 1200 people. In the context of natural disasters, Bangladesh has been known to be at a fairly high risk, with about 1/3rd of its population exposed to sea level rise.

Therefore, one of the best programmes to deal with this situation involving Public Private partnership (PPP) has been the Cyclone Preparedness programme, wherein 15,000 people use their skill (use of cycles, boats, flags/signals) and risk their lives for warning dissemination and emergency rescue operations. These people have a deep sense of commitment and demand respect of the community, for having saved many lives. Communication is mainly with the community through the radio, and maps help to pinpoint where a warning may need to be issued.

Mr. Alimullah mentioned that other private sector initiatives have been taken in the following sectors:

- Social forestry has created huge revenue within a span of 10 years; this is an interesting programme where about 35% of the output goes back to the community and some percentage to the forest officials. Thus, it is a self-sustaining process.
- Multidimensional activities, such as for reservoir and ponds.

- Crop adaptation: Conservation and expansion; now there are new varieties of rice which can be grown in saline water (salt tolerant variety).
- Experiments of scientists, INGOs are implemented with the aid of the community.
- Floating agriculture such as water hyacinth, bamboo etc. for addressing climate is being promoted by NGOs
- 'Grow sacks' experiment- where, in a limited space, one can grow a lot of vegetables. People without land could grow their crops without the need of land. Organic vegetables production in sacks has also been used.
- For the country's youth and children, there could be occupational diversification, and their skills enhanced for better occupations, in case they wish to migrate to other places in Bangladesh. He informed that more private institutes, universities, polytechnics, medical colleges and agricultural universities were being set up in Bangladesh for skill development.

The investment by Bangladesh in such ventures has already started paying dividends, added Mr. Alimullah. Cyclone Sidr and other disasters had occurred, but in the recent cyclone Mohasen, the toll was not high (with 9 people dead). Although the 1970 loss (Bhola cyclone) was very high, the successive years have shown a steady decline. All this goes to show that the country has now better disaster preparedness.

Session VI: The Adaptation Process

This session was moderated by **Mr. Sanjay Vashisht**. He set the background to the session by stating that this session is all about theories of adaptation and its application. Through this session; essentially the attempt is to understand what science communicates and the way it translates into action.

1. **Shiv Someshwar, Columbia University, New York** on Climate Resilient Development

He began by thanking the organizers and practitioners from the South Asian region who had gathered to share their knowledge and experiences. He mentioned that he was asked to give an overview of Science; and at this forum he has taken the liberty of expanding the dimensions of science and what it really implies.

There after he quoted the example of Mumbai floods of year 2005; and the adaptation and management that followed. He discussed adaptation in the context of development and succinctly shared his reflections on possible solutions and approaches.

While building the context, he described Mumbai as a large city where 50 percent of the population is vulnerable to sea level rise and flooding; especially during monsoons. Nevertheless, Mumbai has an extremely well managed disaster management system. Their impressive emergency response system helped mitigate the impact of the flood, where 944 mm rainfall was received in a span of 24 hours. The suburbs were submerged under 15 feet of water, and the death toll from this incident was 630. This could have been devastating for a city like Mumbai-the economic and financial centre of India.

A number of studies followed after this flooding incident and the following reasons were suggested for the same:

- Poor drainage system
- Changes in land usage

- Institutional system failure
- Limits of response (threshold exceedance)

All of these evidences pointed towards the fact that such large scale disasters are indirectly due to climate change. He further discussed that adaptation to climate change involves the need to look at infrastructure and planning. The following are integral components of adaptation and planning:

- Land use planning
- Landscape design
- Risk transfer mechanism
- Participatory processes

Moving on Mr. Someshwar highlighted the challenges related to climate change adaptation. The first being the way we define climate change and the underlying reasons for it. The second challenge is the under developed institutional capacities to deal with climate change. Third challenge is the uncertain and ever growing boundaries of knowledge/science and the ways by which the knowledge can be streamlined and used to mitigate and adapt to climate change. Climate change impacts are known and knowable. The challenge is to use this knowledge effectively.

From there on Mr. Someshwar expounded the critical distinction between weather, climate variability and climate change.

- Weather: relatively shorter span (approximately 10 days)
- Climate variability: 6 months-1 year; extending up to decades (natural forcings)
- Climate change: occurs over centuries anthropogenic forcings)

The climate change funding should therefore be planned to mitigate/adapt to anthropogenic forcing. Mr. Someshwar also brought forth an important concern that all our planning and related preparation is based upon averages. This may however be misleading, as he demonstrated using the example of annual rainfall in the past fifteen years in a given area. The stats of the average that rainfall predictions are based on are actually non-existent. There is no year which has average rainfall. That is why the climate is either “drier” or “wetter” compared to the average. Rainfall is always on a continuum and the planning and preparation process must evolve to deal with it.

In such context, Mr. Someshwar suggested a few solutions:

- Build climate resiliency in the now
- Both poor and non-poor populations are indifferent to climate risk drivers
- Climate resilient development means climate change adaptation and mitigation

He concluded his presentation by stating that local knowledge should be contextualised; scale dependent and dynamic. Apart from that local knowledge is diverse. We need to be more reflective of the limits of science, and be more open to new science; and our ability to change development reality for people. We need to be cognizant of power inequities. There is no such thing as “climate proofing”. Being cognizant of these realities will help us to plan development efforts which are more welcoming of uncertainty and change, of plurality, of knowledge and of anticipatory solutions.

2. Ms. Iskra Panevska, UNESCO on Stakeholder engagement and Knowledge management

Ms. Panevska initiated her presentation by stating that successful climate change adaptation depends on the regular engagement of various stakeholders, namely public, private, NGOs, Civil Society Organizations (CSOs) and communities.

She shared various observations on climate change; which presents a challenge of enormous breadth and complexity, but which can also serve as a catalyst for positive economic transformation. Climate change provides a “wake-up call” warning that the prevailing economic model is not sustainable. Climate change solutions require a better balance among growth, resource use and equity. The mitigation and adaptation process to climate change require an unprecedented marshalling of global & local commitment, resources, innovation and expertise.

Thereafter she spoke about the shared responsibilities of multiple stakeholders at multifarious levels for dealing with climate change. Much of the responsibility to drive climate change solutions to address the needs of the most vulnerable rests with governments. Business will be an essential partner in preparing for and responding to the impacts of a changing climate and in building a global “green economy”. Critical adaptation interventions can be made only through public or civil society organizations. Also, higher education has fundamental contributions to make to cutting-edge scientific and social scientific research.

Describing further, Ms. Panevska enunciated a few engagement principles for mainstreaming climate change adaptation. These principles are as follows:

- There should be a multi-stakeholder engagement of all concerned parties, on a sustained basis, starting at the community, regional and national levels
- There should be consensus and convergence on the principles, content and metrics of what is to be done to foster trust, respect ownership
- As climate change is locally experienced; enlisting the cooperation of local institutions and stakeholders, building up their capacities and empowering them as active participants in decision making processes are a few pre-conditions for efficient and effective adaptation measures
- Technological interventions can only succeed if they are “owned”, managed and become embedded in the social, economic and institutional fabric of the community.
- The governance and development CSOs serve as the link between national and local constituencies to mobilise resources and undertake regulatory and planning functions.

On similar lines, CSOs can play a role in raising awareness, mapping vulnerability and empowering local stakeholders and communities. The CSOs and NGOs can help mobilise communities and resources for watershed and ecosystems development and sustainable management. Competent and experienced NGOs can assist governments and public agencies in developing and deploying implementable climate smart responses and adaptive action.

Explicating further; Ms. Panveska spoke more about the engagement process of various stakeholders. The private sector has much to contribute to the development and implementation of adaptation solutions, including technical and sector-specific expertise, greater levels of financing, efficiency, and an entrepreneurial spirit. Private sector adaptation efforts will be a crucial complement to public finance in support of developing countries’ adaptation needs. One of the most important approaches for integrating private sector growth with the adaptation needs of companies and communities is forming partnerships with civil society entities.

Her presentation concluded by describing a succinct account on information and knowledge management. There is a need to identify what type of knowledge and in what areas knowledge is lacking; especially in case of stakeholder management and involvement.

There is a need to share innovative approaches based on new research and experiences. Lessons learned and good practices from various projects must also be widely disseminated. Apart from that traditional knowledge and coping / adaptation mechanisms should be documented. There is also the critical need for identifying information needs of various stakeholders/actors. Regular testing of communication channels; especially with vulnerable communities is of utmost importance.

On the whole, the most critical emerging concern is to facilitate and encourage local, national and regional cooperation and a space for discussion among different partners through knowledge sharing platforms & networks.

3. Ms. Aditi Kapoor, Development Alternative on Gender dimensions of CCA: Gender, Disasters and Adaptation

Ms. Kapoor commenced her presentation by stating that between men and women, it needs to be understood that their social roles and responsibilities are very varied. Their assets, knowledge and skills and capacities vary widely. If noticed closely, a pertinent question comes up; that how do disasters affect men/women differently? Most women report that they go to bed hungry, because men have a priority for food. Furthermore, the common coping mechanism that men use is distress migration, and this process leaves the women behind. In various disaster situations similar adaptive mechanisms were observed. The end result was an increase in time-labour of women. Most of the work of land, water and forest are done by women. Around 60-80% of the work on the land is done by women; but they do not have ownership of the land.

The survival and livelihood pattern are very different for men and women. In times of loss and damage women have to bear severe and harsher repercussions than men. Women work harder and for longer hours in field and with their cattle to deal with economic slump that comes in with disasters. Women also engage in additional activities (to deal with the economic stress during disasters) like creating organic manure, which is a laborious and time consuming process. Women work tremendously; and are the ones responsible to get the food, firewood for cooking and manage other household work.

There is a pressing need to understand that no community work is homogenous; the gender gap needs to be considered at every level. For instance, the microfinance programme, which appears as a very celebrated programme is not very favorable for women. A welfare approach of the 'trickle down theory' does not work for women. The amount of money that women will receive, and the decision to use that money remains a contested domain.

Ms. Kapoor shared an example from the times when Aila cyclone had rendered thousands of people devastated. She asked women what have been their coping strategies versus men? The women said that they coped with it through vegetable gardens; while most men migrated to safer areas. Women have immense strengths and capacities; and sometimes they are themselves not aware of it. While concluding her presentation, Ms. Kapoor stressed that policy and fiscal planning dealing with climate change should be gender responsive. Issues must also be viewed from a gender lens to get a more fairer and equitable picture.

4. Ms. Elizabeth Colebourn, CKDN, India on Operationalizing adaptation: From Theory to Action

In her address, Ms. Colebourn stressed on the concept of climate compatible development (CCD) which, in essence, means reducing poverty and securing human development in a way which reduces the extent of climate change, and also helps societies to adapt to inevitable change. Climate compatible development is different from other forms of development. Effective CCD has the following advantages:

1. Assessment and understanding of risks- With scientific knowledge feeding in the policy making process, science can be made more accessible and relevant to policy makers. Also, in instances where decisions are taken in situations of uncertainty, CCD becomes a useful tool.
2. Develop and evaluate options: It also aids in considering people's perceptual risks.
3. Implement strategies: It can be integrated in development plans and annual budgets, and requires cross-government engagements.

Ms. Colebourn succinctly mentioned the following drivers/enabling factors to deliver climate compatible development:

- Turning crisis into opportunity: Crisis is the most common driver for CCD adaptation
- Public pressure: Civil society could demand action, even making it an election issue.
- Visionary leadership
- Business case
- Partnership: between researchers, policymakers, businessmen

5. Mr. Anup Karanth, TARU on Developing City resilience strategies (CRS) under CC scenarios

Mr. Anup began by introducing the Asian Cities' Climate Change Resilience Network (ACCCRN), which is a network of ten core cities in India, Indonesia, Thailand & Vietnam, experimenting with a range of activities that will collectively improve the ability of the cities to withstand, to prepare for, and to recover from current and future impacts of climate change. He further mentioned a project undertaken under ACCCRN, which was implemented in 3 cities of India- Surat, Gorakhpur and Indore, and tried to study the underlying causes of disasters/floods which had wrecked the cities. The findings from the study showed how urban development, city embankments, bridges and weirs had increased the probability of flooding in Indore. Surat floods in 2006 impacted health and led to huge financial losses.

The team then came up with strategies to address the issue. The idea of using Urban Vulnerability Analysis (UVA) was implemented, wherein information was tracked on the use of water by the community. Then, the UVA and risk analysis was shared with various agencies, after which they came up with various plans, such as on water security, energy security, urban transport, urban environment and health, and so on.

Further, city resilience strategy (CRS) was developed in Indore and Surat. A set of different tools were developed, since reports are most often not referred to, when planning development. Early Warning Systems were developed for Surat; other innovative practices of creating cool roofs and thermal comfort were developed. It has been felt; concluded Mr. Anup, that there is an increased opportunity for mainstreaming of CCD, and especially with the engagement of government agencies, private sector and the community.

6. Ms. Divya Mohan, TERI on Integrating Climate Resilience Strategy in city development- A case study of Guwahati and Gorakhpur

In the project on integration of climate resilience, Ms. Divya began by mentioning that Gorakhpur city which was part of ACCCRN project above was reviewed along with Guwahati city. Initially, identification of major hazards and vulnerability assessment was carried out. The context in Guwahati showed that there had been encroachment of natural bodies (including water bodies and hills), and unplanned and unregulated development of the city. Garbage and waste was freely dumped in the water bodies causing degradation of the ecosystem; and with inadequate and inefficient urban services and infrastructure, the end result of this had been heavy rainfall in the city in recent years.

Elaborating further, Ms. Divya mentioned that the approaches in building climate resilience are three-pronged: urban services and infrastructure, housing and ecology based urban planning. Sector-wise recommendations were given for both short term and long term support mainly in the areas of structural/physical support, regulatory support, institutional support and community participation. She concluded by mentioning that there must be norms for building bye-laws and that they must respect the natural topography of the hilly terrain, causing minimal changes in the land structure. Similarly, after a detailed review of Gorakhpur city's literature and institutional review, consultations with stakeholders, recommendations were given on regulatory and structural parameters.

7. Ms. Sumana Bhattacharya, Intercooperation India on Getting climate smart for disasters

Setting the background, Ms. Bhattacharya mentioned about the incidence of flooding in the eastern coast of India over the years, with figures from Odisha and West Bengal stating massive losses to life and property. Therefore, for managing disasters, there is a need of strengthened and robust systems and disaster management policies to be in place. Although the country has a National Action Plan on Climate Change and State Action Plan on Climate Change (which is being handled by the Department of Environment and Forests or by the Department of Science and Technology); there exists little cooperation between the two. There is also little to no involvement of the Disaster Risk Management Authorities. The issue thus is that there are many agencies which are addressing the same issue of climate change from different lenses, but have not been converging their efforts.

In the study undertaken by the organization, Ms. Bhattacharya clarified that the specific disaster chosen for the project was cyclones (in the Eastern part of the country) affecting the States of Orissa, Andhra Pradesh, Tamil Nadu and West Bengal. It was learnt that though the incidence of cyclones had been decreasing, the intensities of the cyclones had been steadily increasing. The Super cyclone that struck Orissa in 1999 has been known to cause huge damage to life and property. She mentioned that 6 districts along the Orissa coastline are highly cyclone-prone; and with 85% of the population depending on climate sensitive sector, livelihoods get deeply affected. In the case of West Bengal, the cyclone Aila has affected agricultural activities by making the water saline. Add to this, the incidence of vector-borne diseases as malaria, which wreck havoc on these communities.

The approach that Ms. Bhattacharya recommends is that of Climate Smart Disaster Risk Management (CSDRM), which has 3 major components:

1. Tackling changing disaster risks and uncertainty: through climate projection, flood forecasting, conducting micro-level vulnerability assessment and so on.

2. Enhancing adaptive capacity: through strengthening institutional capacity, building flood shelters, regular training and flexible approach in policies.
3. Addressing poverty and vulnerability and their causes: through working with grassroots' organizations, addressing gender issues and building livelihood resilience.

In summing up, Ms. Bhattacharya concluded that among these components, adaptive capacity seeks to address socio-economic development through fulfilling development objectives, by taking into account a comprehensive framework including energy, water, agriculture, environment, bio-diversity and knowledge management.

Session VII: Towards Development of National Adaptation Priorities

The purpose of this last session was to identify at least 5 key priorities for Climate Change Adaptation action at national level. The group work had two short sessions. One focused on the 8 key themes as listed below and involved joint brainstorming. For the second part, the groups were reshuffled and grouped into country specific groups to identify national/ country priorities. At the end of each session, a representative from each group came up to present the action points submitted by the group.

A. Joint group work

The topics for the first part of the session are listed below. There were about 8-10 participants in each team, selected by a random numbering game.

1. Impact, vulnerability and adaptation assessments
2. Strengthening institutional capacities (local and national)
3. Building resilience of vulnerable population, socio-economic and ecological systems
4. Enhancing climate change related disaster risk reduction strategies
5. Enhanced understanding of climate change induced displacement and migration
6. How to promote access to technologies
7. Strengthening data, information and knowledge systems, education and public awareness;
8. Improving climate-related research

Group1: Impact, vulnerability and adaptation assessment

Priority areas:

- Leadership or coordination bodies at various levels (including national as well as regional)
- CC to be priority in government agenda
- Multi sectoral body/forum for CC
- People centered scientific assessment on impacts and vulnerability
- Engage people and communities effectively
- Assessment tools and methodologies should be consistent, otherwise there is difficulty in comparison
- Integration of assessments(s) procedures
- National level framework to match local level planning

- Decentralization or delegation of certain responsibilities
- Bottom up planning should be promoted

Solutions:

- Many times, assessments do not involve people, when in fact; they must be placed at the centre. Inclusion helps to connect to the field better.
- Standard tools and methodologies should be adopted which could be customized to meet individual needs
- Access at the local level must be improved
- For financing, a multi-sectoral approach should work, comprising of government, donor agencies, local and other agencies.
- Decentralization of the budgeting process

Group 2: Strengthening institutional capacities (local and national)

The priority areas identified by this group were:

1. Early warning systems:
 - Fixing accountability at every level
 - Strengthening information sharing at the local level
 - Information sharing at the national and regional level too
2. Elected representatives and Local Authorities
 - Orientation on CCA and DMR
 - Capacity building
 - Inclusion and Equity
3. Legalizing (legal framework) for CC
4. Strengthening regional institutions like SAARC
5. Coordination among Ministries and Departments about CCA and DRR.

[Youth Group]

Causes for institutional incapacity:

- Lack of Political will
- Lack of knowledge and information
- Lack of communication
- Lack of implementation
- Lack of public participation

Solutions:

- Disseminating information about how CC impacts the locals and flagging it as a political agenda
- Encouraging government participation in the international forum
- Increased participation of NGOs
- Increased participation of women and children- for inclusive growth and development
- Education about CC (causes, effects) for students living in vulnerable areas through school curriculum

Group 3: Building Resilience of vulnerable population, socio-economic and ecological systems

1. Vulnerability needs to be defined in a context; while building resilience of vulnerable population, certain socio-economic and ecological indicators need to be determined.
2. Ecosystem services build resilience and should be considered while planning development activities at urban, rural and ecologically sensitive areas.
3. Indigenous knowledge systems that are self-evolving and spontaneous have built resilience in community. This needs to be recognized and encouraged in research and development policies.
4. Development policies and programmes should be in the context of the local geo-physical and agro-climatic conditions to be more climate- resilient.
5. Specific budgetary allocation for CC resilience.

[Youth group]

- Pre-planning should be done for floods and disasters
- Increasing the earth level could lessen the effect of floods
- Planting trees/poles will check soil erosion
- Education about measures to avoid flood disasters
- Mass media should educate about CC (through serials etc.)
- Efficient leadership for bringing together the community

Group 4: Enhancing CC related Disaster Risk Reduction strategies

Challenges:

- Lack of information of science and climate knowledge reduce possibility of assessment of risks
- Mal development
- Inability to translate the macro/ scientific information to local level information

Priorities:

- To address regional lack of information, in which SAARC could play an important role
- Involvement and leadership of National Planning commission- at country, state, district level
- Enforcement of standards
- Evolving an EWS (Early Warning System) at local level
- Prepare a contingency plan to address contingencies

Group 5: Enhanced understanding of CC induced displacement and migration

Enhanced understanding-

- Capacity building of institution on skills and concepts to conduct research on climate induced displacement and migration
- Research and vulnerability mapping of area and communities, and of causes and effects of CC: Research on ground situation

- Policy gaps should be plugged- relief and rehabilitation policy, land laws and land use laws
- Seasonality
- Zoning should be considered

What could be done?

- Linkage and coordination at various levels
- Policy gaps needs to be plugged
- Relocation of displaced population- R&R policy-land use
- Gender issues to be taken into account
- Roles and responsibilities should be defined clearly
- Provision of basic services to disaster victims
- Participatory planning and sharing across regions for cross sharing (regular interaction through meetings)
- Capacity building of institutions and trainings

(Youth group):

Effects of CC induced displacement and migration:

- Slums/temporary shelters
- Mass displacement
- Children worst affected- CC affects their homes, education (disturbed/stopped), health, are forced to work and makes them vulnerable to trafficking, sexual violence, or even recruited as child soldiers
- High costs on the State's exchequer
- Food insecurity

After displacement, what can be done in South Asia:

When climate induced displacement occurs, there is impact on both the places (which people migrated from and the place to). For this, strategies which may work could be:

- Incentives for displaced persons to return
- Integration of displaced populations together (and pass legislations)
- Internally Displaced Populations should be considered
- Cost effective technologies which could be used: salt tolerant rice, grow sack experiments
- Emphasis on research and knowledge

Group 6: How to promote access to technologies

1. How to promote access to technology: which is appropriate, relevant to context, which is cost-effective, affordable and integrated with local knowledge and culture
2. Research/ mapping of available technologies (dissemination)
3. Building systems to make information about technology available at all levels
4. Creating advocacy groups and making information available as and when they have it
5. Need to pilot/ research different research technologies and findings should be shared with people so that they may choose what they need
6. Dissemination- promote/exchange information
7. Technology promotion centre at SAARC level

Group 7: Strengthening data, information and knowledge systems, education and public awareness

- Lack of data is no excuse for inaction- Most governments use this excuse
- Make information actionable by :
 1. Defining target groups (data for whom)
- Quick and dirty data (which is for quick action)
- Make data available/accessible to all- also use indigenous knowledge
- Risk reduction as a priority instead of risk transfer
- Climate change related to managing risks

[Youth Group]

- Dissemination of information: Wall paintings in the community with key messages
- Puppet shows, street plays and regular mock drills
- Daily update on climate/weather change
- Networking with media for updation about weather/climate
- Early warning systems should be in place
- Capacity building of community about disaster management and safe measures

Group 8: Improve climate-related research

- Data collection is very important for research
 - For forecasting
 - For creating appropriate technology for adaptation
- Operational research is needed, for local conditions
- De-mystifying data and dissemination
- Integration of traditional wisdom, technologies and knowledge
- Scientific inputs/ evidence/ data should drive the policies for CC: Policy and plan has to be driven not by political will, but be based on scientific research
- Funding government allocations for R&D, for development projects
- Importance of involving private sector in research
- More demographic research of identifying vulnerable communities
- Capacity building in terms of knowledge sharing
- Regional collaboration is important- knowledge sharing and data exchange
- Researcher/Scientist should be accountable to people. The indigenous knowledge of people should not be ignored, as compared to scientific knowledge.

B. Country-wise planning- Common priorities for CCA for South Asia

In this part of the last session, the participants from the same countries were made to sit in groups and brainstorm to bring the common priority areas for climate change adaptation in their respective countries. The salient points of their presentation are enumerated below.

Afghanistan:

1. Knowledge management
2. Strengthened coordination- Sharing workshops
3. Mechanism for influencing long term development plan of government
4. Policy gaps analysis
5. Capacity building

Bangladesh

1. Effective and speedy implementation of Bangladesh Climate change and Action Plan: The country has plenty of policies such as NAPA, Disaster Protection Act. However, the policies and Acts have not been actually implemented.
2. Basin-based approach for sustainable water management- Identified water as a major challenge
3. Climate responsive and decentralized governance and decision making: Improvised decision making- Government system has to address the local system.
4. Empowering communities to access climate financing- Resilience fund, etc. not going to the people. People must access these funds directly.
5. Action research and community awareness on long term risk associated with climate change. We need to have continuous action research on long term risk of slow onset of sea level rise, droughts etc. Resilience is a continuous process.

Bhutan

1. Policy and Enabling environment:
 - a. Strengthen the mainstreaming process (poverty, climate, environment, gender and DRR)
 - b. Establish Climate Fund
2. Implementation:
 - a. Vulnerability assessment of all districts by Sectors
 - b. Strengthen CBDRM (Community Based Disaster Risk Management)
3. Research and knowledge management:
 - a. National research and database
 - b. Capacity building

India

1. Enabling/strengthening convergence mechanisms- coordinating agencies such as NDMA
2. Issues of natural resource management- common resources need more attention. Such resources add more resilience among the community. Policies need to have space for traditional wisdom- encouraging use of traditional crop and cattle varieties.
3. Strengthening bottom-up planning process: Strengthening of capacities of local systems. Plans must be made more people oriented- getting the priorities of people inside "people's voice".
4. Access to classified data and research on biodiversity
5. Strengthening systems to reach the last man/ the last person
6. Flexibility and structure for funding mechanism.

7. Emergency management services- Stop gap arrangement for relief and rescue work.

Maldives

1. The government should focus on the water sector as the number one priority, since water shortage is very common. The supply of water has cost the government about 2,000 US\$ every year. On each island, within an atoll, there should be an integrated system using rainwater harvesting.
2. Coastal protection measures: there should be construction of harbor to address climate-erosion happening on either side.
3. Food security: Maldives entirely depends on imported food such as sugar, rice, onions from India. When there are floods in India, supply to Maldives is also reduced; thus, there is a need for alternative arrangements.
4. Protection of coral reefs and marine environment: Need to bank on this, which is considered as a rich biosystem.
5. Health Programmes must address the vector- borne diseases, as epidemic of malaria, dengue and chikangunya is common.

Nepal

1. Consolidation of information and data-
 - Project focused information, not overall country information
 - Limited information, generation and analysis (eg. Meteorological information over time, spatial coverage)
 - Internal and external research
 - De-mystification of data
 - Sector-specific information/ research relevant to CC
2. Integration of Local Adaptation Plan of Action (LAPA) and National Adaptation Programme of Action (NAPA) in sector specific plans/programmes with budgetary allocation
3. Capitalizing the good current practices and lessons learnt in CCA for scale up at different sectors
4. Capacity building at national and local level
5. Strengthening forecasting and Early Warning System (EWS)
6. Introduction of CCA in formal and informal education- making children as change agents.

Pakistan

1. Water resources should be prioritized- through water storage and infrastructure, water conservation strategies, integrated water strategies, enhancing capacities.
2. Agriculture and livestock: this forms a major domain as a majority of the population depends on agriculture. Crop varieties which are drought resistant, new technology to improve crop productivity, improved farm practices, crop diversification.
3. Human health is a key priority area. Need to assess the health vulnerabilities, inform and sensitize the communities and health service providers.
4. Forestry- policy measures, awareness raising
5. Biodiversity: encourage empirical research in flora and fauna. Establish gene banks, seed banks, conservation of biodiversity, encourage local community

This policy document needs to be translated into strategy and into an action plan. The new government should act on these action points in the provinces.

Sri Lanka

1. Make effective the National Climate Change Adaptation Strategy of 2010 and implement it (5 key priority areas: mainstream CCA, minimize CC impacts on food security, improve climate resilience)
2. Ministry of Finance and Planning should effectively integrate CC and DRR strategy
3. Government should prioritize CC in all agendas
4. Impact at the local level is largely unknown. We need local level specific data for planning.
5. Communication and public awareness should be improved
6. Multi stakeholder partnership in policy and decision making – grassroots, academia, NGOs should all come together.

At the end of the presentations, Ms. Margarita Tileva **summarized** the following common themes which were culled out from the presentations of various countries:

- Focus on research
- Inclusiveness in planning
- Stressed on partnerships
- Strengthening policy and implementation
- Proper allocation in budgets

Ms. Tileva also summarized the day's proceedings, which are annexed below (Annexure 2). As the two-day consultation drew to a close, the compère thanked all the participants and the organizers for holding a successful and enriching session on climate change adaptation.

Brief Summary of Discussions (Day 1)

IMPACT OF CLIMATE CHANGE:

- Global consensus that climate change is already impacting our life and will change the world as we know it. Key messages from inaugural as well as from follow up sessions
- Key impacts will be:
 - We will be living in a much more hazardous world; severity, frequency and complexity of disasters will increase as well as economic and probably life losses; there is a direct link between disasters and poverty
 - CC will have a huge social and economic impact – economic losses will increase, will impact food security, will increase risk of conflict over resources and will cause displacement and migration
 - CC will have a huge environmental impact, leading also to extinction of species and spread out of invasive alien species
 - Impact on mega cities, cities, coastal areas and small islands

ACHIEVEMENTS:

- Investments in risk reduction have increased
- Local action (both by government and non-government sector)
- Development of National Plans

CHALLENGES

- Plans developed but not much action on the ground, not because of lack of data and knowledge but a level of carelessness and due to differences in quality of governance
- Less achievements in risk reduction at local level
- Insufficient mitigation
- Limited coordination
- Funding gap / insufficient investments

KEY RECOMMENDATIONS FROM SPECIALIST, POLICY FORUMS AND REPORTS - WHAT TO DO:

- A lot of practical recommendations exist but one thing is clear:
- We need to act immediately.
- The actions need to be linked with the development process in taking into account the right to development (esp. least developed countries), equity. There is a need to accelerate development
- CCA, DRR to be linked with development, so as to become a natural component of the development process (not only advocacy or campaign agenda)
- Focus on high resilience strategies (adaptation plans , capacity building, vulnerability assessment)
- Need of new type institutions
- Strengthen the role of existing institutions (e.g. SAARC:
 - Needs to be strengthened and made more effective to contribute and drive strong regional action
 - Need to play key role in knowledge sharing
 - Regional support to other SA countries from India (for example) needed
 - SAARC Development fund to have significant Adaptation component; complying/less polluting countries to be “rewarded”
 - SAARC to play a role model)
- Focus on regionality (joint regional efforts) (e.g. CC in the Himalayas range/ Ecosystem as it has huge impact on SA and globally)
- Stronger emphasis on risk management (the convergent point between adaptation and mitigation), reconstruction and rehabilitation, long term recovery and resilience building; need to move beyond rescue and relief; greater focus on prevention and risk transfer
- Look at risk from many drivers ; emphasize on and invest in risk assessment combined with vulnerability assessments
- Emphasize and strengthen education, training and CB and public awareness
- Strengthen international cooperation and forecasting
- Effective use of funds
- Focus on local adaptation
- Remove barriers to vulnerable social groups
- Migration also needs to be factored in adaptation strategies and plans
- Develop inclusive partnerships and convergent multi-sectoral approaches
- Improved public accountability
- Recommendations from Children:
 - Need to look at both the social and economical aspect of the adaptation
 - More power to local government needs to be given for successful adaptation action
 - Need of more dialogue like this conference, and more regular to exchange ideas and come to common agreement. Definitely there is a need for more government participation and forums like this one

- Poverty reduction is the job of the government. There is a need of additional international technical knowledge and expertise to be provided to government to address the problem. “Help government to take their responsibility to reduce poverty”
- There is a need of additional stimulus for children. Very little on this important topic is currently taught in schools. Participation at conference like this really revealed to children the depth and complexity of the problem. Therefore it is good that this subject is touched upon more in depth in education systems which will help children in understanding the issue in order to make them prepared for addressing the same. There is also a lot of value in children participating in such conferences.

KEY MESSAGES

- Action is not going to happen on its own. Requires extensive effort of all.
- Engage with key partners : media, civil society and youth (focus on inter-generational justice)
- Risk will not be reduced through insurance. There is a need of physical action

Brief Summary of Discussions (Day 2)

KEY RECOMMENDATIONS FROM SPECIALIST, POLICY FORUMS AND REPORTS - WHAT TO DO:

- Mainstreaming in national policy:
 - Poverty , environment and climate together as they are interrelated
 - Allocate sufficient funding
 - DRR and CCA are disconnected and not integrated, currently handled by different ministries/departments. Need to be managed together but a lot more needs to be done
 - Capacity, understanding and knowledge is still limited especially at local level/ local institutions
- Monitoring and evaluation of adaptation:
 - Highly complex; development proxy indicators can/should be used
 - Capacity of both community and institutions needs to be further build
 - Needs to involve multiple stakeholders
 - Need to be mainstreamed in order to achieve sustainability
- Private sector engagement:
 - Businesses need to be involved; scaling up through businesses can be achieved
 - Need as well to build capacity and create occupational diversity
 - Government need to create enabling environment (change of mindset), remove barriers and businesses will willingly engage in CCA action
- Role of science:
 - Needs to feed into development policies;
 - Dialogue between scientists and policy maker to be promoted
 - More in depth discussion is needed on the use of science in policy
 - In policy and implementation we need to go for Climate Smart actions (maybe not for climate proof)

KEY MESSAGES

- Action is not going to happen on its own. Requires extensive effort of all.
- Engage with key partners : media, civil society and youth (focus on inter-generational justice)
- Risk will not be reduced through insurance. There is a need of physical action

SATNET Regional workshop on: Climate Resilient Small holder Agricultural Farming Systems in South Asia

26-27 June 2013, new Delhi, India

Programme Structure

Below is the summary of the workshop

Day 1	Day 2
<ul style="list-style-type: none"> • INAUGURAL SESSION • The SATNET Asia Project: An Overview • Session I Regional Scenario on Climate Resilient Agriculture for Smallholder Farmers In South Asia • Session II Strategies for Increasing Agricultural Productivity through Climate Change Adaptation For Small Holder Farmers 	<ul style="list-style-type: none"> • Session III Climate Friendly Farming Practices For Smallholder Farmers • Session IV Climate Smart Agricultural Value Chains For Small Holder Farmers • Summary and Way Forward • Training Evaluation

Summary of Key Learning Outcomes

The workshop started with the key issues on “Adapting South Asian Agriculture to Climate Change”. The first part of the session emphasized that adaptation, mitigation and food security should all be addressed at the same time in order for South-Asian agriculture to adapt to climate change and declining resources. Climatic stresses in South Asia such as droughts, frosts, heat, floods and cyclones were highlighted to require attention in the long term. In addition to the climate change stresses, different challenges that the region faces such as demand for food and quality for food, competition for resources, degradation of resources, climate risks and variability of global supplies and prices were emphasized to be seen as an overall with the climate change effects. Key strategies for adopting climate resilient practices were recommended for stakeholders:

- Investment in the management of land and water resources in input delivery systems and in market linkages mechanisms
- Management of current climate risks for poverty alleviation and for equitable development
- Exploiting more the mitigation co-benefits of adaptation options and transferring these benefits to the farmers to increase their adaptive capacity
- Addressing the issues of poverty, governance, institutions and human capital that limit drastically the countries' agriculture growth and smallholder's integration in the market

In the second part of the regional scenario on climate resilient agriculture for smallholder farmers in South-Asia, participating countries (Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan) made a presentation on the climate context of their country, key initiatives taken to enhance climate resilient agricultural farming systems, and priority areas for the future. Participating countries commonly face significant increase in natural disasters such as floods, droughts and land-slide. The unusual breaks out of natural disasters greatly damages on agricultural yield variation and thus impacts on food security of the countries. Concerning the key initiatives, each country presented on their improvements in enhancing climate resilient agricultural farming systems which contain development of national programmes on capacity building and knowledge management, investment on climate resilient technologies and practices, and institutional strengthening for small and marginal farmers. The priority key areas of the countries include addressing current climate-related risks, research and knowledge management, improved governance and stakeholder participation, strengthening resilience to climate change and variability through technical collaborations, and market access facilitation.

The moderated discussion on priority areas for climate change adaptation for smallholder farmers in South Asia summarized the key points and made significant recommendations for stakeholders. Firstly, the better planning for adaptation and the assessment of capacity building are very important since it implies numerous stakeholders including researchers, policy makers and farmers. Secondly, regional cooperation in terms of climate risk management is crucial since the 10 countries in the SATNET South-Asia Project share the same challenges of environment and climate change. Thirdly, livestock and crop insurances should be part of an important risk management strategy and must be implemented. Fourthly, new technologies have to be developed and shared among the countries. Fifthly, some improvements have to be done with scaling methods of the climate change resilient agricultural technologies. Finally, mitigation, as an important aspect of climate change adaptation needs to be better defined within each participating country.

The workshop also focused on the importance of water resources management in South-Asia in a constant context of either “too less” or “too much” water and the urge to manage water strategically, considering the long term increase of climate stresses on agriculture. The benefits of supplemental irrigation in each type of crop exploitation were presented. Also, many specific water management interventions and technologies such as drip irrigation, auxiliary storage reservoirs in canal commands, land levelling techniques and concrete lined watercourses were highlighted which were both implemented in Pakistan. Finally, a range of agricultural water management solutions that can be adopted according to the type of system were proposed.

The “Stress-Tolerant Rice in Africa and South Asia” (STRASA) project began at the end of 2007 and aims to reduce poverty and hunger and to increase food and income security of resource-poor farm families and rice consumers in South Asia and sub-Saharan Africa through the development and dissemination of rice varieties tolerant of abiotic stresses. There have been a) search for new stress tolerant genes for popular varieties crop varieties, b) evaluation of these varieties through national system and their release, c) seed multiplication and dissemination and d) capacity building and policy issues.

Among the major achievements done within the STRASA project, new genes were identified and were developed to resist to floods, toxicity, drought, salinity and cold weather. A major achievement was the development of the Sub1 gene that was transferred in the “Swarna” rice crop, which help to make it much more resistant to flash flooding, drought and salinity. This achievement is an example among many stress tolerant rice varieties and different crop varieties. This provides a potential to usher Green revolution in eastern India, Bangladesh and Nepal by enhancing and stabilizing rice productivity and production in theses stress prone areas.

The main challenges in this STRASA project and for the long term is a) to share and transfer this knowledge across the farmers themselves on the national level and across countries, b) to improve and urge the governments' implementation of those stress tolerant varieties and finally, to c) respond efficiently to the farmers' increasing demand.

The work on soil fertility management and advanced crop nutrition was presented in this session. It started by describing the major sustainability issues in agriculture in India that include declining and deterioration of natural resources, nutrient mining and multiple nutrient deficiencies, and Overexploitation of ground water resources. All these issues affect at long term the soil health and fertility and therefore, the nutrition quality of crops and nutritional security for people. Thus, the session emphasized the need for better management of the soil health/fertility which aims to enhance the sustainability of crop production. Also, a soil health assessment has been developed through a "Soil Health Index" that can be used by farmers to determine the best crop choices and resources options or to determine whether the quality of soil will be profitability or not and finally, to determine which nutrient treatment is required to solve a specific nutrient soil deficiency.

In general, the soil health management is crucial to enhance agricultural output and to maintain biodiversity and healthy land resources. There is an important need to translate scientific knowledge into operational knowledge for farmers to expand soil management best practices on a large-scale and a need to sensitize them.

The key points brought from each presentation were raised throughout the discussions. Firstly, the work done in Nepal within the STRASA project was raised about stress tolerant rice varieties. Nepal's climatic stress is mainly drought. Therefore, they only have implemented one sort of stress tolerant rice variety and are willing to implement more. In this regard, the partnerships with NARC, few NGOs and small/medium seed growers should be encouraged. In addition, reducing water requirement is another avenue raised to face drought stresses.

Secondly, the sort of investment that is required to implement best practices in climate change adaptation was raised. In the case of poverty and lack of capacity's omnipresence, the debate about the sources of investment in South Asia is important in order to identify how to transfer concretely these technologies. There is a different answer for each type of technologies. Where some technologies definitely require a lot of capital, others, like seeds are less costly to distribute and have high benefits. In this sense, the cost of technologies and the possibility of their adoption per region should be highlighted and should require a community approach or support by the governments or NGOS.

Thirdly, the limited access to the "SWARNA-Sub1" seed was highlighted. The discussion explained how the larger producers keep restraining their production in big centres and how the solution may be to provide incentives for smaller rice producer to produce those types of seeds, just like Nepal does.

The moderated discussion on climate friendly farming practices for smallholder farmers focused on the high-yielding abiotic stress-tolerant hybrid cereals and its potential benefits in areas prone to climatic stress. The positive impacts of adapting to abiotic stress tolerant hybrid cereals for smallholder farmers were elaborated in detail. This session also focused on biological control of insect pests and diseases in major agricultural and horticultural crops as a sustainable alternative to chemical pesticides and its potential benefits to small holder farmers. Further this session also deliberated on the environmental benefits of using biological control methods Vis-à-vis chemical pesticides for control of pests and diseases of economically important agricultural crops. The poor shelf life of biological control agents was identified as the key bottleneck for smallholder farmers adopting biological control methods as a viable alternative to chemical pesticides. Further this session also focused on bio intensive integrated pest management for harmonizing ecological imbalances for sustainable agriculture. The potential of improved Cereal-based cropping systems such as Rice-

Wheat or Rice-Wheat-Pulse was also deliberated during this session and it was concluded that such systems have significant potential to enhance the livelihoods of smallholder farmers and also serve as an effective tool of climate change adaptation.

The final technical session of the workshop focused on the climate smart agricultural value chains for small holder farmers. During this moderated session, several post-harvest management practices for small holder farmers for minimizing post-harvest loss of agricultural produce were presented. Several technology packages developed by the Cereals Systems Initiative for South Asia, a programme of the International Rice Research Institute were presented. This session also focused on the agri-business models in India and the key challenges for their sustainability and scalability. Further, the discussions also focused on technology transfer and market access issues for smallholder farmers and some innovative strategies for market development for smallholder farmers through commercial pockets based community managed collection centers, a concept promoted by the Food and Agriculture Centre of Excellence (FACE) of the Confederation of Indian Industry (CII) was also presented.

Evaluation of the Workshop

Workshop Evaluation

The evaluation of the workshop was conducted based on two different approaches including (i) General feedback and (ii) Knowledge, Attitude and Practice. The criteria of evaluation was based on the grading system i.e. Excellent, Good, Fair and Poor. Further, general feedback part was divided into three segments i.e. Content, Process and Logistics containing feedbacks of the workshop related to the subject. The process and logistics were indirectly related to the subject but this part was mainly designed to ensure the workshop mobilization. The second part of the evaluation was prepared using perception based approach-Knowledge, Attitude and Practice. This part mainly discusses about individual knowledge gained from the workshop as well as implementation of specific knowledge in his/her own areas of research. During last day of the workshop twenty three evaluation forms were received from the participants out of 30 to assess the workshop according to its distribution of knowledge, quality and logistics. In general, the workshop was rated as excellent by more than 70% of the participants followed by good remarks.

Usefulness of the content and quality of processes and logistics

Evaluation forms were distributed to the participants to rate the usefulness of the workshop content and quality of processes logistics based on the grading criteria from excellent to poor. Overall, statistic shows (table 1) the workshop was excellent since maximum percentage achieved above 50% has been given to excellent category of content, process and logistics. However, content portion of the evaluation form scored maximum of 65% (L3, L4 and L6) followed by lecture 1 61%. The process part of the feedback was excellent which is close to 50% whereas logistics was given completely excellent accounting more than 70% for resource mobilization.

Workshop Evaluation- SATNET Regional Workshop on Climate Resilient Small holder Agriculture Farming Systems in South Asia

		Excellent	Good	Fair	Poor
Content	Lecture 1: Adapting South Asian Agriculture to Climate Change	61%	26%		
	Lecture 2: Water Resources Management: Climate Adaptive Measures for South Asian Smallholder Agriculture	44%	44%	8%	
	Lecture 3: Stress Tolerant Rice Varieties in South Asia : An Adaptation to Climate Change	65%	26%		
	Lecture 4: Integrated Soil Health Management for Enhancing Agricultural Output – Package of Practices for Crops (Bio-fertilizers, Crop Nutrition System and Fortified Organics)	65%	26%	9%	
	Lecture 5: High-yielding Abiotic Stress-tolerant Hybrid Cereals	39%	48%		
	Lecture 6: Biological Control of Insect Pests and Diseases in Major Agricultural and Horticultural Crops	65%	18%	4%	4%
	Lecture 7: Bio intensive IPM: Harmonizing Ecological Imbalances for Sustainable Agriculture	57%	39%		
	Lecture 8: Potential of Improved Cereal-based Cropping Systems Such as Rice-Wheat or Rice-Wheat-Pulse	37%	57%	4%	4%
	Lecture 9: Climate Change: Post-harvest Management Practices for Small Holder Farmers	57%	35%		
	Lecture 10: Agri-business Models in India: Key Challenges and Opportunities	37%	48%	4%	
	Moderated Discussions	44%	35%		
Processes	Agenda and flow	48%	48%		
	Facilitation, feedback and discussion	48%	52%		
Logistics	Pre-workshop communication	83%	13%	4%	
	Workshop venue facilities	74%	13%		
	Accommodation	70%	17%		
	Food	74%	17%	9%	
	Administrative assistance during the workshop	74%	17%		

On the content part of the evaluation, it is very clear that participants were very engaged in learning the knowledge on climate resilient agriculture and its adaptation strategies in the region. Since excellent and good grading were merely considered while evaluating the proceedings of the sessions,

whereas fair and poor (4% in lecture 6 and Lecture 8) have also been seen occasionally when few presentation on biological controls and rice-wheat varieties were presented.

Expectations

The large number of participants (90%) indicated that the workshop on the Climate Resilient Small Holder Agricultural Farming System in South Asia met their expectations on a large scale. Hence, it is followed by very large and large category of participant from 48% to 40% respectively.

Aspects to be improved in the future

This segment of evaluation indicates that majority of participants have suggested the practical experience should have been covered during sessions as well as inclusion of brainstorming session on the specific topic of climate resilient. These areas are based on the suggestions that participants experienced during the workshop.

Content

- Provide more practical and field experience with scientific explanation by the expertise.
- Include some sessions of Knowledge Management and ICT.
- Focus on the other sub disciplines of agricultural science- livestock, animal husbandry
- Add some more areas of climate change adaptation in South Asia
- Interactive sessions.

Process

- Presentations should be more simplistic rather too technical to understand (IPM & Rice varieties)
- Improve the climate change adaption in integrated or comprehensive approach
- Time allocation for the presenter
- Brainstorming sessions

Logistics

- Presentation file should be given in advance to the participants
- Some session were too long
- Should also include field visits
- More time for discussion and Q/As.
- The duration of the workshop should be more than 2 days to learn.
- Improvement in pre-workshop communication

Facilitation

- Workshop should also include some practical training and field visit with prior information in the region.

Additional comments

The following are additional comments and suggestions have been highlighted during the workshop:

- “It is a great platform for sharing agriculture progress across different regions of South Asia” (Santanu Dutta)
- “New knowledge gained in IPM” (Madan Prasad Forig)
- “Bridging the gap between lab and land” (Akhilesh Surjan)
- “I will improve our organization policies on CCA” (Nazir Ahmed Ghafoori)
- “Workshop was excellent” (Avijit Saha)
- “I really got insight of subject of the workshop” (Alok Sharma)
- “I will incorporate the knowledge in my research” (Chinmai Hemani)

Annexes

Annex 1: Programme Agenda

AGENDA

Day 1: June 26, 2013

Venue: "Nilgiri", The Oberoi

Inaugural session

- 9:00 am – 9.30 am Registration
- 9.30 am – 10.00 am **Inaugural Session**
- Speaker 1:** Dr. Krishnan S Raghavan, United Nations APCTT-ESCAP
- Speaker 2:** Mr. David Mcloughlin, Deputy Representative, UNICEF India and Convener, UN Disaster Management Team (UNDMT), India
- Speaker 3:** Dr. K. D. Kokate, Deputy Director General (Agricultural Extension, Indian Council of Agricultural Research (ICAR), India
- 10:00 am – 10.30 am **The SATNET Asia Project: An Overview:** Mr. Anshuman Varma, Knowledge Management Coordinator, SATNET Asia Secretariat, Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA) of the United Nations ESCAP, Bogor, Indonesia
- 10:30 am – 10.45 am Tea break

Session I: Regional Scenario on Climate Resilient Agriculture for Smallholder Farmers in South Asia

- 10:45 am – 11.45 am **Adapting South Asian Agriculture to Climate Change**
Dr. Pramod Aggarwal, Regional Program Leader (South Asia), CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), New Delhi
- 11.45 am – 12.45 pm **National Scenarios**
- **Afghanistan**
 - **Bangladesh**
 - **Bhutan**
 - **India**
 - **Nepal**
 - **Pakistan**
- 12.45 pm – 1.15 pm **Moderated Discussion on Priority Areas for Climate Change Adaptation for Smallholder Farmers in South Asia**
- Dr. Pramod Aggarwal, Regional Programme Leader, CCAFS, New Delhi

1.15 pm – 2.15 pm LUNCH

Session II: Strategies for Increasing Agricultural Productivity through Climate Change Adaptation for Small Holder Farmers

2.15 pm – 3.00 pm **Water Resources Management: Climate Adaptive Measures for South Asian Smallholder Agriculture**

Dr. Bharat R Sharma, Principal Researcher (Water Resources) and Coordinator: IWMI-India

3.00 pm – 3.45 pm **Stress Tolerant Rice Varieties in South Asia: An Adaptation to Climate Change**

Dr. U. S. Singh, South Asia Regional Project Coordinator – Stress Tolerant Rice for Africa and South Asia & Team Leader, Cereal Systems Initiative for South Asia

3.45 pm – 4.00 pm TEA BREAK

4.00 pm – 4.45 pm **Integrated Soil Health Management for Enhancing Agricultural Output Package of Practices for Crops (Biofertilizers, Crop Nutrition System and Fortified Organics)**

Dr. Naveen Kalra, Principal Scientist (Special Projects) and Former Head (Crop Nutrition Research), Tata Chemicals Limited, New Delhi

4.45 pm – 5.15 pm **Moderated Discussion on Best Practices in Climate Change Adaptation for Smallholder Farmers in South Asia**

Coordinator: Dr. Bharat R Sharma, Principal Researcher (Water Resources) and IWMI-India

5.15 pm – 5.30 pm Wrap-up of day 1 and brief about day 2 programme

Day 2

Venue: “The Connaught”, The Oberoi

Session III: Climate Friendly Farming Practices for Smallholder Farmers

.00 am – 9.15 am Recap of Day 1 and Overview of Day 2

9.15 am – 10.00 am **High-yielding Abiotic Stress-tolerant Hybrid Cereals**

Dr. Takashi Yamano, Senior Agricultural Economist, Cereals Systems Initiative for South Asia (New Delhi)

10.00 am – 10:15 am TEA BREAK

10.15 am – 11:15 am **Biological Control of Insect Pests and Diseases in Major Agricultural and Horticultural Crops**

Dr. P.Jeyakumar, Director(Plant Health Management), National Institute

of Plant Health Management (NIPHM), Hyderabad, India

11.15 am – 12:00 pm **Biointensive IPM: Harmonizing Ecological Imbalances for Sustainable Agriculture**

Dr. Malvika Chaudhary Ghosh, Senior Manager (Research) Biofertiliser, Pest Control India, Bengaluru

12.00 pm – 12:45 pm **Potential of Improved Cereal-based Cropping Systems such as Rice-Wheat or Rice-Wheat-Pulse**

Dr. Sheetal Sharma, Senior Research Scientist, International Rice Research Institute (IRRI)

12.45 pm – 1.15 pm **Moderated Discussion on Best Practices in Climate Friendly Farming Systems for Smallholder Farmers in South Asia**

Dr. P. Jeyakumar, Director (Plant Health Management), National Institute of Plant Health Management (NIPHM), Hyderabad, India

1.15 pm – 2.15 pm LUNCH

Session IV: Climate Smart Agricultural Value Chains for Small holder Farmers

2.15 pm – 3.00 pm **Climate Change: Post-harvest Management Practices for Small Holder Farmers**

Dr. Srivalli Krishnan, Project Management Specialist – Climate Adaptation, USAID-India

3.00 pm – 3.30 pm **Agri-business Models in India: Key Challenges and Opportunities**

Ms. Kavary Ganguly, Deputy Director, Confederation of Indian Industry (CII) – Food and Agriculture Centre of Excellence (FACE)

3.30 pm – 3.45 pm TEA BREAK

3.45 pm – 4.15 pm **Moderated Discussion on Technology Transfer and Market Access Issues Identified for Smallholder Farmers**

Dr. Takashi Yamano, Senior Agricultural Economist, Cereals Systems Initiative for South Asia (New Delhi)

4.15 pm – 4.45 pm **Summary and Way Forward** – Dr. Krishnan S. Raghavan, APCTT-ESCAP and Mr. Anshuman Varma, CAPSA-ESCAP

4.45 pm – 5.15 pm **Training Evaluation**

Annex 2: List of Participants

S.No.	Name	Designation	Organization	Email
1	Abdul Aziz	Director	Agency for Humanitarian and Development Assistance for Afghanistan (AHDA)	engazizsanwari@ahdaa.org
2	Akhilesh Kumar Surjan	Associate Professor	Kyoto University	surjan.akhilesh.5m@kyoto-u.ac.jp
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