

Regional Workshop on Mainstreaming Climate Change Adaptation into Developmental Planning

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Summary of Proceedings

Introduction

1. Climate change poses a serious challenge to social and economic development. Countries can improve their resilience to climate change through a combination of measures and right policy incentives aimed at multiple levels of government. In line with its capacity building activities, the Asian Development Bank Institute (ADBI) organized a four day workshop on Mainstreaming Climate Change Adaptation into Developmental Planning. The workshop looked at mainstreaming opportunities in the most vulnerable sectors of agriculture and water, with the focus on developing countries and small island states.
2. The workshop was organized in collaboration with the United Nations Framework Convention on Climate Change (UNFCCC), Food and Agriculture Organization of the United Nations (FAO), United Nations Environment Program (UNEP), World Health Organization (WHO), United Nations University (UNU), Ministry of Environment (MOE) Japan, Ministry of Land, Infrastructure, Transport and Tourism (MLIT) Japan, Japan International Cooperation Agency (JICA), Institute for Global Environmental Strategies (IGES), and the Asian Disaster Reduction Centre (ADRC).
3. Representatives from governments, mostly senior officials attached to agriculture, water, and other relevant ministries, universities, research institutes, and the private sector attended the workshop. 21 delegates and 30 observers from related organizations in Japan participated in the workshop. The participants and resource speakers were from Bangladesh, Cambodia, People's Republic of China (PRC), Cook Islands, India, Indonesia, Japan, Kazakhstan, Kiribati, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Tuvalu, United States of America, and Viet Nam.
4. The primary objectives of the workshop were to:
 - (i) Understand key developmental risks posed by climate change and the required actions to be taken by policymakers to address these risks.
 - (ii) Share experiences on adjustment of key planning instruments relating to land use, water resource management, coastal zone management, and health to address climate change.
 - (iii) Exchange experiences on successful climate change adaptation programs and measures across key vulnerable areas and stakeholders.
 - (iv) Identify existing policy barriers to effective implementation of adaptation programs and investigate how they can be removed.

5. The workshop was organized as a series of seven thematic sessions spread over four days, including a one-day field visit to Tokyo's tone canal water management station and Centre for Environmental Sciences, Saitama prefecture. Sessions were categorized into the following themes:
 - (i) vulnerability assessment, availability, and applicability of planning tools
 - (ii) selected structural measures of adaptation
 - (iii) selected non-structural measures of adaptation
 - (iv) practices of adaptation planning
 - (v) partnering for climate change adaptation
 - (vi) current status and policy barriers in adapting to climate change
 - (vii) breakout group discussions on mainstreaming strategies

6. The scope of the workshop was to target the areas of:
 - (i) climate geography: semi-arid, tropical, and small islands (secondary: arid, temperate countries)
 - (ii) sectoral: agricultural and water (secondary: health and education)
 - (iii) stakeholders: policymakers from the Asia-Pacific (secondary: development partners, academia).

Opening Remarks

7. In his opening remarks, **Masahiro Kawai**, Dean of ADBI, underlined the threats and challenges of climate change for the Asia-Pacific and stressed the urgency of integrating adaptation measures into developmental planning. Particularly for the least developed countries (LDCs) and small island developing states (SIDS), climate change risks are phenomenal because their economies are more dependent on climate sensitive natural resources. Contributing the least to greenhouse gas emissions in the atmosphere, they are the most vulnerable to the adverse effects of climate change such as rising sea levels and intensification of natural disasters from floods and droughts. Compounding this is the lack of public awareness, institutions and resources, such that LDCs and SIDS also have the least capacity to adapt. In this regard, He also highlighted recent and future initiatives that ADB and ADBI were and will be undertaking to improve adaptive capacities in the region.

8. The keynote speech by **Tae Yong Jung**, Senior Economist at ADB, underscored that climate change is already affecting Southeast Asia, but that the worst is yet to come. Economic growth in the future would be adversely affected if no change in developmental policy is made in the near future to appropriately address the potential impacts of climate changes. Presenting results from the recent landmark ADB study, A Regional Review of the Economics of Climate Change in Southeast Asia, he conveyed that damages could lead to an overall loss of more than 6% of GDP by 2100.

9. Adaptation makes economic sense. To safeguard existing and future developmental progress, adaptation must be integrated into sectoral and institutional plans. If economic development occurs in isolation without considering climate change, this can increase the dependency on climate sensitive resources and further entrench economies in old unsustainable models of growth. Already we are seeing how climate change is impacting developmental progress throughout semi-arid and tropical regions and in SIDS. Thus, climate informed investments are essential to enhance livelihood opportunities and promote sustainable economic growth. According to the

report, adaptation is needed immediately in the key sectors of water, food and agriculture, natural resources management, and health. Acting now would also provide large livelihood benefits to the communities and countries, and will certainly outweigh any costs of no-action.

10. Southeast Asia's capacity to adapt to climate change is almost half that of developed countries. This region must undertake more research to be proactive in mainstreaming adaptation concerns into developmental planning. The region also has an important role to play and could make a significant contribution to global efforts in mitigating the green house gas emissions.
11. It was emphasized that regional cooperation offers effective means to deal with many adaptation issues, such as water resource management, extreme weather events, and outbreak of diseases; as well as for learning and knowledge sharing.
12. The third opening speech was given by **V. Anbumozhi**, Capacity Building Specialist, ADBI. He explained the concept of adaptation and the rationale for mainstreaming it. Climate change adaptation practices refer to actual adjustments, or changes in the decision making process, which might ultimately enhance resilience or reduce vulnerability to observed or expected changes in climate. Adaptation practices could be proactive or reactive, autonomous or planned, top-down or bottom-up, institutionally-driven or community-based, short-term or long-term.
13. Mainstreaming adaptation refers to the incorporation of initiatives, measures, strategies to reduce vulnerability to climate change into other existing policies, programs, resource management structures, and other livelihood enhancement activities, so that adaptation to climate change becomes part of these programs. As a policy instrument, mainstreaming can be a more effective and efficient use of institutional and financial resources than designing and managing two separate climate policies. It also reduces the chances of mal-adaptation.
14. The current status of adaptation planning in developing and developed countries is also reviewed. Apart from a few stand alone structural and non-structural practices, current climate risks have not yet been systematically integrated into the design of new projects in agriculture and water sectors.
15. International funding for adaptation remains limited. Currently, the Adaptation Fund—a major international financing mechanism supporting concrete adaptation projects and programs in developing countries funded by a 2% levy on Clean Development Mechanism (CDM) projects—only receives revenues of \$80-300 million per year. Yet the annual cost of adaptation in developing countries, by 2015, is estimated by the UNFCCC (2007) to be \$86 billion.
16. A framework for mainstreaming adaptation was also introduced as a planning tool that countries could use. This framework illustrated that mainstreaming adaptation into developmental planning could involve four stages (i) awareness building (ii) targeted communication (iii) piloted investments and (iv) mainstreaming which may take about five to seven year period. This framework formed the basis of discussion and was referenced throughout the workshop.

Thematic sessions

Theme 1: Vulnerability Assessment, Availability and Applicability of Planning Tools

17. Various planning tools for different decision-making levels are available to assess the climate risk in agriculture and water sectors. **Session 1** identified the climate risks in agricultural and water sectors, and exemplified the tools necessary for improving the adaptive capacity at the sectoral level.
18. **Zhijun Chen**, Water Resource Development and Conservation Officer, FAO Regional Office for Asia and the Pacific, provided an outlook of the region's future water supplies in the absence of adaptation, as well as a summary of the various water resource planning tools for climate change adaptation, their constraints, and areas for further improvement.
19. The Asia-Pacific region is home to around 61% of the world's population but only has one third of the world's renewable water resources. Despite enjoying fast-paced economic development in recent decades, the region is one of the most vulnerable regions to water-related disasters. From 1980 to 2006, the region had the highest number of water-related disasters and fatalities, with over 600,000 deaths and more than 4.5 billion people affected (80% of the world total).
20. The trends of climate change and its impact on Asia's water have already been observed: increased surface air temperature and rainfall variability across the region; decreased annual mean rainfall in northern PRC, arid plains in Pakistan and north-east India; increased intensity and frequency of extreme weather events in Southeast Asia; and, longer heat waves in many Asian countries, causing glacier-retreat and permafrost.
21. The Inter-governmental Panel on Climate Change (IPCC) forecasts more frequent and intensified water-related disasters with severe floods, cyclones, landslides, mud flows, sea water intrusion, water scarcity, and degradation of the overall water environment. Unabated economic and population growth will accelerate water competition and heighten water scarcity in the coming decades. By 2025, two-thirds of the Asia-Pacific will be under water stress.
22. Various vulnerability assessment and adaptation planning tools are available. A useful reference source, to begin with, is the UNFCCC's *Compendium on Methods and Tools to Evaluate Impacts of, and Vulnerability and Adaptation to, Climate Change*, that includes chapters on complete frameworks, supporting toolkits, cross-cutting issues, multi-sector approaches and sector-specific tools. In addition, the FAO has also produced two new tools—the Rapid Appraisal Process for irrigation projects and the MASSCOTE Approach for irrigation management.
23. **V.R. Reddy**, Research Leader, Crop Systems and Global Change Laboratory, United States Department of Agriculture (USDA), presented the current and projected

impacts of climate change on food security, proposed strategies, and introduced crop simulation models as planning tools for monitoring vulnerabilities and adaptation planning.

24. Trends, signs, and signatures from the earth palpably show that food production cannot meet a growing world population. By 2050, human population is expected to reach around 10 billion people, along with a drastic rise in per capita consumption of meat, poultry and major crops like maize and rice. In 2004, the average world cereal yield was only 3 tons per hectare for 6 billion people. This falls significantly short of the required 4 tons per hectare for 8 billion people (33% more than current levels) or 5 tons per hectare for 10 billion people (67% more than current levels).
25. The future of Asian crop productivity will become more uncertain due to climate change. USDA crop models predict that crop yields will vary widely depending on the interplay between increased carbon dioxide concentration, temperature, ultraviolet radiation intensity, and precipitation variability. While rising CO₂ can stimulate crop growth and yield, rising temperatures and increasing droughts will negate these positive effects. Crop yields are expected to respond positively to small temperature increases at mid-latitudes, but if temperature increases are higher, large reductions in yields will occur. For tropical and subtropical regions (which covers most of Asia), crop yields will decrease even with minimal temperature rises, since many crops are near their maximum temperature tolerance.
26. Current production methods and crop varieties are inadequate for meeting growing demands for food and challenges from climate change. For example, present rice cultivars developed from the 1960s green revolution are high-yielding but environmentally unsustainable because of the large amounts of fertilizer and water they need. Since 1961, fertilizer use has risen more than four-fold, while yields have only doubled. Greater water use has also increased water salinization and water degradation. In the short-term, crop varieties must be developed to withstand higher temperatures, precipitation variability, etc., as well as become much more efficient in terms of yield/hectare, rate of growth, and use of inputs such as fertilizers and water.
27. He also exemplified the benefits of using crop simulation models for adaptation planning. The present challenge is to develop user-friendly and economically-viable planning tools that can be readily adopted by planners and farmers. The USDA is currently developing a tool to help developing countries determine the best planting times for certain drought tolerant crops.
28. For policymakers, assessing the long term economic impacts of climate change is crucial for developmental planning. **Fan Zhai**, Research Fellow, ADBI, presented results from a recent ADBI study which assessed the economy-wide impacts of declining agriculture due to climate change. Using a dynamic computable general equilibrium model, the paper—*Agricultural Impact of Climate Change: A General Equilibrium Analysis with Special Reference to Southeast Asia*—shows that climate change, combined with lower annual agricultural productivity growth, could cause a 1.3% decline in real GDP and welfare losses of 2.0% for Southeast Asia. Thailand, Philippines, and Viet Nam are expected to suffer the largest losses in the region.

29. Dependence on agricultural imports is also likely to increase due to climate change, potentially causing more losses from modified inter-regional and intra-regional trade patterns. He also cautioned that while these results appear to suggest that climate change would cause only moderate losses, there are great uncertainties in both the scientific projections and technical, social, and economic prospects. The results should not be seen as precise forecasts for the future.
30. Southeast Asian economies are dependent on agriculture. This sector contributes up to 10% of GDP in most countries and provides jobs for over one third of the working population. For the region, the most important strategy for coping with climate change is to reverse declining agricultural productivity growth rates which have been negative since 1980.
31. Panel discussions highlighted that the need for integrating climate change into developmental planning, which was increasingly recognized by the policy community. Experts also acknowledged that current models are to be made more inclusive to address the socio-economic aspects of climate change in developing and small island states. Planning tools also require further down-scaling to local conditions in order to be useful for multiple stakeholders. There was clear consensus that building local scientific and technical capacities is to be the first step in mainstreaming the climate change adaptation into developmental planning.

Theme 2: Selected Structural Measures of Adaptation

32. **Taikan Oki**, Professor, Institute of Industrial Sciences, the University of Tokyo, provided an overview of structural measures of climate change adaptation. Structural measures are also often termed 'hard' measures as they include physical construction to reduce or avoid possible hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems. Various measures available for supply side and demand side water management, disaster reduction, and agricultural production improvement are introduced. The design of these structural measures is based on the frequency, magnitude, and spatial occurrence of extreme weather events, such as floods, cyclones, and droughts.
33. **Meinhard Breiling**, Program Coordinator, Vienna University of Technology, Austria, gave examples of current adaptation initiatives as being practices, quoting the recently released European Commission's white paper on *Adapting to Climate Change*. He illustrated the specific adaptation actions taken at the national level, such as land use planning in Austria took advantage of the opportunities provided by climate change. Agricultural lands critical for food security are being adversely affected and secured adjustments have been made in a progressive way to strengthen local economies.
34. **Selvarajah Pathmarajah**, Senior Lecturer, Department of Agricultural Engineering, University of Peradeniya, Sri Lanka, shared South Asia's efforts to rehabilitate the tank cascade system as a part of adaptation strategy. While much investment is already occurring across the countries in the region, policy assistance is needed to rehabilitate water harvesting structures on a large scale, to provide supplementary water-sources for irrigation and recharge groundwater levels. He highlighted various

policy choices that are available including good maintenance of tanks by strong local participation and reinforcing the maintenance funds.

35. **Taiichi Hayashi**, Associate Professor, Disaster Prevention Research Institute, Kyoto University, showed the magnitude of devastating cyclones and monsoons thunder storms in Bangladesh and Myanmar. Actions taken such as the construction of multi-purpose shelters along Bangladesh's coast to help reduce cyclone-related fatalities were also explained. He stressed the importance of combining structural measures with additional non-structural measures such as better education to mitigate climate impacts.
36. **Jostacio Lapitan**, Technical Officer, WHO, illustrated how urban adaptation and health planning could be integrated in order to create healthier, 'greener' cities that have the capacity and resilience to withstand climate-related health risks. He presented selected health impacts from climate change such as heat disorders and dengue fever, and how they could affect urban planning. Recent studies by the WHO Kobe Centre for example, show how the extreme heat of New Delhi summers are affecting labor patterns, with almost no work being conducted outdoors during the hottest parts of the day. Should climate change increase temperatures even further, urban planners may have to consider altering work times permanently to prevent severe heat stress. In most cases, however, health risks cannot be attributed to climate change alone, but largely from other non-climatic factors. Nevertheless, the relationship between climate change, water, and health cannot be underestimated and more long-term studies need to be conducted. Policy interventions are needed at city level to strengthen health services, build capacity in the health workforce, promote 'green' health services, and raise community awareness. WHO training manuals on climate change and worksheets for city officials are available in the public domain.
37. Country experiences in mainstreaming by SIDS were presented by Kiribati, Maldives, and Sri Lanka. In Kiribati, the contamination of groundwater sources by saltwater intrusion, coupled with a lack of rainfall, has meant that it faces constant freshwater shortages. It is predicted that by 2050, 55-80% of Kiribati's North Tarawa Atoll would be completely submerged. In Maldives, 38 islands are flooded regularly or at least once a year, and more than 90 of its inhabited islands have been flooded at least once over the last six years. (See Annex Ongoing Adaptation Actions and Policies for a list of key adaptation measures that countries have implemented).
38. Open discussions following Session 2 focused on the factors behind successful adaptation measures and plans, and barriers to success. Consensus was reached on the prerequisites for successful implementation, including measures which:
 - are simple, practical, easy to implement, and where appropriate multi-purpose, like cyclone shelters in Bangladesh which double as schools. By tackling multiple developmental needs e.g., adaptation and education, this program also offered attractive financial benefits.
 - look for adaptation opportunities from climate change, not just the negative impacts, for example, due to warmer summers in the future, Austria is piloting test plots for rice production, and forecasting potential benefits from increased summer tourism.

- are designed for locals, by locals—strategies incorporated traditional wisdom, directly aimed at addressing locals needs and involved community organizations.
 - are supported by mass awareness of the potential impacts of climate change, and a general understanding of why action must be taken.
 - incorporate a holistic understanding of society, economic activity, level of adaptive capacity, and surrounding natural conditions. For example, installing a weather warning system must consider whether people at risk have access to information systems such as television or radio in order to receive the warning, or if there are means for evacuation.
39. Measures which were less successful failed to consider local concerns, were strongly donor-driven and ignored site specific social factors such as the role of women. Mistakenly-targeted measures were also a source of concern. He warned that by attributing all hazards to climate change, the true source of the problem might not be addressed leading to badly-designed projects.
40. It was also noted that there are many actions taking place that may not be explicitly referred to as an adaptation or climate change measure, but directly contribute to enhancing adaptive capacities (e.g., disaster risk management). Understanding where there are overlaps can help coordinate action more effectively, and minimize notions that adaptation is simply an additional burden – another item on the policy ‘checklist’. But, this does not mean that measures should be renamed under the adaptation umbrella because they have related elements. Climate change is a much more complex problem and it is not just a simple case of changing terminology. Instead, the key is to emphasize that development should be seen through the lens of climate change.
41. Another constraint, briefly mentioned, was the impact of multi-lateral and international trade agreements on adaptation. The trade of certain agricultural products such as rice which is currently faced with high tariffs may need new regimes to adapt to climate change. This could be a worthwhile area for further research and policy interventions.

Theme 3: Selected Non-Structural Measures of Adaptation

42. **Session 3** began with an overview of non-structural measures of adaptation. **Serena Fortuna**, Program Officer, UNEP, opened the session by introducing the concept of non-structural measures or soft measures as ‘measures that do not involve physical construction, use knowledge, practice, or agreement to reduce risks and impacts, in particular, policies, laws, public awareness raising, training and education’. These measures tend to focus on changing behaviors, methods and practices. Some examples include land-use zoning, insurance, water-use efficiency methods, and policies. There are some advantages to using non-structural over structural measures. Well planned and designed non-structural measures can minimize climate change impacts while generating additional socio-economic benefits like income, etc.
43. **Taikan Oki** presented a case study of early warning systems for flood that was designed for local governments in Thailand. Developed in response to flash floods

which hit the areas of Nam Ko and Chiang Mai, the warning system uses easy low maintenance technologies to collect water level data. The data is logged from various sites in Northern Thailand, and then transmitted every hour to a central collection point via a simple GSM dial-up modem and the processed information is shared quickly through internet portals. This practice can be easily duplicated in other countries to enhance their disaster-preparedness, and provide additional benefits by sharing vital data sources for forecasting, and water and agricultural planning.

44. International Flood Network (IFNET) was established to integrate and promote existing flood risk prevention activities around the world. **Kazuhiko Fukami**, Leader, Hydrologic Engineering Research Team, UNESCO's International Centre for Water Hazard and Risk Management, presented IFNET's key project – the Global Flood Alert System (GFAS). The web-based GFAS converts global rainfall data from NASA satellites into useful information for flood forecasting and warning. However, one of the critical implementation issues is the severe lack of scientific data and capacities in developing countries. To address this, IFNET have developed a user-friendly, cheap and efficient tool that countries can use—the Integrated Flood Analysis System (IFAS).
45. Climate insurance can provide a temporary buffer for business and households against unexpected climate costs, which can be substantial. **Harumi Yashiro**, Manager, Catastrophic Risks Quantification Group, Tokio Marine & Nichido Risk Consulting Co., Ltd., presented estimates on how much climate change could impact the insurance industry (UNEP forecasts up to \$1 trillion in losses in a single year in 2040), and selected business sectors like electricity, gas, ski resorts, and beverages. Where appropriate, insurance mechanisms like risk hedge programs, abnormal weather insurance, and weather derivatives, can assist in reducing the financial burden on the governments as well as individuals by pooling the risk across the population. Further efforts on climate insurance are still needed, particularly the greater role of private sector participation in climate change adaptation.
46. Adaptation is primarily a local process, which means initiatives need to be suited to local conditions to be effective and that local capacity must be developed to use and maintain technologies of adaptation. Community-based approach can be an effective way to build adaptive capacities among poor and marginalized communities. **Masanori Kobayashi**, Coordinator, Institute for Global Environmental Strategies (IGES), shared lessons and findings from community-based development projects implemented in Mongolia (forest regeneration and crop farming as an alternative livelihood to livestock), Bangladesh (agriculture, floating vegetable gardens, fisheries, and livestock), and Indonesia (renewable energy from micro-hydro).
47. **Midori Aoyagi-Usui**, Chief, Environmental Planning Section, Social and Environmental Systems Division, National Institute for Environmental Studies, Tsukuba, Japan, offered interesting perspectives on how the role of women, gender networks, and alliances can strengthen adaptation planning at all levels. Women, who make up the majority of the world's poor, are amongst the most vulnerable to the impacts of climate change according to the Women's Environment and Development Organization. They have lower wages, are less educated, participate less in decision-making processes, and are bound more by social and/or traditional norms. In the Japanese context, community disaster preparation and recovery efforts are segmented according to gender. Women are moving away from traditional supporting

roles, to positions involving leadership or decision-making capacities in climate related disaster preparedness.

48. During open discussions, participants canvassed the merits of involving stakeholders at all levels—from policymakers at the national level, donors and NGOs, to the private sector, local community, and marginalized groups such as women. Participants also asked what policy mechanisms could be put in place to ensure that all parties understand the concerns of others when developing adaptation programs. ‘Soft’ non-structural policies and approaches, such as community forums are critical in this regard. Adaptation practice in Mongolia was given as one example. Knowledge institutes acted as a facilitator between local herders and national policymakers by organizing forums to hear the concerns of herders regarding changes to the pasture laws, and then directly communicating those concerns to the policymakers.
49. The underlying message was that non-structural measures can provide more long-term advantages and should not be ignored in lieu of structural measures. In some cases, structural measures, such as dykes and river embankment structures for example, can be expensive, but urgently needed. The challenge is to find and promote no-regret strategies, where cost is minimized and long term benefits are brought in for local communities.
50. Successful adaptations measures are already taking place in the region, and need to be disseminated more widely to those that need it the most. A broader adaptation platform and policy framework, in this regard help synthesise and distribute that knowledge and promote mainstreaming of adaptation concerns into developmental planning

Theme 4: Practices of Adaptation Planning

51. **Session 4** focused on selected top-down approaches taken by governments to mainstream climate change adaptation into national development plans. Working through the development process may be the most direct and effective means of promoting those that strengthen climate resilience and discouraging investments that heighten climate vulnerability. **Tomonori Sudo** of the Japan International Cooperation Agency (JICA) outlined the policy initiatives that could make adaptation effective and proceed at several levels simultaneously. As a general rule, he pointed out that policy interventions should give priority to proactive actions reducing future risk, but in so far as significant risks will remain, should provide as well for reactive approaches to help vulnerable populations recover from unavoidable impacts.
52. **Kaoru Kobayashi**, Director, Global Environment Bureau, Ministry of the Environment (MOE), presented Japan’s policy experiences from mainstreaming adaptation. Japan is particularly concerned with ensuring adaptation measures are based on sound scientific assessments and increasing international support for adaptation, particularly for SIDS and LDCs. As a bilateral donor, the Japanese Government is providing financial assistance for adaptation and mitigation through its US\$10 billion Cool Earth Partnership. It is also conducting joint studies with international organizations to improve the effectiveness of adaptation aid assistance and assess the vulnerabilities of Asian mega-cities to climate change. Recognizing that climate change is a

crosscutting issue, Japan has begun coordination meetings comprising key ministries such as MOE, Ministry of Education, Sciences and Technology, Ministry of Agriculture, Forestry And Fisheries, Ministry of Economy Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism (MLIT), and the Japan Meteorological Agency, as a way towards an explicit adaptation policy at national level. It was also emphasized that effective adaptation requires discrete institutional arrangement to implement policies, assess priorities, direct resources, and focus efforts.

53. For the water sector, Japan has designed a national strategy to create a water disaster adaptive society. **Toshio Okazumi**, Director, International Water Management Coordination, MLIT, outlined the strategy's main components, which include a roadmap. A key element of the strategy is the incorporation of feedback mechanisms to ensure that the roadmap is continually updated to incorporate new data. He illustrated how Japan integrated multiple structural and non-structural measures, ranging from flood control dams and underground discharge channels, land use control, city re-design, flood hazard maps, local education, and awareness campaigns. One interesting strategy was to encourage rainwater storage facilities in schools, parks, and public houses to counter both the increased demand for water and minimize flood runoff from heavy rainfall which are projected to occur in the future.
54. Every year, Viet Nam experiences on average 6-10 sudden storms and floods. Living and adapting to these natural disasters has become a way of life for the Vietnamese, and is reflected in the way disaster prevention is given high priority during socio-economic planning. Mobilizing financial resources remains a major challenge however. To address this, the Vietnamese central government formulated innovative financial mechanisms such as the new national Self Reliance Fund for Natural Disaster Mitigation (SRF), presented by **Bui Duong Nghieu**, Senior Researcher, Institute of Financial Science. The SRF is designed to be a highly communal, not-for-profit, but self-funding and sustainable for households. It aims to be an integrated body that can mobilize domestic and foreign financial resources, based on voluntary and compulsory contributions to finance *ex-ante* and *ex-post* vulnerability reducing measures.
55. Country presentations from landlocked countries, Lao People's Democratic Republic (PDR) and Kazakhstan showed shifting priorities among adaptation options. Lao PDR is a tropical country heavily affected by monsoons, floods, and drought. National statistics recorded a total of 29 floods and 8 droughts from 1966 to 2008. In recent years, droughts have been characterized by higher and irregular increases in temperature, and extreme flood years have become more common after 1986. Intergovernmental Panel on Climate Change (IPCC) projects that this variability from severe floods to severe droughts is likely to increase in the future. Kazakhstan is a semi-arid to arid country that has seen rising seasonal and annual temperatures of 1.3°C during 1894-1997. The Kazakhstan National Communication report to UNFCCC indicated that climate change will increase average temperatures (+1.4°C by 2030) and precipitation—particularly in winter—and lead to greater rainfall variability. Climate change impacts are likely to exacerbate existing land degradation and increase crop water stress and drought risk. A list of key adaptation measures as implemented in those countries are summarised in the Appendix.

56. A short commentary and presentation by **Tsugihiko Watanabe**, Professor, Research Institute for Humanity and Nature (RIHN), Kyoto, demonstrated a cross-disciplinary approach to modeling the relationship between climate change, agricultural production systems and human activity is a promising way for land locked countries to assess the climate change impact and design adaptation plan. A pilot project involving Japanese and Turkish scientists from the fields of climate science, hydrology, crop, vegetation, irrigation and drainage, economics, and socio-economics was explained for its strengths and opportunities for application in other countries. Conducted in Turkey's Seyhan River Basin, the project used crop models and down-scaled climate projections to assess how Turkish wheat production would be affected by higher temperatures and lower precipitation. Modeling demonstrated that wheat yields could increase in some regions but decrease in others. Yields could also increase due to higher temperatures and CO₂ concentrations but decrease due to less precipitation.
57. There was discussion on the relationship between national adaptation plans (NAPs) and national communications (NCs) on climate change, and how both are reflected in national development plans. NCs should provide the foundation for any adaptation planning and be the point of reference for NAPs. Countries like Lao PDR and Kazakhstan have published NCs, but are yet to establish NAPs. The Chair also highlighted that NCs and national development plans are often considered in isolation—a weakness that governments must address in order to successfully mainstream adaptation planning and develop effective strategies to cope with climate change.
58. Overall, the session noted that national efforts on adaptation to date have delivered scientific information, resources, and capacity building, but have yet to facilitate significant on-the ground implementation, technology development, or access or establishment of robust institutions to mainstream adaptation agenda. While some countries have conducted NCs and NAPs, they remain as stand-alone documents and are often given minimal consideration in the bigger and higher-priority policy statements like national development plans.

Theme 5: Partnering for Climate Change Adaptation

59. **Session 5** offered donors and international organizations the chance to share perspectives on their roles, current initiatives, opportunities for partnership, and available financial support for climate change activities. Over the past years bilateral and multilateral development agencies have screened their projects portfolios, generally with the twin goals of ascertaining the extent to which existing development projects already consider climate risks and identifying opportunities for incorporating climate change explicitly. The Chair of the session **Gerd Droege** emphasized the need for strengthening international mechanisms to support proactive adaptation by facilitating regional strategies and committing reliable funding for high priority implementation projects. International efforts could contribute to national level actions to reduce or cope with climate risks.
60. **Tomonori Sudo**, Climate Change Advisor, JICA, explained the new changes to JICA operations and aid modalities to better assist countries to cope with climate change. JICA has provided technical assistance to Argentina on downscaling methods for local-level climate change scenario modeling, as well as structural assistance and

loans to improve flood control in Iloilo (Philippines) and coastal management in Bali (Indonesia). As an Official Development Assistance (ODA) arm of Japan, JICA recognizes climate change as a real but uncertain threat to future development, and gives deep thought to how different development patterns could be evolved through portfolio screening. JICA also offers various training programs for adaptation.

61. **Liza Leclerc**, Adaptation Financing and Operations Specialist, Regional and Sustainable Development Department, ADB, gave insights into the challenges that donors face, especially the risks to ADB's active sovereign loan portfolio from anticipated climate change impacts, given that a substantial proportion of ADB investments are loans for infrastructure projects in developing countries. ADB has developed a *Portfolio at Risk* assessment tool to help countries understand risk exposure. This tool is supposed to achieve two things: first, it contributes to climate proofing, and second, it ensures that future projects are consciously aimed at reducing vulnerability by including priorities that are critical to successful adaptation.
62. To improve regional and national cooperation on adaptation, UNEP is developing a multi-stakeholder *Regional Climate Change Adaptation Knowledge Platform*. **Serena Fortuna** introduced the key components of the platform. The platform brings together adaptation researchers, practitioners, policymakers, and business leaders, to engage in joint learning and dialogue, and generate new knowledge on matters relating to climate change adaptation. The platform would also bridge existing and emerging networks and initiatives in the region. Ms Fortuna also outlined UNEP's strategic priorities in climate change adaptation and upcoming activities.
63. The United Nations University (UNU) is focusing efforts to support and engage the higher education sector in developing countries to build local capacities and produce a critical mass of climate change researchers and practitioners in the Asia-Pacific region. **Srikantha Herath**, Senior Academic Programme Officer, Institute for Sustainability and Peace (ISP), gave details of a multi-year comprehensive program recently developed by the UNU to train scientists, practitioners, and government officials on how to downscale climate change forecasts, assess extreme flood risks, and develop response plans. He also presented another UNU interdisciplinary study that analyzed the climate change and global warming impacts on Sri Lankan rice production and the complex socio-economic issues associated with adaptation.
64. The UNFCCC is the key international environmental treaty on climate change. The Convention refers to adaptation in Articles 2 and 4, which were outlined by **Youssef Nassef**, Manager, Adaptation Subprogramme, UNFCCC Secretariat. He drew attention to the highly contextual nature of adaptation—action which constitutes adaptation in one setting may not serve as such in another, and could even constitute maladaptation in another. Adaptation science is evolving rapidly—new data, research, and technologies will change the way adaptation is approached and how we do things now may not be relevant for long.
65. There are diverse channels of ongoing work and support for adaptation under the UNFCCC process, including the *Buenos Aires Programme of Work on Adaptation and Response Measures* (Decision 1/CP.10), National Adaptation Programmes of Action (NAPAs), and the *Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change* (NWP). Currently 39 NAPAs have been submitted, including 437

projects, of which agriculture and water resources are considered the main sectors for urgent adaptation actions.

66. He also explained the funding mechanisms of the Convention which comprise the *Global Environment Facility (GEF) Trust Fund* (\$50 million, 22 approved projects), the *Special Climate Change Fund* (\$91 million as of October 2008) and the *Least Developed Countries Fund* (\$172 million as of October 2008)—all of which are operated by the GEF, as well as the *Adaptation Fund*.
67. Looking forward, it was recommended that monitoring the current negotiations on how to implement the Convention beyond the 2012 expiry date of the Kyoto Protocol is vital. One of the issues, particularly for the UNFCCC Secretariat, will be how to manage adaptation funding should it be significantly scaled-up post-2012.
68. Overall, this session highlighted how bilateral and multilateral development partners can play a catalytic role in assisting developing countries mainstream climate change adaptation and facilitate integrated approaches at the regional level. Many adaptation initiatives are occurring within national borders and are often undertaken independently from each other. Actions in one country however, may have adverse trans-boundary implications in another. A key policy recommendation was for greater improvements in integrated regional engagement and dialogue; international institutions are critical in this regard.

Field Visit

71. Participants had the opportunity to observe adaptation practices of Japan's Water Agency and the Saitama prefectural government. The first visit was to the Tone Canal Water Station which controls and regulates municipal and agricultural water supplies for the Tokyo, Saitama and Gunma prefectures. The tour was hosted with the assistance of **Hideaki Yamamoto**, Director, Tone Canal Control Station, Japan Water Agency. Participants were given an overview of the irrigation canals, and flexible water control structures, approaches in allocation of water rights among agricultural, industrial, and household users. The station also incorporated environmental fishways inside the canals, at the request of the local community to improve population for migratory fish species such as salmon and ayu which had drastically declined in past decades. Participants also toured the station facilities, including the operation room, from where climate resilient decisions are made in a scientific way.
72. The second visit was to the Center for Environmental Science in Saitama (CESS) where **Tsuneo Takeuchi**, Director, Atmospheric Environment Group, CESS, gave a presentation on the non-structural measures being promoted by the local government and roles of its inhabitants in mitigating and adapting to climate change. He talked about the government's action plan, the *Saitama Navigation 2050*, which describes seven navigations for transferring to a low carbon society, and specific measures that require immediate implementation, such as a local carbon trading system.

Theme 6: Current Status and Policy Barriers in Adapting to Climate Change

73. The final day of the workshop began with **Session 6**. Country delegates presented their country reports which they were asked to prepare before coming to the workshop. The country reports brought in a broad view of (i) current trends in climate change vulnerability highlighting its impact on agriculture and water sector; (ii) investments in research and development in the areas of agriculture, natural resource management to meet the challenges of climate change; (iii) adaptation measures and practices that have been or plan to be implemented; (iv) policies and programs designed to integrate the adaptation measures into developmental planning; and (v) issues and challenges in mainstreaming adaptation into development planning of agricultural and water sectoral activities.
74. To introduce the session, **Anbumozhi** provided an analytical summary of the reports. He observed that awareness of climate change adaptation is often confined to environmental departments and experts, and that climate change is largely considered to be an industrialized country issue with limited immediate relevance to other strategic objectives (like food security, water security, and health). As such, adaptation is still considered as a stand-alone agenda to be addressed through international mechanisms. While environmental safeguards (e.g., environmental impact assessments) are already mainstreamed into developmental activities, climate risk assessments are yet to be mainstreamed. He also noted that the development projects and/or programs cycle is generally funded over the short-term horizon but climate change adaptation risks are considered over the long-term.
75. In providing an overview of the reports, Asian countries are broadly categorized into three tiers:
- Tier 1 countries that focus on climate change impacts, and frames adaptation measures in relation to mitigation.
 - Tier 2 countries that pay attention to impact assessments versus adaptation options and formulated policy responses.
 - Tier 3 countries that proactively showed progress towards implementing adaptation.
76. A composite review of policies and strategies of the three tiered countries provides a good foundation for strategic discussion of the barriers to mainstreaming climate change adaptation. One significant barrier is that, when given the choice between economic development and climate change, often policy makers gave higher priority to the former. Governments confronting other pressing challenges have few incentives to divert scarce resources to investments that are perceived as not beneficial until the impacts of climate change are fully manifested. This trade off has become particularly acute in light of the current global financial crisis. To help minimize these trade offs, adaptation could be seen through the lens of development. In this regard, development practitioners need access to credible climate information and reliable cost-benefits analyses. Box 1 provides a list of the barriers to mainstreaming identified in the reports and workshop discussions.

Box 1: Barriers to Mainstreaming

- 1) Limited understanding of the nature and extent of risks and vulnerabilities, or lack of credible climate information.
- 2) Available climate information is often not directly relevant for development related decisions.
- 3) Lack of information on the economics of good adaptation measures, or simply an absence of knowledge on available 'no regret' strategies.
- 4) Trade-off between climate and development objectives exist.
- 5) Lack of available funds or restricted access to finance.
- 6) Segmentation within governments, no strong supportive policies, standards, regulations, etc.
- 7) Differences in willingness to accept uncertainties.
- 8) Funding modalities are not well established. Difficult for adaptation efforts to attract resources compared to more visible activities such as emergency response, disaster recovery and reconstruction.

77. The session concluded with a short commentary and presentation given by **Shigeko Haruyama**, Professor, Mie University on the projected climate change impacts for the Mekong Delta region. It was pointed out that sectoral level impact assessments could provide a framework for the management of actions for climate change adaptation, either structural or non-structural, including identifying key factors that contribute to the vulnerability of natural systems.

Theme 7: Group Discussion on Adaptation Strategies

78. In **Session 7**, participants were divided into three groups and asked to identify: 1) steps to strengthen the knowledge base on structural and non-structural measures at the national and regional level; 2) 'no regrets' adaptation measures and how they can be effectively utilized at the sub-national level; and, 3) critical issues for developing countries in relation to adaptation finance and other support systems.
79. Box 2 outlines the strategies that were discussed and categorizes them to align with the Framework for Mainstreaming Adaptation.

Box 2 Policy Recommendations

Stage 1: Awareness Building

- **Identify the underlying causes of vulnerability:** need a clear understanding of the risks from climate change across all levels, but especially at the household, community and district level.
- **Invest in scientific and technical research and capacities:** through improved data collection and analysis, and downscaling climate modeling data.
- **Need for more institutions, locally, nationally and regionally:** such as establishing new or sustaining existing climate change centers in the region, and directly linking them with policymakers, to facilitate better sharing of scientific knowledge and adaptation experiences.

- **Develop an appropriate global intellectual property rights framework** that promotes clean technology and research transfer, so that developing countries can develop and use technologies, for example, drought-resistant crop cultivars.
- **Improve capacities of donors** to better understand local conditions and community needs. Also, improve coordination between country donors and multi-lateral funding agencies.
- **Enhancing the capacity and capability to access the funds and in implementing those funds once received.** International/regional networks should be created or developed that encourage and enable regional exchange of information and experiences.

Stage 2: Targeted Communication

- **Make scientific information useful for different stakeholders:** translate data into language and format (e.g. monetary values) that different stakeholders (policymakers, planners, civil society organizations, research communities) can use.
- **Improve cross-sectoral dialogue and cooperation.** Adaptation to climate change requires coordinated actions across multiple sectors and all levels of government. Greater dialogue within government as well as between the scientific and sectoral policymaking community is needed.
- **Further international dialogue and collaboration.** Climate change is a global problem that requires joint contributions by all countries. Adaptation actions can have negative trans-boundary impacts, therefore face-to-face or regional dialogue is important to mitigate this.
- **Improve access to information:** climate change information that is currently available is not effectively disseminated to, or easily accessed by, the general public (due to limited internet access for example). A crucial part of this is ensuring that information guides are communicated in the local language, not just English.

Stage 3: Piloted Investments

Adaptation measures should:

- **Incorporate a 'No Regrets' policy:** recognition that measures taken now to adapt to climate change may bring additional benefits, even if climate change does not occur in future.
- **Consider both structural ('hard') measures and non-structural ('soft' or 'behavioral') measures which can accelerate the mainstreaming of adaptation.**

Structural measures: constructing multi-purpose flood and cyclone shelters which can also be used as schools or medical clinics; create sustainable water supply reservoirs, efficient water-use technologies and develop crops that are heat- and weather-resistant, water-efficient, can withstand drought and salinity, and high-yielding; and, sustainable land use and forest management planning.

Non-structural measures: a national database to assist farmers understand optimal planting times; creating and circulating flood hazard maps drawn using community knowledge; agricultural insurance; policies that preserve biodiversity and prevent over-fishing; public-private partnerships; regional network of climate centers; and climate change education across all levels.

- **Incorporate local conditions, address community needs and consider indigenous knowledge:** to ensure local ownership, participation and sustainability of investments.
- **Encourage more country-ownership** rather than purely donor-driven initiatives.
- **Increase funding and improve access to funding sources** (bilateral, multilateral, public-private co-financing, domestic funding). Funding is often insufficient, lacks coordination and is plagued with delays or time-consuming procedures.

Stage 4: Mainstreaming

- **Undertake monitoring and evaluation processes**
- **Incorporate climate risk assessments into development projects**
- **Broaden environmental impact assessments to include climate change impacts**
- **Shift from project-based to program-based approaches to maximize benefits**
- **Establish appropriate and effective regulatory frameworks and policies**

80. The group discussions made a strong case for strengthening the scientific capacity at national and sub-regional levels to predict the adverse impacts of climate change and design site-specific adaptive capacities. While several scattered efforts are already made across the region on planning tools, it needs greater support with knowledge transfer from other parts of the world. Policy assistance is also required to upscale current works.
81. During open discussions, participants were particularly interested in identifying various approaches for mainstreaming climate change adaptation viz., internal versus external, public versus private, funding aspects of climate change adaptation. Among several suggestions on no-regret strategies which bring co-benefits, the discussants called for setting up a climate management information system at national and regional level to help integrate baseline information into policy, planning, and investment decisions. Identification of appropriate entry points for climate change information is also needed. Potential entry points for integration include land use planning, water management planning, disaster responsive strategies, and structural design. Environmental Impact Assessments (EIA) could be another entry point for mainstreaming climate change adaptation into developmental planning. For that purpose EIA guidelines would need to be broadened to include considerations of climate change impacts.
82. While financial mechanisms available to climate change adaptation have improved over time, there remain some contentious issues associated with access to availability of adaptation funds. Increased international funding commitment to support climate relief or insurance type approaches in vulnerable countries are emphasized. While it was agreed that developing countries have limited financial capacity to support critical adaptation projects, and therefore will need external assistance, the largest source should come from the national budget if mainstreaming adaptation is to be successfully achieved. The opportunities and challenges of the public-private partnership model for adaptation projects were also discussed and capacity building needs were identified.

Closing: The Way Forward

83. The workshop concluded with a panel session, chaired by **Worapot Manupipatpong**, Director, Capacity Building and Training, ADBI, who stated that although climate change impacts may take decades to manifest, there is need for action now to avoid higher future costs and missed opportunities associated with a development path that compromises on climate risk management. Panelists re-iterated the key outcomes and messages of the workshop.
84. **Nassef** (UNFCCC) emphasized the need to create an enabling environment to absorb the increased adaptation support and funds that are likely to come in the future, particularly in the new post-Kyoto framework which should see scaled-up adaptation action by 2012. He spoke of the importance of creating a workable central financial mechanism (like Indonesia's ICCATF) and cross-sectoral institution that can coordinate and integrate climate change actions across all sectors and key stakeholders, particularly local communities. He also emphasized the importance of utilizing regional knowledge centers and networks to enhance knowledge sharing and prevent adaptation actions in one country from negatively impacting on another.
85. **Reddy** (USDA) emphasized the need for more research on cultivars that can adapt to climate change must be developed—this is an area of research which he has not seen any published studies to date. Concrete measures need to be implemented, like remote sensing and better tillage systems that can reduce environmental damage. He also agreed that creating regional centers and networks is critical for scientific capacity building.
86. **Chen** (FAO) reviewed the key constraints to mainstreaming; underscoring that the way forward must focus on enhancing scientific understanding, dissemination and awareness. To build capacity, he recommended the preparation of more guidebooks to help adaptation, updating school books and higher education curricula to include climate change and reviewing agriculture and water sector regulations. He noted that regional networks play important roles for regional sharing and exchange.
87. **Sudo** (JICA) shared his perspectives on the ingredients required for successful and sustainable projects including: local ownership, harmonization and alignment of goals, actions, and funding (across local and central governments, communities, private sector and other stakeholders), results-orientation and accountability. He spoke on a healthy balance between donors and recipient relationship; donors should respect the needs of developing countries, and conversely, developing countries should not always rely on donor assistance.
88. **Suzuki** (ADRC), Executive Director, Asian Disaster Reduction Center, commented on the benefits of both top-down and bottom-up approaches in adaptation planning. He also supported the idea of regional and sub-regional mechanisms to help facilitate and/or support national governments implement climate change policy and mainstream adaptation into developmental planning.

89. **Manupipatpong** (ADB) provided the closing remarks. He reemphasized the need for greater awareness by all stakeholders, particularly policy makers, of the risks posed by climate change as well as relevant measures available. One of the challenges in climate change adaptation is the accuracy of the long term (50 – 100 years) scientific forecast on which the impact assessment is based. Another challenge is to sustain natural disaster insurance by developing well-diversified insurance scheme through risk pooling across the region. He also recognized that there is no ‘one-size-fits-all’ solution for climate change adaptation but noted the potential applicability of many structural and non-structural measures successfully implemented and shared by participating countries. He welcomed the development of various guidelines and guidebooks by international agencies and reiterated ADB’s willingness to collaborate with the concerned agencies to promote dissemination and adoption of these guidelines and best practices on climate change adaptation.
90. The workshop sessions highlighted both practical experiences as well as creative thinking required for mainstreaming climate change adaptation into developmental planning. The main recommendations that emerged from the workshops that delegates could take back to their countries to guide and enhance the way they work are:
- Scientific capacity building is required for using planning tools such as climate risk assessment framework.
 - Efforts should be made to identify no-regret measures for climate change adaptation
 - Greater sharing of information regarding (successful) adaptation measures as well as scientific data on climate variability is needed and can be promoted through regional knowledge centers and networks.
 - Integrating adaptation measures into sectoral and national development plans will enhance feasibility of funding and facilitate their implementation.

Appendix: Overview of Ongoing Adaptation related Actions and Policies

	Country	Structural and Non-Structural Adaptation Actions and Policies
Small Island States	Kiribati Nuntaake Tokamauea Economist, Ministry of Finance and Economic Development	<p>Structural: construction of seawalls; planting mangroves along coastlines; developing sluice gates, and embankments.</p> <p>Non-structural: climate measures incorporated into the 4-year <i>Kiribati Development Plan (KDP)</i>, released a <i>Policy Statement on Adaptation to Climate Change, Kiribati Adaptation Project</i> (currently in its 3rd phase); drafting <i>National Water Policy</i>, revising the draft <i>National Building Code</i>; developing rainwater harvesting guidelines; forecasting and early-warning systems, relocation (worst-case scenario).</p>
	Maldives Aishath Shafina Environment Officer, Ministry of Housing, Transport and Environment	<p>Structural: developing coastal protection of designated safer islands and the Male' International Airport; flood control measures.</p> <p>Non-structural: <i>Maldives Climate Change Strategy (CCS)</i>; <i>National Adaptation Program of Action (NAPA)</i> which is given one of the highest priorities in the Government's 7th <i>National Development Plan (NDP)</i>; <i>Population and Development Consolidation (PDC)</i> program; carbon neutral policy; established a multidisciplinary <i>National Climate Change Technical Team</i>; strengthening health care capacities; improving education and awareness; establishing Maldives as a climate research hub</p>
	Sri Lanka W.M.A.D.B Wickramasinghe Additional Director, Department of Agriculture	<p>Structural: programs to improve crop and water management, plant protection and fertilization; rehabilitation of water storage tanks, reservoirs and irrigation systems (e.g. <i>Hambantota Irrigation Rehab. Project</i>); Drought Mitigation program (2006-2015); distribution of flood-resistant crop varieties (2005-2008); <i>Post-Tsunami Coastal Rehabilitation and Resource Management Program</i> (ongoing, funded IFAD and GEF); improving fisheries.</p> <p>Non-structural: Enhancing training capacities (implemented by the Disaster Management Center); implementing the Soil Conservation Act; <i>National Rain Water Policy</i>.</p>

Land-locked Countries	<p>Lao PDR</p> <p>Immala Inthaboualy Technical Officer, Department of Environment, Water Resources and Environment Administration</p>	<p>Structural: flood and drought mitigation programs; constructed embankments in Vientiane Capital and Pakse, Hongxaeng water drainage channel; invested in 7000 water pumps; construction of irrigation systems.</p> <p>Non-structural: launching a NAPA Report in May 2009; establishing the National Strategy Committee on Climate Change Chair involving the Deputy Prime Minister and relevant ministries – the Committee is tasked with developing the National Strategy on Climate Change (due end of 2009); rolling out early warning system and training in 142 districts nationwide by 2010; improving community-based educational campaigns; <i>Disaster Management Strategic Plan (2003)</i>.</p>
	<p>Kazakhstan</p> <p>Irina Goryunova Manager, Regional Environmental Centre for Central Asia</p>	<p>Structural: introducing integrated water management (river-basin approach), developing water-efficient infrastructures, promoting mini-hydropower generation; [community-based adaptation measures] developing artificial seeded pastures, rehabilitating natural rangeland ecosystems, stabilizing slope-wash, introducing pasture-rotation methods and changing crop patterns, reducing land-degradation pressures.</p> <p>Non-structural: Published its Initial National Communication to UNFCCC in 1998; awareness raising campaigns; fostering local institutions for cooperative community management; the 2006 <i>Concept of Transition to Sustainable Development for 2007-2024</i>; the 2003 <i>Concept of Ecological Safety for 2004-2015</i>; the 2005 <i>Programme to Combat Desertification for 2005-2015</i>; the <i>Program on Rural Development for 2004-2010</i>; <i>Programme for Fish Conservation and Fishery Development for 2004-2006</i>; <i>Kazakh Forests Programme for 2004-2006</i>; <i>Concept for Development and Management of Protected Areas till 2030</i>; the <i>Concept of Development of Water Sector and Water Management Policy until 2010</i> (currently developing the next phase for up to 2025).</p>
East Asia	<p>PRC</p> <p>Jiang Zhaoli Director, Division of</p>	<p>Structural: enhancing technology development and transfer (to increase organic fertilizer use, develop high-yield low-GHG and stress resistant crops – <i>the Seed Project</i>, semi-dry rice cultivation, water-saving and sea water utilization); improving livestock management; intensifying ecological agriculture in high-intensive production areas; enhancing water resource management; rehabilitating rivers; dike construction; establishing initial national water right allocations and transfer systems; speeding up the <i>South-to-North</i></p>

	Cooperation, Department of Climate Change, National Development and Reform Commission	<p><i>Water Diversion Project</i> and construction/improvement of 51 key water control projects; constructing regional water storage and diversion projects.</p> <p>Non-structural: strengthening and implementing laws and regulations for improved agricultural production and increased agricultural ecosystem carbon storage; developing farmland and pasture protection construction plans; <i>Agricultural Law, Grassland Law, Fisheries Law, Law on Land Management; Regulations on Grassland Fire Prevention; Water Law, Flood Control Law and Regulations on River Administration.</i></p>
	<p>Mongolia</p> <p>Batsuuri Nantsag Secretary of State, Ministry of Nature, Environment and Tourism</p>	<p>Non-structural: <i>National Action Programme on Climate Change (NAPCC)</i> was approved in 2000 and targets the following sectors: pasture land, animal husbandry, arable farming, water resources, forests and soil degradation and desertification. High priority adaptation measures that were identified include: developing measures to revive traditional pasture management and restore degraded pastures; expanding/rehabilitating pasture water supply and developing irrigated pastures; modifying grazing patterns; increasing feed reserves for livestock; research and training; community-based adaptation; expanding access to credit; improving weather forecasting and early warning systems.</p>
South Asia	<p>Bangladesh</p> <p>Mia Md. Tajul Islam Senior Assistant Secretary, Ministry of Agriculture</p>	<p>Structural: flood management schemes; constructed around 6,000km of coastal embankments and coastal polders, over 2000 cyclone and flood shelters; raising roads and highways above flood levels; irrigation schemes; planting mangroves along 9,000km of shoreline creating a 'greenbelt'.</p> <p>Non-structural: <i>Climate Change Action Plan (2009-2018)</i>; established a Climate Change Cell under the Ministry of Environment and Forests to support mainstreaming of climate change into development planning; developed a network of 34 'focal points' in various government agencies, research and other organizations; created flood-warning systems; expanding community-based disaster preparedness; established agricultural research programs to develop saline, drought and flood-adapted high-yielding crops.</p>
	<p>India</p>	<p>Structural: crop improvement, drought proofing, livelihood preservation; disaster management programs.</p>

	<p>Parama Sen Director, Ministry of Finance</p>	<p>Non-structural: <i>First National Action Plan on Climate Change (NAPCC)</i> released in 2008 and identifies eight core 'national missions' running through 2017 (solar, enhanced energy efficiency, sustainable habitat, water, sustaining the Himalayan ecosystem, 'green' India, sustainable agriculture, strategic knowledge on climate change); increasing awareness and education including providing web services for farmers; risk financing; health; <i>National Environment Policy 2006</i>.</p>
	<p>Nepal</p> <p>Dhan Raj Ratala Joint Secretary, Ministry of Agriculture and Cooperatives</p>	<p>Structural: water saving irrigation methods, upland land use changes</p> <p>Non-structural: preparing a NAPA; established a Climate Change Network (CCN) and establishing a Himalayan Research Center; the Ministry of Home Affairs has drafted National Strategies for Disaster Risk Management which focuses on shifting away from reactive emergency response policies to proactive climate risk management initiatives; introduced mandatory EIA and Initial Environment Assessment (IEA) which must be undertaken before developing major projects; developed a <i>Three-year Interim Plan (2008 to 2010)</i> to prioritize policies and strategies related to climate change in the development agenda; monitoring glaciers in Langtang and Solukhumbu and Tsho Rolpa</p>
	<p>Pakistan</p> <p>Md. Tahir Anwar Senior Agricultural Engineer, Ministry of Food and Agriculture</p>	<p>Structural: <i>Water Resources Development Plan</i> to improve flood control and protection, embankments, barrages; precision land leveling/laser land leveling; reducing tillage, resource conservation cultivation; raised bed cultivation; watercourse lining and improvement; high efficiency irrigation systems and drip/trickle and sprinkler irrigation systems.</p>
<p>Southeast Asia</p>	<p>Indonesia</p> <p>Syamsidar Thamrin Deputy Director, National Development Planning Agency</p>	<p>Non-structural: 2007 <i>National Development Planning Response to Climate Change (NDPRCC)</i>, 2007 <i>National Action Plan on Climate Change (NAPCC)</i> and the <i>Climate Change Roadmap</i> (draft due in June 2009) which will bridge the NAPCC into the Government's 5-year mid-term development plan (RPJM) 2010-2014; currently establishing the <i>National Climate Change Trust Fund (ICCTF)</i>.</p>

	(Bappenas)	
	<p>Philippines Resurreccion P. Marinas Senior Consultant, Office of the Presidential Advisor on Global Warming and Climate Change</p>	<p>Non-structural: submitted its first Initial National Communication (INC) on climate change to UNFCCC in 2000; established the Presidential Taskforce on Climate Change (PTFCC) and relevant other task groups (fisheries, watershed protection, water recycling, rainwater conservation, atmospheric activities, CPR economics, fossil fuels, information); progressing a <i>Climate Change Bill</i> for mainstreaming climate change adaptation into all government policies and programs; established a Philippine Government-UN joint-program <i>MDG-F 1656: Strengthening the Philippines' Institutional Capacity to Adapt to Climate Change</i>, which has already implemented 5 adaptation demonstration projects across the country.</p>
	<p>Thailand Natthanich Asvapoositkul Environmental Expert, Office of Climate Change Coordination, Office of Natural Resources and Environmental Policy and Planning</p>	<p>Structural: improving crop resilience, local-community water resource management and farming practices, and alternative livelihood and tourism activities.</p> <p>Non-structural: Submitted its Initial National Communication (INC) on climate change to UNFCCC in 2000 and is currently in the middle stages of completing its Second National Communication (SNC) due approx. end of 2009; launched Thailand's <i>Strategic Plan on Climate Change 2008-2012</i>; established the <i>Project Steering Committee</i> (PSC) to implement the SNC; undertaking climate scenarios modelling; strengthening human resources and learning processes, social protection systems and empowering local communities; integrating adaptation measures with natural hazard reduction and disaster prevention programmes; established early warning and preparedness systems.</p>
	<p>Cambodia Chan Thou Chea</p>	<p>Structural: river bank modification, crop diversification.</p> <p>Non-structural: Released a <i>National Adaptation Programme of Action</i> (NAPA) in 2006 which identifies 38</p>

	Deputy Director, Ministry of Environment	project profiles targeting water management, and vulnerability assessments and adaptation measures in coastal areas. Submitted its INC to UNFCCC in 2002. Its 2 nd Socio-Economic Development Plans (SEDP II) briefly acknowledges the negative impacts of climate change. The Royal Decree on <i>the Creation and Designation of Protected Areas</i> (1993), the <i>Law on Environmental Protection and Natural Resource Management</i> (1996), and the <i>Forestry Law</i> (2002) are relevant to environment and sustainable development but do not explicitly mention climate change.
	Myanmar Tin Oo Director, Ministry of Agriculture and Irrigation	Non-structural: conducted a comprehensive hydrological research study and field survey of the 2008 Nargis Cyclone, including historical analysis of the magnitude and frequency of cyclones and cyclone tracks over time. Results are expected to assist the development of national adaptation measures.
	Malaysia Maximilian Conrad Assistant Secretary, Ministry of Natural Resources and Environment	Structural: enlarging reservoir capacities; improving hydrological forecasting; promoting widespread use of groundwater; changing land-use practices; developing demand-side management for water resources; creating buffer zones in agriculture and forestry industries to minimize erosion and sedimentation; constructed the multi-purpose <i>Smart Tunnel</i> which is used as both a motorway and flood-diversion channel. Non-structural: Completed its <i>Initial National Communication</i> (INC) in 2000 and is expected to complete its <i>Second National Communication</i> (NC2) by the end of 2009; currently developing a national climate change policy (due end of 2009); formulating <i>Clean Air Action Plan</i> , establishing technical secretariat for CDM; incorporated climate change projects into the 9 th Malaysia Plan; establishing an inventory of agricultural GHG emissions; conducting lifecycle assessments and renewable energy research.