

**PROCEEDINGS OF  
THE THREE DAY REGIONAL CONSULTATION ON  
INTEGRATED DROUGHT MANAGEMENT IN SOUTH ASIA**

*Colombo, Sri Lanka (24<sup>th</sup> – 26<sup>th</sup> July, 2010)*



*Organized by :*



**Global Water Partnership South-Asia (GWP-SAS)  
Regional Office, Colombo, Sri Lanka**



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**Prepared & Edited by:**

***Dr. Veena Khanduri***

**Focal Point Drought Management, GWP-SAS**

***Organized by:***

**Global Water Partnership – South Asia (GWP-SAS)  
Regional Office, Colombo, Sri Lanka**

## **Preface**

There is mounting evidence that South Asia identified as a climate change hot spot will be subject to increasing disasters both in terms of magnitude and occurrence as a consequence of extreme events linked to climate change and global warming. Since inception a core focus of GWP-South Asia has been on flood management with increasing concern on droughts and its debilitating impacts in recent times. All programmatic activities be they at policy, capacity building or grass root implementation related to IWRM, water and agricultural productivity, gender and poverty, health and sanitation – in fact the realisation of all the water related MDGs – closely intertwined with urban and rural livelihoods need to be considered in the overarching context of climate change/variability. The recent collaboration of GWP with WMO has given impetus to drought management and provided opportunity for GWP South Asia to reassess its priorities under this scenario. Unlike in flood and disaster management where response mechanisms are continually improving the only palliative to the insidious onslaught of drought has been subsidies or relief payments without much attempt at an integrated solution.

GWP-South Asia considered it opportune to mobilise expertise in the region to evolve a programme aimed at integrated drought management. A three day workshop supported by GWP and held in Colombo Sri Lanka at which renowned drought experts from the regional countries contributed to develop a pre proposal on Regional Integrated Drought Management for South Asia identifying priority issues needing to be addressed. We are extremely appreciative of the fact that more than outlining a set of recommendations to be followed the workshop delivered working document for implementation through external financing and extremely useful directions to develop pre-proposal into a full-fledged marketable proposal to attract financial partners.

GWP South Asia is therefore thankful to these experts for their contributions to ensure successful completion of the workshop. I wish to place on record my appreciation to Mr. Karamat Ali for preparing and getting approved the Proposal of the Regional Consultation from GWP, to the Regional Office in Colombo on the excellent logistical arrangements and to Dr. Veena Khanduri, Focal Point Drought Management GWP-SAS for compiling the workshop proceedings.

Sardar Muhammad Tariq  
Regional Chair, GWP-South Asia

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## **ABBREVIATIONS**

BWP	Bangladesh Water Partnership
BoR	Board of Revenue
CAZRI	Central Arid Zone Research Institute
CGWB	Central Groundwater Board
CRIDA	Central Research Institute for Dryland Agriculture
CWPs	Country Water Partnerships
CWWG	Crop Weather Watch Group
DTW	Deep Tube Well
DST	Department of Science and Technology
DDP	Desert Development Program
DPAP	Drought Prone Area Program
DRAPP	Drought Recovery Assistance Programme Project
GWP	Global Water Partnership
GWPO	Global Water Partnership Office
GWP-SAS	Global Water Partnership-South Asia
GDP	Gross Domestic Product
IMD	Indian Meteorological Department
IWDP	Integrated Wasteland Development Program
IPCC	Inter-governmental Panel on Climate Change
IWMI	International Water Management Institute
LPA	Long Period Average
LPAV	Long Period Average Value
NADAMS	National Agricultural Drought Assessment and Management System
NCMRWF	National Centre for Medium Range Weather Forecasting
NDMA	National Disaster Management Authority
NFFWP	National Food for Work Program
NOAA	National Oceanic and Atmospheric Administration
NREGS	National Rural Employment Scheme
NWP	Numerical Weather Prediction
PMGSY	Pradhan Mantri Gram Sadak Yojana
RIDMP	Regional Integrated Drought Management Plan
SLWP	Sri Lanka Water Partnership
SAUs	State Agricultural Universities
SDI	Storage Drought Deficit Index
SLI	Storage Drought Duration Index
SGSY	Swarnjayanti Gram Swarojgar Yojana
UDMC	Upzilla Drought Management Committee
WMO	World Meteorological Organization

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**I. Background**

All South Asian countries are adversely impacted by prolonged droughts arising from climate variability. In fact drought has been one of the primary reasons for widespread poverty and environmental degradation (water security, water quality) in South Asia. The situation is likely to worsen in the water scarce regions with increasing severity due to the above. Such conditions disrupt the balance in the pattern of water supply and demand for water across agriculture, domestic and industry leading to reduction in the choice of cropping systems posing a threat to food security and increase frequency of water induced diseases.

The Inter-governmental Panel on Climate Change Fourth Assessment Report (IPCC, 2007) states that the world has been more drought-prone during the past 25 years and the vulnerability of tropical countries to drought is likely to increase, more so in South Asia. The South Asian region has been among the perennially drought-prone regions of the world. While India, Pakistan and Sri Lanka have reported droughts at least once in three years in the past five decades, Bangladesh and Nepal also suffer from drought frequently.

With almost 60 per cent or one billion people dependent on agriculture related livelihoods and over 50% of the cropped area irrigated, their livelihoods are exposed to high levels of vulnerability to drought. While relief oriented administrative disaster management and response mechanisms exist in all countries to deal with extreme conditions where relief is paramount, integrated approaches to reduce or pre-empt adverse impact of drought is restricted to mostly sector based initiatives and some institutional extension activities. As drought onset is gradual and generally considered to be transient, focus has been on policy responses and institutional systems geared mostly for relief operations, while only limited mechanisms for drought monitoring, prediction, preparedness and mitigation exist. In many countries and regions, such as in Australia and the Mediterranean region, severe droughts have triggered water sector reforms in order to build great water security, managing water demand and safeguarded livelihoods. A common understanding of drought is essential for its highly comprehensive management by addressing the overall development goals and well being of the people living in drought prone areas, through involving different sectors and stakeholders affected.

**II. Workshop Organization**

- 2.1 Drought mitigation and management is a common concern for South Asia. In this region, the practice of drought management in terms of policies, laws, use of technological inputs, etc. follow certain patterns but no universal model exists. Hence in order to cope up with critical challenges, it was decided by GWP-South Asia to organize a three day Expert Consultation on Regional

Integrated Drought Management through its Regional Office in Colombo from 24<sup>th</sup> to 26<sup>th</sup> July, 2010 with a view to understanding drought, its impacts and influence on the water sector in South Asia. The intent was to prepare a Regional Integrated Drought Management Plan for the South Asian region whilst developing proposals for funding that would reinforce its implementation. At the consultation, experts from Central and State Governments, Research, Meteorological and Disaster Management Institutions and Non Government Organizations in the fields of droughts, floods, agriculture, climate change and water management nominated by Country Water Partnerships (CWPs) of GWP-South Asia namely; Bangladesh, India, Nepal, Pakistan and Sri Lanka participated. The main objectives of the consultation was to identify drought experts from South Asia to present the existing and expected drought conditions in the respective countries together with focus on potential river basins/sub basins likely to be selected as case studies to be carried out in each country (one case study for each selected river basin). On completion of the three day consultation, it was envisaged that a Regional Integrated Drought Management (RIDM) Plan for the South Asia will be developed, further refined and submitted to the donors as a Regional Proposal. Proceedings of the three day regional consultation are detailed in the following paragraphs.

- 2.2 Before organizing the regional consultation, a background note on the main objectives of the consultation was circulated among all the experts to enable a clear understanding of requirements. The background note covered two major areas; the country specific and particular river basin scenario. For country specific aspects, the experts were requested to focus on (i) Background (Geographic and climatic information) ; (ii) Extreme weather events and incidence ; (iii) Livelihood impacts with focus on rural livelihoods (iv) Response mechanisms, mitigation/adaptation measures and institutional arrangements ; (v) Drought management and practices linked to water sector ; (vi) Drought management policies and issues ; and (viii) Future Strategy for drought mitigation.

Under the proposed pilot river basin, the experts were advised to prepare their presentations on an already identified river basin of their country (impacts of drought on the rural masses, drought mitigation programs already underway, gaps/lacunae in program implementation, etc.) where the Plan is finally going to be implemented and how the envisioned IDM Plan is more innovative and effective than other programs in mitigating the drought impacts by increasing crop production, water conservation, reducing migration and improving health & hygiene of the communities living in and around the river basin. Based on the background note, the experts from all the countries prepared their presentations and made valuable contributions in the regional consultation.

- 2.3 The regional consultation was divided into five sessions viz ; (i) Inaugural Session ; (ii) Technical Session-I ; (iii) Technical Session-II ; (iv) Technical Session-III ; (v) Program Drafting Session; and (vi) Concluding Session. The list of participants is given at **Annex-I**, the detailed agenda of the workshop is provided in **Annex-II**, the Pre Proposal Draft is placed at **Annex-III**, and the session-wise proceedings of the workshop are detailed below.

### III. Inaugural Session (Day-1)

- 3.1 **Mr. S. B. Niyangoda**, Chairman, Sri Lanka Water Partnership (SLWP) formally welcomed the participants to Colombo and to the conference. He appreciated the efforts put-in by all the CWP's for selecting their best experts in drought management to represent their country. In his welcome address, he gave a brief background and history of drought in Sri Lanka. He cited that prolonged periods of dry weather are not uncommon in history of Sri Lanka. Drought in Sri Lanka is a direct result of the delay or failure of the expected monsoon down pour or reduced precipitation and mostly experienced in the areas demarcated as dry and arid zones. He emphasized the need for horizontal and vertical integration of various levels by establishing mutually benefiting linkages of science and communities and its administration. He hoped that this three day regional planning consultation would certainly result in developing a common approach for evolving sound proposal on Integrated Drought Management for which the experts have spared their valuable time.



**Mr. S B Niyangoda, Chairman, SLWP  
welcoming the participants**

- 3.2 The Welcome Address was followed by the Inaugural Session. In the Inaugural Address, **Mr. Sardar**



**Mr. Sardar Muhammad Tariq,  
Chairman, GWP-South Asia addressing the  
participants during Inaugural Session**

**Muhammad Tariq**, Chairman, GWP-South Asia pointed out that drought is a slow developing natural disaster across the South Asia which has grave socio-economic impacts. He said that South Asia with 25 per cent of the world population has only 9 per cent of world water and uses over 90 per cent of its water for irrigation. According to World Bank estimates, over 500 million people survive below the poverty line, where even the basic needs are not met. Its share in global income is only 1.3 per cent and it has the largest share (40 %) of the

poorest people in the world. With the increasing population, contribution of water in the total GDP of South Asian countries is affecting. For instance, water productivity in terms of GDP generated from the use of one cubic meter of water is less than US\$ 24 generated by the world's top food producers. He also stressed that continued decline in productivity leads to diminished assets and reduced investments. Stressing on the dire necessity for developing and seeking consensus on the means and measures to move ahead with the common approach which accommodates divergent stakeholders and takes the region ahead, he raised some questions i.e, what common approach is needed that incorporates technical and financial inputs? What are the common priorities in the region and comparative strength to handle the drought situation? How do we make this comparative advantage as strength to develop a regional common approach for undertaking



Regional Integrated Drought Management (RIDM). The Inaugural Address gave an inference that it is the right time to evolve a comprehensive drought management plan that dovetails short-term measures into the long term one.

- 3.3 After the inaugural address by the GWP-SAS Chair, **Dr. Mercy Dikito Wachtmeister**, GWP Network Officer, South-East Asia, South Asia & Caribbean briefed the participants about the Integrated Drought Management – A joint WMO-GWP program which is a very important program for GWPO. She stressed that for GWPO, this planning consultation on Regional Integrated Drought Management Plan



**Dr. Mercy Dikito-Wachtmeister briefing the Participants**

assumes great significance. Highlighting GWP strategic Goal-2 which addresses critical water challenges, planning consultation on RIDM fits well under this goal. She explained that drought is one of the critical challenges across the regions. Keeping this in view, GWPO is preparing a joint program with WMO for integrated approach to water resource management involving stakeholders from the communities and sectors affected by the drought. She stressed that the outcomes of this three day planning consultation held in the South Asian region will be used as an input for enriching the GWPO-WMO proposal. The final proposal would be placed in donors' Round Table Conference planned during October, 2010 at Bonn, Germany to raise funds for Integrated Drought Management Plan for South Asia.

- 3.4 On completion of the Inaugural Address, **Dr. Veena Khanduri**, Adviser, India Water Partnership and focal point for the RIDM explained to the participants about the objectives of the consultation and the expectations from the same. She said that globally, the largest numbers of people affected due to drought are from Eastern Africa, South Eastern Asia, Central Asia and South Asia. Frequent droughts in Africa and Asia still result in misery, erode livelihoods, and damage natural ecosystems and cause diseases or deaths due to poor quality of water and hunger. Most countries in South Asia are affected by severe and often multi-year drought. Latest drought of 1999-2002 affected more than 100 million people in South Asia Region. In recent years concern has grown worldwide that the drought may increase in frequency due to climate change as per Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC 2007).

Taking the above into account, she said that this is the right time to discuss the effects of drought in detail and appealed to the experts to handle the extreme effects of drought and requested all the participants to come together and start planning to prepare a sound Regional Integrated Drought Management Plan for the South Asia to cope, combat and mitigate the drought effects in the region. She further briefed about the drought status, mitigation/adaptation mechanism/policies, and early warning/forecasting/monitoring systems existing or not existing in each country. On this count she said that while drought mitigation, adaptation mechanism/policies largely exist in India and Pakistan and a number of Institutions/Departments are involved to handle, no such mechanism

exists in Bangladesh, Nepal and Sri Lanka. She proceeded with her presentation with impacts of drought which occurred during 2002 in India. Later on she explained about the rationale of the RIDM and its approach. Regarding expectations from the planning consultation on RIDM, she said that the regional consultation will contribute to (i) Identify practices and develop suitable solutions by involving widely divergent stakeholders (respective CWP's in developing RIDM for South Asia) (ii) Demonstrate the role of water in solving critical development challenges – such as drought (iii) Identify rural livelihoods and adaptation practices linked to the water sector (iv) Develop an improved approach, new framework and tools for IDM supporting land, water and agriculture through IWRM for developing a marketable/bankable regional proposal (v) Generate better information and knowledge on drought and recorded practices in drought planning and management across the South Asia (vi) To further raise awareness on the problems among all actors and stakeholders and solutions of the problems thereof ; and lastly (vii) An improved approach and new framework and tools for drought management supporting land, water and agriculture through Integrated Water Resource Management.

At end of her presentation, she outlined expected outcomes of the RIDM which are (i) Compilation of information and knowledge on past droughts and recorded practices in drought planning and management in selected countries of South Asia; (ii) A common better understanding of drought; (iii) Comprehensive management in an integrated approach – successful experience across various sectors; (iv) Cross fertilization of ideas and experience between countries so that success achieved in one way be applied in others ; and (v) Advocacy and specific recommendations for implementing new integrated approach for drought management.

3.5

**Dr. Tushaar Shah** of IWMI and member of GWP Technical Committee in his Keynote Addresses “Coping with Droughts in South Asia : Yesterday and Today” explained about understanding of the drought, the drought situation in South Asia and its effects on the rural poor. He quoted some examples of recent drought events in South Asia; Afghanistan 1997-2002 (resulted in drinking water crisis, drying up of shallow wells), Baluchistan and Sindh 1997-2001 (2.5 million livestock perished, national GDP growth rate suffered), Rajasthan-India 2002 (led to water famine) & India 2002 (one of worst in 100 years in which 300 million people and 1.50 million livestock affected). He explained the traditional nomenclature of drought impacts in Indian context with scientific definitions viz; (i) Meteorological (precipitation deficit) – Jalakal (water famine), (ii) Agricultural (crop moisture deficit) - Jalakal/Annakal/Trinakal (water+food+fodder famine), (iii) Hydrological (stream flow+groundwater deficit)–Jalakal/Annakal/Trinakal =Trikal +Dravyakal (water +food+fodder+cash famine) and (iv)Socio-economic (livelihood deficit). Dr. Shah also pointed out that arid regions are seriously affected by even small deviations of precipitation from normal because of limited natural buffer. Highlighting how official research responded to drought, he explained that the first order of drought impacts on poor agrarian households which include drinking water shortage due to drying of ponds, lakes, rivers and wells resulting in decline in cropped area and low yields coupled with loss of livestock by starvation and distress sale. The



**Dr. Tushaar Shah delivering the  
Keynote Address**

second order drought impacts affect agrarian communities leading to rise in food prices, decline in employment, crash in livestock prices especially of cows, sheep, bullocks, distress sale of assets including land, migration for water, food, fodder, etc. Third order impacts the long term livelihood and earning capacity of the households resulting to 2-3 per cent decline in GDP growth rate. He also said that drought monitoring and early warning system helps in crisis management, organizing relief and ameliorates the first order impacts but not the 2<sup>nd</sup> and 3<sup>rd</sup> order.

He suggested that traditionally groundwater aquifers are most reliable buffer storages against drought. Hence, in the ancient times, Kings used to give orders to dug reservoirs during droughts. These traditional methods of water conservation are very important in present times also. Explaining the water storage structure for pre-monsoon storage, he quoted that use of groundwater for drought preparedness is an effective solution, which requires plenty of wells that manage aquifers. Dr. Shah also quoted that before 1970, a drought used to quickly turn into a famine because South Asia had no cost effective technology to use groundwater for irrigation. But now bore wells and pumps are pervasive. Dr. Shah presented two cases of Gujarat for its appropriate response to drought resilience.

#### **Case-1 : Response to Drought through Groundwater Management**

- Gujarat's agriculture is growing at 9.6 per cent year.
- The growth has also become more stable and resilient to droughts. Mass movement for constructing 500,000 check dams, percolation ponds, sub-surface dykes, dug well recharge structures.
- Annual deepening of water tanks, filling of tanks and large reservoirs with surplus canal water.
- Construction of 600 Km long recharge canal from Kadana reservoir to North Gujarat.
- Transferring water from South North Gujarat by linking seven rivers.
- Pro-active ground water demand management by effective rationing of electricity to 8 lakh tube wells that irrigate 3.5 mha of land.

In the second case, he explained that how the Gujarat State had pursued with the unusual strategy for building agricultural resilience to drought in the recent years, how it has sustained the drought conditions by increased power supply, how the Gujarat's groundwater regime is improving, benefits of Rural Power Supply Scheme "Jyotigram Yojana", etc.

#### **Case-2 : Increased Food Production during a Drought Year through**

**Improving groundwater storage and a network of 0.8 million tubewells provided  
substantial drought proofing**

2008-09 monsoons were weak and delayed; but Gujarat government increased the power supply to farmers during critical sowing period; late rainfall recharged aquifers and the rabi crop was larger than normal. Gujarat's farm production not only sustained but increased during a drought year.

The session concluded with the Vote of Thanks by Mr. Ranjith Ratnayake, Regional Coordinator, GWP-SAS.

#### **IV. Technical Session –I (Day-2)**

- 4.1 This Session was chaired by Mr. Sardar Muhammad Tariq, Chair GWP-SAS and the rapporteur was Dr. Kh. Azharul Haq , BWP. The first technical session was meant to understand the country position in terms of better scientific understanding and inputs for drought management, monitoring prediction and early warning system, policy and planning for drought preparedness and mitigation across sectors and drought reduction and response, etc. The participants were briefed on Day 1 discussions before starting the country-wise presentations.

#### **4.2 Recapitulation of Day-1**

Dr. Veena Khanduri briefed the participants about the background of this planning consultation for developing a Regional Integrated Drought Management Plan (RIDMP) which has been considered keeping in view the South Asia's current priorities as well as GWP and GWP-SAS priorities which falls under Strategic Goal 2 of coping with critical challenges. She also briefed about the steps followed for the planning consultation, which includes selection of two drought experts from each CWP working with government/ research institutions/ universities/ non-profit organizations in agriculture, water management, hydrology, meteorology, disaster management/preparedness, etc .Each country prepared one country position paper on drought and its management and one paper / presentation on selected basin in each country for implementation of pilot RIDMP.

She stated that the Inaugural Session gave an inference that it is the right time to evolve a comprehensive RIDMP for South Asia region which is facing the impacts of dwindling water sources, and prolonged droughts. Because of high dependence on agriculture, fast population growth rate and marginalized economy, the existing hardship due to drought is likely to lead towards disastrous consequences in the scenarios of projected climate changes in the region. Therefore, there is an urgent need to plan for a regional approach to reduce vulnerabilities, develop coping mechanisms and establish collaboration with different organizations to get the needed information on all aspects of drought management (increasing knowledge, awareness and capacity building) and to use it effectively in the development of short term and long term drought management plans and actions. After inaugural session brief, country representatives made their presentations.

#### **4.3 Presentation by Bangladesh**

**Dr. Giasuddin Ahmed Choudhury and Dr. Kh. Azharul Haq** made their presentation on Integrated Drought Management for Food Security and Sustainable Livelihood: Experience from Bangladesh. Dr. Haq said that Bangladesh is most vulnerable to several natural disasters due to too much of water in monsoon and too little in dry seasons. With the growing population there is huge imbalance between water demand and supply due to lack of water storage capacity. The situation is further aggravating due to changing hydrological conditions, depletion of ground water and intensive agricultural practices through change in cropping pattern resulting in drought proneness in Bangladesh.

He also cited that Bangladesh has experienced droughts of major magnitude in 1973, 1978, 1979, 1981, 1982, 1989, 1992 & 1995 consecutively. The 1973 drought was labeled as “the worst drought” in recent history, 1979 drought as the worst in living memory and 1994-95 droughts the worst in this century. In context of Bangladesh, the drought was instrumental in wiping out our Kharif II crop. Drought in Bangladesh is considered for the two cropping periods of the year. The Rabi and pre- kharif period starts from November and ends in June with the critical dry period. The Kharif period is between July to October, with the critical dry period from September and October. Depending on the intensity and duration of drought, reduction in paddy yield can be as high as 50 percent in a long duration drought. This situation adversely affects both food security and livelihood as over 60 percent of the rural population depends directly on agriculture.

Dr. Choudhury further explained that in Bangladesh communities are practicing local adaptive practices, which vary from area to area. These includes traditional practices such as pond and dighi excavation, retention of rain water in khari and canals, state supported responses such as DTW facilitated irrigation and alternative responses such as adoption of mango farming, orchard development and domestic responses such as alternate livestock, poultry/ birds rearing.

The local level structure of Union Disaster Management Committee for disaster management also functions officially but the access to these Upzilla Drought Management Committees (UDMCs) and capacity of these institutional entities is very weak.

He suggested two different types of measures for drought management; a) supplementary irrigation system; and b) reliance over indigenous technologies are pointed out as prime concern. Referring a study finding of World Bank, 2000 which suggested that for drought management software and hardware approaches can be adopted, he further elaborated that software approach will include developing crop varieties which will be able to survive under prolonged water stress conditions and hardware approach will include construction of infrastructure to make water available to offset moisture deficit. The latter appears to be the major adaptation modality. However, creation and recreation of water storage systems (ponds, khals, reservoirs, etc.) operated and maintained by vulnerable communities need to be given due emphasis. Choice of low-water-consuming crops instead of paddy will reduce immense pressure on dwindling ground water aquifers. Such an adaptation will not only help to diversify crop agriculture, it will also counteract gradual lowering of piezoelectric surface of ground water aquifer system. He suggested that National Strategy for Drought Management has to focus on:

- Preparation of Drought Management Plan
- Expansion of irrigation systems
- Regional Cooperation
- Identification of drought vulnerable hotspots
- Drought assessment and prediction model
- Drought resistant crop varieties
- Improved resource management

#### 4.4 Presentation by India

**Prof. Santosh Kumar** gave his presentation on Drought in India: Issues and Challenges. He started his presentation with the history of drought in India. He told that there were around 25 major famines across India in the latter half of the century which killed between 30 and 40 million people. The famines continued until independence in 1947, with the Bengal famine of 1943-44 being among the most devastating, killing 3-4 million people. The situation improved remarkably after 1960s Green Revolution.

He said that India has witnessed drought in its rainy season from time immemorial and from the ancient period. India has peculiar physical and climatic characteristics. More than 80 per cent rainfall is received in less than 100 days during the South –West monsoon and 21 per cent area receives less than 700 mm rains annually making such area the hotspots of drought. As average annual rainfall is 1150 mm, no other country has such a high annual average; however, there is considerable annual variation. Therefore, keeping in view such a peculiar climate characteristic, it is important to know that in context of India, how drought is defined. He elaborated that drought year as a whole is defined in India by the Indian Meteorological Department (IMD) as a year in which, the overall rainfall deficiency is more than 10 per cent of the Long Period Average Value (LPAV) and more than 20 per cent of its area is affected by drought, either moderate, severe or combined moderate and severe. In India, around 68 per cent of the country is prone to drought in varying degrees. Of the entire area, 35 per cent of the area, which receives rainfall between 750 mm and 1000 mm, is considered drought-prone, while another 33 per cent, which receives less than 750 mm of rainfall, is called chronically drought-prone 19.6%), semi-arid (37%), and sub-humid areas (21%).

He stated that among the drought years, 1987 drought was one of the worst droughts of the century, with an overall rainfall deficiency of 19 per cent. It affected 59–60 per cent of the crop area and a population of 285 million. In 2002 too, the overall rainfall deficiency for the country as a whole was 19 per cent. Over 300 million people spread over 18 States were affected by drought in varying degrees. Around 150 million cattle were affected due to lack of fodder and water. Food grains production registered the steepest fall of 29 million tons. No other drought in the past had caused reduction in food grain production to this extent. Further in 2009, 15 states and 352 districts were under drought.

He further said that in post independence, the Government policy to tackle drought has considerably been modified and it now rests upon early warning preparedness, crisis management (response), mitigation and long term drought management measures in which inputs of science and technology play significant role. A number of long term and short term programmes for the rural India have been evolved. Some of them are ; (i) Drought Prone Area Program (DPAP), (ii) Desert Development Program (DDP), (iii) Pradhan Mantri Gram Sadak Yojana (PMGSY), (iv) National Food for Work Program (NFFWP), (v) National Rural Employment Guarantee Scheme (NREGS), (vi) Integrated Wasteland Development Program (IWDP), (vii) Swarnjayanti Gram Swarajgar Yojana (SGSY), (viii) Land reform programs and other watershed development programs. Beside this, Crop Weather Watch Group (CWWG) functions at Central, State and even district-level which bring data for monitoring mechanisms for rainfall, water resources, crop growth, etc. Decentralization of drought management and policy initiative by thinking in terms of micro level management is the new paradigm for effective drought management which is likely to benefit the distressed population.

Presenting the institutional arrangements for drought, he informed that Indian Metrological Department (IMD) is the designated agency for providing drought early warning and forecasting. IMD monitors agricultural drought once in every two weeks on a real-time basis during the main crop seasons (kharif and rabi). Medium Range Weather Forecasting (NCMRWF) – which was set up In January 1988, by the Government of India approved the establishment of the National Centre for Medium Range Weather Forecasting (NCMRWF) as a constituent unit of the Department of Science and Technology (DST) to help develop suitable Numerical Weather Prediction (NWP) models for medium-range weather forecasts (3–10 days in advance) and prepare agro-meteorological advisories for the farming community in 127 agro-climatic zones of India. The Central Research Institute for Dryland Agriculture (CRIDA) located at Hyderabad caters for All India Coordinated Research Projects on Agri-meteorology and Dryland Agriculture (AICRPAM and AICRPDA), each having 25 centres under State Agricultural Universities (SAUs) across the country which take part in drought studies pertaining to assessment, mitigation, risk transfer, etc. The Central Arid Zone Research Institute (CAZRI), in Jodhpur acts as repository of information on the status of natural resources and desertification processes and their control. It maintains 6 agro-meteorological observatories in their research stations at Jodhpur, Jaisalmer, Chandan, Bikaner, Pali, and Bhopalgarh. National Agricultural Drought Assessment and Management System (NADAMS) developed by the Department of Space for the Department of Agriculture and Co-operation, primarily monitors the vegetation through National Oceanic and Atmospheric Administration (NOAA). The Central Groundwater Board (CGWB), with over 15,000 hydrograph stations across the country, is responsible for monitoring India's groundwater. Monitoring usually done four times a year, is essentially a recording of the response of the groundwater system to natural and artificial conditions, or recharge and discharge.

**Prof. M S Rathore** made presentation on Banas river basin located in Rajasthan (India). In his presentation, Prof. Rathore first explained about the risk of climate change/variability in South Asia and India for which he suggested that first of all we should (i) Identify the most vulnerable (sector/ region/ community) ; (ii) Assess the current coping mechanism ; (iii) understand the current climate including its variability and extremes - effectiveness / ineffectiveness ; and then try to assess the magnitude of future changes and additional adaptation requirements due to exacerbated impacts of climate change. In India drought is a perennial feature and 19 per cent of its area and 12 per cent of population are affected annually. Based on the rainfall deficiency data, he said that Tamilnadu, Jammu & Kashmir, Telangana, West Rajasthan suffer drought every 2.5 years; Gujarat, East Rajasthan & Western Uttar Pradesh every 3 years; and other States every 4-5 years. He presented the zone-wise data for 106 years from 1901 to 2006 on intensity of drought in Rajasthan, which has suffered drought for all the 106 years.

About severity of drought in the districts, he mentioned that all the nine districts near the Banas river basin have been impacted by either very severe, severe, moderate, light or normal droughts during 1901 to 2006. He also told that Jaipur district was hit by very severe drought with 10.4 per cent intensity, Ajmer with severe drought 15.2 per cent, Pali with moderate drought 17.9 per cent and Sawai Madhopur district with light drought 21.7 per cent. The overall good or normal years for Rajasthan for these districts have been 52.8 per cent during the above period.



He said that nine types of threats have been foreseen for the existence of Banas river which are (i) Encroachments; (ii) Obstruction in free flow-dams, anicuts, diversions; (iii) Sand mining; (iv) Mining and quarrying activities in the catchment area ; (v) Soil erosion and degradation of catchment area ; (vi) Over-exploitation of groundwater ; (vii) Disruption of hydrological system by infrastructure development and industrial development ; and (viii) Pollution – surface and groundwater. After talking about the threats to the river, he suggested seven types of targeted specific interventions for adaptation viz (i) Organizational interventions by reviving traditional institutional mechanisms such as food, fodder and seed banks/stocks.(e.g. collective fodder management), (ii) Educational and skill development by providing fund for research to innovate and test on field new cropping systems, farming systems to minimize climatic risk, demonstrate the model on farmers' field., (iii) Communication for adaptation by providing information on rainfall patterns and other climate change related variables in short, medium and long term., (iv) Adapted infrastructure by preparing village wise water management plans (Water auditing) and designing rain water harvesting and aquifer recharge plans, (v) Financial and risk spreading; (vi) Livelihood and economic diversification; and (vii) Eco-system management.

#### 4.6 **Presentation by Nepal**

**Mr. Naveen Mangal Johsi** and **Mr. Som Nath Poudel** made presentation on “Drought Concerns in Nepal”. Mr. Poudel stating the water resources scenario explained that Nepal has a network of around 6,000 rivers. In addition to this, there are more than 200 rivers that originate from Siwaliks and flow out to India. The total runoff from all these rivers systems is estimated at about 225 billion cubic meters. The average annual rainfall of the country is around 1,530 mm.

Nepal experiences heavy rainfall accounting to 80 per cent of the total rain from June to September. Due to good rainfall over the last 50 years, Nepal has considered itself so rich in water resources and the subject of drought was totally ignored even though much of the country fall in semi-arid area. But on the contrary, the year of 2006 and 2009 are reported to be the driest years in terms of rainfall during winter which is essential for good kharif crop. The rainfall was less than 20 per cent of normal in more than half of the country. Elaborating extreme climatic events in Nepal, he further said that besides dry winter, the year 2009 was also extreme in terms of temperature records and the delayed monsoon. Hence year 2009 can be considered as a special case for assessing climate impacts for developing adaptation measures.

Mr. Naveen Mangal Johsi said that Nepal government have been always concerned with flood devastation and as a measure it has been felt that flood as well as drought could be managed with the construction of 27 number of dams planned at different places in the country. However, monsoon rainfall has been quite erratic since last 3 to 4 years resulting in more food scarcity or reduction in food grain production. Mr. Joshi informed that so far there is no separate policy for handling the drought in the country. The main instrument for state intervention in river regime is Water Resources Act 1992 and Irrigation Policy 2003. At present Department of Agriculture & Cooperatives is entrusted to coordinate the government response to the management of drought in a crisis management mode and the Ministry of Home has the overall responsibility of all kinds of disaster management. In addition, handling drought is also implicitly part of the Department of Irrigation activities as the drought is simply the failure of rains to occur in the expected manner.



Mr. Joshi further said that Nepal has not focused on drought strategy and the major concern has been more towards relief rather than preparedness. Although the overall impacts of drought conditions in Nepal is yet to be assessed, 2009 case of drought is considered to be as a special case for assessing climate impacts for developing adaptation measures. Also contingency plan need to be prepared. He suggested that for studying the drought in Nepal, Babai river basin could be taken-up. He also pointed out that as groundwater conditions are highly variable and often depend on very localized factors, the precise location and timing can only be determined if groundwater monitoring is reoriented in a way so as to allow the incorporation of local information system into drought warning system.

#### 4.7 Presentation by Pakistan

**Dr. Pervaiz Amir** and **Mr. Naseer Ahmad Gillani** presented “Drought Management in Pakistan – A Profile” covering drought situation in Pakistan – issues and state of affairs, institutions & politics and engagement strategy. Later on they presented case of drought to be undertaken in Patohar region Soan-Korang Sub-basin of Indus River. Dr. Pervaiz first briefed about Pakistan which is amongst the most vulnerable lower riparian in Himalayan region to face water crisis. He said that three forth of the country receives rainfall less than 250 mm and 20 per cent of it receives 125 mm. Extreme weather events and incidence are occurring in Pakistan. The past decade has witnessed extreme events throughout the country. From 1998-2001, Sindh, Baluchistan and Southern Punjab witnessed one of the worst droughts in the country’s history. Due to failure of monsoon, around 2.4 million people got affected by the last drought. He also informed that agriculture contributes to almost 24 per cent of Pakistan’s GDP and 70 per cent of foreign exchange is earned from agriculture and allied industries (sugarcane, textile & high value enterprises). Besides this rural livelihoods are closely tied to agriculture that employs 50 per cent of the rural labour force. Women, children and elderly are being especially impacted and their livelihoods are put under pressure. He pointed out that in the current year 2010, temperature during March and May have broken past 54 years records reducing 2010 wheat production by almost 35-40 per cent. He highlighted that rural versus urban division is rapidly increasing. As per official statistics some 32 per cent of Pakistanis (36.3 % rural and 22.4 % urban) live below the poverty line. As agriculture contribution to total GDP is around 25 per cent and due to erratic rainfall, the crop productivity is getting affected due to this production of forage, fodder and tree foliage is on decrease on which the rural poor life depend (fodder, fuel wood, etc.). He further said that overall water table is rapidly declining, which results in higher pumping cost, increased diesel and electricity costs, undermines the quality of life and sustainability and push the rural poor to the brink of poverty line.

Mr. Naseer Ahmad Gillani talked about the response mechanism, mitigation/adaptation measures and institutional arrangements. He informed that the government of Pakistan has put in place the National Disaster Management Authority (NDMA) to cater to all types of disasters including the drought. The other initiative is the Drought Recovery Assistance Programme Project (DRAPP) to address emergency relief from drought. He also said that government of Pakistan has National Calamity Act. The Act provides legislative framework to counter drought effects. The government by notification declares drought affected area and entrust provincial Board of Revenue (BoR) to appoint a relief commission. Relief assessment is done based on the parameters as livelihood of population, availability of water, health, sanitation and nutrition. He also informed that special relief packages through the Agriculture Development Bank and donors based projects and programs

mainly by UNDP to address the issue of drought, supporting institutional reforms are also under progress.

With reference to drought management and practices linked to water sector, he informed that government priority is to strengthen its meteorological services to better predict on drought, develop drought resistant varieties, introduce better conservation technologies in the form of rain water harvesting, check dams, deep sprinklers, etc. Better on-farm water management practices along with IWRM approaches are being introduced at the farm level to conserve water. However, for better implementation, improved coordination and infrastructure mechanism at the district level needs to be strengthened. In context of taking-up pilot project to understand drought and implementation of future program for mitigation, he suggested Potohar region which is largest contiguous block of rainfed agriculture covering 28 per cent of area. Runoff at Potohar plateau is 3.5 MAF of which only 0.10 MAF is stored in small and mini dams. The remaining 3.4 MAF goes into Indus and Jhelum rivers. To initiate a pilot project from GWP-SAS, concerned stakeholders from the Potohar region could be consulted within close proximity of the federal capital at starting point of the basin (Chakwal) and potential site at the end of the sub-basin as soon as river enters Indus at Kalabagh. This provides potential for testing up different IWRM concepts and approaches.

#### **4.8 Presentation by Sri Lanka**

Sri Lankan presentation by **Prof. Champa M. Navaratne and Dr. B. V. Punyawardena** focused on “Drought Management in Sri Lanka”. Prof. Champa stated that drought or extreme negative rainfall anomalies are experienced in Sri Lanka under three major meteorological situations. The first situation normally occurs during December-February when air stream over the island comes from the northern hemisphere with high pressure and travels over the dry main land of India immediately before reaching Sri Lanka during North-East monsoon season. The second situation occurs during October to January due to marked decrease in formation of weather system in the Bay of Bengal. The third situation occurs in May-September when prevailing air system of summer monsoon is relatively dry due to deviation of flow direction from its usual path.

Tracing the duration and intensity of drought conditions, Prof. Champa said that the intensity is highly variable from one ecological zone to another. The average drought period ranges from just one month in the wet zone areas, 2-5 months in the intermediate zone and 6-8 months in the dry zone. She also said that almost all parts of the country have experienced drought conditions in the last 30 years which affected thousands of people every year with severe loss of economy. However, drought in December, 2003 was the worst in 50 years in Sri Lanka. The entire island has been suffering from the effects of the drought for several months. About three million people, mostly poor rural farmers, have been severely affected by a drought throughout 14 of the 25 districts in Sri Lanka.

It is likely that frequency and severity of the drought in years to come will increase in Sri Lanka and this will be true mainly for Deduru Oya basin of which the catchment lies mainly in the relatively drier intermediate zone of Sri Lanka.

In the past, drought management was done by one of the most advanced hydro-engineering structures – ancient tank system. After post-independence, government has taken a number of steps to reduce the impacts of drought by opening up of trans-basin diversion and resettlement schemes such as Gal Oya, Uda Walawe and Mahaweli new domestic water supply schemes. Besides these schemes, developing drought tolerant crop varieties, promotion of water efficient cultivation practices, rainwater harvesting, etc. were the other steps. It is felt that infrastructure development as well as institutional development have contributed significantly to lessen the drought impact in recent times, however, Sri Lanka's future strategy needs comprehensive national policy or plan for drought management. She highlighted that there are various agencies to work on different technical issues that has bearings on the drought and its impact such as water supply, irrigation, agriculture, crop research, health & sanitation, etc. but no single agency is able to counter the impacts of drought. Hence option for mobilizing all available resources is important.

She also shared proposed strategies to reduce the vulnerability to droughts by explaining formula i.e  $Vulnerability = \int (+)Exposure*(+)Sensitivity*(-) Adaptive\ capacity$ . Here reducing exposure to drought means protection of river banks reservations in Deduru Oya and its all tributaries; introduce micro level rain water harvesting tanks-farm ponds, etc. Reducing sensitivity to drought refers to rehabilitation of village tank networks, rehabilitation & restoration of irrigation structure, proper irrigation planning, etc. Enhancing the adaptive capacity include knowledge sharing and dissemination.

IWMI, Sri Lanka presentation on “A Global Picture of Drought Characteristics, Vulnerability, and Preparedness” by Nishadi Eriyagama, Vladimir Smakhtin and Nilantha Gamage was presented by **Dr. Nishadi Eriyagama**. She shared her views and findings based on the study undertaken by IWMI to examine the global pattern and impacts of drought as an individual natural disaster. Highlighting the study methodology adopted by IWMI, she said that IWMI mapped 14 drought related characteristics and indices across the globe. The indices cover mean annual precipitation and variability, per capita mean annual river discharge, infrastructure vulnerability index, socio-economic drought index, agricultural water crowding, drought risk index, storage duration index, storage drought deficit index.

She also explained that based on indices, areas more prone to multi-year hydrological droughts are of Africa, South, Southwest, Central Asia; and northern Australia. Out of them Australia and Southern Africa appear to have sufficient storage to satisfy their water needs during drought periods but South and Central Asia have no apparent hydrological barriers for increasing storage in the future. Dr. Nishadi also explained through pictorial maps about Storage Drought Duration Index (SLI) which represents what proportion of the annual hydrological drought duration can a country's present storage satisfy, based on its monthly water needs. She said if  $SLI \geq 1$  this shows that there is satisfactory storage. In case of Storage Drought Deficit Index (SDI), which represents that what proportion of the annual hydrological drought deficit can a country's present storage satisfy, based on its monthly water needs, the index shows if  $SDI \geq 1$ , it is susceptible to river fragmentation and over-exploitation of fresh water resources.

With regard to measure anti-drought coping capacity, the study included infrastructure vulnerability index at the scale of 0-100 which covered parameters like rural accessibility and improved drinking water availability. Measure of dependence on agriculture and diversity of crops have been also included in socio-economic drought vulnerability index. The index covers parameters like percentage of persons employed in agriculture, share of agriculture to GDP and crop diversity. Based on the indices, she concluded that agricultural economies of Asia and Africa are much more vulnerable to adverse societal impacts of meteorological droughts. Also the African continent lags behind rest of the World on many indicators related to drought preparedness. The findings of this study would be helpful to develop a Global Drought Indicator Atlas. As far as future research is concerned, the focus should be on quantifying and indexing vulnerabilities to droughts with countries and at local and household levels to identify vulnerable region or population. She also suggested that it is necessary to identify and carry over research on how some of the mapped indices might change with change in climate.

## **V. Technical Session –II (Day-2)**

The Technical Session-II was chaired by Mr. Naseer Ahmad Gillani and the rapporteur was Dr. Veena Khanduri. During the session the Chair informed that first 45 minutes will be used to discuss key issues raised by each country experts and later on the participants will be working on development of proposal by grouping them in three groups.

While Group-1 will work on identifying the common aspects of the region, Group-2 will identify the activities and develop a logframe work and Group-3 will look after the implementation mechanism. The session started with several key questions that the experts raised during their country specific position. Thereafter, the Chairperson invited participants for their comments and discussions. Views of participants are as under:

- Many participants suggested that this forum should decide on common better understanding of the drought. Whether drought across the South Asia is on the same scale?

With regard to above questions, Prof. Ranjith Premalal de Silva said that drought in Sri Lanka is a direct result of the delay or failure of the expected monsoon downpour or reduced precipitation. This situation is mostly experienced in the areas demarcated as dry and arid zones. Prof. Ranjith Premalal also said that conceptually drought has been defined by variety of definitions. Meteorologists defined drought on the basis of the degree of dryness and the duration of the period; Agriculturists on the basis of the influence of yield reduction, Hydrologists on the basis of the shortfall in precipitation on surface and sub-surface water supply, and Socio-economists on the basis of the change in the supply and demand of commodities.

Mr. Som Nath Poudel said in case of Nepal, the subject of drought has been almost ignored. He further indicated that current research suggests that Nepal is also likely to exacerbate both drought and floods. In Nepal the responsibility to handle drought is part of the Department of Irrigations activities and the understanding is that drought is taken care of by providing irrigation waters to the water scarce areas.

Prof. Santosh Kumar suggested that drought as a whole is defined in India by the IMD as a year in which, the rainfall deficiency is more than 10 per cent of the Long Period Average (LPA) and more than 20 per cent of its area are affected by drought conditions, either moderate or severe or combined. With regard to specific interventions by Govt. of India, Prof. Santosh highlighted that new proposed index for declaration includes standard monitoring tools which need to be applied in combination for drought declaration i.e, rainfall deficiency, the extent of area sown, normalized difference in vegetative index and soil moisture index.

Prof. M S Rathore said that in case of proposed Banas river basin for implementation of the pilot project, preparation of village-wise water management plans (water auditing and design, rainfall harvesting and aquifer recharge plans) are the targeted interventions. He further indicated that specific targeted interventions also include communication for adoption and this should provide information on rainfall pattern and other climate change related variables in short, medium and long term.

Agreeing with Dr. Tushaar Shah that groundwater can play a buffer role, Mr. Poudel enquired does this also suggest that in case of Nepal on upper catchment dam should be built? Mr. Naveen Mangal Johsi said that primarily in Terai, we recommend using shallow tube wells since there were deep aquifers in the same pockets. Now the government has not taken this approach. As per the Nepal's Food and Drought Policy, 27 number of dam sites have been identified for flood prevention as well as for drought.

Dr. Pervaiz Amir suggested that stakeholders from relevant fields including public, private, NGOs and civil societies must be provided a chance to highlight the drought problems hotspots to achieve broader agreement for interventions.

Prof. Ranjith Premalal also added a very important dimension stating that drought is not just an ecological occurrence but also a social reality among the livelihoods of the dry zone peasantry in Sri Lanka. He also shared that people in dry zone particularly the farmers use various agricultural and non-agricultural strategies to cope with periods of predicted droughts. In case of agricultural adjustments when farmers realize that there will be inadequate or delayed rainfall in the forthcoming season, they adopt one or more strategies such as; cultivating irrigable lands in time, observe the early rains and cultivate short duration paddy varieties, cultivate subsidiary food crops in paddy lands, no cultivation in low lands and cultivation of drought resistant crops in Chena land. While non agricultural adjustments are adopted by farmers to lessen the impact of drought on food security which include construction of newly dug wells in the tank bed, farm water management and rainwater harvesting. He also emphasized that a drought preparedness plan should have four primary organized tasks viz ; (i) monitoring ; (ii) impact assessment ; (iii) response & mitigation ; and (iv) comprehensive early warning system.

Dr. Mercy said that all the presentations were very informative and it is visible in presentations that all South Asian countries have experienced droughts of major magnitude and still countries are grappling with drought. This adversely affects both food security and livelihood. With climate change, incidence of drought is expected to increase both in terms of period,

intensity and duration. Hence efforts should be made to find the best approach or integrate several approaches for preparing a regional framework with selected indicators.

After the discussions, Mr. Naseer Ahmad Gillani told that on the basis of experts' presentation and further deliberations, it is understandable that for developing the plan, all the participants will work in their respective groups on three major categories or thematic areas. The first group will work on common regional issues/aspects pertaining to drought, the second groups will take-up identification of activities for reducing vulnerabilities and building resilience to drought with special focus on implementation and the third group will work on implementation and governance aspects of the project. Therefore, all the participants were divided into three groups to contribute on the above mentioned areas.

## VI. Technical Session –III (Day-3)

The third session was chaired by Prof. Santosh Kumar and the rapporteur was Mr. Som Nath Poudel. Prof. Santosh Kumar invited Group-1 for presenting their presentation. Keeping in view the common issues/commonalities among the South Asian countries to be incorporated in the proposal, the points mentioned by the group are as follows:

- Nature of drought and its mapping
- Impact of drought
  - Frequency
  - Intensity
  - No. of People affected
  - Impact on ground Water
  - Impact on Agriculture/water/Livelihoods
  - Forced Migration
- Emerging risks (Present & future)
- Strategies adopted by various countries
- Process of drought declaration
- Existing institutions and systems (Policy, Act, systems, institutions, funding-ex-post and ex-ante)
- Strategies for risk reduction
- Learning from climate change model for the region and issues to be addressed
- Community resilience system and capacity building
- Innovation – risk transfer mechanism, damage and loss assessment, insurance – agriculture, livestock, and water source



**Group Exercise by the participants**

Following the presentation by Group-1, Mr. Sardar Muhammad Tariq said that common issues identified across the South Asia clearly spelt that understanding of drought and its mapping is very important. He also suggested that common understanding of issues clearly indicate that

development of a national and local level drought assessment and prediction model is urgent for early warning dissemination.

Dr. Mercy said in setting the context, identification of common concerns/issues provides an important background in a broader context. Group exercises have given a broader framework and it needs to come up in the shape of zero draft.

Prof. Santosh Kumar invited Group-2 to present their group exercise results on activities to be taken-up for RIDMP in South Asia. In line with the task assigned to Group-2 i.e, identification of activities for reducing vulnerabilities and building resilience to drought with special focus on implementation. Group made their presentation on purpose, input/activities, methodology outputs and outcomes. The salient points that emerged through the presentation were:

### **Purpose**

- To understand droughts, its occurrence, temporal and spatial variation, estimating duration and intensity, its impacts on agriculture, ecosystems and livelihoods of the people.
- Identifying coping strategies and response mechanisms to droughts.
- Explore available technologies including indigenous know how to adapt and mitigate droughts.
- Guiding the national governments for formulation of drought management policy.
- Sharing of experience of the countries of South Asia and building regional cooperation for more comprehensive and integrated approaches for drought management.

### **Inputs**

- Defining drought in context of South Asia region with the help of available knowledge and considering local, regional and global factors.
- Assessment of droughts with field observation as well as using available models and its mapping with identification of hotspots in South Asia.
- Monitoring of droughts with space, time, duration and intensity and considering climatic factors.
- Early warning and forecasting.
- Assessing impacts of droughts on agriculture, ecosystems and livelihoods of the people.
- Resource assessment (e.g water and energy availability, available financial and human resources and institutional mechanism whether in place to address droughts).
- Developing coping strategy and response mechanisms to droughts

### **Methodology**

- Formation of Regional Core Team of experts in drought management.
- Formation of National Core Team of Experts in drought management.
- National level study on the activities and consultation
- Regional Consultation on country studies
- Preparing the Regional strategies and plan for drought management.
- Communicating the strategies (both national and regional) to the national governments.

- Sharing the regional drought mapping in the climate events at regional and international level for its focus in global climate change adaptation strategies.

### **Outputs**

- Identifying hotspots of droughts in South Asia.
- South Asia map of droughts.
- A Report on impacts of droughts.
- Strategy documents on how to cope with droughts.

### **Outcomes**

- National Governments adopt drought policy and coping strategy to droughts.
- Use of drought map by the donors, climate experts and national government for proper planning of drought management and addressing droughts in areas on priority to reduce vulnerability.

### **Activities**

- Assessment of Drought Management Practices in each country
- Identification of best practices
- Development of drought impact assessment model
- Development of drought forecasting model
- Development of drought management model
- Capacity building

**Time Frame**: Three years

Based on the exercise, Group-3 made presentation on implementation, governance and project strategy for undertaking the pilot project. The group raised some key questions for consideration which are:

- The nature of proposal is as unsolicited but it focuses on state of the art.
- Before planning or formulating the proposal, identification of donors and networking was not taken into consideration.
- The proposal may be sharpened/focused as per donors' agenda.
- Multiple funding can be explored for project to program.
- As GWP/WMO focus is on drought, it is a comparative advantage.
- Pre-selling agenda – which is to lead, what, when, where and how, etc. As it is in planning stage, proposal must address on Project Steering Committee, National Steering Committee, and Project Management Unit/Project Implementation Unit. Selection of Team Leader and other key personnel are also to be included in the project implementation design.

With regard to key personnel, it was proposed that the team should comprise of Agronomist/Soil Scientist, Hydrologist, Social Scientist, Environmentalist, Meteorologist, Livestock specialist. The group also recommended that the project collaborative partners should be from research organizations and universities.



The group also felt that a project of regional scale needs to incorporate legal considerations, equipments procurement procedures, rules & regulations. Besides this, reporting requirement such as inception report, quarterly progress reports, mid-term review, annual report, project publications, etc. should also be included. It was also suggested to incorporate monitoring & evaluation component in the project design.

After presentations by all the three groups, Prof. Santosh Kumar told that the group of experts gathered here has identified the niche and now specific responsibilities need to be entrusted to work further on strengthening the proposal. Prof. Rathore and Dr. Pervaiz Amir suggested to first identify the donors who are interested on this issue. Dr. Mercy clarified that GWPO has supported the GWP-SAS for organizing the planning consultation on RIDM and now the region has to take the lead to put forward this consultation's recommendations to formulate a good proposal. She also suggested that although to take lead for this initiative mainly lies with the region, the other suggestive option is that the proposal can be put-up during the next donors' conference at Bonn, Germany.



**Prof. Santosh Kumar summarizing the Group Presentations**

## **VII. Program Drafting Session (Day-3)**

The Program Drafting Session was divided into two groups; (i) Technical Group ; (ii) Financial Group. While technical group was vested with the responsibility for preparing the technical proposal, the financial group was assigned the task of preparing the financial bid. During this session, Dr. Veena Khanduri suggested to draw an outline of draft regional program based on the feed-back received from the three group of Technical Session-III. Mr. Naseer Ahmad Gillani also suggested that a panel of key experts comprising of Prof. Santosh Kumar, Prof. M S Rathore, Dr. Pervaiz Amir, Mr. Ranjith Ratnayake, Ms. Reba Paul and Dr. Veena Khanduri will prepare a draft outline of the proposal.

Thereafter, the draft outline of the proposal was finalized in consultation with the above mentioned experts and the same was presented by Prof. M S Rathore. The major points addressed are as follows:

- Context (covering overall disaster events, economic loss and drought in the region)
- Policy gaps
- Objectives
- Activities
- Implementation plan
- Follow-up

## **VIII. Concluding Session (Day-3)**

The third session concluded with the brief address by Chairman, GWP-SAS who said that three day continuous brainstorming and sharing has given new directions and approach to prepare a Regional Integrated Drought Management Plan for South Asia. He also said that this is just a zero draft of the proposal at present and further refinement and comments from experts, country chairs will be incorporated to prepare a realistic proposal. The Chairman also thanked all the experts, Regional Coordinator, Mr. Ranjith Ratnayake, Mr. S. B. Niyangoda, Chairman, SLWP, Dr. Veena Khanduri (GWP-SAS Focal Point for RIDM) for their useful contributions to make the regional consultation a successful one. Apart from Mr. Ranjith Ratnayake's active participation in technical sessions, the Chairman also thanked him for making a very good logistics arrangements for the participants.

Dr. Mercy also expressed her satisfaction on the outcome of regional consultation which finally came out with a zero draft proposal. She also appreciated the region for identifying well renowned experts from the respective countries to feed into the drought planning workshop. She further said that the experts' presentations were very good and well received.

Dr. Mercy thereafter briefed about the set deadlines for preparing the full fledged proposal which are as under:

- Between now and 15th August, - workshop participants will submit afterthoughts, if any, on the pre proposal.
- From the 16th - 24th August, a small working group will work on the comprehensive proposal
- From the 25th August, the Proposal will be circulated to the region for comments for 1 week.
- End of August, a regional Draft proposal to be discussed with GWPO will be ready, just in time for the CP meeting.
- The Regional Chair with the support of the region will also concurrently sharpen focus on donor agencies agenda as well as explore possible multiple funding arrangements for the proposal. Depending on the outcome of this process, proposals will be modified to align them with the donor agencies proposal format requirements.

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# Regional Consultation on Integrated Drought Management Colombo, Sri Lanka

**Venue : Galadari Hotel, 64-Lotus Road, Colombo  
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## LIST OF PARTICIPANTS

Sr.#	Name	Designation / Organization / Country	Tel / Mobile	Email address
1.	Mr. Sardar Muhammad Tariq	Regional Chair, GWP-SAS	+92 51 435 9007, +92 302 850 5538	<a href="mailto:smtariq@pwp.org.pk">smtariq@pwp.org.pk</a>
2.	Dr. Tushaar Shah	Senior Fellow – IWMI, Anand India	+91 2692 263817 / +91 9825931984	<a href="mailto:t.shah@cgiar.org">t.shah@cgiar.org</a>
3.	Dr. Mercy Dikito-Wachmeister	Senior Network Officer, GWPO	+46 (0) 73 914 26 48 / (0) 73 714 89 86	<a href="mailto:Mercy.Dikito-Wachmeister@gwpforum.org">Mercy.Dikito-Wachmeister@gwpforum.org</a>
4.	Mr. Ranjith Ratnayake	Regional Coordinator, GWP SAS	+94 11 2880000 ext. 3303, +94 11 2880188 (Dir)	<a href="mailto:r.ratnayake@cgiar.org">r.ratnayake@cgiar.org</a>
5.	Dr. Giasuddin Ahmed Choudhury	Executive Director, Center for Environmental and Geographic Information Services (CEGIS) & Executive Committee member-Bangladesh Water Partnership (BWP) Bangladesh	+880 2 8817651	<a href="mailto:gchdhury@cegisbd.com">gchdhury@cegisbd.com</a>
6.	Dr. Kh. Azharul Haq	Regional Council Member, GWP SAS & Executive Committee Member-Bangladesh Water Partnership (BWP) Bangladesh	+880 1819212996	<a href="mailto:kahaq@dhaka.net">kahaq@dhaka.net</a>
7.	Ms. Reba Paul	Executive Secretary - Bangladesh Water Partnership (BWP) Bangladesh	+880-2-8116668, 01553701152 (Mobile)	<a href="mailto:bwp@dhaka.net">bwp@dhaka.net</a>
8.	Prof. M. S. Rathore	Director - Centre for Environment and Development Study Jaipur (Rajasthan) India	+91 0141 2353362 (o), +91 0141 2350456 @, +91 9414061241(Mobile)	<a href="mailto:msr@cedsj.org">msr@cedsj.org</a> , <a href="mailto:msrorama@gmail.com">msrorama@gmail.com</a>
9.	Prof. Santosh Kumar	Head - Policy, Planning & Cross Cutting Issues Division, National Institute of Disaster Management India	+91 11 23702433, 32	<a href="mailto:profsantosh@gmail.com">profsantosh@gmail.com</a>
10.	Dr. Veena Khanduri	Adviser- India Water Partnership (IWP) India	+91 11 2689 1111 / +91 11 09891195806	<a href="mailto:iwpneer@gmail.com">iwpneer@gmail.com</a> , <a href="mailto:veenakhanduri@yahoo.com">veenakhanduri@yahoo.com</a>
11.	Mr. Naveen Mangal Joshi	Project Director, CMIASP-Member, NWP JVS/Water Resources Expert-Nepal Water Partnership (NWP) Nepal	777 1 4229582, 9841328083	<a href="mailto:jvs@wlink.com.np">jvs@wlink.com.np</a>
12.	Mr. Som Nath Poudel	Vice Chair, Nepal Water Partnership (NWP) JVS/ Senior Water Resources Specialist Nepal	777 1 4229582, 9841205253	<a href="mailto:jvs@wlink.com.np">jvs@wlink.com.np</a>
13.	Dr. Pervaiz Amir	Agricultural Economist, Pakistan	+92 51 2256970, +92 300 5055560	<a href="mailto:pchellianwala@gmail.com">pchellianwala@gmail.com</a>
14.	Mr. Naseer Ahmad Gillani	Chair - Pakistan Water Partnership (PWP), National Program Manager, Drought Emergency Relief Assistance (DERA), Govt. of Pakistan, Pakistan	+92 51 920 4953, +92 333 512 3412	<a href="mailto:naseeragillani@yahoo.com">naseeragillani@yahoo.com</a>

## Annex-I

Sr.#	Name	Designation / Organization / Country	Tel / Mobile	Email address
15.	Mr. Karamat Ali	Country Coordinator-Pakistan Water Partnership (PWP) Pakistan	+92 51 573 1085, +92 300 850 4310	<a href="mailto:karamat@pwp.org.pk">karamat@pwp.org.pk</a> , <a href="mailto:pwp@pwp.org.pk">pwp@pwp.org.pk</a> , <a href="mailto:karamat.ali.pwp@gmail.com">karamat.ali.pwp@gmail.com</a>
16.	Dr. B. V. Punyawardena	Director - Natural Resources Management Centre (NRMCC) Sri Lanka	+94 714 159 671	<a href="mailto:batugedara_vrp@yahoo.com">batugedara_vrp@yahoo.com</a>
17.	Prof. Champa M Navaratne	Head, Agricultural Engineering, University of Ruhuna, Sri Lanka	+94 779 024 013	<a href="mailto:champa@agricc.ruh.ac.lk">champa@agricc.ruh.ac.lk</a>
18.	Ms. Lalani Imbulana	Director, Disaster Management Center (DMC), Sri Lanka	+94 773 957 898	<a href="mailto:indra.imbulana@gmail.com">indra.imbulana@gmail.com</a>
19.	Mr. S. Premalal	Meteorologist, Department of Meteorology, Sri Lanka	+94 714 402 908	<a href="mailto:spremalal@yahoo.com">spremalal@yahoo.com</a>
20.	Mr. Ramitha Wijethunga	National Programme Officer - Disaster Management, UNDP, Sri Lanka	+94 11 2580691 ext.383/ +94 77 3444179	<a href="mailto:ramitha.wijethunga@undp.org">ramitha.wijethunga@undp.org</a>
21.	Prof. Ranjith Premalal de Silva	Professor - Post Graduate Institute of Agriculture (PGIA), Sri Lanka	+94 777 801712	<a href="mailto:rpdesiva@pdn.ac.lk">rpdesiva@pdn.ac.lk</a>
22.	Dr. Nishadi Eriyagama	Water Resources Engineer, IWMI-HQ	+94 11 2880000 ext.1304	<a href="mailto:n.eriagama@cgiar.org">n.eriagama@cgiar.org</a>
23.	Mr. S. B. Niyangoda	Chair - Sri Lanka Water Partnership (SLWP), Sri Lanka	+94 11 2880000 ext.3304	<a href="mailto:s.niyangoda@cgiar.org">s.niyangoda@cgiar.org</a>
24.	Ms. Kusum Athukorala	Vice Chair - Sri Lanka Water Partnership (SLWP), Sri Lanka	+94 11 2521604, +94 722 442426	<a href="mailto:kusum@itmin.net">kusum@itmin.net</a>
25.	Mr. Lalith Dassenaik	Additional RC Member Sri Lanka Water Partnership (SLWP), IWMI Researcher, Sri Lanka	+94 11 2880000 ext. 2303	<a href="mailto:l.dassenaik@cgiar.org">l.dassenaik@cgiar.org</a>
26.	Mr. G. B. Samarasinghe	Director General, Department of Meteorology, Sri Lanka	+94 11 2694104	<a href="mailto:meteo1@slt.net.lk">meteo1@slt.net.lk</a>
27.	Major General Gamini Hettiarachchi	Director General, Disaster Management Center, Sri Lanka	+94 11 2136100 (Dir)	<a href="mailto:dg@dmc.gov.lk">dg@dmc.gov.lk</a> <a href="mailto:dgdmc@slt.net.lk">dgdmc@slt.net.lk</a>

# Regional Consultation on Integrated Drought Management Colombo, Sri Lanka (July 24<sup>th</sup> -26<sup>th</sup>, 2010)

**Venue: Salon Orchid, Galadari Hotel, 64-Lotus Road, Colombo 01.**

## PROGRAM

<b>Day One – 24th July 2010 (1700 – 2130 hrs)</b>			
<div><div><b>INAUGURAL SESSION (1700 – 1900 Hours)</b></div><div><b>Chairperson : Sardar Muhammad Tariq, Chair, GWP SAS</b></div></div>			
1700 – 1730hrs	Registration		
1730 – 1735 hrs	Welcome	:	Mr. S. B. Niyangoda, Chair, Sri Lanka Water Partnership
1735 – 1755 hrs	Inaugural Address	:	Mr Sardar Muhammad Tariq, Chair, GWP SAS
1755 – 1815 hrs	Objectives /Expectations of the Consultation	:	Dr. Veena Khanduri, Adviser, India Water Partnership (IWP) and Focal Point Drought Management, GWP SAS
1815 – 1830 hrs	Integrated Drought Management – A Joint WMO-GWP Programme	:	Dr. Mercy Dikito-Wachtmeister, Senior Network Officer, GWP Southeast Asia, South Asia & Caribbean
1830 – 1915 hrs	Keynote Address – An Approach to Drought Proofing Agriculture. (A case study of Gujarat, India)		Dr. Tushaar Shah, (IWMI Anand),
1915 – 1920 hrs	Vote of Thanks	:	Mr. Ranjith Ratnayake, Regional Coordinator, GWP-SAS
1920 – 2100 hrs	<b>RECEPTION &amp; INAUGURAL DINNER</b>		

<b>Day Two – 25<sup>th</sup> July 2010 (0830 - 1700 hrs)</b>			
<div><div><b>TECHNICAL SESSION – I (0830 – 1300 HOURS)</b></div><div><b>Chairperson : Sardar Muhammad Tariq, Chair, GWP SAS</b></div><div><b>Rapporteur : Dr. Kh. Azharul Haq, BWP</b></div></div>			
0830 – 0845 hrs	Recapitulation of Inaugural Session	:	Dr. Veena Khanduri, Adviser, IWP
<b>Country Presentations</b>			
0845 – 0930 hrs	• Presentation by Bangladesh	:	Mr. Giasuddin Ahmed Choudhury & Dr. Kh. Azharul Haq
0930 – 1015 hrs	• Presentation by India	:	Prof. Santosh Kumar & Prof. M. S. Rathore
1015 – 1030 hrs	<b>TEA/COFFEE</b>		
1030 – 1115 hrs	• Presentation by Nepal	:	Mr. Naveen Mangal Johsi & Mr. Som Nath Poudel
1115 – 1200 hrs	• Presentation by Pakistan	:	Dr. Pervaiz Amir & Mr. Naseer Ahmad Gillani
1200 – 1245 hrs	• Presentation by Sri Lanka	:	Prof. Champa Navaratne & Dr.B.V.R.Punyawardena
1245 – 1315 hrs	• Presentation by IWMI	:	Dr Nishadi Eriyagama
1315 – 1415 hrs	<b>LUNCH</b>		

<div><div><b>TECHNICAL SESSION – II (1400–1700 HOURS)</b></div><div><b>Chairperson : Mr. Naseer Ahmed Gillani, Chair, PWP</b></div><div><b>Rapporteur: Dr. Veena Khanduri, Adviser, IWP</b></div></div>			
1415 – 1500 hrs	Open House - Comments / Discussions on presentations		
1500 – 1515 hrs	Structuring Breakaway Group Sessions - Formation of participants into functional groups.		
1515 – 1600 hrs	Group Work		
1600 – 1615 hrs	<b>TEA/COFFEE</b>		
1615 – 1700 hrs	Group Work		

<b>Day Three – 26<sup>th</sup> July 2010 (0830 - 1700 hrs)</b>			
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<p align="center"><b>TECHNICAL SESSION – III (0830 – 1130 HOURS)</b>  <b>Chairperson : Prof. Santosh Kumar, Head, Policy, Planning &amp; Cross Cutting Issues Division</b>  <b>National Institute of Disaster Management, Ministry of Home Affairs, Govt. of India</b>  <b>Rapporteur: Mr. Som Nath Poudel, NWP</b></p>		
0830 – 0845 hrs	Presentation of Recommendations of Group-I	: Group Leader
0845 – 0900 hrs	Question-Answers	
0900 – 0915 hrs	Presentation of Recommendations of Group-II	: Group Leader
0915 – 0930 hrs	Question-Answers	
0930 – 0945 hrs	Presentation of Recommendations of Group-III	: Group Leader
0945 – 10.30 hrs	Open House discussion on the Recommendations of three Groups – Source for Guidance for Regional Program Development Team	
1030 – 10.45 hrs	<b>TEA/COFFEE</b>	

<p align="center"><b>PROGRAM DRAFTING SESSION (1200 – 1600 HRS)</b>  Support Persons:  Technical Group - Dr. Veena Khanduri, Advisor IWP, Focal Point DM, GWP - SAS  Financial Group - Mr. Ranjith Ratnayake, Regional Coordinator, GWP – SAS</p>		
1045 – 1300 hrs	Work on Draft Regional Program for GWP SAS Two Groups: 1) Technical Group 2) Financial Group	Two small groups to prepare Draft Regional Program/ Proposals under guidance of Prof. M S Rathore & Mr. Naseer Ahmed Gillani in the light of above sessions: Group 1- Technical proposal and Group 2- Financial proposal
1300 – 1400 hrs	<b>LUNCH</b>	
1400 – 1500 hrs	Joint Groups Session (Group 1 + Group 2)*	To finalize the comprehensive program.

<p align="center"><b>CONCLUDING SESSION (1600 – 1700 HRS)</b>  <b>Chairperson : Dr BVR Punyawardene Director NRMC</b>  <b>Rapporteur: Dr. Veena Khanduri, Adviser, IWP</b></p>		
1515 – 1530 hrs	Presentation on salient points incorporated in the Draft Regional Integrated Drought Management Program	: Prof. M S Rathore & Mr. Naseer Ahmed Gillani
1530 – 1540 hrs	Questions/Comments / Feedback on Draft Program	
1540 – 1545 hrs	Closing remarks	: Chairperson
1545-1600 hrs	<b>TEA/COFFEE</b>	

## **Implementation Plan**

Focuses on achieving the desired outcomes of a solid input into national and regional capacities to manage droughts in an integrated manner with minimal delays and maximum positive impacts. A log frame will be developed that enlists the inputs, outputs, resources, and outcomes in a systematic manner. The implementation plan will lay out in a logical framework what will be activities/tasks need to be undertaken to meet project objectives in a cost efficient and timely manner. A Gantt chart will be developed that shows use of human resources, their timing and scheduling to enable project completion on time and achievement of deliverables when they have maximum benefit. Extensive use of micro computers will be employed for monitoring and evaluation of the implementation plan.

## **Follow-up Requirements**

To transform the pre-proposal into a fully fledged proposal with minimal delay the following steps are envisaged

1. Endorsement and agreement on the pre-proposal with more rigorous editing and polishing
2. Serve as a basis for initiating initial discussion with prospective donors and short listing interested donors
3. Based on advice develop into a solicited proposal with these donors a full fledged proposal that is professionally prepared.
4. Formation of a core internal review group to provide extensive input into preparation of the proposal with country program/relevant ministry endorsements of the proposal prior to submission.
5. Prepare a resource analysis for a 3 year project with national program input—not necessarily in an equally divided resource sharing as opposed to addressing the extent of the problem
6. Develop a time table for remainder activities that is realistic and coincides with donor programming calendar and other GWP financial and activity development schedule
7. Act and implement what is agreed upon with minimal loss of time

## **GWP-SAS PRE-PROPOSAL FOR INTEGRATED DROUGHT MANAGEMENT IN SOUTH ASIA REGION**

*There is clear indication that in the emerging global and regional scenario, climate change adaptation and disaster coping is interwoven and crucial to water sector initiatives undertaken by GWP South Asia with the region identified as a global hot spot. Aspects such as IWRM, water management, agricultural productivity, flood and drought management, gender and poverty issues linked to livelihoods are inexorably linked to climate change and therefore to be addressed in that overarching context. Focus on floods have been on stream for some time while the situation demands attention to the insidious onslaught of droughts which are equally debilitating to the rural and urban poor. This pre-proposal is the outcome of a 3 day expert consultation in Colombo Sri Lanka in July 2010 by 20 experts from South Asia (list attached as Annex-1).*

### **Context:**

#### **Disaster vulnerability of South Asia**

In 2007, South Asia, as a region, led the world in terms of the number of people killed by the natural disasters. More than 16,000 people killed by natural disasters worldwide, more than 50% were from South Asia. Among South Asian countries, Bangladesh alone had got 5635 people killed, while there were 2236 deaths in India due to the natural disasters. In fact, 2007 witnessed 49 incidences of natural disasters in South Asia, which is just 12 percent of the disasters that struck worldwide. But 12 percent disasters caused more than 50% of the casualties. With regards to the incidence of natural disasters, floods recorded having highest frequency 40 out of 49 followed by cyclone and drought along with heat and cold waves. The frequency of floods in 2007 was much higher i.e. 40 against the yearly average of 27.1. Cyclone Sid and the phenomenal increase in the frequency as well as magnitude of floods were the main components of South Asian disasters in 2007. Among 55.7 million victims of disasters in the South Asia region during the year, 53 million (more than 95%) were due to the floods, followed by 2.6 million due to cyclone (4%). Floods and cyclone put together contributed to 99% of the disasters victims in 2007. It is also important to highlight that flood victims in 2007 were more than 50% of the yearly average of 35 million. Floods in 2007 impacted the largest number of people, while drought and earthquake had marginal impacts. To be precise, natural disasters in 2007 alone killed 9718 people in South Asia. 58% of them belonged to Bangladesh, followed by India.



## **Economic Losses**

Comprehensive data on damage and loss due to disasters in South Asia are not available from any source. EM-DAT has estimated losses only in respect of cyclones and flood for five countries of South Asia, namely Bangladesh, India, Pakistan, Nepal and Sri Lanka. As per this estimate Bangladesh suffered maximum loss of USD 2414 million, followed by Pakistan (USD 1947 million), India (USD 376.15 million), Nepal (USD 2.4 million) and Sri Lanka (USD 0.5 million). Cyclone accounted for loss of USD 3920 million and flood USD 841.7 million. But these may be gross under estimation of the damages as India alone is reported to have spent an amount of USD 1 billion on account of disaster response and relief, which covered only part of losses due to disasters. Earlier a study conducted by the World Bank revealed that South Asian countries may be losing between 2.5 to 7.6 percent of their GDP and between 12.15 to 66.03 per cent of their revenue on account of disasters, which are huge losses by any standard.

Surely there are huge data gaps which need to be addressed in a comprehensive manner. Every type of disaster irrespective of its size and magnitude in every country of South Asia should be covered in the estimation of damage and losses due to disasters. This would be attempted in the South Asia Disaster Reports of 2008 onwards.

## **Drought**

Drought is an insidious natural hazard affecting a very large part of South Asian regions. While many definitions of drought exist, the importance of drought lies in its overall social, economic and environmental impacts. With the non-structural nature of its damage and impact covering larger geographical areas, drought hits the largest number of people in South Asia. The agrarian economies of the South Asian countries are therefore more vulnerable. In fact, drought has been one of the primary reasons for widespread poverty and environmental degradation. Further, the latest IPCC report and other climate model predictions indicate that the global change is likely to increase the vulnerability of tropical countries to drought, more so in South Asia. The South Asian regions have been among the perennially drought-prone regions of the world. Afghanistan, India, Pakistan and Sri Lanka have reported droughts at least once in three years in the past five decades, while Bangladesh and Nepal also suffer from drought frequently. What is of concern is its increasing frequency. Since the mid 1990's, prolonged and widespread droughts have occurred in consecutive years in Afghanistan, India and Pakistan while the frequency of droughts has also increased in Sri Lanka, Nepal and Bangladesh. The impact of droughts is more severe on the food and agricultural sector. The loss of crops and livelihood and its effect on the agrarian economy has severe consequences on the overall well being of

the rural poor. The continued decline in productivity leads to diminished assets and reduced investments. The impact of drought has been severe in rain-fed areas with large portions of arid and semi-arid zones.

Drought, a creeping phenomenon, seldom results in structural damage, in contrast to floods and earthquakes. For these reasons, the quantification of impacts and the provision of relief are far more difficult tasks than in the case of other natural hazards. The non-structural characteristic of drought impacts has hindered the development of accurate, reliable, and timely estimates of severity and ultimately, the formulation of drought contingency plans by most of the governments. Drought has been grouped as meteorological, hydrological, agricultural, and socioeconomic). The aggregate of all these finally leads to rural poverty and food insecurity. Drought has both natural as well as social components. The risk associated with drought is a product of both the region's exposure to the event (i.e. probability of occurrence at various severity levels) and the vulnerability of society to the event. Exposure to drought varies spatially. Vulnerability is determined by social factors such as population, demographic characteristics, technology, policy, and social behaviour. These factors change over time, and thus vulnerability is likely to increase or decrease in response even if they are identical in intensity, duration, and spatial characteristics, because societal characteristics will have changed. However, much can be done to lessen societal vulnerability to drought, especially in the context of South Asia to these changes. Subsequent droughts in the same region will have different effects.

### **Gaps**

South Asia has witnessed some of the greatest famines, like the Bengal famine of the pre- Independence era. Since then, the continuing economic and social impacts of droughts have led all the affected governments to put in place effective policies. The present policies on drought management in the region have evolved over a period of time. The relief policy, broadly speaking, consisted of ad hoc measures during the initial period of drought management. A famine code was provided for taking measures when a danger of large-scale human mortality was apprehended and aimed at preventing deaths on account of calamities. Later, famine-relief codes were replaced with scarcity relief measures with emphasis on reducing human distress and misery. The public distribution system was evolved in response to the droughts of the mid-1960s for building up a reliable food supply system.

Later came the employment-generation programmes, which led to the creation of durable and productive assets.

Drought management policy seeks to provide social and economic goals and the egalitarian objective of the State. The objective was not only to prevent starvation death but also to halt physical deterioration and destitution of people and livestock. The existing drought management package consists of several programmes, which aim at mitigating the severity of drought. However, notwithstanding their welfare goals, these programmes in general suffer from poor infrastructure, technical content and low credit flow in the chronically drought prone areas. In South Asia, the practices of drought management in terms of policies, laws, use of technological inputs, etc. follow certain patterns but no universal model. In countries with a historical tradition of a highly centralized government, the drought management institutions and systems that have evolved typically are also highly centralized and dependent upon national government institutions and capabilities. In countries where there is a stronger tradition of local power, authority, and autonomy, drought management systems tend to be more locally driven, relying on support from higher levels of government.

An analysis of the policy perspectives being pursued in the region has brought the following strategies and trends into focus:

- Management of natural resources holds the key. Focus is placed on a community-centric, ecosystem-based approach of planning, implementation of plans and proactive mitigation measures, risk management, resources stewardship, environmental considerations, and public education. Integrating all these, a clear-cut national drought management policy with multi-sectoral linkages is necessary. Few countries currently have a national drought policy in place. Australia has set a good example by following such a comprehensive drought policy. China too has a drought management policy. Most of the countries in the region have a drought reduction strategy rather than a policy.
- Stronger linkages between agricultural meteorological networks and drought management functionaries on the ground are of great significance. This is essentially to aim at enhancing the effectiveness of observation networks, monitoring, prediction and information delivery, and to foster public understanding of and preparedness for drought.
- Encouraging the integration of comprehensive insurance and financial strategies into drought preparedness plans.
- Institutionalizing a safety net of emergency relief that emphasizes sound stewardship of natural resources and self-help.

- The rank of priorities should follow thus: preference of preparedness over insurance, insurance over relief, and incentives over regulation.

## **Key Objectives**

The objectives of this pre-proposal are to:

1. Develop understanding, knowledge and promote state-of-the-art technology through documentation, consultative workshops, dialogues and networking for integrated drought management.
2. Map and assess the impacts of droughts, promote adaptation of best practices, incorporate risk mitigation/reduction and develop strategies based on indigenous and scientific knowledge.
3. Initiate case studies of pilot basin/sub-basin involving local communities to serve as models.
4. Facilitate national governments incorporate assessment/findings on drought management in their national programs and policies.
5. Synthesize country findings, develop regional strategies for drought management including outputs e.g. drought declaration, monitoring framework, develop conceptual framework, regional drought center and explore possibility of establishing a regional drought management fund.

## **Activities**

- Activity-1: Review and assessment of current state of knowledge at national and regional level.
- Activity-2: Engage stakeholders through documentation, conferences, meetings, public hearings and dialogues.
- Activity-3: Mapping of key hotspots/vulnerable areas including key variables at national and regional level.
- Activity-4: Assessment of findings and incorporation of those into national policies and framework documents.
- Activity-5: Development of medium and long term strategic plans with outlines for National Action Plans
- Activity-6: Outline basis of South Asia region endowment fund to address drought.

## Activity-7: Developing conceptual framework and blueprint of a Regional Drought Management Center.

### **Implementation Plan**

Focus on achieving the desired outcomes of a solid input into national and regional capacities to manage droughts in an integrated manner with minimum delays and maximum positive impacts. A log frame will be developed that enlists the inputs, outputs, resources and outcomes in a systematic manner. The implementation plan will lay out in a logical framework what will be activities/task need to be undertaken to meet project objectives in a cost efficient and timely manner. A Gantt chart will be developed that shows use of human resources, their timing and scheduling to enable project completion on time and achievement of deliverables when they have maximum benefit. Extensive use of micro computers will be employed for monitoring and evaluation of the implementation plan.

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