REGIONAL WORKSHOP ON
SOUTH ASIA DROUGHT MONITORING SYSTEM (SADMS)

Hotel Jaypee Siddharth, New Delhi, India | 30 – 31 January 2017

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Overview

Experts from South Asian countries including Afghanistan, Bangladesh, Bhutan, India, Nepal and Sri Lanka participated in a regional workshop on January 30-31st 2017 in New Delhi, India to discuss ways of using satellite remote sensing data and ICT for drought monitoring, and develop mitigation strategies in South Asia. The workshop saw enthusiastic participation from both government and scientific organizations. The two-day workshop was inaugurated by Dr. Trilochan Mohapatra, Secretary (DARE) & Director General of ICAR, Government of India.

The SADMS tool was demonstrated at the workshop to gather crucial feedback from representatives. The outcome of a three year project, SADMS was developed by the International Water Management Institute (IWMI) supported by the World Meteorological Organization (WMO), the Global Water Partnership (GWP), CGIAR Research Program on Water, Land and Ecosystems (WLE), CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan. The tool combines multisource satellite data on vegetation combined with weather data, soil moisture condition and historical information on drought events and crop yield information to develop integrated drought severity index (IDSI). The drought indices has been validated in several states in India and Sri Lanka with the support of various stakeholders. It helps predict the severity of coming dry spells and how long they might last.

The workshop further tried to explore the possibility to making use of the SADMS at the country level facilitating drought monitoring information available in near real time. The participants discussed how SADMS could be used by the member countries for monitoring the situation, undertaking the assessment of drought risks and finally to use them in drought mitigation measures.

Participants also discussed the potential of collaborating with the government agencies and ways in which the near real time drought monitoring information provided by SADMS could be used by member countries to link to current drought management plans at different levels. Despite progress in identifying adaptation strategies, experts also highlighted the need for substantial investment to scale up such solutions. Experts agreed that priority should be given to building the capacity of South Asian nations to adapt through both regional partnerships and South-South exchanges. Innovation and technology transfer should be supported by building policy frameworks that enable technology adoption.

The workshop was jointly organized by the International Water Management Institute (IWMI), Global Water Partnership (GWP), World Meteorological Organization (WMO CGIAR Research Program on Water, Land and Ecosystems (WLE), CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Indian Agriculture Research Institute (IARI), India Water Partnership (IWP), International Commission on Irrigation & Drainage(ICID) and WAPCOS and the Ministry of Agriculture, Government of India.

Opening Session

Welcome remarks by Avinash Tyagi, Vice President, India Water Partnership (IWP) & Secretary General, ICID

Welcoming participants, Mr Avinash Tyagi highlighted that drought is an important subject which affects a number of stakeholders and various sectors impacting livelihood and human health. Giving the example of the severe drought in Maharashtra last year, which resulted in huge economic losses including cricket matches being shifted out of the state to conserve water, he pointed out the need for drought monitoring system being established in each country to help strengthen in response to future droughts and preparedness measures. He further stressed on the importance of using drought-monitoring systems in agriculture resilience.

Figure 1: Speakers at the opening ceremony. [L-R] Veena Kanduri(IWP), Avinash Tyagi(IWP & ICID), Alok Sikka(IWMI), Trilochan Mohapatra(ICAR), Ravinder Kaur(IARI) and Giriraj Amarnath(IWMI)

Remarks by Dr. Ravinder Kaur, Project Director (WTC) & School Coordinator (NRM), Indian Agricultural Research Institute (IARI)

Dr Kaur spoke about the extensive impacts of droughts and how it impacts almost 40% of the people directly. Commending the South Asia Drought Monitoring System (SADMS) developed by IWMI, She mentioned that the IARI team has been working on an India drought monitoring system in collaboration with National Disaster Management Centre (NDMC) and University of Nebraska since 2012. The IARI team has good experience in developing meteorological, hydrological, composite drought monitoring indicators. She further highlighted that there is no dearth of science and scientists, but the pertinent question that needs to be developed upon by the participants is how to bridge the gap between technical and operations.

Remarks by Dr. Alok Sikka, IWMI- India Representative

Dr Sikka began by highlighting that frequency of extreme events has increased and it is important to think about vulnerability in agriculture in South Asia. In non-monsoon season, drinking water is as important as cultivation. At the core of drought preparation is early warning and drought monitoring. Noting that drought is not a single-ministry issue and that it is not restricted to one department like water, agriculture or disaster, there is a strong need for one agency to coordinate with all the line departments. In addition, regional and country level cooperation and financial support is required. In such a scenario, it becomes important for finding ways in which different agencies like IWMI, ICAR, IMD or CRIDA could work together.

Workshop Context, Purpose and Goals by Dr Giriraj Amarnath, Sub-Theme Leader: Water-related Disaster Risk Management, IWMI

Setting the context for the workshop, Giriraj took the participants through the history of the South Asia Drought Monitoring System (SADMS), which was first started in 2004 for Southwest Asia, covering some states like Gujarat and Rajasthan. The tool has undergone multiple iterations and transformation to be in the current shape. He mentioned that the tool is at the stage where feedback and input is required to understand the gaps and make the system better. He further asked the participants to think of how to improve, customize, and integrate the platform based on global demand and technological changes including availability of new satellite sensors that are improving both the spatial resolution and data frequency to use it more operationally.

Address by the Chief Guest, Dr. Trilochan Mohapatra, Secretary DARE & Director General, ICAR

Dr Mohapatra noted that South Asia suffers routinely from drought and other extreme climatic events, which result in huge crop losses. He noted that ideas are needed to improve better agriculture resilience, develop early warning and monitoring system which is robust as climatic variations are huge and location specific. If water is going to be more limited in the future and droughts more frequent, a drought monitoring system would be even more relevant going forward. Commenting on drought monitoring system, he asked if we could demonstrate the use of technology in chronically drought-prone states. He mentioned that we should all join hand together and bring together our strengths to make an actionable plan.

Vote of Thanks, Veena Khanduri, India Water Partnership

Ms Khanduri extended the vote of thanks to all the participants and organizers of the workshop. She thanked Dr Mohapatra, Secretary (DARE) for gracing the inaugural session and delivering the keynote speech and sharing his views on how drought can affect the price commodity index and his ministry's approach on drought and new steps taken.

She conveyed gratitude to Dr Sikka for giving his views and highlighting IWMI's efforts for drought management. She thanked Dr. Ravinder Kaur, Director and Vice Chancellor, IARI, for providing a total insight on drought management in India.

Session I: Keynote Speech

Drought Early Warning and Information Systems: People, Parameters, Process and Policy, by Dr. Mark Svoboda, Director, NDMC at UNL, USA

Dr Svoboda joined the participants in Delhi over skype to make his presentation virtually. He presented work on the Drought Early Warning and Information Systems (DEWIS) and how it could be used for monitoring and forecasting to serve as a tool for decision makers. He highlighted that validation is very important for Drought Index criteria consideration. He presented the U.S. Drought Monitor and maps with high resolution grid along with example of CDI maps in North Africa validated with data mining.

Some of the questions raised by participants -

- What are hydrological drought and agricultural drought (soil moisture)?
- Stochastic model or deterministic model? Confident degree?
- How to blend the indicators?

Drought Monitoring and Management in India by Dr Ravinder Kaur, Project Director (WTC) & School Coordinator (NRM), IARI

Dr Kaur presented the work being done by Indian Agricultural Research Institute on drought mapping and monitoring. She described the activities on the drought vulnerability mapping and creation of a portal on crop condition monitoring which can be found at the IARI website (http://creams.iari.res.in/cms/). It is not labelled as a drought monitoring portal as it is in the developmental stage. As far as crop and condition monitoring is concerned, it has proved to be valuable in the last two years. She explained efforts of the IARI team in Drought monitoring Index development, which is trying to also integrate early warning systems. She further highlighted how mitigation strategies was developed along with contingency plan in different districts.

Mainstreaming Climate Resilience into Sub- national Planning for Drought Proofing South Asia by Dr. Anil Kumar Gupta, Head, Division of Policy Planning, NIDM, India

Dr Gupta started with the fact that despite technological advances and better understanding, the impact of drought clearly highlight the need for how the lessons learnt from case studies across the world should be integrated in the development process. He presented how one of the NIDM's focus is trying to reduce disaster risks by building resilience. From initially being mitigation centric, the focus shifted to social aspects of disaster resilience. We now have three major global agenda – Sendai framework for DRR, Paris agreement and new set of SDGs. He raised the question on the importance of early warning, how much in advance do we need to have information to initiate counter actions. Giving the example of infrastructure, he said that there isn't going to be much we can do in a short time. Hence, sustainability and climate resilience needs to be built in all systems including agricultural systems. He stressed on developing a mechanism or plan at a national level to deal with El Niño conditions.

Increasing resilience of agricultural systems by Mr Ian Makin, Director (Asia) and Lead Specialist (Irrigation)

Presented challenges the world is facing globally and how farmers and rural communities need to become more resilient to a wide range of pressures – climate change, economic shifts, rural-urban migration; changing dietary choices; aging and feminizing farmers. Ian presented IWMI's work in the region from solar irrigation, waste reuse to natural capital in Ethiopia. He highlighted the convergence of opportunities for driving sustainability from conducive operative context (SDGs, private sector), opportunities for innovation (big data, renewables) to growing knowledge base and initiatives along with a range of technologies at our disposal today.

Comments from the Session chairs

- We cannot stop disaster but reduce its impact
  - Sri Lanka had critical drought and we can mitigate the impact using the methods discussed in the session
- Does early warning system work for cyclones?
  - Drought is different from flood, but small innovation can contribute both

Session II: Status of SADMS and way forward

Presentation by Dr Giriraj Amarnath, Sub-Theme Leader: Water-related Disaster Risk Management, IWMI

Giriraj stared with the overview of the South Asia Drought Monitoring System (SADMS) with the products and outcomes. He demonstrated the tool by showing maps generated and the portal webpage (http://dms.iwmi.org/). He discussed the method of developing Integrated Drought Severity Index (IDSI), the various classification of IDSI and how it has been validated through field surveys in India and Sri Lanka in collaboration with academic institutes and government agencies. Giriraj highlighted new approached like SWADI, SADEWS and soil moisture sensor are being combined with existing methods to bring out a more robust products that are relevant to stakeholders.

Some of the questions raised include:

- Example of helping planning to land use? – [Reply] DMC and Ministry of Agriculture could be users. There is example in Maharashtra.
- Is ground observation combined to SADMS?
- There are questions related to spatial and temporal resolution.
- Future prediction with global climate forecasting?

Session III: Operationalization of DMS: Example and Capacity in the countries of the region

"Functionalization of South Asia Drought Monitoring System (SADMS) in Bangladesh" - Country Presentation by Engr Md. Waji Ullah

Engr Ullah started by giving a background of drought and its impact on Bangladesh especially the Northwest region which is affected every year. He spoke about the monitoring and mitigation initiatives including capacity building activities. According to Engr. Ullah, the potential stakeholders of SADMS would only increase ranging from agricultural, meteorological, water-environmental and other organizations. He highlighted some points to consider for implementation such as simpler input, verification and SADEWS.

As a way forward, he suggested linking SADMS to existing management practices, using mobile apps and hot-spot identification in an effort to appeal to various stakeholders.

"Agricultural drought monitoring in India", Country Presentations by Dr Shibendu S. Ray, Crop Forecast Centre, Dept of Agri& Coop., Ministry of Agriculture & Family Welfare, GoI

Dr SS Ray spoke about the drought occurrence frequency in India. He described the structure of the government and agencies which take care of drought. He mentioned that drought manual for India has been recently revised and contains parameters of drought declaration which include (Cause) Rainfall, dry spell; (Impact) NDVI/NDWI, other indicators; and Verification. He also described National agricultural drought assessment and monitoring system (NADAMS). He highlighted that district wise monthly information available online. He pointed out there is a needs to be thought through like monitoring at dis-aggregated level, early warning, composite indicator, vulnerability assessment, Rabi season assessment, Climate Change impact assessment.

Sri Lanka Country Presentation by Dr. S Amalanthan, Addl. Secretary, MoDM, Government of Sri Lanka

Dr Amalanthan presented the overview of agriculture, Climate Change and drought situation in Sri Lanka. He spoke about methods of weather monitoring and forecasting in Sri Lanka. He pointed out to information quality and farmers' need for data as challenges to be addressed. He proposed that the drought monitoring system be used in Sri Lanka's context.

Comments by the Chairman

Commending the presenters, the chairman remarked that countries in South Asia are in different stages of operationalizing of Drought Management System. India is in a more advanced stage while other countries are trying to catch up. He suggested using some of the manuals, documents produced by India and readily available on web. He further requested Indian participants to help share. The chairman spoke of the scenario in Nepal. The massive earthquake disaster in 2015, saw a casualty of more than 9,000 people with over 30,000 getting injured. More than 300,000 houses collapsed and poeple haven't fully recovered from that. He pointed out that after earthquake many irrigation system collapsed and farmers were unable to rebuild the system quickly. That very year, kharif crop was substantially reduced locally where drought was felt. He highlighted that they could not concentrate on drought management system in the country due to the earthquake. He further suggested that progress made in India could serve as an example for Nepal.

"South Asia Drought Monitoring System (SADMS) Framework, development and application", Demonstration of SADMS with two case studies by Peejush Pani and Shuhei Yoshimoto, IWMI

Peejush Pani presented the operational process of drought mapping and demonstrated the functioning of SADMS tool to the participants. Two case studies were also presented to evaluate drought events. Some of the questions and comments during the presentation are as follows -

- Evapotranspiration T is important. Is it considered in the tool? – [Answer] Yes, it is included.
- Suggestion: We should use bias-corrected dataset.
- Is it applicable for Double cropping? – [Answer] Double and triple crop. Currently we use uniform.
- How is VCI/NDVI this year? Is the same crop sown at the same time? –Harvest has not yet taken place because of delay of rainfall.

- Is the western part of India this masked? – [Answer] We have considered using publicly available datasets from NASA and NRSC images to improve the agricultural extent. In some cases, NRSC provide less agricultural areas.

Day 2: Regional Workshop on South Asia Drought Monitoring System (SADMS)

Review of the First Day Workshop by Dr Giriraj Amarnath, IWMI

Dr Amarnath summarized the discussions of Day 1 and highlighted the importance of research institutions like IWMI, ICAR and others to work closely with governments and development partners to help scale up the SADMS tool. He also stressed that forecasting will play more important role than today. Dr Amarnath thanked participants for their helpful comments and questions during the SADMS demo. He explained that long term historical data needed for VCI & NDVI for better interpretation and drought zonation. He further raised the question of how SADMS could help local planning through district-level evaluation.

Session-IV: Group Discussion: Way forward and implementation of SADMS

The participants were divided into three groups and asked to discuss the challenges and how they envision way forward for SADMS. Dr Giriraj who was the facilitator asked the participants to customize solutions for country-specific issues. The three groups were give a topic for discussion, group 1 discussed utility of SADMS and explored broader application in drought preparedness and mitigation measures. Group 2 discussed the various coordination mechanism on SADMS and group 3 discussed capacity building and outreach opportunities for the uptake of the tool. The broad framework for discussions can be found in *Annexure -2*. The feedback from each group is as follows –

- Group 1: **Utility of SADMS and explore broader application in drought preparedness and mitigation measures**
  - Primary focuses of SADMS is on agriculture can also be on water, power and forest.
  - The basic framework is currently designed for government and high-level decision makers, but we need to consider how to make the process executable and usable for farmers.
  - SADMS needs to further consider the complexity and coordination required among multiple agencies such as decision makers and markets. Different models and extensions for them would be required.
  - There has been a lot of supplemental information about weather changes. Early warning, operationalization, updating, grounded process, capacity building, development plans and others seems required.
- Group 2: **Coordination Mechanism on SADMS**
  - Open software such as QGIS should be utilized for planning instead of ArcGIS. Compatibility is necessary to be checked.
  - Hardcopies in local language and mobile apps could enable to directly transmit to farmers and downscale to local level.
  - We should crosscheck and receive feedback, with WMO, CG centers, scientific organizations, universities such as IIT and downscaled GCM products. Coordination with different agencies would be helpful.

- Regional impacts need to be used to calibrate the protocol.

- Group 3: **Capacity Building and Outreach**
  - Stakeholder mapping exercise-

    Organizations which are working directly or indirectly on various components of drought management need to be identified in the respective countries
  - Assessment of the capacities and strengths of the organizations identified
  - Capacity building through training modules for different levels of stakeholders is required. Communication material needs to be designed for various user groups

    Module 1-
    - Demos in respective countries
    - Audience- senior level scientists/implementers
    - Frequency of training sessions- 1-2 per year

    Module 2-
    - Customization of SADMS based on requirement of the respective countries
    - Audience- senior level scientists
    - Requires collaboration and coordination with the nodal agencies

    Module 3-
    - Output generation
    - Dissemination of information and sharing of resources

    Module 4-
    - More rigorous trainings at state and other lower stakeholder levels
    - Audience- Various line departments
    - The module will seek two way flow of knowledge and information
  - All these training modules require integration of case studies to build or enhance confidence and capabilities of researchers, academicians, implementers, policy makers and other stakeholders in GIS and RS.
  - At international level, for constant improvement and better coordination, a nodal agency needs to be identified which can act as a coordinating agency.

- Summation by the Facilitator, Dr Giriraj Amarnath
  - How to map the stakeholders is important.
  - Technology and governance in each department might be limited and there are geopolitical issues to be considered. We have to respect the centers in each country. We work with WMO, but requires substantial efforts from WMO and country level meteorological agencies for developing mid and long-term strategy on drought risk reduction measures.

- Comments:

  We discussed only mechanism and protocol at political level, not capability – [Reply] As a focal point, we deal with national centers such as DMC in Bangladesh, and work with scientific agencies. They give the information and workshops. There is an example in Sri Lanka; Foreign

Ministry has been briefed on the topic of SADMS to aid their understanding of the system. In addition, SADMS is the flagship product, and requires commitment from governments, donors to achieve in developing better knowledge platform in addressing all stages of the drought cycle (drought early warning, preparedness, response, mitigation and planning).

Session V: Breakout Groups to develop a project outline for fund raising

- Summation by Dr Giriraj Amarnath:
  - SADMS application can be relevant to Africa and experience of technologies in South Asia can be utilized
  - There is still requirement for ensuring long-term sustainability, so we need to explore further collaborations.
  - We need to understand that drought affects all sectors. Water shortage is felt not only on irrigation water supplies, but also for drinking water, animals, fish, and all others consumption. Water released from tanks for crops also needs water. If calculation went wrong, crops would not be able to stand and farmers would complain. We have seen examples where reservoir water shortage have caused power cut. Cricket stadium have closed because of drought in Maharashtra. Water is needed in all segments.
  - Not everything is about funding. We discussed in the previous sessions. Experience around SADMS is increasing.
- Comments from participants:
  - *Participant from India*: Finding funding for technology development is a basic problem which the CGIAR group faces. We need to bring SAARC or any other agency who can market the fund. Find a nodal agency is important for the South Asia region along with developing linkages. Senior experts who are attached with the government and donor organizations could play a key role in supporting the regional drought resilience initiative. The team should develop a small presentation like business model, which is useful for users and elaborates on how to collaborate with local agencies.

- Project like SADMS is important to the region, and stakeholder mapping is required. In addition, efficiency is also important. Innovative projects are required for sustainability modelling. Drought indices, capacity building and SADMS itself are our products. For example, NASA publishes images for flooding in Himalayas, but customization is not available in the global products. We need regional customization. Innovation is such that the information reaches the farmers for better planning. It can be funded by all countries and agencies such as ADB. There is limitation, but we should explore.
- We need to know how the end users feels about the application and its usefulness. There are a lot of funding programs, but does this have productive outputs for the sustainability? We have to understand that the overall CG fund is reducing. We need to understand how the global funding mechanism works. Collaborating with international agencies and nurturing the networks is required.
- In Afghanistan, we follow the partnership model. Drought is also present but we have another name for it - dry spell. We use the term drought but its definition is different when compared with the definition of other countries.
- We need to make it easy for governmental agencies to use SADMS, such as Meteorological Agency. Regional application to agriculture and building capacity is important. In the US, Meteorological Agency provided programs and tools, and then colleagues went out of the country. Their capacity is limited. For SADMS sustainability, it is not only about funding requirement but robust setup and provide capacity building to users in this region. The important thing is developing a product and building capacity of users such as government and farmer to its utility. We focus to agriculture and we cannot do everything. Balancing across sectors is needed.
- Drought situation is important and no single agency can handle the task alone. There is a larger program opportunity for SADMS. Global Framework for Climate Services (GFCS) doesn't have much funding, but we can take a part through conferences etc. World

Bank is investing in India for disaster risk reduction and related agriculture management activity and including the capacity development of the South Asian region.

- Participant from Nepal: How can staff skills be retained? About 25 percent experts shift out frequently due to career advancement moves or other reasons. That is a problem.
- Giriraj's comment: These are important inputs from various organizations. If one considers South Asia, the stakeholders need capacity development. Smart people move on, that is a problem; they have reasons ranging from career, income, marriage, life, salary, and so on. However, a curriculum model of capacity development is more important.
- Participant from Sri Lanka: There have been lots of floods in the country, so we monitor it. We have opportunities to survey VCI, and there is a separate proposal for soil moisture mapping. Sri Lanka is implementing many projects with World Bank and JICA. A project for climate resilience in Kurunegala is ongoing. Another project is to involve private sectors for building resilience, support and mitigation measures with DMC. In addition, Irrigation Department has projects on basin studies and flood management. We can try drought monitoring by linking up with opportunities like the ones mentioned.
- Comments from Giriraj: If possible, we can collaborate. We have other soil-moisture initiative. If we have decision, irrigation strategies, allocation and management of tanks, cultivation and water balance changes and the information could be used to quickly for appropriate policy direction.
- Participant from Bhutan: We are a water-rich country. Mitigation of drought risks in small pockets and desertification is an issue, but not a big issue, because plantations and forest covers dominate the landscape.
- Participant from Maldives: We don't face drought but water related issues all year-round. In the dry season of 2015-16, shortage of drinking water occurred in almost 50% of the islands. Sea water was desalinated and transported to islands. Same as Bhutan, SADMS should figure out international collaboration.
- Participant from Afghanistan: Thousands of people are moving affected by droughts and floods, in turn increasing insecurities. Early monitoring of drought is the main issue. There are some funding programs from agencies (WB, FAO) but we develop proposal to support SADMS. Issues are due to lack of coordination between ministries and the programs.
- Add more collaborators names with the product and cite SADMS as joint initiative in the website. For marketing the product, it would be good to have multiple agencies, for example- US DMS. Having ownership would help in increasing visibility.
- Product should be pushed at the state level as it's the state which declares drought rather than the center. States governments have funds available at their level. This is something which should be taken into consideration.

- Comments from Giriraj:
  - Usability of the data is limited, but possibility to explore with insurance industry in drought risk data for agricultural insurance application. Collaboration, networking, involving and benchmark bring SADMS to the next milestone.

Annexure 1: Concept Note and Agenda

REGIONAL WORKSHOP ON

SOUTH ASIA DROUGHT MONITORING SYSTEM (SADMS)

Venue: Hotel Jaypee Siddharth, New Delhi, India

30 – 31 January 2017

CONCEPT NOTE

Background

It is recognised that the drought risk can be reduced by reducing vulnerability or taking preventive measures at the local level. It is the responsibility of the local agencies to draw drought preparedness and risk mitigation plans. The local authorities design their preparedness plans based on the present drought situation and the forecast, based on the socio-economic impact of the creeping drought calculated through the well-established warning systems based on various drought indices.

Given the fact that drought is a meteorological phenomenon that knows no political boundaries, it can be monitored in a meteorologically homogenous area. Considering the fact that South Asian weather is strongly influenced by the South Asian Monsoon, International Water Management Institute (IWMI), World Meteorological Organisation (WMO) and Global Water Partnership (GWP) agreed to develop a South Asia Drought Monitoring Systems (SADMS) as a joint undertaking of IWMI, GWP South Asia (GWP SAS), the WMO/GWP Integrated Drought Management Programme (IDMP) and the CGIAR Research Program on CCAFS and WLE and MAFF (Japan).

IWMI has now developed an interactive SADMS portal that allows data sharing and viewing of all available drought and related maps for the entire region at http://dms.iwmi.org/. The current stage of SADMS requires additional efforts for further improvement both from the drought characterisation in different climatic zones and coordination with national agencies.

GWP SAS supported the strategic development of the work with a Needs Assessment for a SADMS held in 2014, by collecting feedback from users in discussions at the 5th South Asian Climate Outlook Forum (SASCOF-5) Climate Service User Forum on Water (CSUF - Water) in Pune in 2014 and at the workshop on SADMS held back to back with SASCOF-6 in Dhaka, 2015. During the GWP SAS 22nd Regional Council meeting it was decided to organise a workshop to explore the potential of partnering with the government agencies to utilise SADMS for preparing drought management plans and developing drought risk reduction measures.

The workshop is jointly organised by IWMI, GWP, WMO, CGIAR CCAFS and WLE, MAFF, ICAR, IARI, IWP, ICID and WAPCOS.

Objective and Scope of the Workshop

Objective

The overall objective of the workshop is to explore the possibility to make use of SADMS at the country level in South Asia facilitating drought monitoring information available in near real time and can be used by the member countries for monitoring the situation, undertaking the assessment of drought risks and finally to use them in drought mitigation measures.

- To explore the current state of SADMS and its capability in drought monitoring
- How to link the DMS to current drought management plans at country level and how the knowledge products can be explored on its usability in various thematic applications
- Drought preparedness from SADMS and climate change resilience in South Asia: applying an integrated approach to design, monitor and evaluate institutional change.

Workshop participants will focus their discussions on:

- What can be done with the present SADMS;
- What are the opportunities and challenges to improve SADMS;
- How to link drought monitoring to current drought contingency management plan;
- Way forward including activities and funding of these activities, hosting of SADMS at the regional level in the medium and long term;

Scope

The Scope of the workshop is proposed as follows:

1. Understand the present SADMS platform developed by IWMI
    a. Its objectives and sustainability;
    b. Mechanism for ensuring flow of the Input Data from various sources, and availability for pre-processing;

   c. How historical and current drought information can be accessed by member countries;
   d. Requirements (technical) for processing and developing the various indices on a continuous basis.
2. Understand the SADMS products and possible outputs
   a. How the products provide advanced drought monitoring and assessment information for various purposes;
   b. What temporal resolution are presently used and how these products could be developed at higher resolution, if required; and
   c. How these products could be adapted and used by various stakeholders.
3. What capacity development (institutional as well as technical) actions are required to be undertaken at the regional level or by the member countries:
   a. Coordination mechanism for setting up national DMS in the lines of SADMS
   b. Hardware, software and personnel requirements
   c. Recommended cooperation mechanism with agencies for setting up socio-economic drought vulnerability products and
   d. State/National capacity in drought monitoring built in all participating agencies to address the gaps in Drought Risk Reduction.
4. Identify the existing capacity of the countries in the region to operationalise the SADMS, the challenges they face and the demand for SADMS in their own countries.
5. Seeking for tri-partied agreements to ensure the sustainability of the product. This includes application products, fund raising, proposal development, hosting the SADMS at the regional level in the medium and long term and wider communication outreach etc.

Participants

At this workshop, it is aimed to provide a platform for enhanced interaction between water and the climate community within South Asia region with the objective of making best use of the SADMS. Participants from key agencies (Depts. of meteorology, agriculture/irrigation, and disaster management) will be invited for the workshop. Invitations will be extended further to IWMI, WMO, GWP (Global Secretariat and GWP South Asia), ICID and the CGIAR Research Program of CCAFS and WLE.

Workshop Outcome:

The SADMS will be assessed by the practitioners. Discussions will be conducted on present challenges and way forward including capacity building, internalisation of the system, fund raising and development of a road map by covering these aspects.

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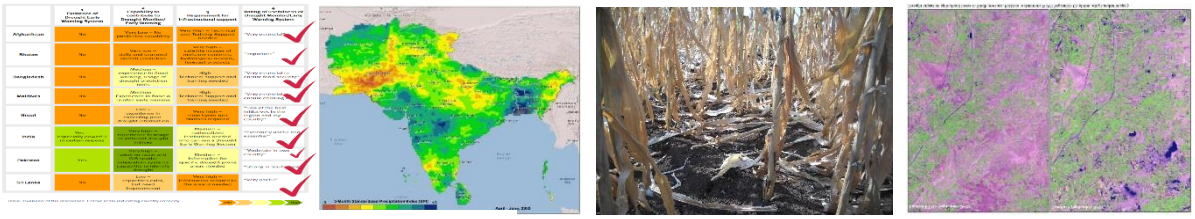
SOUTH ASIA DROUGHT MONITORING SYSTEM (SADMS)



New Delhi, India – 30-31 January 2017

TENTATIVE AGENDA

Monday, 30 January 2017

09.00 – 09:15	**Registration**	
09:15 – 10:15	**Opening Ceremony**	
	Welcome remarks by IWP Chair Remarks by IARI Remarks by IWMI Workshop Context, Purpose and Goals Address by Chief Guest DG, ICAR Vote of Thanks by Executive Secretary of IWP	R K Gupta Ravinder Kaur Alok Sikka Giriraj Amarnath Trilochan Mohapatra Veena Khanduri
10:15 – 10:45	**Group photo/Morning Tea**	
10:45 - 12.00	**Session I: Keynote Speech** Drought Early Warning and Information Systems: People, Parameters, Process and Policy Drought monitoring and Management in India Mainstreaming Climate Resilience into Sub-national Planning for Drought Proofing South Asia	**Chair(s):** S. Amalanthan, Addl. Secretary, MoDM, SL and Azharul Haq, President, BWP Mark Svoboda, Director, NDMC at UNL, USA (via skype) Ravinder Kaur, Director (Officiating), IARI Anil Kumar Gupta, Head, Division of Policy Planning, NIDM, India

	Increasing resilience of agricultural systems	Ian Makin, Director (Asia) and Lead Specialist (Irrigation)
12:00 – 13:30	**Session II: Status of SADMS and way forward** 1. Introduction & Status of SADMS by IWMI 2. SADMS Products and outcomes 3. Capacity building requirements 4. Data Sharing 5. Internalisation of SADMS	Giriraj Amarnath, Sub-Theme Leader: Water-related Disaster Risk Management, IWMI
13:30 – 14:30	**Lunch**	
14:30 – 15:30	**Session III: Operationalisation of DMS: Example and Capacity in the countries of the region** 1. Afghanistan Country Presentation 2. Bangladesh Country Presentation 3. India Country Presentations 4. Sri Lanka Country Presentation	**Chair(s)**: Avinash Tyagi, DG, ICID and Som Nath Poudel, NWP (Each presentation 10 minutes + 5 minutes discussion)
15:30 – 16:00	**Tea break**	
16:00 – 18:00	**Demonstration of SADMS with two case studies for participants to evaluate drought events**	IWMI

Tuesday, 31 January 2017

09.30	**Review of the First Day Workshop**	Giriraj Amarnath, IWMI
09:45 – 11:00	**Session IV: Interactive Session** Group Discussion: Way forward and implementation of SADMS	
	Tea Break	
11:00 – 12:30	**Session V: Breakout Groups to develop a project outline for fund raising** (Participants will be divided into two groups - develop a project outline. Brief framework will be developed)	
12.30 – 12:45	Closing remarks	
13:00	**Lunch**	

Annexure 2: Framework for Session IV and Session V

Group Discussion: Way forward and Implementation of SADMS 31 January 2017

A. Utility of SADMS and explore broader in application in drought preparedness and mitigation measures?
    - How effectively the drought information products generated from remote sensing data being used during drought and preparedness measures?
        - Product customization (report, bulletin, stats) Country specific, spatial (district to taluk/GN) and temporal scale (daily, weekly, monthly,)
    - How to ensure the output from SADMS reach decision makers of member countries during drought situation?
    - Explore the potential application of SAMDS an integral part of the overall drought management efforts?
    - Explore the opportunities of drought index insurance in your country and how SADMS can contribute by providing the timely, consistent status of crop growth to both government and insurance industry?

B. Coordination mechanism on SADMS
    - What are the gaps in hardware and software requirements among stakeholders for wider applicability and scaling up? If so, what role required ensuring timely information reaches relevant Authority?
    - How best it can addressed with the help of other member countries or regional/international agencies in south Asia?
    - Will a coordination committee represented by multi-lateral agencies and stakeholders like national disaster management departments from member countries ensure sharing of information and resources from SADMS?
    - Data sharing can improve and strengthen SADMS? Can list the details?

C. Capacity building and Outreach
    - What are the existing capacity among stakeholders to use systems like SADMS?
    - Who are the key stakeholders within member nations this training should Target
    - What are the modes and frequency of training required by the respective member nations?
    - Does the stakeholder possess required hardware and commercial software systems used to implement SADMS?
    - How the SADMS Training across member countries can be coordinated to ensure maximum impact and outreach?
    - Can we pilot SADMS (cash studies) with range of stakeholders in member countries for wider acceptability to strengthen coordination mechanism?

Pointers for session v: Breakout groups to develop a project outline interactive session

A. Explore Future funding opportunities and issues around sustainability?

- What are the potential source of funding to sustain and improve SADMS in the long term?
- What funding role respective member governments can play to ensure SADMS provides timely Information on drought forecast and monitoring?
- Can the operational cost to implement and sustain SADMS Be borne by multi-lateral agencies in short –term? If so who are the relevant agencies to approach for the same?
- Discuss the feasibility of Including SADMS operational cost within the respective member countries disaster management department funding sources?
- Opportunities to strengthen regional funding programme e.g. World Bank, DFID, USAID?

B. Development of brief framework

- Based on the need for potential improvements, discuss and list additional components needed to SADMS in national and regional context?
- Develop a brief project framework to further improvements in SADMS
- Discuss and detail a communication strategy to enable maximum outreach and increased utilization of SADMS

Annexure 3: SADMS Press Release

PRESS RELEASE

Satellite based early-warning system to bolster drought risk reduction

Experts meet in Delhi to discuss how South Asian countries could adopt the new drought monitoring system to better prepare and mitigate drought risks

(Delhi, January 30): The South Asia Drought Monitoring System (SADMS) and its newly launched online portal was demonstrated at a regional workshop held in New Delhi today. The SADMS expected to provide near-real information of drought onset and progression helping decision makers respond in time. The interactive SADMS online portal, http://dms.iwmi.org/, would help in data sharing and viewing of all available drought and related maps for the entire region instantly.

Speaking at the event, Dr. Trilochan Mohapatra, Secretary (DARE) & Director General of ICAR, Government of India said, "South Asia routinely suffers from drought and it's severe impact on agriculture production and livelihoods. Early warning and monitoring system are important but at the same time need to be robust as climatic variation is huge and location specific. If water is going to be more limited in the future and droughts more frequent, a drought monitoring system would be even more relevant going forward."

Experts from South Asian countries including Afghanistan, Bangladesh, Bhutan, India, Nepal and Sri Lanka participated in the workshop and discussed ways of using satellite remote sensing data and ICT for drought monitoring, and develop mitigation strategies in South Asia. "Droughts have the ability to adversely affect the economic well-being of a region. However, the risk posed by it could be reduced by taking preventive action in time. The SADMS is a comprehensive early-warning drought monitoring system to provide information in easy-to-understand maps, which pinpoint locations under distress and provide regional to district scale information about drought's effect on agriculture. The online portal would further help us make valuable information available to larger audience in a timely manner. We welcome feedback and opinion on how to co-develop and strengthen the SADMS". Said Dr Giriraj Amarnath, Project Lead and Sub-Theme Leader: Water-related Disaster Risk Management (WDRM) at IWMI.

Over one billion people of South Asia (SA), dependent on agriculture related livelihoods and predominantly poor, are highly vulnerable to drought. In 2016, South Asia reeled from one of the worst droughts in decades with severe water shortages and crop losses. In recent years South Asian countries have been suffering from increasing droughts as a consequence of delays and changing patterns of monsoon rainfall. Over 300 million people were affected in India alone due to two weak monsoons. "With increased incidence of extreme climatic events like droughts, it is important we safeguard and better plan our limited water resources in an already water-scarce South-Asian region. Remote sensing and other advances in technology can be used to help forecast and prepare for such climatic shocks." Said Dr Alok Sikka, IWMI-India Representative at New Delhi.

The outcome of a three year project, the SADMS tool was developed by the International Water Management Institute (IWMI) supported by the World Meteorological Organization (WMO), the Global Water Partnership (GWP), CGIAR Research Program on Water, Land and Ecosystems (WLE), CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan. The tool combines satellite images of vegetation with weather data, soil moisture levels and crop yield information. It helps predict the severity of coming dry spells and how long they might last.

"The SADMS has already been put to the test. This year, IWMI has collaborated with the Government of Sri Lanka to regularly provide maps with 16-day advance drought forecast information. Last year the system was used to generate maps for monitoring the drought situation in Maharashtra, in India," said Dr Giriraj.

The workshop provided a platform not only to demonstrate the SADMS tool but also to gather crucial feedback from representatives on how the SADMS could be utilized for preparing drought management plans and developing drought risk reduction measures. Participants also discussed the potential of collaborating with the government agencies and ways in which the near real time drought monitoring information provided by SADMS could be used by member countries to link to current drought management plans at different levels.

Despite progress in identifying adaptation strategies, experts also highlighted the need for substantial investment to scale up such solutions. "To increase the resilience of countries, it is important to review institutional arrangements and the physical infrastructure of different agencies to deal with extreme incidents. Climate funds also need to be mobilized to help smallholders cope with global warming and keep food on the world's table", added Dr Giriraj at the workshop. Experts agreed that priority should be given to building the capacity of South Asian nations to adapt through both regional partnerships and South-South exchanges. Innovation and technology transfer should be supported by building policy frameworks that enable technology adoption.

Press release link - http://www.iwmi.cgiar.org/2017/01/press-release-satellite-based-early-warning-system-to-bolster-drought-risk-reduction/

Annexure 4: List of Participants

No.	Country	Name of the Nominee	Designation	Institute & Address	Tel/Fax/Mobile
1	Afghanistan	Mr Mohammad Waheed Ibrahimzada	Environmental and Climate Change Specialist	Afghanistan Rural Enterprise Development Program (AREDP) Ministry of Rural Rehabilitation and Development (MRRD) Darulaman, Nila Bagh Street, MRRD Compound, Kabul, Afghanistan	Mobile: + 93 (0) 700 275 989 + 93 (0) 776 819 993 Email: waheed.ibrahimzada@mrrd.gov.af ibrahimzada@gmail.com Skype ID: ibrahimzada1
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5	Bangladesh	Mr Motaleb Hossain Sarker	Director	Ecology, Forestry and Biodiversity Division Center for Environmental and Geographic Information Services (CEGIS) House # 06, Road No 23/C, Dhaka 1212 Bangladesh	
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45	India	Dr. Aman Sharma	General Secretary	India Water Partnership & Executive Director, Ganga Rejuvenation, WAPCOS Ltd.	No details
46	India	Ms. Pooja Kapoor	Regional Council Member	GWP-South Asia & Head, Centre for Business Development, WAPCOS Ltd.	kd@wapcosindia.com 011-23326646
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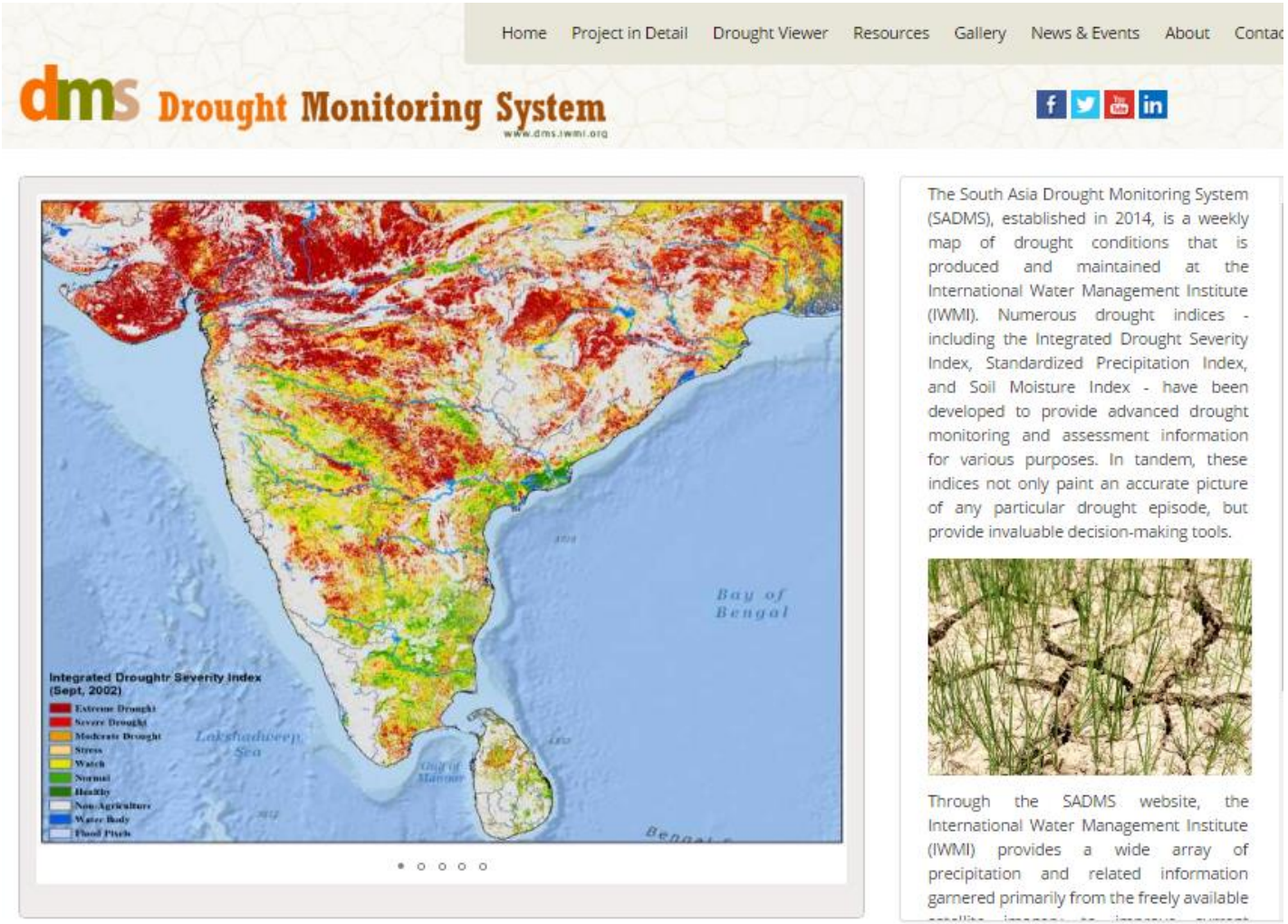

For more information on IWMI's work on Drought Monitor, please visit **http://dms.iwmi.org/**, or contact Dr. Giriraj Amarnath, Research Group Leader: Water Risks and Disasters, at a.giriraj@cgiar.org or Nitasha Nair, Senior Communications Officer, at n.nair@cgiar.org

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