

Report
On
Knowledge Exchange Workshop on South Asia Drought Monitoring System
(SADMS) in the Drought Prone Areas of Bangladesh

Venue: Rigs Inn, Gulshan-I, Dhaka 1212

Date: 13 December 2018



1.1 Introduction

Climate change effect on changing of hydrological conditions and agricultural practices in Bangladesh have gradually converted it into a drought prone country. Especially the water shortage during the dry period is adversely affecting the agricultural, social and economic development of Bangladesh. The growing imbalance between water demand and supply in this period is expected to deteriorate further. Trends become visible of both reducing water availability and increasing demand, while many water "users" are becoming more sensitive to water shortage conditions (e.g., widely cultivated HYV crops, which are generally more sensitive to water shortage). However, the water stress condition in the soil impact on the crop very quickly and consequences results is yield reduction. Water stress condition denoted the drought, which impacted environment, agriculture and livelihood. So far, Bangladesh faces three categories of droughts are (i) meteorological drought, (ii) hydrological drought, and (iii) agricultural drought.

Drought is not the problem of only Bangladesh, other South Asian Countries as well as India, Pakistan, Sri Lanka etc. are also facing challenges. The drought modeling has become important issue to solve the drought related problems. The climate change issues are also aggravated the drought severity problems in South Asian Countries. The agricultural drought is highly sensitive with the food security because the growing population in the sub-continent and South Asian countries. So, customized drought model and its application to assess the drought severity of the region as holistic approaches would be benefited to scientists, engineers, decision makers and planners for proper mitigation measures.

Recently, IWMI/GWP has developed South Asian Drought Monitoring System (SADMDS) to monitor the drought severity monthly and fortnightly and event daily. Further, SADMS model has the options for drought severity index calculation using the outputs from satellite images. Following-up of the Delhi Workshop, BWP organized **"Knowledge Exchange Workshop on South Asia Drought Monitoring System (SADMS) in the Drought Prone Areas of Bangladesh"** on 13 December 2019 at Hotel Rigs Inn, Gulshan-1, Dhaka, Bangladesh with technical assistance from Center for Environmental and Geographic Information Services (CEGIS). The workshop is aimed to disseminate the benefit of SADMS for further implementation of it is at drought prone areas of Bangladesh.

1.2 Preview of SADMS Model

SADMS is developed under the partnership with WMO, GWP and GWP South Asia, and Governments in South Asian Countries. The main goal of the SADMS is to build climate resilience, reduce economic and social losses, and alleviate poverty in drought-affected regions in South Asia through an integrated approach to drought management. SADMS Integrates remote sensing and ground truth data (vegetation indices, rainfall data, soil information, hydrological data). Another objective of the SADMS is to supports regionally coordinated drought mitigation efforts that can be further tailored to national level. The major indicator or indices used in SADMS are (i) Vegetation Condition Index (VCI), (ii) Temperature Condition Index (TCI), (iii) Precipitation Condition Index (PCI) etc. Based on these indices the IDSI – Integrated Drought Severity index can be calculated for selected crops.

1.3 Objective of the Workshop

The main objective of this Knowledge Sharing workshop was to exchange the knowledge on drought monitoring using SADMS and determine the road map for operationalization of SADMS in different drought prone regions of Bangladesh. However, the specific objectives of the workshop were:

- Exchange the drought related innovative activities taken by different stakeholder organizations of Bangladesh
- Explore and discuss the present and past drought management initiatives by the different
- Disseminate the concept and understanding of SADMS including potential application in Bangladesh to the relevant stakeholders
- Explore the SADMS with respect to
 - Model domain
 - Software platform and system requirement
 - Identification and generation of Input Data/Parameters
- Informing the workshop participant about the application of **Remote Sensing and GIS** in SADMS
- Determine road map for operationalization of SADMS in different drought prone regions of Bangladesh
- Identification of ways and process for full scale Implementation of SADMS in Bangladesh

1.4 Identification stakeholders

The workshop was indent to identify the relevant stakeholders for future implementation of SADMS, which focus on both the meteorological and agricultural drought. The workshop discussion was focused the SADMS model that can be used by researchers, scientists, planners as well as decision makers in the field of water, meteorology, agriculture and other crosscutting issues. Thus, the major stakeholders will be participants from relevant ministries, academic institutes, BARI, BRRI, BADC, BMDA, BMD, DAE, DOE, SRDI, Universities and other relevant organizations etc.

1.5 Participants of the workshop

About 60 participants from more 30 organization were presented in the Knowledge exchange Workshop from different Government and Non-government organizations, Institutions, NGOs and private sectors including Local Government Engineering Department (LGED), Bangladesh Agricultural Research Institute (BARI), Bangladesh Rice Research Institute (BRRI), Department of Environment, Department of Agricultural Extension, Soil Resource Development Institute (SRDI), Bangladesh Water Partnership (BWP), Space Research and Remote Sensing Organization (SPARRSO), Bangladesh Institute of Nuclear Agriculture (BINA), Institute of Water Modeling (IWM), Food and Agriculture Organization (FAO), Water Resources Planning Organization (WARPO), Thengamara Mohila Sabuj Sangha (TMSS), Sher-e-Bangla Agricultural University (SAU) etc. The detail list of participants of the workshop were presented in **Appendix-1**.

1.6 Approach, Venue and Programme Schedule of the Regional Workshop

1.6.1 Approach

The Knowledge Sharing Workshop conducted with number of presentation, key stakeholders experience sharing on drought management, open discussions and rapport building including identification of way forward for road map. The approaches of the workshop was presented in Figure 1.

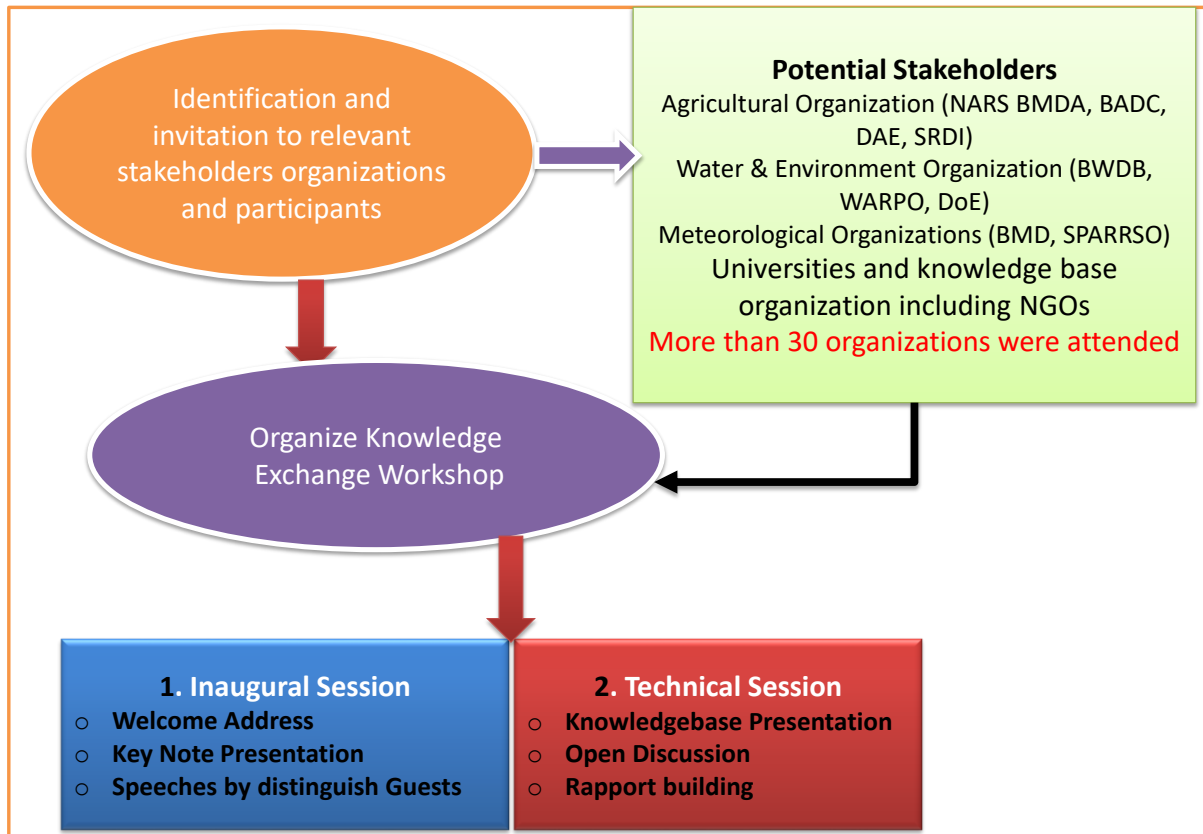


Figure 1: Workshop Approaches

1.6.2 Venue

The Knowledge Sharing Workshop was organized at the Conference Hall of Rigs Inn Hotel, Gulshan-1, Dhaka-1212. Dhaka. Partial view of the workshop with participants at the Conference Hall of Rigs Inn Hotel is shown in Figure 2 and 3.



Figure 2: View of Workshop at Hotel Rigs Inn

1.6.3 Programme Schedule

The workshop was organized two sessions are, Opening Session and Technical Session. The opening session of the workshop was governed by the keynote presentation and innovative and encouraging speeches from distinguished guests on policy issues. The technical session was covered by four knowledgebase presentations from different stakeholders and knowledgebase presentation.

Program	
Inaugural Session	
09:00	: Registration
09:30	: Welcome Address by Dr. Maminul Haque Sarker , Deputy Executive Director (Development), CEGIS Key Note Presentation on Road Map and use of Remote Sensing in application of SADMS in drought prone areas of Bangladesh by Mr. Motaleb Hossain Sarker , Director, Water Resources Management Division and Mr. Mohammad Shahidul Islam , Director, Remote Sensing Division, CEGIS
10:15	: Address by Special Guest: Dr. Khondoker Azharul Haq , Regional Chair GWP, South Asia
10:20	: Address by Chief Guest: Dr. Abul Kalam Azad , Director General, BARI, Bangladesh
10:25	: Address by Chair: Engr. Md. Waji Ullah , Executive Director, CEGIS, Bangladesh
10:30	: Vote of Thanks by Ms. Mukta Akter , BWP, Bangladesh
10:35	: Tea Break
Technical Session	
Chair of the Session: Engr. H.S Mozaddad Faruque, President, BWP, Bangladesh	
11:00	: Technical Presentation-1: Drought Management in Barind Area by BMDA, Bangladesh
11:15	: Technical Presentation-2: Development of Drought Tolerant Varieties by BARI, Bangladesh
11:30	: Technical Presentation-3: Drought Monitoring/Management under Changing Climate Conditions, Dr. Fazole Rabbi Sadeque Ahmed , Director (Environment and Climate Change), PKSf, Bangladesh
11:45	: Technical Presentation-4: Conservation of Soil Moisture for Drought Management by SRDI, Bangladesh
12:00	: Open Discussion
12:40	: Rapport by Chair of the Technical Session
13:00	: Lunch and Closing

2. Brief Description of Inaugural and Technical Session

2.1 Brief Description of Inaugural Session

The inaugural session of the workshop begin with welcome address by Dr. Maminul Haque Sarker, Deputy Executive Director (Development). Then Mr. Motaleb Hossain Sarker, Director, Water Resources Management Division and Mr. Shahidul Islam Director, Remote Sensing Division of CEGIS presented Keynote Paper.

Mr. Motaleb Hossain Sarker mainly presented the background drought events and its impacts in South Asia and Bangladesh. During the presentation Mr. Sarker mainly cover different arena of Workshop are; (i) Drought Monitoring and Mitigation Initiatives in Bangladesh, (ii) Concept & understanding of SADMS including functionality and model domain its applicability, (iii) Detail Road Map for implementation of SADMS in Bangladesh. Then Mr. Shahidul Islam Director, Remote Sensing Division of CEGIS elaborately presented Use of Remote Sensing in application of SADMS with different aspects of satellite uses for drought indices mapping for decision makers and planners. Finally, Mr. Sarker presented the 'to do list' and way forward to implement the SADMS in Bangladesh.



Figure 2.1: Key Note Presentation by Mr. Motaleb Hossain Sarker

Speech of the Special Guest, Dr Khondoker Azharul Haque: The workshop was blessed by the presence Dr. Khondoker Azharul Haque Regional Chair of the Global Water Partnership (GWP), South Asia. During his speech, Dr. Azharul Haq (Figure 2.2) mentioned that SADMS is very important tools for sustainable drought management, which can be implemented in Bangladesh following the harmony of drought indices of with other countries of South Asia. He urges that SADMS can be implemented through integrated effort with technical partners, apex body and interested stakeholders. He also thanked to CEGIS for organizing such a knowledge sharing workshop inviting appropriates organizations. He also appreciated the organizers for presence of 60 participants from 30 relevant organizations. He also thanks to the keynote presenters for such knowledgebase presentation.



Figure 2.2: Dr. Azharul Haq delivering in the workshop

Speech of the Chair, Engr. Md. Waji Ullah: Engr. Md. Waji Ullah, Executive Director, CEGIS and Member, Joint River Commission (JRC) chaired the inaugural session of the workshop. Mr. Ullah (Figure 2.3) gave thanks to Bangladesh Water Partnership (BWP), Global Water Partnership (GWP) especially to Dr. Azhar for engaging CEGIS to organize this national important knowledge-sharing workshop. He mentioned that CEGIS is center excellence who providing intellectual services to BWP and GWP since last more than a decade. Engr. Ullah also mentioned that CEGIS has also participate in New Delhi SADMS workshop during 2017. Following the outcome of the workshop, CEGIS conducted a study **“Development of Crop Specific Drought Severity Index using SADMS and Remote Sensing”** for North West Region of Bangladesh taking Tanore upazila as pilot area and due to unavailability of SADMS tool the study conducted through applying Remote Sensing and direct survey. CEGIS has also

developed DRAS model in collaboration BARC, BIRRI and BARI he also mentioned in his speech. Enr. Ullah also mentioned that the CEGIS could be technical partner for executing the SADMS as it has substantial use of Remote Sensing. He gave special thanks to Dr. Abul Kalam Azad, Director General, Bangladesh Agricultural Research Organization (BARI) and Chief Guest for blessing the workshop as Chief Guest and giving encouraging – knowledgebase speech. He also thanks to the keynote presenters for such knowledgebase presentation.



Figure 2.3: Engr. Md. Waji Ullah Executive Director, CEGIS giving speech in the workshop

Speech of the Chief Guest. Dr. Abul Kalam Azad: Dr. Abul Kalam Azad (Figure 2.4), Director General, Bangladesh Agricultural Research Organization (BARI) as Chief Guest, blessed the inaugural session of the workshop. Dr Azad thanks to organizers especially the CEGIS and BWP for inviting him as Chief Guest. He also spoke about the drought especially agricultural drought. He mentioned that many drought tolerant varieties for cereal crop, pulses, vegetables, fruit, flower and spices crops. Dr Azad also mentioned that BARI and NARS (National Agricultural Research System) organizations could play vital role in drought management applying and adopting the SADMS in drought tolerant crop variety development as well as its on-farm research system. BARI, BIRRI, BINA and SRDI could be technical partners and BARC could be apex body for implementing, he added it in his speech. He also thanks to the keynote presenters for such knowledgebase presentation.



Figure 2.4: Dr. Abul Kalam Azad giving speech in the workshop

Mrs Mukta Aktar (Figure 2.5), of BWP, concluded the inaugural session with the vote of thanks. Mrs. Aktar thanks to all the participants and distinguish guests for their cordial participation and contributions. He also thanks to CEGIS for successful organization of the workshop.



Figure 2.5: Mrs. Mukta Aktar, BWP delivering vote of thanks

2.2 Brief Description of Inaugural Session

H.S Mozaddad Faruque, President Bangladesh Water Partnership (BWP), chaired the technical session. Four presentation were delivered by (i) Dr. Akkas Ali, Chief Scientific Officer (CSO), Bangladesh Rice Research Institute (BARI), (ii) Dr. Altaf Hossain, Principal Scientific Officer (PSO), Soil Resources Development Institute (SRDI), (iii) Engr. Jahangir Alam, Superintending Engineer, Barind Multipurpose Development Authority (BMDA) and (iv) Dr. Fajle Rabbi Siddiqi Ahmed, Director (Environment and Climate Change) Palli Karma-Sahayak Foundation (PKSF) respectively. The chair and presenters/speakers of the Technical Session are shown in Figure 2.2. Further, brief description of these presentations are given below:



Figure 2.2: Dr. Altaf Hossain (starting from left), Mr. H.S Mozaddad Faruque, Dr. Akkas Ali, Dr. Fajle Rabbi, and Engr. Jahangir Alam (Right and standing for delivering presentation)

2.2.1 Technical Presentation by Dr. Akkas Ali, Chief Scientific Officer, BARI, Joydevpur: Dr. Akkas Ali (Figure 2.2.1) provide technical presentation on “Drought Tolerant Varieties and Technologies Development by BARI”. Dr. Ali in his presentation mentioned that BARI has developed 543 nos. of drought tolerance crop varieties during 2016 - 2019 among which 77 are cereal crops, 110 are

vegetable crops, 86 are fruits and rest are other crops. BARI has also developed more than 500 new technologies from 2016 to 2018 for managing crop specific agricultural droughts. These new technologies are saving natural resources and money; for an example, in the alternate furrow irrigation technology, 35-40% water can be saved with almost no sacrifice in yield of a specific crop.

2.2.2 Technical Presentation by Dr. Altaf Hossain, PSO, SRDI, Dhaka: A technical presentation on “Conservation of Soil Moisture for Drought Management” delivered by Dr. Altaf Hossain, Principal Scientific Officer (PSO), Soil Resources Development Institute (SRDI). In his presentation Dr. Hossain mentioned that moisture content in the soil and its loss due to high temperature or climate-induced drought is an important issue for crop production. Dr.Hossain also inform the audience that the different types of soils has different amount of moisture availability; for example the available moisture content in Silty loam is 205 mm; on the other hand it is 160 mm in Silty clay/clay. In silt loam soil, short duration early robi crops may be grown successfully without irrigation. Techniques like spreading manure or compost over the soil, crop rotation and reducing tillage can be applied to hold the moisture in soil. Drought vulnerable area will increase in case of moderate to severe climatic condition especially in the severe climatic condition the north western and southeastern part of Bangladesh will highly be affected.



Figure 2.2.1: Dr. Akkas Ali providing technical presentation during the workshop.



Figure 2.2.2: Dr. Altaf Hossain providing technical presentation during the workshop.

2.2.3 Technical Presentation by Engr. Jahangir Alam, SE, BMDA: A technical presentation on “Drought Management at Barind Area” delivered by Engr. Jahangir Alam, Superintending Engineer, Barind Multipurpose Development Authority (BMDA) Rajshahi. During his presentation, Mr. Alam inform the overall activities of BMDA including water management aspects during dry or drought periods. Water conservation through pond, canal/khal, ditches re-excavation, rainwater harvesting technology and planting trees along the roads, practicing orchard crops, water meter system for optimum use of irrigation water, rubber dam construction, construction of water reservoir for water supply to aquaculture and irrigation system, introduce drip irrigation and motivational program are the major activities to manage the agricultural and hydrological droughts in the Barind Area by BMDA mentioned by Engr Alam. BMDA also provide on-farm help services for irrigation water management and solar panel based irrigation system.



Figure 2.2.3: Engr. Jahangir Alam, SE, BMDA providing technical presentation during the workshop.

2.2.4 Technical Presentation by Dr. Fajle Rabbi, PKSF, Dhaka: A technical presentation on “Drought Management Under Changing Climatic Conditions” delivered by Dr. Fajle Rabbi Siddiqi Ahmed, Director (Environment and Climate Change) Palli Karma-Sahayak Foundation (PKSF). Dr. Rabbi delivered the presentation covering issues of (i) concept and causes of droughts, (ii) pattern of temperature and rainfall in drought areas of Bangladesh, (iii) groundwater depletion under climate induced drought conditions, (iv) impact of drought and (v) adaption measures for drought mitigations. The measure drought mitigation measures presented by Dr. Rabbi are; (i) Excavation and re-excavation of canals, ponds and ditches; (ii) Rainwater harvesting technology to be strengthened for all types of dry land crops during drier months, (iii) Construction of water reservoir for water supply to aquaculture and irrigation system, (iv) Storage of rainwater and river water and (iv) Locally improved drip irrigation.

Dr. Rabbi (right seating - Figure 2.2.4) also mentioned that drought is a slow onset event related to man- made cause and climate change and for a long time it is not scientifically addressed. He also urges for enhance the capacity to store surface water have to be increased. Further maintenance of river, canal, pond and bills is an important issue to store enough surface water as well as for ground water recharge. He also told that water use efficiency should be increased though appropriate research, AWD, sprinkler and drip irrigation. More tolerant varieties of different crops and fodder crops should be introduced. Insect and pest infestation due to drought is an important issue to be addressed.



Figure 2.2.4: Dr. Fajle Rabbi (starting from right at seating situation) in technical session

2.2.4 Open discussion: During the technical session, an open discussion being conducted by the chair of the technical session Mr. H S. Mozaddad Faruque, President of BWP. Different participants from different organizations were participated and ask questionnaires to the presenters. They also gave suggestion and comments on the presented papers, workshop subject matters and road map for implementation of SADMS in South Asia. Many organizations especially BDMA, BMD, BADC and RDA have expressed their interest to be the technical partners for implementing the SADMS model.

2.2.5 Rapport and concluding Speech by the chair of the technical session: Mr. H S. Mozaddad Faruque, President of BWP gave concluding speech with thanks to the presenters of both inaugural and technical sessions. He also thanks to organizers especially the CEGIS for successful organization of the knowledge exchange workshops. Dr. Faruque also gave special thanks to Mr. Motaleb Hossain Sarker, one of the keynote presenters for presenting detail road map for implementation of SADMS

in Bangladesh with time schedule. He also informed that without making availability of SADMS model, it could not be implemented by with road map timeline shown by Mr. Motaleb Hossain Sarker. He also appreciated all the presenters of technical session for sharing scientific and innovative knowledge base already generated in context of drought management.



Figure 2.2.5: Mr. H.S Mozaddad Faruque (starting from left) providing speaking in the technical session

3. Outputs from the regional/divisional workshops

The aim of the workshop was to develop and share the Road Map for implementing the SADMS in Bangladesh. However, number of outputs those are mainly knowledgebase were generated from the workshop are; (i) comprehensive knowledge base on drought management in South Asia, (ii) Framework and Domain of SADMS model including the data inputs and outputs, (iii) proposed road map and action plan for implementation of SADMS at upazila level in Bangladesh and (iv) capacity building of stakeholders agencies on drought management in Bangladesh etc.

4. Proposed Road Map and Action Plan for implementing the SADMS

CEGIS developed a draft road map (Figure 4.1) and action plan (Figure 4.2) for implementing the SADMS in Bangladesh and shared in the workshop.

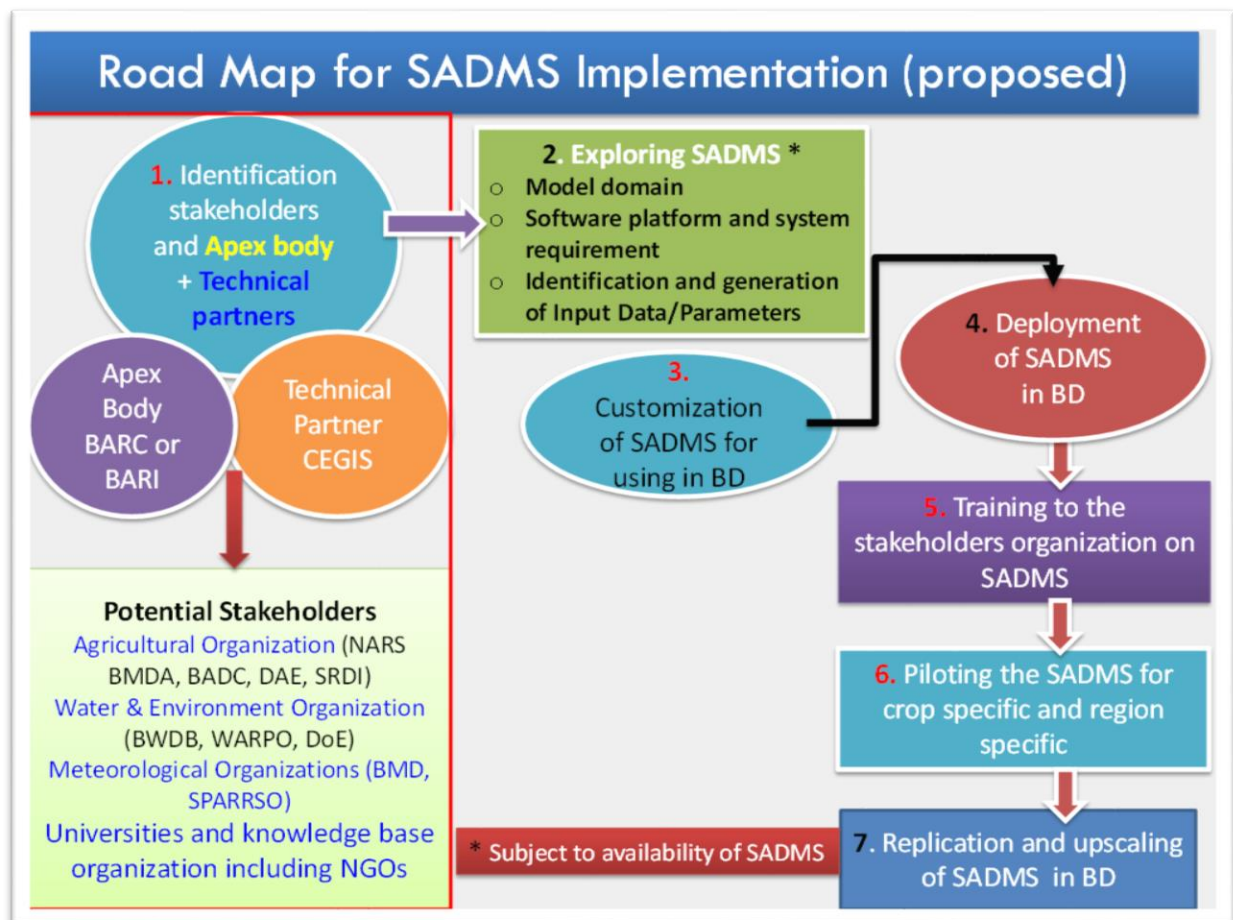


Figure 4.1: Proposed Road Map for implementing the SADMS in Bangladesh

Proposed Implementation Plan of SADMS in BD		
Activities	Tentative Period	Remarks
*Availability MODEL	July 2019	IWMI, BWP and CEGIS
Conceptualization and understanding	July 2019	BWP, BARC and CEGIS
Identification of relevant stakeholders	July 2019	BWP, BARC and CEGIS
Exploring SADMS <ul style="list-style-type: none"> Model domain Software platform and system requirement Identification and generation of Input Data/Parameters 	July – August 2019	CEGIS - BARC
Collection and Preparation of Input Data for SADMS	Sept – November 2019	CEGIS
Customization of the SADMS for Bangladesh	Oct - December 2019	CEGIS
Calibration, testing and validation of SADMS in pilot scale	Jan – April 2020	CEGIS
Deployment of SADMS	May – June 2020	CEGIS - BARC
Organize training programme on customized SADMS inviting relevant stakeholders	Mar - Apr 2020	CEGIS - BWP
Piloting of SADMS at 2/3 drought prone areas	Jan- Apr 2020	CEGIS - BARC
Full scale Implementation of SADMS in Bangladesh	June 2020 - onward	CEGIS – BARC - BWP

* Subject to initiative from BWP for implementation of SADMS in BD




Figure 4.2: Proposed implementation plan for SADMS application in Bangladesh