UNITED NATIONS E

ECONOMIC AND SOCIAL COUNCIL

Distr.
LIMITED
E/ESCWA/SDPD/2015/IG.2/3(Part I)
21 January 2015
ENGLISH
ORIGINAL: ARABIC

Economic and Social Commission for Western Asia (ESCWA)

Committee on Water Resources
Eleventh session
Amman, 26-27 March 2015

Item 4 (a) of the provisional agenda

Climate change and its impact on water resources in the Arab region

Progress achieved in Implementing the Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR)

Summary

The Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR) aims to evaluate the effects of climate change on water resources. The Economic and Social Council for Western Asia (ESCWA) has been tasked with implementing the Initiative, in collaboration with the League of Arab States and international specialized institutions concerned with climate issues. The Initiative was developed in response to the Arab Ministerial Declaration on Climate Change, adopted at the nineteenth CAMRE session held on 5 December 2007, which sets out an Arab vision and measures to tackle climate change issues.

The Initiative is based on four pillars, namely a baseline review of the collection of data and information on water and climate; an integrated assessment of impact and vulnerability; capacity-building and institutional strengthening; and awareness-raising and information dissemination. Several activities have been carried out under RICCAR since the tenth session of the ESCWA Committee on Water Resources. Thirteen regional climate modelling projections have been completed over the Arab domain set out in the Initiative and a number of subregional domains have been identified to analyse future climate impacts on temperatures, rainfall and extreme event indicators.

The Swedish Meteorological and Hydrological Institute and the Arab Centre for the Studies of Arid Zones and Dry Lands have applied three hydrological models that cover the Arab region as a whole, as well as certain river basins. The results were presented at a series of meetings and workshops. Furthermore, a vulnerability assessment methodology was developed and sectoral assessment indicators were identified; and a draft training manual for assessing vulnerability was prepared to facilitate training. In addition, the terms of reference of the regional knowledge hub were formulated, its technical secretariat was formed and work began on its establishment. The RICCAR expert group held its 5th and 6th annual meetings with Arab Governments and partners to review progress in implementing the Initiative and discuss future measures. A series of workshops were held to build the capacities of experts and institutions in various fields. The main obstacles that are hampering the implementation of the Initiative are related to climate and hydrological data collection and instability in the Arab region.

CONTENTS

Introduction

1. The Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region (RICCAR) is a collaborative intergovernmental and interagency initiative of the United Nations and the League of Arab States, implemented in partnership with specialized international institutions. The present report reviews the progress achieved and the challenges faced in implementing RICCAR, and sets out planned future activities.

I. BACKGROUND

2. RICCAR responds to the requests of Arab Governments that wish to increase their understanding of the impact of climate change on water resources and its associated effects on socioeconomic vulnerability in the Arab region. The Arab Ministerial Declaration on Climate Change, adopted by the Council of Arab Ministers Responsible for the Environment (CAMRE) in December 2007, calls for the adoption of methodologies to assess the impact of climate change on water resources, so as to support the development of climate change adaptation strategies and measures in the region. Subsequently, the Economic and Social Commission for Western Asia (ESCWA) adopted resolution 281 (XXV) at its twenty-fifth session held in Sana'a in May 2008, requesting the secretariat to prepare an assessment of the vulnerability of economic and social development in the region to climate change, with particular emphasis on freshwater resources. In January 2009, the Arab Summit for Economic and Social Development agreed on a project to assess the impact of climate change on water resources in the Arab region. The implementation of the Initiative is coordinated and reported upon by the Arab Ministerial Water Council (AMWC), the Arab Permanent Committee for Meteorology of the League of Arab States and the United Nations Regional Coordination Mechanism Thematic Working Group on Climate Change, which is chaired by the United Nations Environment Programme, Regional Office for West Asia (UNEP/ROWA).

3. The objectives of RICCAR are to assess the impact of climate change on freshwater resources in the Arab region and to identify regional socioeconomic and environmental vulnerability to climate change. RICCAR, which provides a common regional platform for addressing and responding to the impact of climate change, is built on the following four pillars: a baseline review of the collection of data and information; an integrated assessment of impact and vulnerability; capacity-building and institutional strengthening; and awareness-raising and information dissemination.

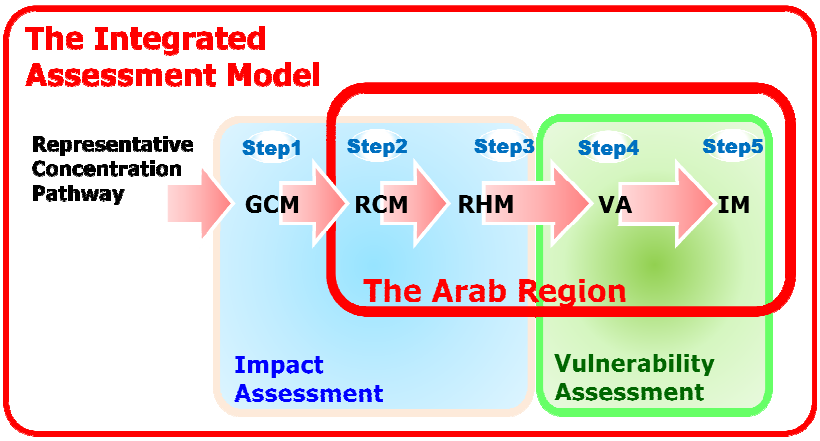
4. The implementation of RICCAR involves Arab Governments, the League of Arab States and its specialized agencies, ESCWA, other United Nations entities and international institutions, including the Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD); the German Agency for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)); the Swedish Meteorological and Hydrological Institute; UNEP/ROWA; the United Nations Educational, Scientific and Cultural Organization (UNESCO) – Office in Cairo; the United Nations University-Institute for Water, Environment and Heath; the United Nations Office for Disaster Risk Reduction (UNISDR) and the World Meteorological Organization (WMO). Recently, the Food and Agriculture Organization of the United Nations (FAO) was added to the list of bodies involved in studying the vulnerability of agriculture and forests to climate change. ESCWA coordinates between all these entities and the Swedish International Development Cooperation Agency (Sida) provides the necessary funding for implementing various activities. Moreover, the German Federal Ministry for Economic Cooperation and Development, in collaboration with GIZ, is funding the vulnerability assessment working groups and the establishment of the regional knowledge hub.

II. PROGRESS ACHIEVED

A. METHODOLOGICAL ASSESSMENT FRAMEWORK

5. ESCWA has developed a methodological framework to fully assess the impact of climate change on water resources and associated socioeconomic vulnerability in the Arab region, which links climate modelling, hydrological modelling, vulnerability assessment and integrated mapping tools. This methodological framework is explained in detail in an ESCWA publication,[1] which contains a step-by-step review of how RICCAR pursues an integrated assessment by using impact assessment outcomes to inform vulnerability assessment development, as shown in the below figure.

Integrated assessment methodology



B. PREPARING A REGIONAL CLIMATE MODEL AND ANALYSING EXTREME EVENTS

6. The Swedish Meteorological and Hydrological Institute (SMHI) has completed 13 regional climate modelling projections over the Arab/MENA domain, with horizontal grid sizes at 50x50 kilometres and 25x25 kilometres as set out in the Initiative. The development of the Arab domain was one of the projects officially adopted within the Coordinated Regional Climate Downscaling Experiment (CORDEX), which is implemented by the Working Group on Regional Climate of the World Climate Research Programme. The adoption of the Arab domain in CORDEX is a great achievement that promotes further research on the impact of climate change on the Arab region. The projections are based on two new representative concentration pathway (RCP) climate scenarios: RCP 4.5 (moderate) and RCP 8.5 (maximum), determined by the Intergovernmental Panel on Climate Change (IPCC) in its Fifth Assessment Report. The aggregated results of these projections were presented at several workshops and meetings. Experts and research institutions in the Arab region can benefit considerably from downloading the nine available projections. This CORDEX data is provided via the Earth System Grid Federation (ESGF). The projections can also be used to prepare vulnerability assessments and are available from the CORDEX website.[2] Climate data used in the regional climate models are available from SMHI.[3]

7. Several subregional domains were identified to analyse expected climate effects on temperatures, rainfall and extreme event indicators, including areas in the upper basins of the Nile, Euphrates and Tigris rivers, the Jordan River basin, the Atlas Mountains in the Arab Maghreb and the Arabian Peninsula. Indicators

[1] ESCWA, *Assessing the Impact of Climate Change on Water Resources and Socio-Economic Vulnerability in the Arab Region: A Methodological Framework for Pursuing an Integrated Assessment* (E/ESCWA/SDPD/2011/1).

[2] http://wcrp-cordex.ipsl.jussieu.fr/.

[3] http://esg-dn1.nsc.liu.se/esgf-web-fe/.

cover dry and rainy seasons, summer days where temperatures rise above a certain level and extremely low temperatures.

8. The projection results were discussed at the Scoping Meeting for the Establishment of the Arab Climate Outlook Forum, held in Amman from 14 to 16 October 2014. The meeting recommended the use of results published on the CORDEX website regarding the Arab domain to strengthen other modelling initiatives in the Arab region and benefit from results of various scenarios, so as to further understand climate change patterns in the region.

9. ESCWA participated in the CORDEX working group meeting on the Arab/MENA domain, organized by WMO, SMHI and the Cyprus Institute, held in Nicosia on 27 and 28 November 2014. The meeting was aimed at coordinating the regional climate model results of several institutes concerned with climate modelling to create a unified outcome for the various projections over the Arab domain set out in the Initiative. The meeting was attended by representatives from specialized institutes, including the Centre of Excellence for Climate Change Research at King Abdulaziz University, the King Abdullah University of Science and Technology, Cairo University, ACSAD, the Cyprus Institute, the German Climate Service Centre, the Moroccan Meteorological Agency, Boğaziçi University and the Euro-Mediterranean Centre for Climate Change.

C. Preparing hydrological models

10. ACSAD and SMHI applied three hydrological models under RICCAR, namely VIC, HYPE and HEC-HMS, which were used for the Arab region as a whole and for certain river basins, including the Majrada River in Tunisia, Wadi Dayqah in Oman and the Great Southern River between Lebanon and the Syrian Arab Republic. The preliminary results of the hydrological models were presented at several meetings. Maps depicting changes in runoff and evaporation were prepared based on the two RCP scenarios, as well as expected changes resulting from floods until 2100.

11. Countries should be encouraged to exchange data to support regional hydrological model development, provide data on basins, and conduct case studies on water levels in subregional domains where long-term hydrological data are required to calibrate and test hydrological models. The Yemeni coordination body has offered detailed data on several basins to facilitate studies using hydrological models calibrated in accordance with RICCAR.

D. Vulnerability assessment

12. The Vulnerability Assessment Working Group supports the preparation of the vulnerability assessment methodology and report. It comprises four Arab Government representatives, four representatives of the League of Arab States and other Arab organizations, four representatives of United Nations organizations and three representatives from specialized international organizations. GIZ has also contracted a German consultancy agency, adelphi, to provide technical support to the Group, in coordination with ESCWA. To this end, adelphi prepared a background report reviewing several vulnerability assessment methodologies and integrated mapping tools for vulnerable areas. The report was presented at the 1st meeting of the Vulnerability Assessment Working Group (Beirut, 29-30 January 2013). The 2nd meeting was held in Beirut, on 27 and 28 May 2013; participants agreed to focus on five sectors, namely water resources, biodiversity and ecosystems, agriculture, human settlements and infrastructure, and people.

13. The 3rd Working Group meeting was held in Amman, on 25 and 26 November 2013. Participants discussed the vulnerability indicators, ways of providing data on them through geographic information systems and remote sensing, and a draft manual on the vulnerability approach under consideration. Following discussions and consultations at the Working Group meetings, the vulnerability approach was formulated and its sectoral indicators were identified (approximately 50 indicators). A draft training manual on the assessment methodology was also prepared to facilitate training. A training workshop to test the

vulnerability approach for the Arab region was held in Beirut, from 11 to 13 May 2014. It was attended by experts from regional research institutes concerned with water resources and climate change; they received practical training on the vulnerability methodology developed using geographic information systems and discussed future steps. Two task forces were formed to review the vulnerability assessment indicators, comprising several experts who participated in two consecutive meetings from 20 to 23 October 2014. At these two meetings, participants discussed all indicators and data, and some proposed additional indicators and suggested a review of the digital maps and database developed through geographic information systems.

E. KNOWLEDGE MANAGEMENT

14. The Working Group on the Regional Knowledge Hub comprises representatives of three Arab Governments, representatives of the League of Arab States and other Arab Organizations, representatives of three United Nations bodies and a representative of a specialized international organization. The Group is tasked with preparing the terms of reference for the regional knowledge hub, including its objectives, scope, fields, administrative structure, target users and the standards and specifications for selecting its host institution. The Group held its first meeting in Beirut, on 31 January 2013; following meetings were carried out via the Internet to discuss and finalize the draft terms of reference of the hub.

15. The draft terms of reference were subsequently submitted to the Technical Scientific Advisory Committee and the Executive Bureau of AMWC at its sixth session, held in Doha in May 2014. The Council agreed that Arab State representatives in the Technical Scientific Advisory Committee would also be members of the hub board of directors, and that a hub coordination secretariat would be established comprising ACSAD and ESCWA. A series of meetings were held with representatives of the League of Arab States, ACSAD, SMHI, GIZ and ESCWA to organize the hub set-up.

F. BUILDING CAPACITIES AND STRENGTHENING INSTITUTIONS

16. A regional workshop on Linking Regional Climate Model Projections to Hydrological Models was held in Beirut, from 26 to 28 June 2013. It discussed the RICCAR integrated assessment approach, focusing on linking the projections of the regional climate model and those of the hydrological models used in the analysis of climate change impacts on water resources, especially run-off. The preliminary results of various regional climate models and Arab studies were presented at the meeting. Participants were trained to use the hydrological model HEC-HMS. Moreover, studies on the application of geographic information systems and remote sensing were reviewed, in the context of evaluating the effects of climate change on water resources in the Arab region. The workshop, supported by Sida, was attended by 40 experts from ministries and water resource bodies in Arab countries and from specialized regional and international organizations.

17. A subregional workshop on Climate Data Rescue and Digitization was held in Amman, from 11 to 13 June 2013, with support from Sida and King Abdullah University of Science and Technology, to provide training on theoretical and practical ways to rescue, digitize, store, preserve, standardize and harmonize data. It was attended by 22 climate change experts and data users from meteorological bodies in Jordan, Palestine, Saudi Arabia and Yemen. The climate data management programmes of some countries were presented, including that of Australia and Jordan. Participants discussed data digitizing methods and surveying and digitizing rainfall data, and stressed the importance of the issues covered at the workshop; many Arab countries have been unable to rescue their historical data owing to a lack of technical and human resources. The workshop was held within the framework of a two-month advisory mission, following a request by the Jordan Meteorological Department to ESCWA and WMO for technical support to recover climate data. Action plans were prepared to recover data in the Jordanian Meteorological Department and the Palestinian Meteorological Office, which set out the necessary financial and human resources and time frame. Coordination efforts are ongoing to implement the action plans.

18. ESCWA, in collaboration with the League of Arab States, organized three training workshops on Capacity Development for Climate Change Negotiations. The first workshop was held in Amman, from 22 to

24 October 2013; the second from 26 to 28 May 2014, also in Amman; and the third was hosted by the Environment Public Authority in Kuwait from 11 to 13 November 2014, pursuant to CAMRE decisions on the role of Arab negotiators in climate change negotiations and the recommendations of the Arab climate negotiations group.

19. ESCWA, in coordination with the League of Arab States, WMO and the Jordanian Meteorological Department, held the Scoping Meeting for the Establishment of the Arab Climate Outlook Forum in Amman from 14 to 16 October 2014, pursuant to decisions taken at the thirtieth session of the Arab Permanent Committee of Meteorology, held in Kuwait from 10 to 13 March 2014. Participants at the Scoping Meeting agreed to undertake the following:

(a) Reach consensus on seasonal forecasts (once or twice a year);

(b) Assess climate change at the regional level;

(c) Exchange knowledge, seasonal predictions and climate change forecasts, facilitated through the use of a common language;

(d) Build the capacities of Arab meteorological services to develop a common approach for the outcomes of the Arab Climate Outlook Forum;

(e) Identify and meet the needs of end users of climate information;

(f) Determine the data required to publish the outcomes of the Scoping Meeting;

(g) Preserve the data property rights of Arab meteorological bodies;

(h) Organize the first session of the Forum in 2015, focusing on climate change issues, and hold further sessions of the Scoping Meeting on a rotational basis;

(i) Request the League of Arab States secretariat to prepare the Forum's draft terms of reference on the basis of discussions held at the Scoping Meeting;

(j) Form an interim steering committee, coordinated by the League of Arab States secretariat, to monitor progress in implementing the outcomes of the Scoping Meeting;

(k) Establish a scientific committee to assist in the technical and scientific work of the interim steering committee;

(l) Ensure that the work of the Forum and the related responsibilities of States will not be in contradiction with the national policies and laws of member States.

G. RICCAR WEBSITE AND BROCHURE

20. ESCWA launched the RICCAR website[4] in May 2012, which provides open access to RICCAR documents, training materials, presentations and meeting reports. ESCWA, in collaboration with other partner organizations, has prepared a brochure on the Initiative and another on the projections of extreme event indicators and RICCAR projections.

III. REGIONAL CONSULTATIONS AND OTHER PROJECTS

A. EXPERT GROUP MEETINGS

21. The 5th expert group meeting on RICCAR was held in Amman, on 11 and 12 December 2013. It reviewed the progress made in implementing the Initiative and presented the results of the hydrological and

[4] www.escwa.un.org/RICCAR.

climate models and of the working groups on vulnerability assessment and the regional knowledge hub. Participants discussed future steps for implementing RICCAR. Participating Sates reaffirmed their support for the Initiative; the use of its results and outcomes in developing policies and programmes at the national level; and the importance of organizing training programmes for national specialists on model applications. The Expert Group recommended that States provide the necessary hydrological data to calibrate models and verify results and outcomes.

22. The 6th expert group meeting was held in Cairo, on 7 and 8 December 2014. It evaluated the progress made in implementing RICCAR activities; reviewed the results of climate and hydrological models and the vulnerability assessment approach applied to five sectors; and assessed progress in establishing the regional knowledge hub and the Arab climate outlook forum. It recommended that States use model results in decision-making processes, in policymaking to tackle climate change in the medium and long term, and in case studies on joint water resources. It also recommended fully benefiting from national sources when developing vulnerability assessment indicators and reviewing preliminary results with national experts; providing training on the RICCAR vulnerability assessment approach; taking the necessary measures to establish the regional knowledge hub; and reviewing the progress made with all stakeholders at the national and regional levels.

B. Regional meetings and consultations

23. ESCWA has systematically reviewed implemented RICCAR activities at a series of intergovernmental meetings, including the following:

(a) ESCWA presented a series of reports on RICCAR at sessions of the Technical Scientific Advisory Committee of the Arab Ministerial Water Council, held in May 2013, January 2014, May 2014 and January 2015;

(b) ESCWA gave a presentation on progress in implementing RICCAR and establishing the Arab climate outlook forum at the thirtieth session of the Arab Permanent Committee on Meteorology, hosted by the Kuwait Meteorological Center in March 2014;

(c) ESCWA made a presentation on progress in implementing RICCAR at the 19th meeting of the Climate and Climate Change Subcommittee of the Arab Permanent Committee on Meteorology, held in Cairo, on 1 and 3 October 2013, and at its 20th meeting, held in Cairo, on 6 and 7 October 2014, which were both convened in preparation for the nineteenth and twentieth sessions of the Conference of the Parties to the United Nations Frame Convention on Climate Change to evaluate progress in implementing the Initiative and strengthen cooperation with Arab meteorological agencies.

24. ESCWA has striven to raise awareness of RICCAR through a series of consultative meetings and conferences, held in collaboration with its Initiative partners, including the following:

(a) ESCWA and the other RICCAR partners organized a side event at World Water Week, held in Stockholm in September 2013, during which the secretariat presented the progress made in implementing RICCAR and initiatives related to climate change vulnerability and adaptation, which are being carried out in collaboration with the League of Arab States, UNEP/ROWA, WMO, SMHI, ACSAD, Sida and GIZ;

(b) ESCWA gave a presentation on RICCAR at a World Water Week seminar, held in Stockholm in September 2014, in which it addressed the water, energy and food nexus in the Middle East and North Africa, and regional cooperation aimed at tackling such issues;

(c) ESCWA participated in a workshop on a project for climate change adaptation in water sectors in the Middle East and North Africa, implemented by GIZ, and in meetings of the project's steering committee, held in January 2014 and January 2015 in Cairo;

(d) ESCWA gave a presentation on RICCAR and the regional knowledge hub at the Regional Network Meeting on Water Data and Knowledge Sharing, held in Amman from 25 to 27 November 2014, in collaboration between UNEP/ROWA, the Abu Dhabi Global Environmental Data Initiative, the Center for Environment and Development for the Arab Region and Europe and the International Union for Conservation of Nature;

(e) ESCWA held a meeting on assessing climate change and adaptation methods on the sidelines of the Third Arab Water Forum, held in Cairo from 9 to 11 December 2014, in collaboration between the League of Arab States, FAO, ACSAD and GIZ.

C. OTHER PROJECTS

25. ESCWA is implementing a project entitled "Developing the capacities of Arab countries for climate change adaptation by applying integrated water resource management tools", funded by the United Nations Development Account. The first project meeting was held in Amman, in November 2013, in collaboration with project partners, namely the Centre for Environmental Health Activities of the World Health Organization, UNEP/ROWA, ACSAD, the Arab Countries Water Utilities Association and GIZ. The aim of the project is to formulate the necessary policies for climate change adaptation in various fields related to the water resources sector, including agriculture, drinking water, sanitation, economics and health, and prepare guidelines for each sector to be applied in the implementation of water resource management plans.

26. ESCWA is participating in the implementation of another project funded by the United Nations Development Account, aimed at strengthening national capacities to manage water scarcity and drought in Western Asia and North Africa, led by the United Nations Department of Economic and Social Affairs. A workshop was held in Beirut in June 2013 to discuss the project and identify the countries concerned, namely Jordan, Lebanon, Morocco and Palestine. ESCWA also took part in an advisory mission to Amman, from 8 to 10 December 2013, to review the national strategy for tackling water scarcity and drought.

IV. IMPLEMENTATION CHALLENGES: LACK OF DATA

27. The implementation of RICCAR has been hampered by difficulties in securing reliable data from Arab Governments. Observed climate data is vital for the calibration of regional climate models. Water-related data, such as data on river flows, are key inputs to hydrological models, and lack of data on certain basins affects the ability to validate long-term predictions on flow changes in rivers. ACSAD is working to secure approval from Arab States to use some hydrological data in pilot models for certain river basins. Although SMHI uses globally available climate and hydrological databases to carry out preliminary analyses of model results, additional data from official sources are needed to verify these results. The League of Arab States and ESCWA are seeking political support to facilitate data exchange in the Arab region through resolutions issued by ministerial councils, for example. AMWC issued a resolution requesting Arab States to present proposals to ESCWA on studies to be conducted under RICCAR and identify focal points for data and information exchange. The Governments of Iraq, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, the Sudan and Yemen subsequently shared the details of their focal points with ESCWA.

V. FUTURE ACTIVITIES

28. ESCWA will participate in a meeting of the Arab Permanent Committee on Meteorology of the League of Arab States, to be held in Jeddah, from 26 to 30 April 2015, at which the terms of reference of the Arab climate outlook forum will be presented and the progress in implementing RICCAR will be reviewed.

29. Preparations have begun for a regional meeting on transitioning from using models to evaluate the impact of climate change to assessing vulnerability, to be held in June 2015. The aim is to find ways to benefit from climate and hydrological model results under the Initiative to assess socioeconomic

vulnerability to climate change in the Arab region, using approaches applicable at the local and subregional levels in Arab countries.

30. The final RICCAR report is being drafted. Its contents were set in consultation with all RICCAR partners and reviewed by the Technical Scientific Advisory Committee of AMWC in January 2015. Technical reports and policy summaries will also be prepared on the results of the Initiative. In September 2015, a meeting will be held to review and evaluate RICCAR outcomes, which will be attended by a review panel comprising Arab and international experts. The final RICCAR report will be presented at a high-level meeting, to be held in December 2015 and attended by water, agriculture, health and meteorology ministers and all RICCAR partners.
