

Regional Consultation on
**Collective Actions for Opening Access to Agricultural
Information and Knowledge in the Asia-Pacific Region**

(13-15 December, 2012)
Thimphu, Bhutan

PROCEEDINGS





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Organized by

**Asia-Pacific Association of Agricultural Research Institutions (APAARI)
Food and Agriculture Organization of the United Nations (FAO)
Global Forum on Agricultural Research (GFAR)
SAARC Agriculture Center (SAC)
Council for Renewable Natural Resources Research of Bhutan (CoRRB) and
Information and Communication Services (ICS), Ministry of Agriculture and
Forests, the Royal Government of Bhutan**

Regional Consultation on Collective Actions for Opening Access to Agricultural Information and Knowledge in the Asia-Pacific Region: Proceedings

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The views expressed in this publication do not necessary reflect any official opinion whatsoever of the Asia-Pacific Association of Agricultural Research Institutions (APAARI), the Food and Agriculture Organization of the United Nations (FAO), the Global Forum on Agricultural Research (GFAR) and other organizing partners of the consultation.

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Foreword

Access to agricultural information and its effective use by smallholder farmers in the Asia-Pacific region urgently require *collective action* by all stakeholders engaged in ICT for agricultural research for development. Collective action is all the more important especially in smaller and economically weak countries in order to implement policies and practices with targeted investment in ICM, improve governance of agricultural information systems, strengthen partnerships and networks in support of *opening access* for greater sharing of agricultural data, information and knowledge at national, regional and global levels.

The Global Conference on Agricultural Research for Development 2012 (GCARD II) established a clear framework for the collaborations and actions required to *open access to agricultural information*, making use of a number of specific information management tools that have been developed through collaborative efforts supported through GFAR, FAO and the CIARD network over recent years and taken up into the actions of Asia-Pacific Agricultural Research Information System (APARIS) – an important program of APAARI. APAARI has been instrumental in implementing programs in support of collective actions for putting GCARD roadmap into practice in the Asia-Pacific Region with the support of GFAR and FAO with the collaboration of sub-regional and national level partners.

Realizing the need for collective action in opening access to agricultural information and knowledge, a Regional Consultation on “*Collective Actions for Opening Access to Agricultural Information and Knowledge in the Asia-Pacific Region*” was jointly organized by APAARI, GFAR, FAO, SAARC Agriculture Center and the Council for Renewable Natural Resources Research of Bhutan (CoRRB) in collaboration with Information and Communication Services (ICS) of the Ministry of Agriculture and Forests, the Royal Government of Bhutan on 13-15 December, 2012 at Thimphu, Bhutan. Thirty senior ICM managers responsible for managing agricultural information and knowledge systems from 10 countries in the Asia-Pacific region attended the meeting besides experts from ICRISAT, UNESCAP-CAPSA, GFAR, FAO, SAC and APAARI to discuss on the current scenario of use of ICT for AR4D, issues in opening access to agricultural data and information at different levels and finally identify collective actions to be undertaken by different stakeholders in the region.

This publication synthesizes the presentations made in the meeting, captures proceedings of the consultation and presents list of collective actions for opening access to agricultural information and knowledge in the Asia-Pacific region for possible implementation by different stakeholders who endorsed to undertake these actions. I am sure that this publication will be useful to all ARD stakeholders who are engaged in ICT/ICM for AR4D in the Asia-Pacific region.



(Dr. Raj Paroda)
Executive Secretary
APAARI

Abbreviations

AEZ	Agro-Ecological Zones
AgriVOs	Agricultural Virtual Organizations
AGROVOC	Thesaurus by the Food and Agricultural Organization of the United Nations
AIS	Agricultural Information Service (AIS)
AMIS	Agricultural Market Information System
APAARI	Asia-Pacific Association of Agricultural Research Institutions
APARIS	Asia-Pacific Agricultural Research Information System
APEC	Asia-Pacific Economic Cooperation
AR4D	Agricultural Research for Development
ASCs	Agrarian Service Centres
ASEAN	Association of Southeast Asian Nations
ATIC	Agricultural Technology Information Centre
AVC	Audio Visual Center
BARC	Bangladesh Agricultural Research Council
BRKB	Bangladesh Rice Knowledge Bank
BRRl	Bangladesh Rice Research Institute
CABI	Centre for Agricultural Bioscience International
CAPSA	Centre for Alleviation of Poverty through Sustainable Agriculture
CBOs	Community-based Organization
CGIAR	Consultative Group on International Agricultural Research
CIARD	Coherence in Information for Agricultural Research for Development
CICs	Community Information Centers
CMS	Content Management System
CoRRB	Council for Renewable Natural Resources Research of Bhutan
DoA	The Department of Agriculture
FAO	Food and Agriculture Organization of the United Nations
FAO RAP	Food and Agriculture Organization of the United Nations Regional Office for Asia and the Pacific
GCARD	Global Conference on Agricultural Research for Development
GFAR	Global Forum on Agricultural Research
GIS	Geographic Information System

GoN	Government of Nepal
ICAR	Indian Council of Agricultural Research
ICM	Information and Communication Management
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICS	Information and Communication Services
ICT/ICM	Information and Communication Technology/Information and Communication Management
ICTs	Information and Communication Technologies
ICTs	Information and Communications Technologies
IIT	Indian Institute of Technology
IMARK	Information Management Resource Kit
IRRI	International Rice Research Institute
IVR	Interactive Voice Response
KVKs	Krishi Vigyan Kendras
MIS	Management Information System
NAIP	National Agricultural Innovation Project
NARC	Nepal Agricultural Research Council
NARI	National Agricultural Research Institute
NARIS	National Agricultural Research Information System
NARS	National Agricultural Research System
NGO	Non-Government Organization
OA	Open Access
OAJ	Open Access Journal
PARC	Pakistan Agricultural Research Council
PCAARRD	Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (formerly PCARRD)
PDF	Portable Document Format
SAARC	South Asian Association for Regional Cooperation
SAC	SAARC Agriculture Center
SATNET	Network for Knowledge Transfer on Sustainable Agricultural Technologies and Improved Market Linkages in South and Southeast Asia
SMSs	Subject Matter Specialists
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
VERCON	Virtual Extension and Research Communication Network

Introduction

The Asia-Pacific region, home to two-third of the world's hunger, is affected by climate change, loss of biodiversity, spread of trans-boundary disease and other challenges. These have contributed to the steady decline in the growth rate of food grain production since the Green revolution. With almost 80 percent of the world's small and marginal farmers living in this region, the ability to adapt and participate in emerging markets and new agricultural innovation systems is becoming challenging for smallholder farm families.

Realizing this need, the United Nations has designated the year 2014 as the International Year of Family Farming which emphasizes the role played by smallholder farmers in contributing to food security and eradicating hunger worldwide. The sustainability of family farming depends on its ability to respond to changing contexts, economic viability, environmental stewardship, and the intergenerational enhancement of knowledge, traditions, practices, resources, institutions, and social identity. Policies and institutions also influence the “sustainability of family farming”.

The importance of information and knowledge management is the key to overcoming such challenges. Hence, the need for research and development to enable new types of advisory services that integrate rural innovations and open access to agricultural information and knowledge to all, especially through use of emerging Information and Communications Technologies (ICTs) benefitting the resource-poor smallholder farmers.

Over a decade, activities by APAARI along with FAO, GFAR, SAARC and many other partners at national and regional levels have led to identification of critical issues for action to improve ICM at national, regional and global levels. Many of these issues have been acted upon collectively such as through establishment of Asia-Pacific Agricultural Research Information System (APARIS) and the Coherence in Information for Agricultural Research for Development (CIARD). However, more needs to be done in order to usher openness in sharing agricultural information and knowledge in the region.

Need for Collective Action

One of the contentious issues in ICM for Agricultural Development in the Asia-Pacific region is in the inadequacy of useful and relevant agricultural information, its further generation and access. Generating and opening access to relevant and useful information for smallholder farmers and producers and small rural entrepreneurs engaged in agriculture related businesses and livelihoods needs high attention by all actors in agricultural development in the region. Access to agricultural information and its effective use by smallholder farmers in the Asia-Pacific region urgently require collective action to implement policies and practices with targeted investment and capacity building in ICM, improve governance of agricultural information systems and strengthen partnerships and networks in support of opening access for greater sharing

of agricultural data, information objects and knowledge by individual organizations and countries in the region.

Collective action is all the more important to enable smallholder resource-poor farmers and producers to effectively share and use information and knowledge for agricultural innovation, especially in smaller and economically weak countries of the region. Realizing the importance of collective action, a regional consultation on “Collective Actions for Opening Access to Agricultural Information and Knowledge in the Asia-Pacific Region” was jointly organized by APAARI, GFAR, FAO, SAARC Agriculture Center and the Council for Renewable Natural Resources Research of Bhutan (CoRRB) in collaboration with Information and Communication Services (ICS) of the Ministry of Agriculture and Forests, the Royal Government of Bhutan on 13-15 December, 2012 at Thimphu with the following objectives:

- To identify collective actions that can be taken by various actors at national, regional and international levels in opening and sharing useful and relevant agricultural data, information and knowledge.
- To suggest and share good practices to guide national organizations to generate and open access to relevant and useful agricultural information for smallholder resource-poor farmers and producers in small and weak countries of the region.
- To strengthen institutional commitment, partnerships and networks in support of opening access to agricultural information and knowledge in the region.

Senior ICM managers responsible for managing agricultural information and knowledge systems at the national level, CGIAR centers and experts from the regional and international organizations were invited for the expert consultation. Six focal point experts of the SAARC Agriculture Center were also invited to share country reports on use of ICT in agriculture in SAARC countries. Expert resource persons from ICRISAT, UNESCAP-CAPSA, GFAR, FAO, SAC and APAARI were also invited to share their experiences on sharing agricultural information and knowledge and to provide inputs to the dialogue on collective action for opening access to agricultural data and information in the region.

Inaugural Session

The Minister for Agriculture and Forests, His Excellency Lyonpo (Dr.) Pema Gyamtsho inaugurated the consultation meeting. During the opening of the meeting, a Marchang ceremony was performed, which is the tradition in Bhutan when any new activity is started. It is customary to invoke the glorious teachers, the four *Daka* and *Dakinis* of three worlds, the dwellers of eight charnel grounds, and guardians of all four directions (*Ksterapalas*) and to request all of them to bestow their blessings for the success of the new venture.



Dr. Tashi Samdup, Director, CoRRB performing the *Marchang* ceremony while dignitaries are on the dais

In his inaugural address, His Excellency Lyonpo (Dr.) Pema Gyamtsho highlighted that the primary factor that interacts with and influences agricultural productivity is the “agricultural information”. The Hon’ble Minister stressed that it can help inform decisions regarding land, labour, livestock, capital and management. Above all, he emphasized that agricultural productivity can be improved through use of relevant and useful information and knowledge. See Minister’s inaugural address at Annexure-I.

The Director of Council of RNR Research of Bhutan (CoRRB), Dr. Tashi Samdup said that there is no dearth of RNR knowledge and information. However, the utilization and management of RNR information and knowledge should be improved to have good impact on the farmers. Dr. Raj Paroda, Executive Secretary, APAARI noted that collective action is all the more important to enable smallholder resource-poor farmers and producers to effectively share and use information and knowledge for agricultural innovation, especially in smaller and economically weaker countries of the region.

Dr. Ajit Maru, GFAR; Mr. Gerard Sylvester, FAO; and Mr. Golam Mustafa, SAC spoke on the occasion. The inaugural session was ended with the vote of thanks by Mrs. Singye Wangmo, Program Director, ICS, Ministry of Agriculture and Forests, the Royal Government of Bhutan. The inaugural session was followed by series of technical sessions as per the program (see Annexure-II). Proceedings of the technical sessions are given in the following sections.

Technical Sessions

Session I: Collaboration for Sharing Agricultural Information and Knowledge at the Regional and Global Levels

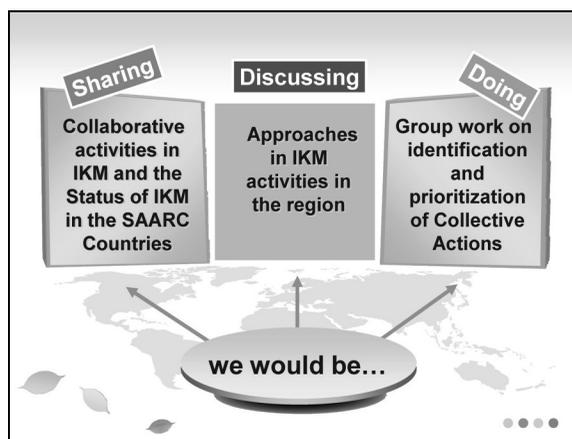
Chair: Dr. Tashi Samdup, CoRRB

Co-Chair: Dr. Sk. Ghulam Hussain, BARC

1. Introduction of the participants and objectives of the consultation

Dr. S. Attaluri, APARIS Coordinator

Thirty senior ICM managers responsible for managing agricultural information and knowledge systems from Bangladesh, Bhutan, Cambodia, India, Nepal, Pakistan, Papua New Guinea, the Philippines, Sri Lanka, and Thailand attended the meeting. This includes six SAARC Agriculture Center's focal point experts from the SAARC member countries and experts from ICRISAT, UNESCAP-CAPSA, GFAR, FAO, SAC and APAARI attended the meeting. See Annexure-III for complete list of participants. The objectives of the consultation and the methodology to be followed in the consultation have been briefly explained in the session. All the experts were asked to participate fully and interact actively in the consultation process of sharing, discussions and group works.



Methodology of the consultation

2. Global perspective on sharing and using agricultural information and knowledge through Collective Actions

Dr. Ajit Maru, GFAR

The presentation focused on value addition chains and information flows in agricultural market chains. It emphasized that for ARD and agricultural innovation to be effective, ARD will have to contribute to improve flow, availability, access, validity, relevance and use of the information. The challenge in ICM for Agricultural Innovation is to link

“Information Chains” to “Innovation Chains” which are linked to Market Value Addition Chains. Technological trends such as big data in agriculture, cloud computing; mobile devices and apps; geo-spatial data and information management; machine to machine communication etc., would transform the way agricultural information is now managed. It further highlighted the need for collective action between national information systems, between organizations, between communities and different stakeholder groups in order to improve sharing and exchange of information; establishing collaboration and partnerships related to information and communications management to share data and information, experiences, skills, tools and technologies, information applications and information systems. The challenges included: attracting investment in this area, content generation, opening access and interoperability, coherence in information services and systems, capacities of different actors and effective use of information.

3. Collaboration through CIARD initiative in the region

Mr. Gerard Sylvester, FAO

Important challenges that agriculture faces today included climate change, sustainable use of natural resources and energy and spread of trans-boundary disease and pests. These challenges cannot be tackled without improved and enhanced sharing of data, information and knowledge globally. The presentation stressed that sharing of data and knowledge ushers greater equity in access and use of agricultural knowledge across and among communities and can lead to greater equity in the benefits of development efforts. It introduced CIARD framework, manifesto, checklist and pathways with brief introduction to CIARD RING and its services and functions.

4. Sharing agricultural information in SAARC countries

Mr. M. Golam Mustafa, SAC

It focused on the role of SAARC Agriculture Centre (SAC) in agricultural information sharing through organizing important workshops such as ‘ICT roadmap to villages’ and ‘ICT for poverty alleviation and agricultural development’ in the South Asian region. It explained benefits of several information dissemination and networking activities of SAC which included: SAARC Journal of Agriculture; SAARC AgriNews; SAARC Statistical Data Book; Directories of Agricultural Institutions, Scientists, Farm Machinery, Ph.D. theses etc., which were well received by users. SAC also generate and share knowledge through timely publications based on research studies on current topics. Important studies included: agricultural research systems and extension system; education system in SAARC region; quality seed in SAARC countries; hill farming; role of media on agricultural growth; impacts of climate change on agricultural production; vegetable and fruit marketing systems; pesticide information sharing system; dairy sector development; status and potentials of aquaculture feed production in SAARC countries. It was explained that issues related to cooperation, investment, participation, institutional processes, and capacities are major constraints for sharing of agricultural knowledge and information in this region.

5. Status of ICM in the Asia-Pacific and collaboration through APARIS

Dr. S. Attaluri, APARIS Coordinator

It presented the salient outcomes of the status on ICT/ICM in AR4D at national level agricultural research and innovation systems in 19 countries in the Asia-Pacific region. It provides detailed assessment of key indicators under concepts viz., ICT infrastructure; information systems; policy and strategies; contents; ICT applications; information and communication services and information channels besides coverage of APARIS initiatives at the regional level in strengthening policy support, advocacy, capacity development and facilitation of CIARD movement in the region. The application and use of ICT in agricultural research, extension, marketing, education, library services and organizational management has considerably improved over a decade. However, poor and less developed countries are lagging behind in using more advanced ICTs such as for database management, modeling, GIS and remote sensing, knowledge based systems for agricultural research management. It is found that the use and application of ICT in extension, outreach and marketing services have considerably expanded due to interventions by governments, private sector, NGOs and other agencies especially in developing countries to empower people with knowledge but they have problems in upscaling, outscaling and sustainability. It stressed need for mainstreaming ICT/ICM in AR4D at different levels; increased political commitment; increased, improved and targeted investment; capacity development; improving governance; advocacy for openness in sharing agricultural information and enabling greater sharing of data, information and knowledge at all levels.

Session II: Status of information and knowledge management activities in agriculture in the SAARC Region with emphasis on sharable initiatives

Chair: Mrs. Singye Wangmo, ICS

Co-chair: Dr. S. Attaluri, APAARI

Six focal point experts of the SAARC Agriculture Center presented the country reports on use of ICT in agriculture in SAARC countries, Brief gist of their presentations is given below:

Bangladesh: Dr. Sk. Ghulam Hussain, BARC

Most of the agencies in agriculture sector have launched websites highlighting their activities. Among the agencies, Ministry of Agriculture, research, extension and allied agencies are actively operating their websites successfully. Major MIS activities being run by the NARS institutes are Financial Information System, Personal Management Information System, and Library Information System etc. Box 1 gives details of important initiatives in ICTs for agricultural development in Bangladesh.

Box 1. ICT in Agriculture in Bangladesh

Community Information Centers

- Grameenphone established 500 Community Information Centers (CICs) running in around 450 Upazillas through which the rural people can have access to wide range of state of art services such as Internet, voice communications, video conferencing and all other information services.

Mobile based services

- *Krishi Jigyasha* "7676": It provides suggestions and answers to any queries related to agriculture issues such as harvesting, pesticides, diseases, information on seeds, fertilizers, poultry and livestock feed, fisheries techniques and much more.
- *Babsha Jigyasha* "7677": Banglalink provides business related advice and information.
- *Krishibazaar*: It empowers the farmers with market information on prices of essential agricultural produce in 18 major markets across the 7 divisions of Bangladesh. It's an IVR (interactive voice response) based service by Banglalink. Customers can avail this service by dialing "2474" and can either listen to market rates at his/her preferred market or upload the product information of his/her goods.

Web portals

- Department of Agricultural Marketing (DAM) provides price related information through its web portal. BIID (Bangladesh Institute of ICT in Development) launched "E-Krishok" service nationwide across 493 Upazillas (Sub-District) of 64 districts to reach 500,000 farmers. Bangladesh Rice Knowledge Bank (BRKB) by BIRRI and IIRRI provides information on rice cultivation. Bangladesh Central Bank has introduced Web-based Agriculture Credit-MIS. Web portal of Agricultural Information

Service (AIS) is designed to accomplish goal of the Vision 2021 through implementation of 'Digital Agriculture' for the benefit of the people. *Jatiyo e-Tathyakose* or the National E-information Hub is an electronic repository which provides information related to people's life and livelihood in various sectors of Bangladesh including agriculture.

Other applications

- BARC developed an AEZ/GIS facility through a five-year project in 1996 with UNDP funding and technical assistance from FAO. Through this project a GIS based computerized land information system for the whole country was established. The AEZ/GIS database is used for crop production technology generation and transfer, crop diversification and disaster preparedness program planning.
- Bangladesh Country Almanac (BCA) was implemented jointly by BARC-CIMMYT during 2002-2005 through USAID funding. The idea of developing the BCA was to enable the non-GIS users to readily get spatial and non-spatial information/data in CD.
- The Bangladesh Space Research and Remote Sensing Organization (SPARRSO) undertaken studies and developed many applications in the areas of disaster monitoring, coastal mangrove, afforestation, environment, fisheries etc.
- Center for Environmental and Geographic Information Services (CEGIS) provide ICT solutions in different national projects. These included: National Water Resources Database, Integrated Coastal Resource Database and Climate Change database. CEGIS developed software for Water Management, Environment Management, Management Information System, Decision Support System, Disaster Warning System and Resource Management System and also developed several web portals.
- Soil Resources Development Institute (SRDI) in collaboration with CEGIS developed Soil and Land Resource Information System or SOLARIS – a massive database that stores soil data using primary information from Upazila Nirdeshika. Customized GIS software SOLARIS-GIS is also developed to map soil data based on classification (Soil Texture, Land type, Landform, Drainage, Slope, and Surface Water Recession) and condition (Crop Suitability, Land Zoning, Nutrient Status and Fertilizer Recommendation). The system can analyze data at the Upazilla, District, and national levels.
- SRDI in collaboration with KATALYST developed web based software named Online Fertilizer Recommendation System. The system is capable of generating location specific fertilizer recommendation for selected crops by analyzing the national nutrient database developed by the institute. The software needs only location and land type information to generate crop specific fertilizer recommendation.

Policy support

- The Parliament passed ICT Act 2009 to allow online financial transactions, digital signatures, dispute resolution for electronic transactions, and law against cyber crime etc. Right to Information Act (RTI Act 2009) is a landmark move towards ensuring people's access to information. eGovernance Interoperability Framework developed to maintain interoperability standards while developing databases, Management Information Systems (MIS), Websites and Information Portals by the public agencies.

The presentation states that mainstreaming of ICT is still lacking in the NARS. The main reason behind this is that majority of the institutes do not have an ICT/MIS unit. The identified problems that most of the institutes are facing in smooth running of ICT/MIS activities at the institute level include lack of professional manpower, paucity of computer hardware and software, absence of LAN setup, Internet connectivity and e-mail facility and above all non-existence of core ICT/MIS unit in the institutes. To make ICT/MIS activities at NARS sustainable it should be institutionalized as an important core activity. It is suggested that BARC should take lead to strengthen use and application of ICTs in NARS in Bangladesh.

Bhutan: Mr. Kinley Tshering, ICS, MoAF

The country status highlights the Interactive Voice Response (IVR) application in disseminating market information, VERCON, use of radio and television and other ICT applications. Brief details of these initiatives are given in Box 2. It was noticed that the number of queries have been significantly increased due to IVR services and touched 120,000 (January 2012) mark as it provides updated information from the auction markets which is very useful for taking better decisions. In future, it is proposed to include provision of real time information from the markets, voice recognition and customer information. The VERCON experiences shows that inadequate internet connectivity, lack of capacities and other conceptual issues have been major challenges in implementing the project in Bhutan. Important ICT activities in agriculture in Bhutan are given in Box 2.

Box 2. ICT in Agriculture in Bhutan

- *Toll free '2009' service:* The Department of Agricultural Marketing and Cooperatives (DAMC) established toll free telephone number '2009' for M. Mobile users to provide Interactive Voice Response (IVR) to queries on agricultural market prices in five auction markets in Bhutan.
- *VERCON:* In 2004-2006, Bhutan introduced Virtual Extension and Research Communication Network (VERCON) – an internet-based ICT application to network and facilitate communication among RNR extension systems, researchers and farmers. It improved collaboration and coordination among RNR extension agents, farmers and the RNR research agencies located at the regional research centers.
- *Radio and Television:* Radio and TV plays an important role in disseminating RNR information through a variety of programs. *Sanam Rigpa* – a popular live panel discussion program on various topics of RNR broadcast on every Monday on Radio and TV provides the latest information and solutions to current problems.
- Other important initiatives included: CountrySTAT, TADInfo, GIS Maps, Bhutan Bio-Security System and G2C services.

The presentation emphasized need for ICT capacity building for extension staff, collaboration within extension system, use of mobile technology, importance of local dialects and voice recognition in the information services to farmers.

India: Dr. P. Adhiguru, ICAR

The presentation made elaborate account of institutional infrastructure of agricultural research, extension, education and marketing system in India with functional linkages upto the farming community. Krishi Vigyan Kendras (KVKs), Agricultural Technology Information Centre (ATIC) and Agricultural Technology Management Agency (ATMA) occupies prominent place in disseminating appropriate technologies and information to farmers in India. Considering the weaknesses in the current system, the 12 Five Year Plan proposes a Network Project in Extension Education in order to improve innovative extension methodologies of reaching and empowering farmers through participatory and ICT-based extension initiatives (XII Plan-WG on R&E, 2012). It pointed out multiple source and pluralistic information flows in the agricultural innovation systems in an ever increasing roles of different players across the value chain and the growing information needs of farmers. It highlighted several ICT-based initiatives, projects, and radio and television programs in agriculture. Some of the important and current initiatives are given in Box 3.

Box 3. ICT in agriculture in India

- *Agropeadia*: A Joint program of ZPD IV and IIT, Kanpur under National Agricultural Innovation Project (NAIP) in collaboration with several institutions such as ICAR, ICRISAT, UAS-Raichur, IIM-Calcutta. It covers 37 KVKs in Zone IV (25 Uttar Pradesh and 12 Uttarakhand States in India). The *agropeadia* platform www.agropedia.iitk.ac.in is the one-stop-shop for all information, pedagogic or practical knowledge related to extension service in Indian agriculture. It consists of knowledge repository, a social networking platform and content distribution services. Knowledge repository consists of universal meta-models and localized content development for open learning and sharing of information related to agriculture. It is the first Indian agricultural knowledge repository developed with knowledge model for localized content for a variety of users with appropriate interfaces built in collaborative model to support information access in multiple languages.
- *Digital Green* (www.digitalgreen.org): The Digital Green combines technology and social organization to improve the cost-effectiveness and broaden the community participation of existing agricultural extension systems. The unique components of the Digital Green system include (1) a participatory process for local video production, (2) a human-mediated instruction model for video dissemination and training, (3) a hardware and software technology platform for exchanging data in areas with limited Internet and electrical grid connectivity, and (4) an iterative model to progressively better address the needs and interests of the community with analytical tools and interactive phone-based feedback channels. Digital Green works with existing, people-based extension systems and aims to amplify their effectiveness. While video provides a point of focus, it is people and social dynamics that ultimately make Digital Green work.
- *Kisan Mobile Sandesh (KMS)*: In Madhya Pradesh, 43 Krishi Vigyan Kendras (KVKs) use mobile technology to send SMS messages to farmers group (8,000), selected extension functionaries (1,900) and agro-clinic dealers (950). At least 2 messages are sent to farmers on weekly basis at the cost of less than Rs. 50 per year.

- *Kisan Call Centers '1551'*: Department of Agriculture and Cooperation provide answers to farmers queries in local language through toll free number '1551' that can be accessed through landline or mobile phone. The call centers respond to issues raised by farmers, instantly, in the local language in every state. A Kisan Call Center consists of a complex of telecommunication infrastructure, computer support and human resources organized to answer effectively and efficiently the queries raised by farmers instantly in the local language. Mainly, Subject Matter Specialists (SMSs) using telephone and computer, interact with farmers to understand the problem and answer the queries. Kisan Call Center operates at three levels viz., a professionally managed Call Center (Level-I); a Response Center in each organization, where services of Subject Matter Specialists are made available (Level-II); and the Nodal Cell (Level-III).
- *Reuters Market Light (RML)*: A mobile-SMS service, started by Thomson Reuters in 2007, provides personalized information to around a million subscribed farmers in more than 40,000 villages India. The service is delivered through SMS in eight local languages, across 13 states, and over any service provider or mobile phone (RML 2010).
- *IFFCO Kisan Sanchar Limited (IKSL)*: Indian Farmers Fertilizer Co-operative Limited (IFFCO) Kisan Sanchar Limited (IKSL) is a partnership between IFFCO and the mobile service provider Bharti Airtel started in 2007 and covers 18 states in India. Subscribers purchase an IFFCO-Airtel *Green* SIM (subscriber identity module) card, and revenue is generated from the use of talk time by the subscribers. The main service of IKSL is the provision of five free daily voice messages in the local language to subscribers. Till date, around 139,000 voice messages have been developed and nearly 95,000 messages have been delivered to farmers. Information is provided on weather, crop and animal husbandry advisories, market prices etc.

The presentation identifies that content development in local languages; transforming every village into a knowledge center; addressing information needs of smallholder farmers; capacity development on ICTs at different levels for different stakeholders; establishing electronic linkages between and among institutions, agencies, NGOs and other stakeholder groups; attracting investment for ICTs in agriculture etc., need to be considered for better implementation of ICTs for agricultural development.

Nepal: Mr. Baikuntha Adhikari, NARC

ICT can be an efficient tool for providing agricultural information to farmers in a country like Nepal with a variety of terrains. Radio, television, print media, telephone and computer use and internet application are very widely used channels of communication. In Nepal there are about 460 registered community radios, majority of which are very active in disseminating agricultural related information to farmers. There are about 900 telecenters in the rural areas initiated by the government, NGOs and different projects with the aim of providing access to information to rural population. Most of the government organizations and NGOs provide information through websites and mobile phones are widely used for disseminating market information. Some of the ICT initiatives in Nepal agriculture are given in Box 4.

Box 4. ICT in Agriculture in Nepal

- *AMIS*: A web-based agriculture market information system (www.amis.gov.np) provide daily wholesale price through SMS service. It covers four wholesale markets and 24 commodities. The service is available 24/7 throughout the year.
- Market Information Service (MIS): www.agripricenepal.com is a joint undertaking of AEC/ FNCCI, UNDP/RUPP and Market Development Division of GoN. It provides price information of more than 100 commodities including fruits, spices and vegetable from 11 major agricultural markets besides agricultural news, traders' information and periodic reports. It offers its services for a nominal membership of Rupees 3,000.
- *Krishak Ko Chautari* (Farmers get-together point): A popular 30 minute weekly programs broadcast by FM radios. It provides latest information on production technologies, post harvest handling and market information.
- *Krishi Darpan* (Agriculture Mirror): A weekly 30 minute television program on market information, value chain development, marketing extension and subject matter support services to the project stakeholders.

ICTs in agriculture in Nepal are characterized by inadequate infrastructures, insufficient human resources, lack of capacities, lack of awareness on use of ICTs by farmers, poor coordination between agencies and issues in sustainability of tele centers. The presentation emphasizes need for skill development training to staff, massive awareness campaign about the benefit of ICT and involvement of CBOs, NGOs, cooperatives and local bodies in the ICT initiatives. In order to disseminate agricultural information effectively, it is suggested to take advantage of tele centers or agricultural information centers and local FM radios which have become very popular mode of communication in the rural areas.

Pakistan: Mr. Syed Aijaz Shah, PARC

In Pakistan, application of ICT in agriculture has considerably progressed during pre-cultivation, cultivation and harvesting and post-harvest phases through a variety of tools and technologies. Pakistan Agricultural Research Council (PARC) website (<http://www.parc.gov.pk>) provides access to agricultural information databases, journal articles and other resources and establishes linkages with other national and international organizations. It functions as the AGRIS center in Pakistan and facilitates access to several databases and CABI on-line journals. PARC maintains more than 50,000 records of publications on Pakistani agriculture; union database of journals with more than 3,000 titles of journals and magazines available in 36 agricultural and related libraries at national level; National Agricultural Research Information System (NARIS) database containing information of 640 PARC scientists/officers; and database of Pakistani Periodicals on Agriculture and Allied Services with 177 records. Some of the ICT initiatives in agriculture in Pakistan are given Box 5.

Box 5. ICT in Agriculture in Pakistan

- *Kissan Portal* www.pakissan.com: This portal provides latest information on almost all agricultural topics in Pakistan. It gives market prices in the country; information on the fertilizers availability in the country, their rates, the soil on which they are effective and subsidies given by the Government; Information on crop diseases and the proposed remedies and details of the available pesticides; daily regional weather alerts; information on the agricultural loans offered by Banks; up-to-date machinery rates and the subsidies offered to them by the Government etc.
- *CABI Knowledge Management System (KMS)*: CABI, UK piloting 'ICT based services for Agriculture Extension' in Punjab for (2010-2013) with the support of DFID, Mobilink Foundation and Directorate of Agriculture Extension and Adoptive Research, Government of Punjab. The objective of the project is to improve reach and monitoring of extension services to the farming community at a lower cost. It undertakes development of content for mobile/web applications, development of software application and implementation and helpline service to farmers besides strengthening extension system.
- *Fertilizer UAF* (www.fertilizeruaf.pk): It's a software application developed for each major crop, district wise, on the basis of 10 years data of fertilizer trials generated by Soil Fertility Institute, Punjab. The software has been finalized for wheat, rice, maize, sugarcane and cotton crops for all the relevant districts of Punjab and it has been uploaded. This platform helps to collect and synthesize available fertilizer trials data; provide information on fertilizer prediction models to the end users; diagnose for low adoption of fertilizer use technology and imbalance use of nitrogen and phosphorus and undertake training programs on use of fertilizer prediction models to agricultural extension and soil fertility staff at the district level.
- *Agricultural Virtual Organizations (AgriVOs)*: Sindh Agriculture University (SAU) developed a network-based application environment using Grid Computing Technology. This technology enables the scientists in the research organizations to create Agricultural Virtual Organizations (AgriVOs) based on the research collaboration among multiple organizations. Contents Management System (CMS) is used to integrate and configure the AgriVO environment, which will provide a user-friendly interface to the scientists, who will create and share the research data.

Challenges to ICTs included: lack of awareness on the benefits of ICTs; lack of capacities; end-user training; integration of different systems and availability of software and hardware. It is suggested to improve rural access to ICTs through support of multi-use telecenters in rural and marginal areas. It is necessary to establish public libraries, science parks, technology incubation centers and science museums for promotion of ICT culture and diffusion of technology. Besides empowering farmers and agricultural extension agents on the use of agriculture knowledge and information systems for increasing productivity, it is very important to ensure women and girls participation in emerging knowledge networks in order to improve women's access to ICTs.

Sri Lanka: Dr. R.R.A. Wijekoon, DoA, MoA

Sri Lanka ranks 21st in the Global Services Location Index that deals with size of workforce and size of existing IT/BPO in a country. The status of ICT in Sri Lanka

agriculture is remarked with the establishment of National Agriculture Information Center and a network among 560 agrarian service centers in the country. Cyber Extension was an important initiative that uses the power of on-line networks, computer communications and digital interactive multimedia to facilitate dissemination of agricultural technologies. More than 100 rural knowledge centers (Cyber Units) were established covering all the provinces. Each Cyber Unit is equipped with basic computer, internet connectivity, printer, scanner, digital camera etc. Interactive multimedia CD-ROMs on various themes of agricultural importance and skills in communication are highly useful in improving self learning of more than 9,000 ARPAs and farmers in the country. The Department of Agriculture provides access to several agricultural information resources through a variety of platforms and technologies. The reality television programs by the DoA to motivate young farmers to join agriculture have been very successful. Some of the important initiatives are given in Box 6.

Box 6. ICT in Agriculture in Sri Lanka

- *The Department of Agriculture (DoA)*: It maintains the largest interactive website (www.agridept.gov.lk) through which it provides up-to-date information by using popular tools and social media applications. It gives the latest market prices, farmers database, agricultural technologies, videos films on agricultural issues etc., besides several information resources. The DoA website has been recognized as best departmental level as well as the overall government website in Sri Lanka.
- *Wiki Goviya* (<http://www.goviya.lk>): It's a latest addition to the ICT-based agriculture extension campaign of the Audio Visual Centre of the Department of Agriculture expected to attract more audience than ever. It's based on the popular "Wiki" technology for website development. The primary role of the Wiki Goviya is to promote agriculture in an aesthetically pleasing means of ICT to bridge the information gap of rural farmers with the rest of the world and expects the collaborative contribution of agriculture community (AC) through the participatory approaches of the web technology.
- *'1920' Agriculture Advisory Service*: A popular call center service started at the Audio Visual Center of the Department of Agriculture to assist farmers in solving their various problems such as agriculture related technical matters, inputs and marketing problems. The service can be contacted by farmers for their queries over any land or mobile phone in office hours by dialing '1920'.
- *Rice Knowledge Bank*: It's the world's leading repository of extension and training materials related to rice production. It was launched by the International Rice Research Institute (IRRI). The Audio Visual Center of the Department of Agriculture is coordinating the Sri Lanka Rice Knowledge Bank (www.knowledgebank.irri.org/sriLanka/home.html). It provides information on agro-ecological zones, paddy varieties, land preparation, fertilizer recommendation, water management, pesticide management, harvesting and rice recipes etc.
- *Fish Lanka*: The first ever web portal (www.fishinglanka.com) of Sri Lanka which provides up-to-date information on the potential fishing zones in the Indian Ocean. It helps fishing community of Sri Lanka to find the potential fishing zones faster and reduce fuel consumption. Indicators such as mixed layer depth, sub surface temperature, salinity, wind, weather, ocean currents etc., are used to identify potential fishing zones. Information on fishing zones is usually sent as SMS messages to the fishing boat owners or agents of fishing boats who in turn send information to fishermen through radio messages and mobile phones.

The use of ICTs in Sri Lankan agriculture face challenges such as lack of awareness on the benefits of ICTs by the farming community; lack of motivation among agricultural officer to use and maintain ICTs for agricultural extension works; inadequate administrative and policy support coupled with insufficient financial support to ICT activities. In future the Government of Sri Lanka has taken initiative to establish Cyber Extension Units in all Agrarian Service Centres (ASCs) with proper staff provision to maintain farmers database and an island wise network. The DoA has taken initiative to establish Agriculture Radio station with the open source mobile phone-based software for effective participatory radio programs. Mobile phones will emerge as important technology for frontline SMS applications to disseminate and collect information, establish two-way communication between farmers and the radio broadcasters and address queries of farmers through locating interactive mapping facilities.

Session III: Shareable ICTs, information and knowledge management activities for agricultural development in the Asia-Pacific

Chair: Dr. Ajit Maru, GFAR

Co-chair: Dr. Katinka Weinberger, UNESCAP-CAPSA

A lively panel discussion was conducted to share experience and approaches in information and knowledge management activities for agricultural development in the Asia-Pacific at the national, sub-regional and regional levels by the following members with the moderation of the Chair and Co-chair:

- Dr. Rameshwar Singh, ICAR, India
- Dr. Laurence David Fooks, NARI, Papua New Guinea
- Ms. Cecilia B. Leaño, PCAARRD, Philippines
- Mr. Golam Mustafa, SAC
- Mr. Gerard Sylvester, FAO RAP
- Dr. S. Attaluri, APAARI



Panel discussion in progress

The discussants shared different agricultural information and management initiatives at the national, sub-regional and regional levels with focus on issues for inclusion of stakeholders and collaboration. Dr. Rameshwar Singh, ICAR, India shared that the ICAR has placed knowledge management in agriculture on priority to open up access to agricultural data and information to all stakeholders. He highlighted the initiatives under the NAIP, opening access to ICAR research journals and expert resources available with the ICAR. Dr. Laurence David Fooks, NARI, Papua New Guinea mentioned that the Pacific context needs to be considered differently due to inadequate infrastructure, lack of capacities and cooperation both within and outside the organizations in the region. He emphasized need for training staff, support from the policy makers and following standards for exchange of data and information. Ms. Cecilia B. Leaño, PCAARRD, Philippines shared the strengths of knowledge management systems of PCAARRD especially the linkages with other agencies,

farmers information technology centers and quick dissemination services across the Philippines. She felt there is need for international standards for managing and sharing agricultural information at nations, regions and global levels. Mr. Golam Mustafa, SAC explained the information support services to the SAARC Agriculture Center to the member countries in South Asia. He shared that effective sharing of information by the national agricultural systems needs further cooperation and capacity development at national level. Mr. Gerard Sylvester, FAO RAP shared the efforts of taking forward the CIARD movement in the region with the collaboration of partners, capacity development and learning through IMARK, FAO initiatives in information standards through AGROVOC and linked open data. He emphasized importance of social media in sharing agricultural information and knowledge. Dr. S. Attaluri, APAARI shared role and activities of APARIS in sharing agricultural information at the regional level, improving use and application of ICT and developing capacities of ICM managers on policies, technologies and need for opening access to agricultural information. He mentioned that the less developed NARS in the region require more attention in the areas of capacity development and technical assistance in order to exchange agricultural information and innovations effectively.

The Chair summed up that there is a need for demand-driven interventions in the less developed countries instead of investing in the generic type of activities. Stress should be more on open access to all information including research journals and “grey” literature, development of institutional repositories, use of new tools such as AgriVIVO, AgriFeeds, Agripaedia and social media. There is also dire need for sensitization of heads in the agricultural research systems on the relevance of investments in ICM, enabling policies and need for coherence initiatives like CIARD for effective sharing and using information for agricultural problems. In continuation of sharing the experiences on opening access to results of the institutional research and development activities and information related to sustainable agriculture and transfer of technologies, the following two presentations were made:

Open Access to Agricultural Information and Knowledge: the case of ICRISAT

Mr. Madhan, ICRISAT

ICRISAT adopted an Open Access Policy to share and disseminate widely the results of its research and development activities through the open platform <http://oar.icrisat.org>. The policy makes every scientist/author in all locations, laboratories and offices to send the final version of PDF copies immediately after its acceptance by the publishers. All PDF files should be sent to the Library and Information Services and provide complete citation details once the article is published. The Library will make the PDFs available via the ICRISAT’s open access platform. As of now, ICRISAT repository is home to more than 5,700 documents covering from 1971 to 2013. It comprises of research articles, book sections, monographs, workshop proceedings, books, theses etc. About 178,000 items were downloaded in 2012, which shows that this source is very popular among scientific community. The presentation also highlighted the ICRISAT’s Open Data Repository (<http://dataverse.icrisat.org/dvn>) – a web application for sharing, citing, analyzing and preserving research data. Each dataverse contains

studies or collections of studies, and each study contains cataloging information that describes the data plus the actual data and complementary files. ICRISAT also launched an e-learning platform AgEd Open Course Ware through its Learning Systems Unit (LSU). It provides various learning courses developed using Moodle, an open-source community-based tool for e-Learning which allows feedback and interaction among actors. It was stated that public institutions will exist and play an important role in agricultural research and extension. In order to make information accessible to public, Open Access should be mandatory in all the institutions.

SATNET Asia: Innovation network for food security and poverty reduction

Dr. Katinka Weinberger, UNESCAP-CAPSA

SATNET Asia is a regional network to bring stakeholders closer to share knowledge and experiences on agricultural technologies and measures for trade facilitation. It's supported by the European Union and implemented by the Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA) with an aim to connect organizations working in sustainable agriculture and trade, helping them to identify, systematically document and share existing best practices. It facilitates their collaboration and capacity building to enable them to reach those who need these technologies and to put them into actual use. SATNET works with governments, research organizations, researchers, NGOs, and the private sector. SATNET Asia provides information through its website (www.satnetasia.org) in the form of fact sheets, extension material, expert information etc., and also uses social media and on-line discussion to facilitate engagement and solicit inputs of stakeholders to analytical work and to strengthen the innovation network.

Session V: Plenary Session

Chair: Dr. Raj Paroda, APAARI

Co-chair: Dr. Ajit Maru, GFAR

The session was opened by the chair Dr. Raj Paroda highlighting the need for collective actions to open access to agricultural information and knowledge in the region for better impact of research in the field. He mentioned that the Global Conference on Agricultural Research for Development 2012 (GCARD II) established a clear framework for the collaborations and actions required for opening access to agricultural information for greater sharing of agricultural data, information and knowledge at national, regional and global levels.



Plenary session in progress

The co-chair Dr. Ajit Maru stressed need to follow 7 Cs (capital, content, connectivity, collaboration, capacity, community participation and culture of organization) for opening access to agricultural information and knowledge. He pointed out that there should be provision for clear budget for ICM activities for agricultural institutions besides commitment of people. He stated that there is essential need to sensitize the heads of national agricultural research systems and the policy makers on the importance of opening access to information related to agricultural research and innovation systems for sharing valuable experiences, expertise and knowledge in order to address problems in agriculture. Each participant was asked to share views on the opportunities and challenges for opening access to agricultural information at their institutions and possible areas for collaboration.

The draft list of collective actions emerged from the group work was presented for discussion and finalization against the background of each participant's views expressed in the plenary session. After thorough discussion on each action point, the following collective actions are identified to be undertaken by different organizations:

Collective Actions

- 1. Sensitization of SAARC Agricultural Ministers and Senior Policy Makers:** SAARC Agriculture Center will schedule a session to sensitize the Agricultural Ministers on the importance of ICT/ICM for AR4D during the next SAARC Agricultural Ministerial meeting which will possibly be held in the first half of 2013. GFAR/FAO and APAARI will provide technical support and jointly organize the event. It was suggested that the ADG and RR of FAO RAP may be approached to include discussion and presentation on ICM for agricultural development in the agenda of FAO APCR 2014. ASEAN and APEC may be approached to organize such a special session in their Ministerial Meetings. Sensitization on ICM for agricultural development at national, sub-regional and regional levels should be taken up through appropriate platforms and events.
- 2. Compilation of ICM projects and experts in the Asia-Pacific region and testing AgriVIVO with the dataset:** APAARI will prepare a database of ICM projects in the Asia-Pacific region with the contribution from ICM managers in the NARS by the end of 2013, share it on the website and test with AgriVIVO. It was suggested to form a group comprising experts from APAARI, FAO RAP and ICRISAT to finalize the matter regarding database development.
- 3. Need-based training programs to ICM managers in the developing NARS:** Indian Council of Agricultural Research (ICAR) should offer training programs to ICM managers of the developing NARS in the region free of registration cost in 2013. FAO, SAARC and APAARI should support suitable candidates for need-based training programs. It was suggested that APAARI and FAO/GFAR should provide technical support to national level training and capacity development programs and also approach other developed NARS for such training opportunities. PCAARRD and ICRISAT were asked to circulate the training opportunities to all countries.
- 4. Policies and strategies on open access to agricultural research articles:** ICRISAT should share its open access policies, strategies and procedures with NARS through APAARI/APARIS by January 2013. ICRISAT will also support through technical assistance/help desk.
- 5. Catalogue of e-extension initiatives in India with critical analysis on their impact on agricultural development:** Indian Council of Agricultural Research (ICAR) should prepare the catalogue of e-extension initiatives in India with the technical support of APAARI by December, 2013. Drs. S. Attaluri, P. Adhiguru, Rameshwar Singh, Gerard Sylvester and Madhan will prepare a format for the catalogue by March, 2013 and share it with other countries to develop catalogue of e-extension initiatives in those countries.
- 6. Development of AGROVOC in the countries:** FAO should initiate development of AGROVOC in Bangladesh – with the collaboration of Bangladesh Agricultural Research Council (BARC); Pakistan – with the collaboration of Pakistan Agricultural Research Council (PARC); Sri Lanka – with Council for Agricultural Research Policy

(SL CARP); and Bhutan – Information and Communication Services (ICS), Ministry of Agriculture and Forests.

7. Development of Handbook of Agriculture on Wiki through collaborative contribution: Indian Council of Agricultural Research (ICAR) should initiate publishing of handbook of agriculture on Wiki platform. Technical support needs to be provided by ICRISAT.

8. Joining AgriFeeds by the NARS for effective sharing of information and news to global users: All NARS to immediately generate RSS feeds and join the AgriFeed for effective sharing of information and news. APAARI and FAO should coordinate this action.

9. Joining CIARD RING: APAARI and FAO should pursue the SAARC Agriculture Center, Bangladesh Agricultural Research Council (BARC), Pakistan Agricultural Research Council (PARC) to join the CIARD RING immediately and also initiate follow-up with other NARS in Loa PDR, Cambodia, Sri Lanka, Bhutan and the Philippines to join the CIARD by February, 2013.

10. Developing Agricultural Information Repositories: ICRISAT should provide necessary technical support and help to BARC, PARC, CoRRB/ICS and NARC who showed interest to develop institutional repositories.

11. Open Access to Agricultural Journals: Indian Council of Agricultural Research (ICAR) should impart capacities to make the following research journals as open access journals: SAARC Journal of Agriculture by the SAC; Bangladesh Journal of Agricultural Research by BARC; Journal of RNR Bhutan by the CoRRB; and Annals of the Sri Lanka Department of Agriculture (ASDA) by the Department of Agriculture, Peradeniya University.

12. E-learning module on opening access to agricultural information as part of IMARK: FAO should develop e-learning module through the IMARK initiative on the principles and elements of open access, tools and institutional issues.

13. Strengthening APARIS: APAARI, GFAR and FAO should develop a proposal to strengthen APARIS program to undertake the collective actions and to improve management and sharing of agricultural contents in the region.

Valedictory Program

The consultation ended with a valedictory session in which all the participants shared their feedback and appreciated the organizers and the host country Bhutan for nice hospitality. Mrs. Singye Wangmo, ICS; Dr. Tashi Samdup, CoRRB; Mr. Golam Mustafa, SAC; Mr. Gerard Sylvester, FAO; Dr. Ajit Maru, GFAR and Dr. Raj Paroda, APAARI made their concluding remarks and thanked all the participants for their active participation and appreciated the efforts of CoRRB and ICS in organizing the meeting successfully in a very short notice. Mr. Kailash Pradhan, CoRRB made the vote of thanks.

Annexure-I

Regional Consultation on
Collective Actions for Opening Access to Agricultural Information
and Knowledge in the Asia-Pacific Region

13-15 December, 2012, Thimphu, Bhutan

INAUGURAL ADDRESS

by

H.E. LYONPO Dr. PEMA GYAMTSHO
Minister for Agriculture and Forests

Distinguished dignitaries on the dais, participants who have come from different countries, delegated, ladies and gentlemen,

Good morning!

It gives me immense pleasure to welcome you on behalf of the Ministry of Agriculture and Forests, the Royal Government of Bhutan to this very important consultation organized by the CoRRB and ICS in collaboration with APAARI, FAO, GFAR and SAARC Agriculture Center. I extend a warm welcome to all participants who have come from different countries and organizers from different organizations to Bhutan.

Dear participants! Over 3 billion people in this world live on less than \$2.50 a day. About 1 billion children live in poverty and feeding growing population has been a challenge for many developing countries and it is acute in the Asian region. In order to feed the population in future, developing countries will increasingly depend on cereal imports. By 2030 they could be producing only 86 percent of their own needs, with net imports amounting to some 265 million tonnes annually – almost three times of the present levels. Beyond these basic food crops, the agriculture and often the whole economy of many developing countries depend to a high degree on the production of one or a few commodities destined principally for export. Looking into the future, the scope for growth in world demand and in the exports of developing countries is greatest for those commodities whose consumption is growing rapidly in the developing countries themselves, several of which are likely to become large importers.

Although the food production and demand trends seem murky, there are means to undertake the challenge of feeding the world. One among many factors is the use and application of *agricultural information*. “Agricultural information” plays a key role in agricultural productivity. Agricultural productivity can arguably be improved by relevant, reliable and useful information and knowledge. It can help inform decisions regarding land, labour, livestock, capital and management.

As Rolling puts it, an agricultural information system is a system in which agricultural information is generated, transformed, consolidated, received and feedback sent to underpin knowledge utilization by agricultural producers. Therefore, generating and opening access to relevant and useful information for smallholder farmers and producers and small rural entrepreneurs engaged in agriculture related businesses and livelihoods needs high attention by all actors in agricultural development in the region.

Ladies and gentlemen! Access to agricultural information and its effective use by smallholder farmers in the Asia-Pacific region urgently require collective action to implement policies and practices with targeted investment and capacity building in ICM, improve governance of agricultural information systems and strengthen partnerships and networks in support of opening access for greater sharing of agricultural data, information objects and knowledge by individual organizations and countries in the region. Collective action is all the more important to enable smallholder resource-poor farmers and producers to effectively share and use information and knowledge for agricultural innovation, especially in smaller and economically weak countries of the region.

This expert consultation conference with objectives of (i) identifying collective actions, (ii) sharing good practices, and (iii) strengthening institutional partnership and commitment in opening access to agricultural information and knowledge in the region is timely and I thank the organizers for selecting Bhutan as the venue for holding such important conference.

I am sure that the eminent scientists and ICM experts from the Asia-Pacific regions in this consultation would definitely deliberate critical issues on opening access to agricultural information and knowledge for addressing the problems of poverty and food insecurity and come out with collective actions which can help improve our agricultural information and knowledge systems in the region and in the world. I wish all the success to this consultation.

Thank you and Tahsi Delek!

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Annexure-II

Program

Day 1 Thursday (13 December, 2012)		
09:00-09:20	Marchang	
09:20-09:25	Welcome Address	Dr. Tashi Samdup, Director, CoRRB
09:25-09:35	Welcome Address	Dr. Raj Paroda, Executive Secretary, APAARI
09:35-09:40	General Remarks	Dr. Ajit Maru, GFAR
09:40-09:45	General Remarks	Mr. Gerard Sylvester, FAO
09:45-09:50	General Remarks	Mr. M. Golam Mustafa, SAARC Agriculture Center (SAC)
09:50-10:10	Inaugural Address	H.E. Dr. Pema Gyamtsho, Minister, Ministry of Agriculture and Forests
10:10-10:15	Vote of Thanks	Mrs. Singye Wangmo, Program Director, ICS
10:15-10:45	Coffee break and Group Photo	
<i>M.C.: Ms. Kunzang Choden</i>		
Session I: Collaboration for Sharing Agricultural Information and Knowledge at the Regional and Global Levels		
	Chair: Dr. Tashi Samdup, CoRRB	
	Co-chair: Dr. Sk. Ghulam Hussain, BARC	
10:45-11:00	Introduction of the participants and Objectives of the consultation	Dr. S. Attaluri, APAARI
11:00-11:20	Global perspective on sharing and using agricultural information and knowledge through Collective Actions	Dr. Ajit Maru, GFAR
11:20-11:40	Collaboration through CIARD initiative in the region	Mr. Gerard Sylvester, FAO
11:40-12:00	Sharing agricultural information in SAARC countries	Mr. M. Golam Mustafa, SAC
12:00-12:20	Status of ICM in the Asia-Pacific and collaboration through APARIS	Dr. S. Attaluri, APAARI
12:20-13:00	Open discussion	
13:00-14:00	Lunch	

Session II: Status of information and knowledge management activities in agriculture in the SAARC Region with emphasis on sharable initiatives	
	Chair: Mrs. Singye Wangmo, ICS
	Co-chair: Dr. S. Attaluri, APAARI
14:00-15:00	<i>Bangladesh:</i> Dr. Sk. Ghulam Hussain, BARC <i>Bhutan:</i> Mr. Kinley Tshering, ICS, MoAF <i>India:</i> Dr. P. Adhiguru, ICAR
15:00-15:30	Coffee break
15:30-16:30	<i>Nepal:</i> Mr. Baikuntha Adhikari, NARC <i>Pakistan:</i> Mr. Syed Aijaz Shah, PARC <i>Sri Lanka:</i> Dr. R.R.A. Wijekoon, DoA, MoA
16:30-17:30	Discussion
18:30-	Reception Dinner by APAARI

Day 2 Friday (14 December, 2012)

Session III: Shareable ICTs, information and knowledge management activities for agricultural development in the Asia-Pacific	
	Chair: Dr. Ajit Maru, GFAR
	Co-chair: Dr. Katinka Weinberge, UNESCAP-CAPSA
09:00-09:10	Introduction to the session by the Chair
09:10-11:30	<p><i>Participatory Panel Discussion:</i> Sharing experience and approaches in information and knowledge management activities for agricultural development in the Asia-Pacific: Focus on inclusion of stakeholders and collaboration.</p> <ul style="list-style-type: none"> • Dr. Rameshwar Singh, ICAR, India • Dr. Laurence David Fooks, NARI, Papua New Guinea • Ms. Cecilia B. Leaño, PCAARRD, Philippines • Mr. Gerard Sylvester, FAO RAP • Dr. S. Attaluri, APAARI • Mr. M. Golam Mustafa, SAC
11:30-11:45	Wrap up by Co-chair
11:45-12:15	Experience sharing on opening access to information related to sustainable agriculture and transfer of sustainable technological to smallholder farmers and other stakeholders in the region.
12:15-12:45	
12:45-14:00	Lunch

Session IV: Collective Actions for Opening Access to Agricultural Information and Knowledge for All		
14:00-15:00	Working Session on identifying issues and prioritization of solutions in collaboration and partnerships <ul style="list-style-type: none"> • Institutional aspects • Capacity building • Technical Issues and Technologies 	<i>Facilitators:</i> Dr. S. Attaluri, Mr. Gerard Sylvester and Mrs. Singye Wangmo
15:00-15:30	Coffee Break	
15:30-17:00	Working Session continues...	
17:00-17:30	Presentation outcomes of the Working Session on Key Actions	
17:30-17:40	Wrap up by the Chair	
18:00-	Dinner hosted by the Minister of Agriculture and Forests, the Royal Government of Bhutan	

Day 3 Saturday (15 December, 2012)

Session V: Plenary Session		
	Chair: Dr. Raj Paroda, APAARI	
	Co-chair: Dr. Ajit Maru, GFAR	
09:00-09:15	Opening Remarks by the Chair	
09:15-10:30	Round table on the Collective Actions on enabling institutional commitments and new partnerships in the region	
10:30-11:00	Coffee break	
11:00-11:15	Wrap up by the Chair	
11:15-12:30	Valedictory Program	
	Concluding remarks:	Mrs. Singye Wangmo, ICS Dr. Tashi Samdup, CoRRB Dr. Golam Mustafa, SAC Mr. Gerard Sylvester, FAO Dr. Ajit Maru, GFAR Dr. Raj Paroda, APAARI
	Vote of Thanks	Mr. Kailash Pradhan, CoRRB
12:30-	Close	

Annexure-III**List of Participants****Dr. Tashi Samdup**

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