

Report of the High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization Strategy in Asia and the Pacific Region

“Sustainable Mechanization Across the Food Chain”

**26 - 27 June, 2014
Bangkok, Thailand**



**Food and Agriculture Organization
of the United Nations**



**UNITED NATIONS
ESCAP**
Economic and Social Commission for Asia and the Pacific
Centre for Sustainable Agricultural Mechanization

CSAM

Foreword



Agricultural mechanization is playing an increasingly important role in agri-food systems development across Asia and the Pacific region. Asia and the Pacific region has made considerable progress over the past two decades in the adoption of mechanization and is now the largest market for agricultural machinery, implements and equipment, globally. Despite this progress, the level of agricultural mechanization in the region as a whole is lagging behind that of developed countries. Agricultural mechanization is still at a very basic stage of development in most countries of the region.

With urbanization, the feminization of agriculture and an increasing scarcity of labor in rural areas across the region, there is a growing need for mechanization to address productivity enhancement in a sustainable manner so as not to jeopardize production systems now and in the future. Of equal importance is the need to address the use of mechanization in post-production systems - harvesting, post-harvest handling and in processing operations - to assure improvements in efficiency and profitability across agri-food chains.

Toward meeting that end, a holistic approach must be taken, wherein emphasis is placed on the development of sustainable production and post-production systems - that is systems that maintain optimal production without jeopardizing production factors; which employ practices that assure energy efficiency, reduce carbon and gas emissions and which avoid accelerating erosion and soil degradation by applying measures to conserve soil fertility, through, for example, the efficient and appropriate use of agricultural inputs and which reduce post-production losses. Sustainable mechanization must also contribute to enhancing the financial performance of agri-food value chains, improving food security, reducing the drudgery associated with work in these chains and help to alleviate labor shortages in rural areas of the region. Sustainable mechanization is, therefore, of vital importance in supporting inclusive and efficient agro-food value chain development in the region.

This report summarizes the key findings and recommendations of a High Level Multi-stakeholder Consultation on Sustainable Agricultural Mechanization Strategy convened in Bangkok on 26 and 27 June 2014, by the Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Pacific, in collaboration with the UNESCAP Centre for Sustainable Agricultural Mechanization (UNESCAP/CSAM).

I take this opportunity to express my sincere appreciation to UNESCAP\CSAM and to all participants for their contributions to this important High Level Consultation.

Hiroyuki Konuma
Assistant Director-General and Regional Representative
FAO Regional Office for Asia and the Pacific

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Executive Summary



The *High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Asia and the Pacific Region* was convened in Bangkok, Thailand, during the period, 26 -27 June 2014, by the Food and Agriculture Organization - Regional Office for Asia and the Pacific (FAO-RAP) in collaboration with the UNESCAP Centre for Sustainable Agricultural Mechanization (UNESCAP/CSAM) Bangkok, Thailand.

The Consultation was attended by senior level Government officials representing twenty-one countries in the region. Other participants to the Consultation, were representatives of civil society organizations (CSOs), the private sector, academic and research organizations, and development partners. A total of seventy-two individuals participated in the Consultation.

A draft strategy document titled *Sustainable Agricultural Mechanization Strategy (SAMS) for Asia and the Pacific Region*, commissioned by FAO in collaboration with CSAM, served as the background document to facilitated discussions during the Consultation. Participants agreed that the key issues to be addressed within the context of the strategy, be categorized under four thematic areas: technical, socio-economic and institutional, environmental and cross-cutting issues.

Key issues highlighted during discussions that framed the scope of the strategy, included:

- The need to recognize that mechanization is required for the entire agricultural and food sector - and in this regard, that ‘agriculture’ in the context of the strategy, be defined broadly to include crop and livestock production as well as fisheries and agro-forestry production.
- The need to cover the entire agri-food chain from the supply of inputs, to on-farm production as well as post-harvest handling and processing to the logistics of transportation and distribution of the agricultural produce to the ultimate consumer.

While there was general consensus on the need for networking and information sharing on SAM across the region, a majority of country representatives took a cautious approach to endorsing the development of a Network on Sustainable Agricultural Mechanization for Asia and the Pacific (SAMNET), requesting additional information. It was agreed that the SAMNET concept note presented to the Consultation, would be amended taking into consideration the feedback received during discussions and would be re-circulated to participants for their feedback.

1. Introduction



Although Asia and the Pacific region has emerged over the past two decades as the largest market in the world, in terms of sales of agricultural machinery, implements and equipment, agricultural mechanization is at a very basic stage of development in most countries of the region.

With urbanization, the feminization of agriculture and an increasing scarcity of labour in rural areas across the region, there is a growing need for the development of farm mechanization to address productivity enhancement in a sustainable manner so as not to jeopardize production systems now and in the future. It is equally important to address the quality of, and use of mechanization across the value chain.

Toward meeting that end, a holistic approach must be taken, wherein emphasis must be placed on the development of sustainable agricultural production systems - that is systems that maintain optimal production without jeopardizing production factors; and which employ practices that assure energy efficiency, reduce carbon and gas emissions; which avoid accelerating erosion and soil degradation (and which include measures to conserve soil fertility, through, for example, the efficient and appropriate use of pesticides and fertilizers. Sustainable agricultural production systems must also enhance the financial performance of farms, contribute to improving food security, reducing the drudgery associated with agricultural work, and help to alleviate labour shortages in rural areas of the region, while making appropriate use of sustainable agricultural mechanization (SAM).

Sustainable Agricultural Mechanization Strategy or SAMS, is a planning strategy that contributes to the agricultural goal of sustainability, while meeting food self sufficiency, generating economic development and inclusive growth as well as social benefit. SAMS is part of the enabling environment for sustainable agricultural production.

To address the development of SAMS in the region, the Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Pacific (FAO-RAP) and the UNESCAP Centre for Sustainable Agricultural Mechanization (UNESCAP-CSAM), embarked on collaboration in December 2011. The inaugural meeting of SAMS, produced a strategic framework founded on five key pillars to address SAMS development in Asia and the Pacific Region:

- Pillar 1 Assessments and analyses of the current status of agricultural mechanization
- Pillar 2 Enabling policies and institutions
- Pillar 3 Human capacity development
- Pillar 4 Investment in SAMS
- Pillar 5 Advocacy on sustainable agricultural mechanization

A follow-up workshop convened at FAO in April 2012, produced a document outline to be used by countries for consolidating data and information of relevance to Pillar 1, under the strategic framework. Country reports were prepared in accordance with the outlines developed and were presented at a Workshop on SAMS convened by CSAM and FAO in November, 2012. A number of country papers, prepared from a policy perspective, were presented at a Regional Forum on Sustainable Agricultural Mechanization in the Asia-Pacific Region, convened by UNESCAP/CSAM in October 2013 in Qingdao, People's Republic of China.

All of the above consultations/workshops and their outputs, underlined the critical importance of moving toward sustainable agricultural practices, by not only increasing access to environmentally sound farm machinery and implements but also by developing and transferring land preparation and crop husbandry techniques that contribute to the enhancement of sustainable rural livelihoods as well as the reduction of pressure on natural resources which are the lifeblood for food production.

It is against this background that FAO-RAP in collaboration with UNESCAP-CSAM, convened a two-day High Level Multi-stakeholder Consultation on Sustainable Agricultural Mechanization Strategy (Annex 1). Seventy-two individuals, including senior level officials representing Governments of twenty-one countries (Annex 2) in the region participated in the Consultation. Other participants to the Consultation included representatives of CSOs, private sector, academic and research organizations, and development partners.

The objectives of the Consultation, were to:

- Review agricultural mechanization across grain and non-grain value chains in the region;
- Finalize a regional sustainable mechanization strategy;
- Develop a regional network for Sustainable Agricultural Mechanization (SAMNET).

2. Opening Ceremony



The *High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Asia and the Pacific Region* was convened in Bangkok, Thailand, 26 -27 June 2014. The meeting was opened by Mr. Hiroyuki Konuma, Assistant Director General and Regional Representative of the FAO Regional Office for Asia and the Pacific.

In his opening remarks **Mr. Konuma** emphasized the value placed by FAO on the collaboration established in December 2011 with UNESCAP/CSAM to collaboratively address the issue of Sustainable Agricultural Mechanization Strategy or SAMS in the region.

Mr. Konuma noted that Asia and the Pacific Region has emerged, over the past two decades, as the largest market in the world, in terms of sales of agricultural machinery, implements and equipment. He, however, emphasized that while rapid agricultural mechanization has been successful in contributing to increasing food production, productivity and in enhancing rural economies, ensuring that agricultural mechanization utilizes the region's natural resource base in a sustainable way, in order not to jeopardize food production systems now and in the future is of critical importance..

He informed that SAMS is part of the enabling environment for sustainable agricultural production, and is a planning strategy that contributes to the agricultural goal of sustainability while meeting food self-sufficiency, generating economic development and inclusive growth as well as social benefits.

Mr. Konuma underlined the critical importance of a multi-stakeholder platform in discussing SAMS and in mapping the way forward in terms of strategic actions to be taken at the country and regional levels, to enrich the strategy and policy of member nations toward achieving sustainable food security while taking cognizance of lessons from past policies and strategies on agricultural mechanization as well as future socio-economic and technological trends.

In his opening remarks, on behalf of UNESCAP and CSAM, **Mr. Zhao Bing**, Head of CSAM, noted that the main contributing factors which need to be considered in the development of agricultural mechanization include: policies and strategies of member countries; subsidies through, among other mechanisms, subsidized credit and reduced taxes; support to research and development efforts as well as targeted extension services.

He highlighted the enormous scope for regional collaboration in tackling the challenges of agricultural mechanization given the comparatively low levels of mechanization in some countries and reiterated CSAM's commitment to the creation of regional forums for policy dialogues and data and information hubs.

3. The Consultation

A draft strategy document titled *Sustainable Agricultural Mechanization Strategy (SAMS) for Asia and the Pacific Region*, commissioned by FAO in collaboration with CSAM, served as the background document to facilitated discussions on SAMS. The agenda of the Consultation (Annex 4) included five plenary presentations. The presentations are attached as Annexes 3 – 6.

Following each plenary session, facilitated discussions were conducted in order to obtain the immediate feedback and impressions of participants.

1. The Strategy Document: Key Issues Emerging from the Facilitated Discussions

Past Developments and the Need for SAMS

- i. SAM is an important factor in the region's overall agricultural development strategy leading from the progress in agricultural mechanization development so far attain over the past five decades.
- ii. The role played by FAO and UNESCAP in the past in the development of agricultural mechanization in the region is recognized and the need for the two organizations to be even more active in the development of SAMS is quite apparent. This will involve activities both at the national and regional levels and a good start has been made, in this respect, in the consultations on SAMS facilitated by FAO and CSAM since 2011.
- iii. There is a need to recognize that mechanization is required for the entire agricultural and food sector- and in this regard 'agriculture' is defined broadly to include crop and livestock production as well as fisheries and forestry production and the associated post on farm production operations until the food and/or agricultural produce reaches the consumer.
- iv. The focus should be on all types of farmers from the small subsistence farmers to the small scale commercial ones as well as medium and large scale farmers. It was noted that all of these farmers have played a role in the development of agricultural mechanization which has occurred over the past 5 decades and will continue to feature in the SAMS.
- v. The demographic trends in the region – increasing urbanization; ageing farmer population and feminization of agriculture are important issues which have influenced the pace and type of agricultural mechanization occurring in the region in the past and will continue to feature even more in SAMS over the next 2 – 3 decades.
- vi. Policy is critical to agricultural mechanization development and there is a need to learn from the experience of the different countries (and even regions within countries) on what policies have been successful and which ones have failed including reasons for success and/or failure. The experience of the different countries in the region on agricultural mechanization over the past 5 decades is rich and diverse and SAMS needs to build on it.
- vii. Environmental issues are critical to the development of agricultural mechanization in the region. While these have not featured that highly in the agricultural mechanization strategies

- implemented in the region in the past, they are going to be key issues for the sustainability of agricultural systems in the region and have to have a much higher priority in SAMS.
- viii. Manufacturing and trade of agricultural machinery, implements and equipment has increased significantly in the region over the past three decades and the region is emerging as the leading global player in this sector. The role of the different countries (both small and the large ones) as well as different stakeholders (the public and private sectors; chambers of commerce and regulatory bodies for testing and standards) in manufacturing and trade in agricultural machinery and implements has been critical in development of agricultural mechanization in the past and will feature highly in SAMS.
 - ix. Research and development as well as technology transfer and extension services have been key issues in agricultural mechanization development and will continue to be so in SAMS. Specifically the roles of public and private sector agencies as well as roles of small and large countries and regional cooperation and coordination are all important in this respect.

Thematic Strategies and Options

- I. Capacity building at all levels starting from farmers to scientists in research and development organizations has been a key factor in agricultural mechanization efforts of the past. This also includes in institutions responsible for agricultural mechanization development – including credit and financing institutions; distribution, sales and repair and maintenance franchises; research and development as well as technology transfer agencies. The same will apply to SAMS especially given new technologies (ICT; Precision farming etc.) and the need for a regional coordinating mechanism.
- II. On transforming the farm power situation in Asia and the Pacific region – the declining role of draught animals was noted and there is a general agreement that they are being replaced by two and/or four wheel tractors in many parts of the region. While there is a rapid increase in the number of tractors in use and a rapid decline in the number of draft animals in use in many parts of the region, the exact dynamics of how this transformation in sources of farm power is occurring is not well understood and documented. In particular, how the millions of small scale farmers are (or are going to be) affected by this transformation in the short, medium and long term; what happens to both the draught animals being released from farm work and the feed resources they are consuming i.e. what is the implication of this to the entire livestock sector.
- III. There was a general agreement that there is a need to transform the current tillage and crop husbandry practices to more sustainable methods. While Conservation Agriculture (CA) practices have been adopted in North and South America as well as in New Zealand and Australia, it however cannot be that easily adopted in much of the Asia and Pacific region. This is due to the fact that crop rotations and fallowing of land – the two hallmarks of CA in the Americas and Australia - are difficult to implement due to paddy being the dominant crop in Asia and due to the severe land shortage in the most of the region thus making fallowing of land as not a feasible option. There will be a need to develop special types of CA practices and technologies suitable to the region. It was suggested that FAO needs to look more critically on CA rather than promoting it as a one size fits all solution globally. The participant from the World Bank noted that efforts to promote CA practices were affected by, among

other factors, the low capacity of the extension services in this area as well as lack of credit for purchasing the required implements.

- IV. It was noted that chapter 6 and indeed the entire document was too focused on mechanization of crop production. There is need to review this to reflect mechanization in other agricultural sub-sectors like livestock production; agro-forestry; aquaculture etc. - all of which are quite important to food security and rural development for the region. Further, mechanization has to cater for the entire agri-food chain from on farm production to the produce reaching the ultimate consumer –hence the concept of sustainable mechanization across agri-food chains (SMAAC) may be more appropriate, in this respect.
- V. There was a general agreement that gender and youth empowerment in agriculture are quite important and mechanization is likely to play a leading role in achieving this. Therefore, SAMS needs to factor in gender issues given the increasing feminization of farming caused partially by the increasing migration of youth to urban areas due to, among other reasons, the drudgery associated with current farming methods.
- VI. Most delegates stressed the need for SAMS to come up with programs which help small scale farmers tackle the agricultural mechanization constraints they face – either through designing of appropriate and affordable machinery and implements coupled with credit lines to procure the same or helping cooperatives and/or entrepreneurs set up enterprises which can efficiently and effectively provide such mechanization services at affordable prices. It was noted that there are quite a number of such schemes which have been successfully implemented throughout the region and the policies and support services which facilitate their success need to be studied and documented to be emulated and/or scaled up.
- VII. It was noted that the region is emerging as the largest manufacturer and consumer of agricultural machinery, implements and equipment. While the large countries like Japan, India and China dominate in this respect, the smaller countries are also becoming quite active. The establishment of regional standards and testing networks such as ANTAM will be beneficial to all users of agricultural machinery as well as the manufacturers.
- VIII. The issue of support for policy and strategy formulation is crucial for SAMS. Most countries in the region will need some technical assistance to help them to formulate appropriate policies and strategies for tackling their mechanization constraints given the rapidly changing socio-economic and technological conditions prevailing and/or going to occur in the region during the first half of the 2^{1st} century. Regional cooperation will facilitate exchange of information and experiences and there is need to explore what mechanism and institutional frameworks can effectively and efficiently facilitate such collaboration.
- IX. Finally, it was suggested that the strategies/areas and options, raised in chapter 5 and 6 could be clustered around four main areas; Technical, Socio-economic and Institutional, Environmental and Cross-cutting. The key issues to be addressed/discussed within the context of these thematic areas, as agreed to, by the meeting is summarized in Table 1.

Table 1. Key Thematic Areas and Options for Sustainable Agricultural Mechanization Strategy

Technical	Socioeconomic & Institutional	Environment	Cross cutting
<ul style="list-style-type: none"> - Changing source of farm power - Improving agricultural mechanization engineering & design - Increased usage of ICT in machinery - Transforming land preparation - Crop husbandry practices - Transplanting and seeding - Fertilizer application and residue management - Water use efficiency - Increased use of mechanization in harvesting & on-farm post-harvest operations - Mechanization across the value chain - Post harvest and processing - Post harvest losses (quantity & quality) - Quality improvement of harvest - Research & development - Standards & testing - Machinery, implements & consequent price reduction - Role of 	<ul style="list-style-type: none"> - Role of gender & empowerment of women - Youth empowerment - Small-holders & farmer organizations - Manufacturing - Financing of investments in SAM - Cost of inputs - Land tenure - Risk management (insurance, etc.) - On-farm value addition - Data - Subsidies and funding 	<ul style="list-style-type: none"> - Land degradation - accelerated soil erosion and soil compaction owing to inappropriate use of mechanization - Overuse & inappropriate use & handling of chemical inputs - Threat of climate change - Emissions 	<ul style="list-style-type: none"> - Policy Support - Advocacy - Capacity Building - Knowledge sharing - R&D - Extension - Technology transfer - Technical Support Services - Training

<p>manufacturers of agricultural mechanization equipment</p> <ul style="list-style-type: none"> - Mechanization services – maintenance & spare parts - Monitoring and evaluation - Risk management - Operators' safety issues - Engineering and design - Energy efficiency (consumption) 			
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Recommendations

It was agreed that the focus of agricultural mechanization in the coming three decades should be on sustainability of the systems involved and should cover the entire agri-food value chain from the supply of inputs, to on-farm production as well as post-harvest handling and processing to the logistics of transportation and distribution of the agricultural produce to the ultimate consumer.

Participants agreed in principle that the draft document covered important issues and agreed to endorse it, provided that all inputs contributed during the plenary discussions of the High Level Multi-Stakeholder Consultation are taken into consideration in the revised version of the document.

Follow Up

The draft strategy document would be revised by the consultants to integrate all of the issues consolidated in Table 1, and will be circulated to participants for their further review and input.

2. Proposed Regional Network for Sustainable Agricultural Mechanization (SAMNET)

The slightly modified working document (Annex 2) for a Network for Sustainable Agricultural Mechanization (SAMNET) was presented in plenary as a basis for discussions on the formation of a Network for Sustainable Agricultural Mechanization (SAMNET) in the region.

The idea of creating a SAMNET was fully endorsed by Pakistan. A high level of interest in seeing such a platform being created was also expressed by the IRRI representative.

While there was general consensus on the need for information sharing on SAM across the region, a majority of country representatives took a cautious approach, requesting additional information, prior to providing endorsement on SAMNET.

Recommendations

The Chair proposed that the SAMNET concept note would be amended, taking into consideration the feedback received during discussions.

Follow Up

It was agreed that an amended SAMNET concept note would be circulated to all participants for their consideration within two weeks.



Food and Agriculture Organization
of the United Nations



**High-Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization
in Asia and the Pacific Region
26 - 27 June, 2014, Bangkok, Thailand**

“Sustainable Mechanization Across the Food Chain”

Agenda

Date/Time	Activities	Chair/Facilitator
Day 1		
08:00	Registration	
09:00 – 09:30	Opening Session	Dr. Rosa Rolle
	<p>Welcome remarks - Mr. Hiryouki Konuma, Assistant Director General and Regional Representative, FAO Regional Office for Asia and the Pacific</p> <p>Remarks – Mr. Zhao Bing, Head, Centre for Sustainable Agricultural Mechanization (CSAM), UNESCAP</p>	
09:30 – 10:00	Plenary presentation – <i>Overview of agricultural mechanization in Asia and the Pacific region.</i> Mr. Zhao Bing, Head, Centre for Sustainable Agricultural Mechanization (CSAM), UNESCAP	
10:00 – 10:30	Plenary presentation – <i>The SAMS framework – A review.</i> Dr. Rosa Rolle, Senior Agro-Industry and Post-harvest Officer, FAO Regional Office for Asia and the Pacific	
10:30 – 11:00	Coffee break	
11:00 – 11:30	Plenary presentation – <i>Key Issues - Technical, socio-economic, demographic, environmental and policy that shape agricultural mechanization systems in Asia and the Pacific region.</i> Dr. Peeyush Soni, Assistant Professor, Agricultural Systems and Engineering, Asian Institute of Technology	
11:30 – 12:30	Facilitated discussion on key issues.	Mr. Le Roy Hollenbeck,

12:30 – 13:30	Lunch	
13:30 – 14:00	Plenary presentation – <i>Thematic strategies and options for sustainable agricultural mechanization (SAM) in Asia and the Pacific Region.</i> Dr. Geoffrey Mrema, Professor of Agricultural Engineering, Sokoine University of Agriculture.	
14:00 – 15:00	Facilitated plenary discussion on SAMS strategic themes.	Mr. Le Roy Hollenbeck,
15:00 – 15:30	Coffee break	
15:30 – 16:30	Facilitated plenary discussion on strategic themes continued.	Mr. Le Roy Hollenbeck
18:30 – 20:30	Cocktail reception	

Date/Time	Activities	
Day 2		
09:00 – 09:30	Presentation - <i>Final Draft of SAMS.</i> Dr. Geoffrey Mrema, Professor of Agricultural Engineering, Sokoine University of Agriculture.	
09:30 – 10:30	Plenary discussions and finalization of SAMS strategy.	Mr. Le Roy Hollenbeck
10:30 – 11:00	Coffee break	
11:00 – 11:30	Plenary presentation - <i>Goals and objectives of a SAMS Network for Asia and the Pacific Region.</i> Dr. Rosa Rolle, Senior Agro-Industry and Post-harvest Officer, FAO Regional Office for Asia and the Pacific	
11:30 – 12:00	Facilitated discussion on the relevance of a SAMS Network.	Mr. Le Roy Hollenbeck
12:00 – 13:30	Lunch	
13:30 – 15:30	Plenary presentation/discussion - Review of a draft document on the formation of a SAMS network in the region.	
15:30 – 16:00	Coffee break	
16:00 – 17:00	Concluding Session	

List of Participants

AFGHANISTAN

Mr Mohammad Qasim Wesal
 President of Agriculture and Mechanization
 Ministry of Agriculture, Irrigation and Livestock
 Mechanization Directorate - Kabul
 Jamasmina Positive Kabul University
 Kabul
 EM: qasim_wesal@yahoo.com

BANGLADESH

Mr Md Abu Zubair Hossain Bablu
 Deputy Secretary
 Ministry of Agriculture
 Bangladesh Secretariat Building-4 (fourth floor)
 Dhaka 1000
 Tel: +88-02-9540603
 Fax: +880-2-7171555, 7167040, 7163080
 EM: zubair6696@yahoo.com

Dr Sultan Ahmmed
 Member Director
 Natural Resources Management (NRM) Division
 Bangladesh Agricultural Research Council (BARC)
 Airport Road, Farmgate
 Dhaka 1215
 Tel: 88-02-9111432
 Fax: 88-02-8142459
 EM: s.ahmmed@barc.gov.bd , md-nrm@barc.gov.bd

BHUTAN

Mr Karma Thinley
 Programme Director
 Agriculture Machinery Centre
 Ministry of Agriculture and Forests
 Paro
 Tel: +975-8-272439,271234
 Fax: +975-8-271568
 EM: krt@druknet.bt ; karzang2005t@gmail.com

Mr Sonam
District Agriculture Officer
Chhukha Dzongkhag
Tel: +975-8-478808, 478205
Fax: +975-8-478213
EM: bumthap@yahoo.com

CAMBODIA

Mr Pech Sovanno
Deputy Director General
General Directorate of Agriculture (GDA)
Ministry of Agriculture, Forestry and Fisheries

Dr Chan Saruth
Director, Department of Agriculture Engineering
General Directorate of Agriculture (GDA)
Ministry of Agriculture, Forestry and Fisheries
E-mail: saruthchan@hotmail.com

CHINA, PEOPLE'S REPUBLIC

Ms Lu Yubin
Deputy Division Director
Department of Agricultural Mechanization
Ministry of Agriculture
11 Nongzhanguannanli
Beijing 100025
Tel: 008610-59192821
Fax: 008610-59192880
EM: yubinlu@126.com ; luyubin@agri.gov.cn

Mr Liu Jing
Programme Officer
Department of Agricultural Mechanization Management
Ministry of Agriculture
11 Nongzhanguannanli
Beijing 100025

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

Mr Choe Chol Ho
Deputy Director
Department of Foreign Exchange of Science and Technology
Academy of Agricultural Sciences (AAS)
Pyongyang District
Pyongyang
EM: aas1948@star-co.net.kp

Mr Tokgo Song Chol
Senior Officer
Department of Scientific Guidance
Academy of Agricultural Sciences (AAS)
Pyongyang District
Pyongyang
EM: aas1948@star-co.net.kp

INDIA

Dr V.N. Kale
Additional Commissioner (M & T), DAC
Ministry of Agriculture and Food Processing Industries
Room No. 298, Krishi Bhawan
Dr. Rajendra Prasad Road
New Delhi 110 00
Fax: 011-23387200
EM: kalevn2000@yahoo.co.in

Dr A.N. Meshram
Deputy Commissioner (M & T)
Ministry of Agriculture and Food Processing Industries
Krishi Bhawan, Dr. Rajendra Prasad Road
New Delhi 110 00
Fax: 011-23382922
EM: anmeshram2000@yahoo.com

INDONESIA

Dr Abi Prabowo
Specialist Researcher
Indonesian Center for Agricultural Engineering Research and Development
Ministry of Agriculture, Situgadung
Tromol 2, Serpong, Tangerang – Banten 15310
Tel: 6221-70936787
Fax: 6221-71695497
EM: harimurtipuspo@gmail.com

Mr S. Mardison
Senior Engineer
Indonesian Center for Agricultural Engineering Research and Development
Ministry of Agriculture, Situgadung
Tromol 2, Serpong, Tangerang – Banten 15310
Tel: 6221-70936787
Fax: 6221-71695497
EM: ardhison_pipo@yahoo.com ; dhison77@gmail.com

LAO PEOPLE'S DEMOCRATIC REPUBLIC

Dr Phouang Parisak Pravongviengkham
Deputy Minister for Agriculture and Forestry
Ministry of Agriculture and Forestry
Lane Xang Avenue
Vientiane
Tel: +856-21-412342, 415361
Fax: +856-21-412344
EM: planning.maf@laogov.net

Mr Sousath Sayakoummane
Deputy Permanent Secretary
Ministry of Agriculture and Forestry
Lane Xang Avenue
Vientiane
Tel: 856-20-97142409
Fax: 856-20-22513440
EM: sousaths@hotmail.com

Dr Phommy Inthichack
Deputy Director
Division of International Cooperation
Department of Planning and Cooperation
Lanexay Avenue Patouway Square, P.O. Box 811
Vientiane
Tel: 856-21-415358
Fax: 856-21-412343
EM: p_inthichack@yahoo.com ; pinthichack@hotmail.com

Mr Thippavong Ounla
Secretary to Deputy Minister for Agriculture and Forestry
Ministry of Agriculture and Forestry
Lanexay Avenue Patouway Square, P.O. Box 811
Vientiane
Tel: 856-21-415358
Fax: 856-21-412343

Mr Kham Ouane Khamphoukeo
Director
Division of Cooperatives and Agribusiness and Director of National Project Coordinator
Small-holder Development Project
Department of Agriculture Extension and Cooperative (DAEC)
Lanexay Avenue Patouway Square,
P.O. Box 811
Vientiane
Tel: 856-21-415358
Fax: 856-21-412343

Mr Khonesavanh Vongxay
Director
National Programme Coordinator for Soum Son Seun Jai
Community-based Food Security and Economic Opportunity Programme
Department of Planning and Cooperation
Ministry of Agriculture and Forestry
Lanexay Avenue Patouway Square, P.O. Box 811
Vientiane
Tel: 856-21-415358
Fax: 856-21-412343

Mr Vinoth Vansy
National Project Director
National Project Coordinator for Sustainable Natural Resource
Management and Productivity Enhancement
Department of Planning and Cooperation
Ministry of Agriculture and Forestry,
P.O. Box 811
Vientiane
Tel: 856-21-285170-1
Fax: 856-21-285172
EM: snmapep5@gmail.com ; vinus_lao02@yahoo.com

MALAYSIA

Dr Mohd Taqiuddin bin Zakaria
Principal Assistant Secretary
Service Support and Development Industry
Ministry of Agriculture and Agro-Based Industry
Level 13, Wisma Tani No. 28
Persiaran Perdana Presint 4
62624 Putrajaya
Tel: +60-3-88701217
Fax: +60-3-88888463
EM: mtaqiuddin@moa.gov.my

Dr Chan Chee Wan
Deputy Director and Senior Principal Research Officer
Electric and Building Environmental System Program
Malaysian Agricultural Research and Development Institute (MARDI)
PO Box 12301
Kuala Lumpur 50774
Tel: 603-8943-7072
Fax: 603-8948-2961
EM: cwchan@mardi.gov.my

MALDIVES

Mr Mohamed Shareef
Deputy Minister for Fisheries and Agriculture
Ministry of Fisheries and Agriculture
Velaanaage, 7th Floor, Ameer Ahmed Magu
Malé - 20096
Tel: +960-3339206
Fax: +960-3326558
EM: admin@fishagri.gov.mv

Mr Mohamed Rihvaan
Assistant Director
Ministry of Fisheries and Agriculture
Velaanaage, 7th Floor, Ameer Ahmed Magu
Malé - 20096
Tel: +960-3339206, 7520349

MONGOLIA

Ms T. Renchinsengee
Director-General
Crop Production Policy Implementation Department
Ministry of Industry and Agriculture
13381 Zasgiin gazriin IX bair, Enkhtaivanii urgun chuluu 16A
Bayanzurkh duureg
Ulaanbaatar
Tel: +976-51-262713
Fax: +976-11-452554
EM: renchinsengee@mofa.gov.mn

Mr D. Galsanbuyan
Deputy Director
Crop Production Supporting Fund
Ministry of Industry and Agriculture
13381 Zasgiin gazriin IX bair, Enkhtaivanii urgun chuluu 16A
Bayanzurkh duureg
Ulaanbaatar
Tel: +976-51-262271
Fax: +976-11-452554
EM: galsan999@yahoo.com

Ms R. Enhchimeg
Officer of International Cooperation Division Ministry of Industry and Agriculture Government
building IX, Enkhtaivan Avenue 16A
Ulaanbaatar
EM: enhchimeg@mofa.gov.mn ; re.chimeg@gmail.com

Mr R. Buuveibaatar
Head of Department of Electrical Engineering
Mongolian State, University of Agriculture
Ulaanbaatar
Tel: 976-70130414
EM: Elec_msua@yahoo.com

Mr L. Davaasuren
Head of Industry and Agriculture Department of Tuv aimag
Ulaanbaatar
EM: davaasuren99@yahoo.com ; PHL.88@yahoo.com

Mr U. Boldsaikhan
President of Ensada Holding Ltd.
4th floor, Ochir Building, Peace Avenue 15A/5
Sukhbaatar District, 1-khoroo
Ulaanbaatar 14210
Fax: 976-70119833
EM: boldoo@citcorp.ca

MYANMAR

Mr Myint Zaw
Director
Agricultural Mechanization Department
Ministry of Agriculture and Irrigation
Building No. 15
Nay Pyi Taw
Tel: +95-067-410004, 403321
Fax: +95-067-400013
EM: ir-dap@myanmar.com.mm
Mr Soe Soe
Deputy Director
Agricultural Mechanization Department
Ministry of Agriculture and Irrigation
Building No. 15
Nay Pyi Taw
Tel: +95-067-410004, 403321
Fax: +95-067-400013
EM: ir-dap@myanmar.com.mm

NEPAL

Mr Madhusudan Singh Basnyat
Senior Agricultural Engineer
Officiating Programme Director
Directorate of Agricultural Engineering (DOAE)
Department of Agriculture (DOA)
Harihar Bhawan, Lalitpur
Tel: 977-1-5522082
Fax: 977-1-5010088
EM: basnyatms@ymail.com ; basnyatms@gmail.com

PAKISTAN

H.E. Sikandar Hayat Bosan
Minister for National Food Security and Research
Ministry of National Food Security and Research
C-Block, Pak Secretariat
Islamabad
Tel: +92-51-9210088, 9204756
Fax: +92-51-9205912, 9210616

Dr Iftikhar Ahmad
Chairman
Pakistan Agricultural Research Council (PARC)
Room No. 504, PARC-HQ, Sector G-5/1
Atta Turk Avenue, Islamabad
EM: iftahmad@gmail.com , chair@comsats.net.pk

PAPUA NEW GUINEA

Mr Stephen Mesa
Acting Regional Director, Northern
Department of Agriculture and Livestock
Vele Rumana Building, 4th Street
2nd Floor – Suite 2, P.O. Box 4535
Lae City 411, Morobe Province
Tel: 675-4720114
Fax: 675-4720114
EM: mesasa67@gmail.com

Mr Ralph Yamb
Acting Manager, Erap Station
Department of Agriculture and Livestock
Vele Rumana Building, 4th Street
2nd Floor – Suite 2, P.O. Box 4535
Lae City 411, Morobe Province
Tel: 675-4720114
Fax: 675-4720114
EM: ralphyamb@gmail.com

PHILIPPINES

Dr Raul R. Paz
Acting Director
Philippine Center for Postharvest Development and Mechanization (PHilMech)
CLSU Compound 3120, Science City of Muñoz
Nueva Ecija
Tel: 044-4560213
Fax: 044-4560110
EM: raulrpaz@yahoo.com , od.philmec@yahoo.com

SINGAPORE

Ms Fadhlina Suhaimi
Senior Scientist (Horticulture)
Horticulture Technology Department
Technology and Industry Development Group
Agri-Food and Veterinary Authority of Singapore (AVA)
Sembawang Research Station, Larong Chencharu Singapore 769194
Tel: 65-67519821
Fax: 65-67521244
EM: fadhlina_suhaimi@ava.gov.sg

SRI LANKA

H.E. Mahinda Yapa Abeywardena
Minister for Agriculture
Ministry of Agriculture
“Govijina Mandiraya”
80/5 Rajamalwatta Avenue
Battaramulla, Colombo
Tel: +94-11-2869553, 2872093
Fax: +94-11-2868919, 2868915
EM: magriliv@sltnet.lk

Mr B.M.P.C. Balasooriya
Engineer, Farm Mechanization Research Center
Department of Agriculture
Ministry of Agriculture
“Govijina Mandiraya”
80/5 Rajamalwatta Avenue
Battaramulla, Colombo
Tel: +94-11-2869553, 2872093
Fax: +94-11-2868919, 2868915
EM: magriliv@sltnet.lk

THAILAND

Mr Viboon Thepent
Senior Agricultural Engineering Specialist
Director, Post-harvest Engineering Research Group
Klong-1, Klongluang District,
Pathumthani 12120
Tel: 02-5290663, 02-9158436
Fax: 02-5290664
EM: v_thepent@hotmail.com

VIET NAM

Mr Nguyen Duy Duc

Deputy Director-General

Viet Nam Institute of Agricultural Engineering and Post-Harvesting Technology and Deputy Director-General, MARD

Ministry of Agriculture and Rural Development

2 Ngoc Ha-Ba Dinh

Hanoi

Tel: +84-0838481151

EM: ducnguyenduy2003@yahoo.com

Mr Tran Minh Manh

Vice Head

Agricultural Engineering Division

Department of Processing for Agro-Forestry-Fishery Products and Salt Production

Ministry of Agriculture and Rural Development

2 Ngoc Ha-Ba Dinh

Hanoi

Tel: +84-0437711113

EM: manhtm.cb@mard.gov.vn

Private Sector Associations and Networks

Agricultural Machinery Manufacturers Association

Dr. D.S. Balachandra Babu

President

Agricultural Machinery Manufacturers Association

Plot No. B-37, Survey No. 15

B. U. Bhandari Greens Coop. Housing Society

Dhanori, Pune – 411 015

INDIA

EM: balachandra.babu@gmail.com

European Network for Testing of Agricultural Machines (ENAMA)

Dr Sandro Liberatori

General Director

European Network for Testing of Agricultural Machines (ENAMA)

Meccanizzazione Agricola,

Via Venafro 5 - 00159, Roma

ITALY

Tel: 39-06-40860027

Fax: 39-06-4076264

EM: sandro.liberatori@enama.it

Ms Natascia Maisano
International Relations Office
European Network for Testing of Agricultural Machines (ENAMA)
Meccanizzazione Agricola,
Via Venafro 5 - 00159, Roma
ITALY
Tel: 39-06-40860027
Fax: 39-06-4076264
EM: natascia.maisano@enama.it

The Thai Chamber of Commerce

Mr Pornsil Patchrintanakul
Vice Chairman
The Thai Chamber of Commerce
150 Rajbopit Rd. Pranakhon
Bangkok 10200
THAILAND
Tel: 02-6221860-70
Fax: 02-2253372
EM: pa2724@gmail.com ; tcc@thaichamber.org

Ms Sukanya Chaichuen
Assistant to Vice Chairman
The Thai Chamber of Commerce
150 Rajbopit Rd. Pranakhon
Bangkok 10200
THAILAND
Tel: 02-6221860-70
Fax: 02-2253372
EM: sukanya_2120@yahoo.com

Academic and Research Institutions

Asian Institute of Technology (AIT)

Dr Peeyush Soni
Assistant Professor
Agricultural Systems and Engineering
Asian Institute of Technology (AIT)
58 Moo 9 Paholyothin Highway, KlongLuang
Pathumthani 12120
THAILAND
Tel: 02-5245000
EM: soni.ait@gmail.com

International Rice Research Institute (IRRI)

Mr Martin Gummert
Senior Scientist
Crop and Environmental Services Division
Programme Leader, "Adding value"
International Rice Research Institute (IRRI)
10th Floor Suite 1009, Security Bank Center
6776 Ayala Avenue Makati
Metro Manila 1226
PHILIPPINES
Tel: 63-2-8566133
Fax: 63-2-891-1236
EM: m.gummert@irri.org

Japan International Research Center for Agricultural Sciences (JIRCAS)

Mr Tomohide Sugino
Representative, Southeast Asia Liaison Office
Japan International Research Center for Agricultural Sciences (JIRCAS)
50 Phaholyothin Rd., Ladyao, Chatuchak
Bangkok 10900
THAILAND
Tel: 02-5614743, 9405755
Fax: 02-9405949
EM: tosugino@jircas.affrc.go.jp

UN Agencies**UNESCAP**

Mr Marc Proksch
Chief
Business and Development Section
Trade and Investment Division
UN Building, Rajdamnern Nok Avenue
Bangkok 10200
THAILAND

Mr Eric Roeder
MDG Advocacy Specialist
Countries with Special Needs Section
Macroeconomic Policy and Development Division
UN Building, Rajdamnern Nok Avenue
Bangkok 10200
THAILAND
Tel: 02-2882390
EM: roeder@un.org

Mr Bing Zhao
Head
Centre for Sustainable Agricultural Mechanization (CSAM)
A-7/Floor China International Science and Technology Convention Centre
No. 12 Yumin Road, Chaoyang District
Beijing 100029
CHINA
Tel: 86-10-82253579
Fax: 86-10-82253584
EM: bing.zhao@un-csam.org

Ms Ai Yuxin
Programme Officer
Center for Sustainable Agricultural Mechanization (CSAM)
A-7/Floor China International Science and Technology Convention Centre
No. 12 Yumin Road, Chaoyang District
Beijing 100029
CHINA
Tel: 86-10-82253585
Fax: 86-10-82253584
EM: aiyx@un-csam.org

World Bank

Mr Erhard Floether
Agriculture Development Specialist
Crop Production and Farm Mechanization
Soil and Water Conservation and Irrigation
529/16 Kaen Thoy Tani, Maliwan Road
Khon Kaen 40000
THAILAND
Tel: 6643-344819
EM: e.f.floether@googlemail.com

Representatives of Diplomatic Missions

ITALY

Ms Nopasi Niyamabha
Administrative Collaborator of
Economic and Commercial Office
Embassy of Italy
27 & 40 Floor, CRC Tower, All Seasons Place
87 Wireless Rd., Lumpini, Phatumwan
Bangkok 10500
THAILAND
Tel: 02-2504970-5
EM: commerciale.bangkok@esteri.it

JAPAN

Ms Chanyapach Unhajata
Political Assistant
The Embassy of Japan
177 Witthayu Rd.
Lumphini, Pathumwan
Bangkok 10330
THAILAND
Tel: 662-6963000
Fax: 662-6963017
EM: koichi.okamoto@mofa.go.jp

Civil Society Organizations (CSO)**Asia Pacific Network for Food Sovereignty (APNFS)**

Ms Ananeza Aban
Secretariat
Asia Pacific Network for Food Sovereignty (APNFS)
87 Malakas St., Brgy, Pinyahan
Quezon City, NCR 1100
PHILIPPINES
EM: azenana@gmail.com

Farmer and Nature Network (FNN)

Mr Sopheap Pan
Executive Director
Farmer and Nature Network (FNN)
No. 56 AU, St. 230, Sangkat Boeng Salang
Khan Tuol Kork, B.P. 1118
Phnom Penh
CAMBODIA
Tel: 023-6369990
Fax: 023-885146
EM: pansopheap1@gmail.com

Roots for Equity

Mr Wali Haider
A-1 (Ground Floor), Block-2
Gulshan-E-Iqbal
Karachi
PAKISTAN
EM: walikh@yahoo.com

Self Employed Women's Association (SEWA)

Ms Chhaya Bhavsar
SEWA Reception Centre, Opp. Victoria Garden
Bhadra, Ahmedabad 380-001
INDIA
EM: chhayabhavsar@sewa.org

Food and Agriculture Organization of the United Nations

Mr Hiroyuki Konuma
Assistant Director General and Regional Representative
FAO Regional Office for Asia and the Pacific
Maliwan Mansion, 39 Phra Athit Road
Bangkok 10200
THAILAND
EM: Hiroyuki.Konuma@fao.org

Dr Rosa Rolle
Senior Agro-Industries and Post Harvest Officer
FAO Regional Office for Asia and the Pacific
Maliwan Mansion, 39 Phra Athit Road
Bangkok 10200
THAILAND
EM: Rosa.Rolle@fao.org

Mr Yuji Niino
Land Management Officer
FAO Regional Office for Asia and the Pacific
Maliwan Mansion, 39 Phra Athit Road
Bangkok 10200
THAILAND
EM: Yuji.Niino@fao.org

Dr Geoffrey C. Mrema
FAO Consultant
Professor of Agricultural Engineering
Sokoine University of Agriculture (SUA)
Agricultural Engineering Building, Office No. 2
P.O. Box 3233, Morogoro
TANZANIA
Tel: +255-754-322036, +255-714-622916
EM: geoffmrema@yahoo.co.uk , geoffmrema@gmail.com , geoffmrema@suanet.ac.tz

Mr LeRoy Hollenbeck
Facilitator-FAO Consultant
Jln P4engembak No. 16
Sanur/Bali 80228
INDONESIA
EM: haoleru@yahoo.com

Ms Nerlita M. Manalili
FAO Consultant
NEXUS Agribusiness Solutions
3rd Floor, Vega Centre
College, Los Baños
4031 Laguna
PHILIPPINES
Fax: 63-49-5366290
EM: nmm.nexus@yahoo.com ; drnerlie@yahoo.com

OPENING REMARKS

by

Hiroyuki Konuma

Assistant Director-General and
FAO Regional Representative for Asia and the Pacific

delivered at the

**High-Level Multi-Stakeholder Consultation on
Sustainable Agricultural Mechanization in Asia and the Pacific**

26 to 27 June 2014

Bangkok, Thailand

Mr Bing Zhao, Director of the Center for Sustainable Agricultural Mechanization,

Excellencies,

Distinguished Delegates,

Ladies and Gentlemen,

Good morning.

First of all, it is my pleasure to welcome you all to this High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization Strategy in Asia and the Pacific. We value the partnership established in December 2011 with the UNESCAP Centre for Sustainable Agricultural Mechanization, to collaboratively address the issue of Sustainable Agricultural Mechanization Strategy or SAMS in the region.

I wish to acknowledge the presence of Dr. Geoffrey Mrema, former Director of the Rural Infrastructure and Agro-Industries Division of FAO, and currently Professor of Agricultural Engineering, at Sokoine University of Agriculture, Tanzania, and Dr. Peeyush Soni, Assistant Professor of Agricultural Systems Engineering of the Asian Institute of Technology for jointly preparing the draft background document for this Consultation. I also wish to acknowledge the presence of Mr. Leroy Hollenbeck, former Director of UNESCAP – CSAM who initiated discussions toward the partnership established with FAO, during the inception meeting of SAMS in 2011. Dr. Hollenbeck will facilitate discussions during this Consultation.

Today, we have present here, representatives from 21 countries in the region, with some 69 participants including two Ministers of Agriculture, two vice Ministers of Agriculture, representatives of CSOs, academic and research institutions, private sector organizations, donor agencies and development partners. I wish to thank all of you for taking time off your busy schedules to participate in this High-Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization Strategy.

Ladies and Gentlemen,

Asia and the Pacific is home to 62 per cent of the world's undernourished. The region's food system is currently being shaped by a number of forces, including population growth coupled with rising living standards, increasing urbanization rates, particularly among young males, the feminization of agriculture and a declining rural labour force as well declining land resources, and a growing scarcity of water resources for agriculture. There is also the uncertainty of the potential impacts of climate change in the region.

At the same time, the region has emerged over the past two decades as the largest market in the world, in terms of sales of agricultural machinery, implements and equipment - projected to have sales of US \$49 billion in 2015 (as compared to \$ 27 billion in North America and \$20.5 billion in Western Europe; World Bank 2010).

This is indeed a great achievement which could not have been contemplated even at the turn of the 21st century. The tractor may well be regarded as the hero of the Asian agricultural revolution in the 21st century just as it was belatedly branded the 'Unsung Hero' of the agricultural revolution in the USA in the middle part of the 20th century.

While rapid agricultural mechanization has been successful in contributing to increasing food production, productivity and the enhancement of rural economies, there is a need to ensure that agricultural mechanization make use of the region's natural resource base in a sustainable way, in order not to jeopardize food production systems now and in the future.

Toward meeting that end, a holistic approach must be taken, wherein emphasis must be placed on the development of sustainable agricultural production systems - that is systems that maintain optimal production without jeopardizing production factors; and which employ practices that assure energy efficiency, reduce carbon and gas emissions; which avoid accelerating erosion and soil degradation (such as conservation and low tillage agriculture), and which include measures to conserve soil fertility, through, for example, the efficient and appropriate use of pesticides and fertilizers. Sustainable agricultural production systems must also enhance the financial performance of farms, contribute to improving food security, reducing the drudgery associated with agricultural work, and help to alleviate labour shortages in rural areas of the region, while making appropriate use of agricultural mechanization technologies.

The new paradigm of "sustainable production intensification" as described in a recent FAO publication titled Save and Grow recognizes the need for productive and remunerative agriculture that conserves and enhances the natural resource base and the environment, and which positively contributes to the delivery of environmental services.

Ladies and Gentlemen,

Sustainable Agricultural Mechanization Strategy or SAMS, is a planning strategy that contributes to the agricultural goal of sustainability, while meeting food self sufficiency, generating economic development and inclusive growth as well as social benefit. SAMS is part of the enabling environment for sustainable agricultural production.

FAO recognizes the critical importance of a multi-stakeholder platform in discussing SAMS and in mapping the way forward in terms of strategic actions to be taken at the country and regional levels, to enrich the strategy and policy of member nations toward achieving sustainable food security while taking cognizance of lessons from past policies and strategies on agricultural mechanization as well as future socio-economic and technological trends. This is why we are here today. We strongly believe that through joint efforts and sharing and exchanging information, the region will be able to

forge ahead in promoting sustainable agricultural mechanization practice in its food production systems.

This Consultation seeks to promote discussions among countries on the development and/or adjustment of their mechanization strategies in light of broader regional/global trends and national priorities; solicit the input of policy makers and a broad range of stakeholders and to help in identifying key strategic options for SAMS, while considering implied trade-offs (or consequences).

Our discussions within the context of SAMS over the next two days will focus on sustainable land preparation and crop husbandry techniques; increasing efficiencies in water use in agriculture; promoting the adoption of more holistic approaches to mechanization to include the entire food chain from the farm to the consumer; capacity building at the national and regional levels toward developing the skills and knowledge base on sustainable mechanization in the region, bringing in a specific focus on gender and youth; standards and testing of agricultural machinery; research and development as well as the transfer and manufacturing of new sustainable mechanical technologies. Requirements for the setting up of institutions that facilitate linkages between smallholders and financial institutions, with manufacturers and distributors of agricultural machinery as well as areas requiring policy support SAMS will also be discussed as elements of the strategy, one of the key outputs of this Consultation.

Another key output of this Consultation will be the constitution of a Network on SAMS (or SAMNET) among countries, to share experiences and approaches on sustainable agricultural mechanization. A draft concept on SAMNET is included in your folders. You are kindly requested to review it, and provide your inputs and feedback to Dr. Rolle by the end of today's discussions.

Ladies and Gentlemen,

I look forward to fruitful deliberations and outcomes to this consultation.

Thank you

Technical Presentations



- Regional Overview of Agricultural Mechanization
- The SAMS Framework
- Key Issues that Shape Agricultural Mechanization Systems in Asia and the Pacific Region
- Thematic Strategies and Options for Sustainable Agricultural Mechanization (SAM) in Asia and the Pacific Region

Regional Overview of Agricultural Mechanization

Presentation by

Centre for Sustainable Agricultural Mechanization
UNESCAP



High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

Outline

- I. Introduction**
- II. Background**
- III. Overview of Agricultural Mechanization**
- IV. Policies implemented in Member States**
- V. Challenges**
- VI. Future Trends and Outlook**
- VII. CSAM's Strategic Fit and Programmes**

High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

I. Introduction

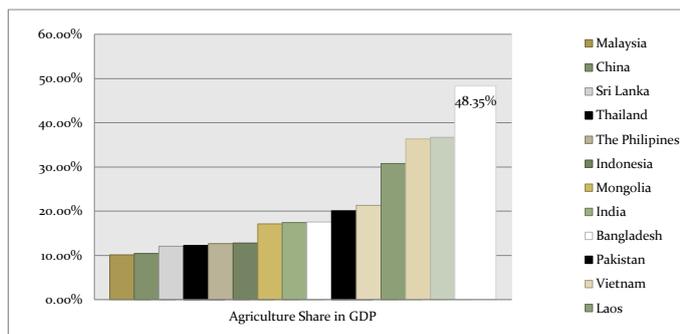
Scope

- The focus of this overview is mostly on the active member countries (about 20) of the Centre for Sustainable Agricultural Mechanization, a group of countries of different nature but most of which are LIFDCs.

High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

II. Background

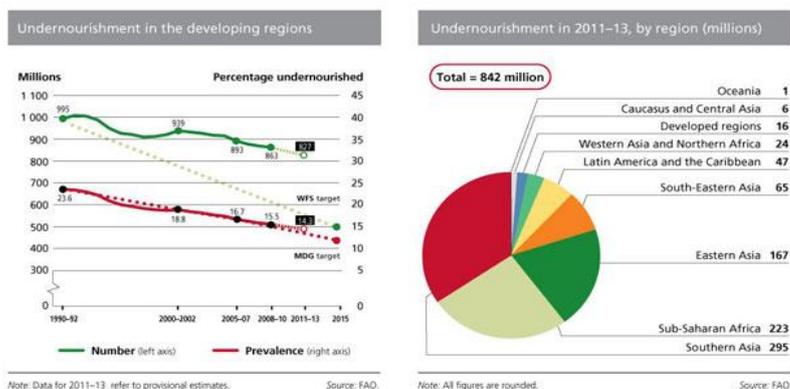
Traditionally agricultural countries, though agriculture's share in their GDPs showing a decreasing trend, it still represents important part of national economies.



High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

II. Background

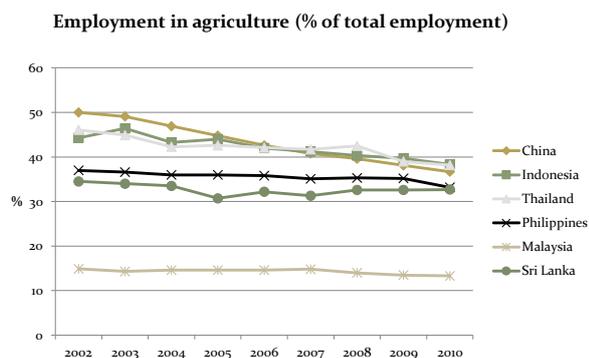
Food security remains a major concern of many countries.



High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

II. Background

Increasing urbanization and decreasing share of rural labour amid dynamic social-economic development.



High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

III. Overview



High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

III. Overview

1. Generally increased mechanization levels...

Many countries witnessed remarkable growth in mechanization. For example:

- China's power availability per hectare reached 3.56 Kw in 2011 and its 'overall mechanization rate' raised from 35% in 2004 to 59% in 2013.

Year	1978	1995	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Overall Mechanization Rate	19.7 %	31.9%	34.3%	36.0 %	39.3%	42.5 %	45.8 %	49.1%	52.3%	54.8 %	57.0 %	59%

High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

III. Overview

1. Generally increased mechanization levels...

- *India's power availability has also achieved steady growth from 0.92 Kw/ha in 1995/96 to 1.84 Kw/ha in 2012.*

Year	1971-72	1975-76	1981-82	1985-86	1991-92	1995-96	2001-02	2005-06	2011-12	2012-13
Total power, kW/ha	0.293	0.358	0.467	0.578	0.76	0.918	1.175	1.5	1.698	1.841

- *The power availability in Bangladesh increased from 0.4 Kw/ha in 1990 to around 1.4 Kw/ha in 2011.*

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III. Overview

1. Generally increased mechanization levels...

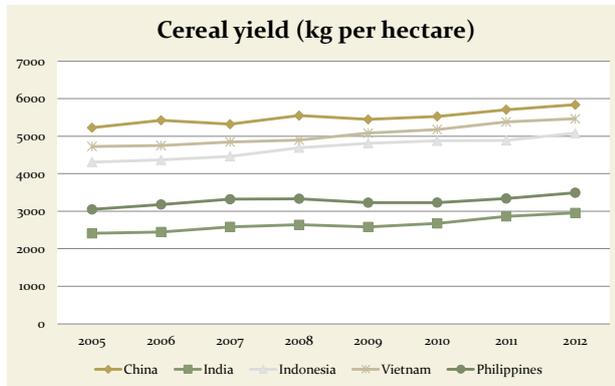
- *In Cambodia, the number of tractors increased more than 2 folds during 2006 to 2012, its harvesters increased fifteen folds.*
- *And total tractors registered in Nepal increased from around 30,000 units in 2003 to nearly 70,000 in 2012.*
- *Vietnam's total agricultural horsepower more than doubled during the first decade of this century.*

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III. Overview

1. Generally increased mechanization levels...

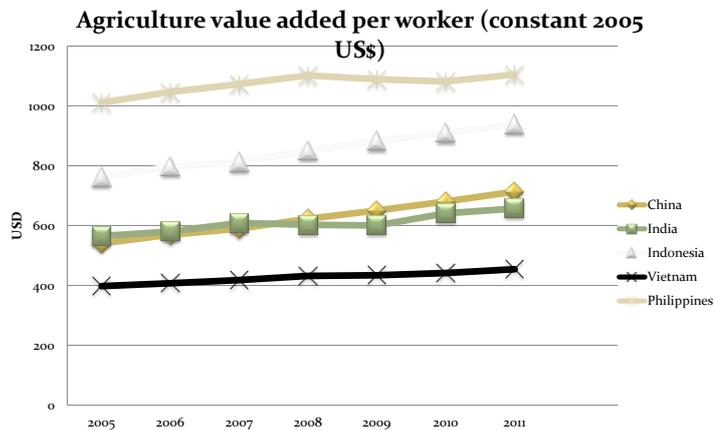
Productivity gains in line with increased mechanization



High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

III. Overview

1. Generally increased mechanization levels...



High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

III. Overview

2. ...but the growth has been unevenly distributed.

- *For instance, the mechanized rice harvesting is rather uncommon in Indonesia, while the mechanization rate of rice production has reached 99% and 97% respectively in Japan and South Korea in 1998;*
- *Yet the unbalance is not only across border but also among different districts within the same country, like in India, the power availability in Orissa was only 0.60 kw/ha in 2001, compared with 3.5 kw/ha in Punjab...*

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III. Overview

2. ...but the growth has been unevenly distributed.

- *Big gaps also exist among different crops, for example wheat harvesting in China was 91% mechanized while that of cotton only 8.3% in 2012;*
- *and among different stages of production too, for example close to 71% of rice is harvested by machines in 2012 in China while the mechanization rate of rice planting is only 31.7% in the same year.*

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III. Overview

3. Major breakthroughs in agricultural machinery manufacturing capacities.

- *India has been a tractor exporting country since 1980s and now about 10% of its tractors are exported;*
- *China claimed to have become the world leading agricultural machinery producer in 2012, producing over 2 million tractors and 1 million harvesting machinery per year;*
- *Local production of power tillers, seeders, hand and foot sprayers, threshers and millers, among other more sophisticated machines and implements, is becoming very common in most countries.*

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III. Overview

4. Increased volume of trade and investment in the agricultural machinery industry

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III. Overview

Contributing factors to increased levels of mechanization:

- Policies and strategies implemented;
- Subsidies/credit/taxation (import duties, tax on industry);
- Research and development efforts;
- Targeted extension service;
- Larger holdings in some countries (cooperatives and land lease); and
- Specialized services (more accessibility and affordability to farmers through custom hiring/leasing).

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IV. Policies implemented in Member States

China

- In 2004, China enacted the *Law on the Promotion of Agricultural Mechanization*;
- Since then, China began to subsidize the purchase of agricultural machinery, which is increased from 70 million yuan in 2004 to 21.75 billion yuan in 2013;
- Currently, China is conducting mid-term review of the implementation of its 12th Five-Year Plan of Agricultural Mechanization Development (2011-2015).

High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

IV. Policies implemented in Member States

India

- *India has launched a Sub-Mission on Agricultural Mechanization (SMAM) for their 12th Five Year Plan (2012-17) with an estimated outlay of US\$ 350 million for the plan period by Machinery & Technology Division (M&T), Department of Agriculture and Cooperation, Ministry of Agriculture of Government of India.*
- The Operational Guidelines of the SMAM was released in 2014.

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IV. Policies implemented in Member States

Other countries

- In Cambodia, a National Strategy on Agricultural Mechanization Development is in place as a milestone;
- The National Agro-food Policy (2011-2020) was approved in Sept 2011 in Malaysia with component to promote continuous adoption and utilization of mechanization in agricultural production;
- A Farm Machinery Act is being drafted in Sri Lanka;
- The Law on Agriculture and Fishery Mechanization (AFMech Law) is newly enacted in 2013 in the Philippines;

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V. Challenges

Small land holding

- The average size of land holding in Asia is only about 1 hectare against an average overall size of 5.5 hectare for 114 FAO member countries

Low investment capacity of farmers

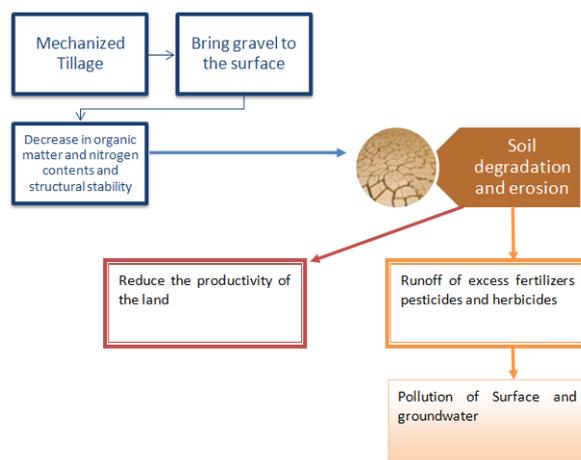
- 57% of the 1 billion world poor living on less than \$1 a day is in Asia and the Pacific, and the majority of which are in rural areas.

Combination of mechanization and agronomy

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V. Challenges

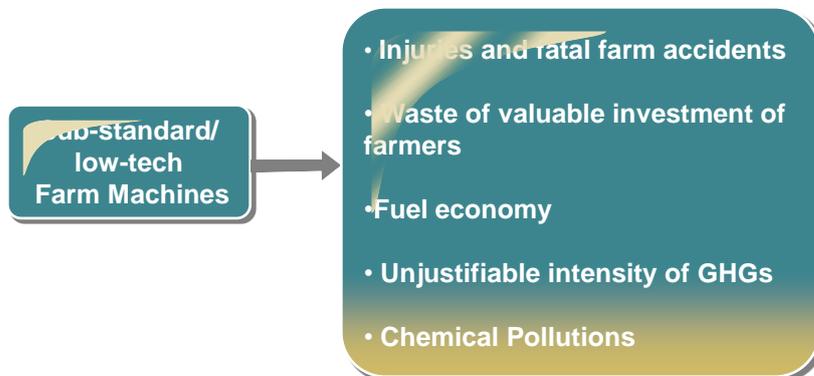
Emerging negative environmental impacts



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V. Challenges

Need for Better R&D and Manufacturing



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VI. Future Trends and Outlook



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VI. Future Trends and Outlook

- Comparatively low level of mechanization implies great potentials and opportunities in the region;
- Favourable government strategies and policies are indispensable;
- International/regional strategies necessary and related discussion will increase;
- Greater need for adaptable machinery and implements for diversified agro-climate zones and topographies;
- Better trade-off of safety, quality and affordability;
- Improved efficiency of utilization, for example through custom hiring or larger holdings;

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VI. Future Trends and Outlook

- The need to tackle environmental concerns, including through conservation agriculture, low energy consumption machinery;
- Stronger public-private partnership;
- Greater scope for regional cooperation in policy assistance, information sharing, collaborative R&D, harmonization of standards, capacity building and trade and investment facilitation; and
- Contributing to the Post-2015 Sustainable Development Goals (SDGs).

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VII. CSAM's Strategic Fit and Programmes

CSAM

- a regional institution of UNESCAP
- operational in Beijing since 2003



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VII. CSAM's Strategic Fit and Programmes

CSAM's Vision

- “achieve production gains, improved rural livelihood and poverty alleviation through sustainable agricultural mechanization for a more resilient, inclusive and sustainable Asia and the Pacific.”

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VII. CSAM's Strategic Fit and Programmes

CSAM's Strategic Functions:

1. Serving as a regional forum for regular policy dialogues;
2. Becoming a data and information hub;
3. Serving as a recognized reference point for standards and protocols;
4. Strengthening its role as the center for capacity building;
5. Facilitating intra-regional agro-business development and trade.

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VII. CSAM's Strategic Fit and Programmes

Current and Up-coming Programmes/Initiatives

Programme Framework:

- Result 1: Enhanced capacity and technologies of member countries via targeted demand-driven capacity building and technical/policy assistance
 - – for more sustainable policies and technologies
- Result 2: Enhanced regional mechanisms and platforms improving mutual understanding and cooperation among member countries
 - – for regional cooperation and integration
- Result 3: Improved awareness and knowledge of the member countries through research and analysis, information/data collection and distribution
 - – for evidence-based decision making

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VII. CSAM's Strategic Fit and Programmes

Current and Up-coming Programmes/Initiatives

Result 1: Enhanced capacity and technologies of member countries via targeted demand-driven capacity building and technical/policy assistance

- Sustainable Agricultural Mechanization Strategy (SAMS)
- Promoting Conservation Agriculture, post-harvest, water- and resources-saving technologies as well as other technologies to reduce loss and use agricultural wastes and residues;
- Trainings;
- Machinery and technology demonstrations

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VII. CSAM's Strategic Fit and Programmes

Current and Up-coming Programmes/Initiatives

Result 2: Enhanced regional mechanisms and platforms improving mutual understanding and cooperation among member countries

- Regional Forum on Sustainable Agricultural Mechanization
- Asian and Pacific Network for Testing of Agricultural Machinery (ANTAM)
- Proposed Asian and Pacific Network of Agricultural Mechanization Associations

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VII. CSAM's Strategic Fit and Programmes

Current and Up-coming Programmes/Initiatives

Result 3: Improved awareness and knowledge of the member countries through research and analysis, information/data collection and distribution

- Regional database of agricultural mechanization in Asia and the Pacific
- Publication on the overall status of agricultural mechanization in Asia and the Pacific
- Regular Policy Briefs and newsletters

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VII. CSAM's Strategic Fit and Programmes

Activities planned for 2014

1. High-level Multi-stakeholder Consultation on SAMS with FAO-RAP (June 26-27, Bangkok)
2. ANTAM annual meeting (September 16-19, Beijing)
3. 2nd Regional Forum in Indonesia + demonstration (September 9-11, Jakarta) . Theme: Enabling Environment for Customs Hiring of Agricultural Machinery
4. Regional Workshop of Agricultural Machinery Associations (October 28-29, Wuhan)
5. DPRK training (October, Beijing)
6. Workshop on statistics and data (November, Siem Reap)
7. LIFT Myanmar.

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VII. CSAM's Strategic Fit and Programmes

ANTAM (Asian and Pacific Network for Testing of Agricultural Machinery)

- *The ANTAM network has been launched in November 2013 as a result of multi-rounds of discussions over the past years*
- *The ANTAM network has the aim to provide safe and quality machines to farmers in the Asia and Pacific region by harmonizing testing codes and procedures and linking the testing stations in the region;*
- *It will collaborate with FAO, UNIDO, OECD Tractor Codes and will be connected closely with ENTAM network in Europe as well as to other networks.*
- *The 1st Annual Meeting will define a roadmap and the role of the different organisation levels in order to provide for a successful initiative offering benefits to all stakeholders including farmers.*

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Thank you.

Zhao Bing
bing.zhao@un-csam.org

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The SAMS FRAMEWORK

Rosa S. Rolle, Ph.D
Senior Agro-Industries and Post-harvest Officer
FAO Regional Office for Asia and the Pacific
Bangkok, Thailand



High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization Strategy for Asia and the Pacific Region
26 – 27 June, 2014

Presentation Overview

- Background to SAMS Development
- Why SAMS?
- SAMS
 - Goal
 - Strategic Pillars
 - Desired impacts



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SAMS : Sustainable Agricultural Mechanization Strategy

- Developed as a joint initiative of FAO and CSAM.
- Launched in December 2011, to promote the sustainable use of mechanization in agricultural production systems.



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Why SAMS?

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Key Challenges for the Region's Agricultural Sector

- Across the region, there is a need to:
 - Meet growing and changing food demands of a growing population.
 - Respond to impacts of demographic change in rural areas owing to urbanization.
 - Use natural resources in a more sustainable way
 - Increase energy efficiency.
 - Promote innovation to enhance resilience to climate change and other risk factors.
 - Reduce post-harvest losses, assure food safety and quality

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What the challenges also highlight:

- The need to focus on the development of **sustainable agricultural production systems**
 - Systems that maintain optimal production without jeopardizing production factors.

SAM is an important element of sustainable agricultural production systems.

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SAMS



- SAMS is a **planning strategy** that contributes to agricultural sustainability, while meeting food self sufficiency, generating economic development and inclusive growth as well as social benefit.
- SAMS is part of the **enabling environment** for the development of sustainable production systems and for the effective use of SAM.

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Goal of SAMS

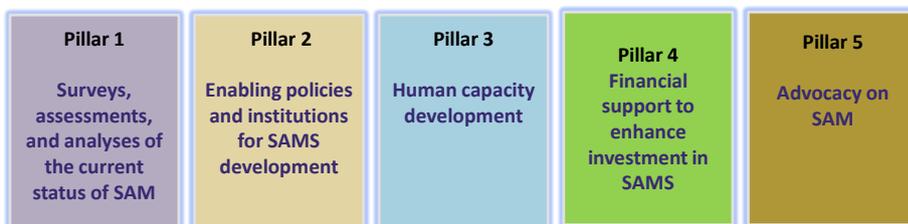


To address food security, poverty alleviation and environmental sustainability through the sustainable intensification of agriculture, by creating an enabling environment.

FAO-CSAM, Bangkok, December 2011 Workshop 2011.

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Pillars of the SAMS Framework



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Pillar 1. Surveys, Assessments and Analyses of the Current Status of SAM

Identification of possible interventions

- Assessment of :
 - Agricultural practices and analysis of supply chains.
 - Intra- and inter- institutions involved in AM
 - Use of targeted subsidies for innovative implements for sustainable agriculture
- Identification and assessment of technologies suited to specific ecological zones.
- Analysis of existing policies

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Pillar 2. Enabling Policies and Institutions for SAMS Development

Formulation and implementation of policies and strategies that lead to government interventions.

- Development of:
 - Public-private partnerships.
 - Testing and standards formulating mechanisms for AM.
 - R & D institutions to enhance innovation in AM.
- Review and harmonization of policies and regulations designed to attract investments in SAMS.
- Institution of quality assurance of machinery, equipment and mechanization services

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Pillar 3. Human Capacity Development

Development of a knowledgeable, trained and disciplined labor force.

- Capacity building of:
 - Farmers, extension staff and local government officials
 - Manufacturers and distributors of supply inputs.
- Enhancing information dissemination on mechanical power technologies (including environmental, social, economic aspects and innovations made to agricultural machinery).

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Pillar 4. Financial Support to Enhance Investment in SAMS

- Review and harmonization of policies and regulations designed to attract investments in AM.
- Increasing financing for AM from the private sector.
- Improving access to:
 - Loans for the purchase of mechanization inputs.
 - Financing for mechanization activities through the establishment of a mechanization promotion fund.

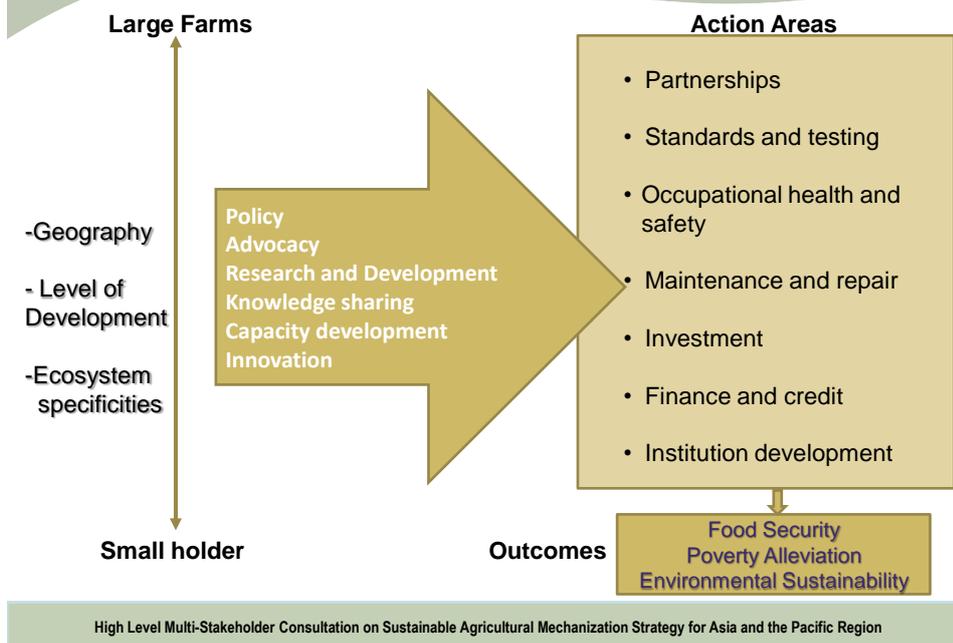
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Pillar 5. Advocacy on SAM

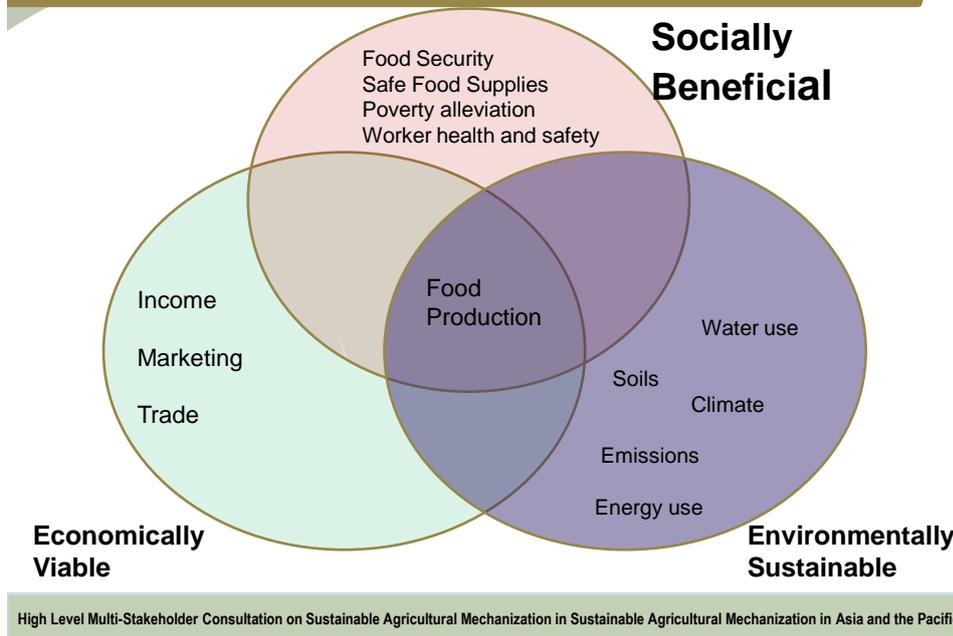
- Promoting a strategic vision for SAM based on national development objectives;
- Facilitating information sharing and lessons learnt about good practice on SAM;
- Ensuring effective participation by all stakeholders in SAM processes;
- Developing and maintaining partnerships with the scientific community;
- Ensuring wide dissemination of knowledge generated on SAM and contributing to policy and decision making processes.

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Dimensions of the SAMS Strategy



Desired Impacts of SAMS



The image features a large, light blue watermark of the Fiat logo in the background. The logo is circular and contains a central emblem of a five-pointed star with a vertical line through it, and the Latin phrase "FIAT PANIS" written around the bottom inner edge. The text "Thank you" is superimposed over the center of the logo in a bold, italicized, black font.

Thank you

Key Issues that shape agricultural mechanization systems in AP Region

Dr. Peeyush Soni

Assistant Professor; Asian Institute of Technology
Vice-President; Asian Association for Agricultural Engineering

soni.ait@gmail.com



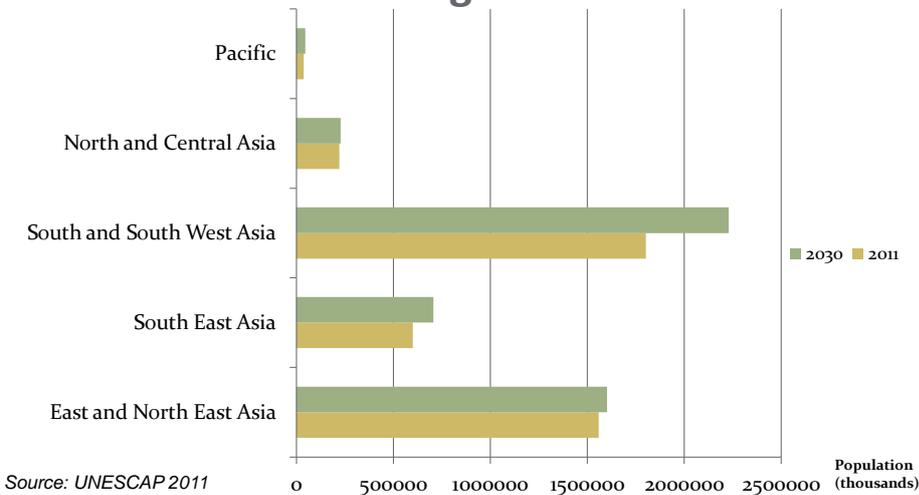
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Context of the Region

- **87%** of the World's **500 M** small farms (<2ha) live in the AP Region.
- Asian farms are predominantly **SMALL**, and getting **SMALLER**.
 - Average size of operated area (actual area cultivated) per holding in the AP Region varies widely from as low as **0.4 ha** to **4 ha**
- Five countries in the Region host about **70%** of the small farms globally (China- **198 M**, India- **98 M**, Bangladesh- **24 M**, Indonesia- **22 M**, Viet Nam- **10 M**)

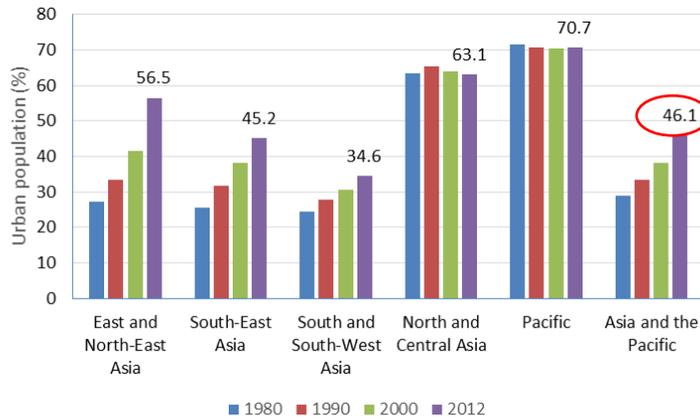
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Population Growth Continues Across the Region



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The Region is Rapidly Urbanizing



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Changes Associated with Urbanization

- Increasing **feminization of agriculture**
 - More men migrating to cities than women
- Ageing Rural Population and the “**greying of agriculture**”
 - Young and educated are migrating to cities

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What these Demographic Trends Mean

- **More food will be required** to feed future populations.
 - By 2025, the AP region would need **684** Mt rice (**20%** more than the 2000's rice production) → equivalent of adding **2-3** Mha/year of new land at current average yield levels.
- **More labour saving equipment will be required** to facilitate the work of women.
- **Greater efforts need to be made to engage youth** in agriculture.

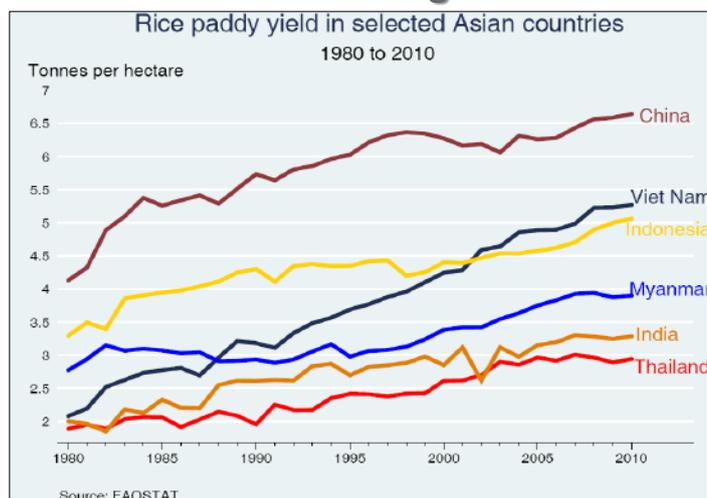
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Trends in Agricultural Production Systems : Case of Rice

- **Decline in Productivity Growth**
 - Growth in rice yields has fallen mainly due to a decline in R&D investment on rice productivity enhancement from **2.2%** (1970-90) → **0.8%** (1990-2000) (IRRI)
- **Land available for rice production is declining** as land around urban areas is being converted for other uses such as for housing and industry.
- **Availability of water for rice cultivation is declining** as demand by industrial and municipal users is growing rapidly

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Rates of Growth in Agricultural Production Are Slowing



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Trends in Agricultural Mechanization in AP Region

- The **AP Region has emerged as the largest market in the world in terms of agricultural machinery sales** – projected to have sales of USD **49 Billion** in 2015 (World Bank, 2010)
- Higher mechanization of processing and irrigation than the mechanization of crop husbandry and harvesting operations
- Wide differences across the region, with respect to the use of farm power
- Declining use of draft animal power in Asian agriculture:
 - In India, number of draft animals declined from **85 M** (1975) → **53 M** (2005) → **18 M** (by 2030) (Singh, 2013)
 - In China, by 2025 the draft animals will be completely replaced by 2WT and 4 WT (Renpu, 2014)

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Technical Issues

- **Changing source of farm power:**
 - Rapid change from animate (animal and human) to mechanical power
 - Increasing use of 2WT/4WT,
 - Increasing use of irrigation pumps (diesel/electric),
 - Increasing use of post-harvest & processing equipment
- **Little change in land preparation and planting techniques**
 - Land preparation in most countries in near future, is likely to remain the same in a significant part of the cultivated land
 - Amidst rapid changes in the sources of farm power, conventional tillage and planting techniques are likely to continue to dominate the Region

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Technical Issues

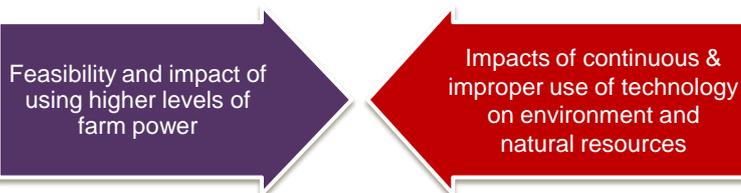
- **Increased use of mechanization in harvesting and on-farm post-harvest operations** with the use of combine harvesters and mechanical threshers
 - Entrepreneurs offering these services across countries in the Region through custom hiring, contract farming arrangements etc.

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Agricultural Mechanization in AP Region

- Mechanization is powerful tool for achieving sustainable agricultural production
- From a *sustainability perspective* the Ag Mechanization debate revolves around two aspects:



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Environmental Issues and Concerns

- **Accelerated soil erosion and soil compaction** owing to inappropriate use of mechanization.
- **Overuse of chemical inputs.**
- **Threat of climate change:**
 - Rice-based production systems in most developing Asian countries are highly vulnerable to climate change risks
 - Delta countries' i.e. Viet Nam and Bangladesh being most vulnerable to sea-level rise, floods and erratic weather

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Policy Support

- **Is critical to agricultural mechanization**
 - Especially when sustainability issues are concerned
 - May require major change in current practices
- **Will be required**, not only in agricultural but industrial and trade policies, as well (manufacturing and imposed duties on imported equipment)
- **Need be closely coordinated with governments** (Ministries of Agriculture, Trade and industry, Finance and Planning)

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Institutional Issues

- **Research and development**

- Public sector initiatives are usually multi-sectoral, but poorly coordinated
- Private sector have most serious R&D, some are by MNC branches, others are home grown local companies

- **Standards and Testing**

Still a long way to go towards regionally harmonized protocols that will enhance trade in Ag Machinery & Implements and consequent price reduction

- **Manufacturing**

With a market of over US\$50 billion for agricultural machinery and regarded as a low cost manufacturer globally, the removal of non tariff barriers to trade in the region will contribute significantly to cost reduction

The Asia-Pacific Network for Testing Agricultural Machinery (ANTAM) has a role to play in facilitating standards and testing and manufacturing

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Institutional Issues

- **Technology transfer, Technical Support Services & Training**

- Reluctance of private sector to get too involved in promoting SAM.
- Capacity development curricula are static.

- **Mechanization of Supply Chains**

- **Financing**

Credit and finance are critical for agricultural mechanization investments and so with SAM technologies

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Conclusions

- Agricultural development is the most effective way for addressing food security challenges; and appropriate mechanization is a powerful tool for achieving sustainable agricultural production
- Issues of Agricultural Mechanization have gone beyond merely using higher levels of farm power; but they now also include impacts of its improper use on environment and natural resources
- Amidst several challenges, the AP Region treasures huge potential of successful (rewarding) adoption of SAMS

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Thank you

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Thematic strategies and options for *Sustainable Agricultural Mechanization (SAM)* in Asia and the Pacific Region

By

Geoffrey C. Mrema; FAO Consultant and Professor of
Agricultural Engineering, Sokoine University of
Agriculture



High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization Strategy for Asia and the Pacific Region
26 – 27 June, 2014

Outline of the Presentation

- Improving Agricultural Mechanization Systems: *Farm Power; Land Preparation & Crop Husbandry; Water Use Efficiency*
- Mechanization Across the Value Chain: *Post-harvest sector and Supply Chains for Mechanization Inputs*
- Gender Role and Empowerment of *Women & Youth*
- Institutional Issues: *Smallholders & Farmer Organizations; Manufacturers; and Financing Mechanisms*
- Technology Development & Transfer: *R & D; Knowledge Transfer & Extension; ICT; Testing and Standards*
- Capacity Building at National and Regional levels
- Policy and Strategy Formulation and Coordination

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Transforming the Farm Power Situation

- The region has made great progress over the past six decades in transforming farm power situation from:
 - Almost 95% from animate sources in 1960s to over 50% from mechanical sources by 2010 in many countries
 - **Four** main types of power sources are emerging i) 2WT; ii) 4WT; iii) Elect. & Diesel pump sets for irrigation; iv) Motorized equipment for harvesting and Post-harvest operations;
 - Use of draft animals likely to be insignificant by 2030 in the region;
- OPTIONS:
 - i) Help all countries to smoothly achieve this transformation
 - ii) Assess the socio-economic and environmental impacts of the transformation

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Transforming Tillage and Crop Husbandry Practices

- Under **Conventional Tillage [CT]** land preparation & crop husbandry techniques use basically same design of implements irrespective of power source
- **CT practiced over many centuries, accepted as conventional knowledge by farmers, researchers etc.**
- *Sustainability of CT practices being questioned & global movement to **conservation agriculture [CA]** – regarded as more sustainable*
- **CA adopted more in OECD countries - North & South America but even here limited adoption cf. effort;**

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Transforming Tillage and Crop Husbandry Practices^{S-2}

- Options for transformation of CT practices include:
 1. Need for short, medium & long term planning for significant conversion of CT practices to more sustainable ones e.g. CA;
 2. Transformation of CT practices more challenging than change of farm power situation – need to draw lessons from the latter;
 3. Requires change of mindset of all involved in agric. sector as CT practices are centuries old & quite entrenched;
 4. Costs involved quite high both to the farmer; public and private sectors including manufacturers of implements;
 5. R & D effort to determine what is the right practice for different agro-regions required not a matter of copying what has worked elsewhere e.g. CA practices from North & South America;
 6. Should be part of *Sustainable Agricultural Intensification*.

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Water Use Efficiency

- Asia & the Pacific region has largest area under irrigation – mostly for paddy cultivation
- Use of electric & diesel pump-sets has increased significantly and will continue to increase;
- Water use efficiency in irrigated agriculture could be improved considerably in reducing water use;
- Options here include technical support for development of irrigation infrastructure particularly for controlled irrigation systems and for R & D efforts;

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Mechanization across the Value Chain

- Previous mechanization analysis confined to on-farm production issues & Did not include off-farm uses of machinery & implements;
- Farmers were realizing economies of utilization & profitability of their agric. mechanization [AM] investments off-farm
- Effective demand of outputs of farming critical to success in AM;
- Need to consider entire food chain - from inputs to post-harvest and processing to consumer protection-(food safety) in AM analysis
- AM can contribute significantly in reducing food losses
- Need to factor in supply chains for AM inputs – repairs & parts etc.
- Options here include considering entire food chain for SAM;
- Factoring environmental impacts of AM – including emerging global issues - Climate Change; CO₂ emissions; application of herbicides and pesticides etc.

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Gender and Empowerment Issues

- Increasing labor costs & feminization of agriculture are creating significant shifts in agriculture in Asia
- More men than women migrating to urban areas creating gender problems in access & ownership of land and productive resources & services like AM ones;
- Need to mainstream gender dimension in SAMS – from legal; social and technological perspectives;
- Youth training and empowerment critical for success of SAMS to create new cadre of farmers and reduce migration to urban areas and greying of agriculture
- Targeted programs for youth and women critical for success of SAMS

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Smallholders and Farmer Organizations

- The region has the largest number of smallholders but they need not be obstacles to AM – lessons from the past;
- **Need for the right policies, regulations & incentives which facilitate provision of AM services to smallholders;**
- Provision of AM custom-hiring services to smallholders by entrepreneurs and other farmers critical to SAMS;
- **Right policies for credit; land tenure; R & D and technology transfer are essential for success of SAM with smallholders;**
- Farmer organizations including cooperatives and other associations need to be capacitated to provide AM services;
- **Welfare & industrial policies which facilitate AM processes**

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Manufacturing of agricultural machinery and implements

- Asia Pacific region emerging as a leading global player in the manufacture and use of AM inputs
- **Key issue is how to incentivize manufacturers to R&D and produce SAM machinery and implements;**
- Other options include - setting up and operation of efficient supply chains for AM inputs especially for low profit margin items e.g. for land preparation and
- **Creation of regulatory frameworks to facilitate operation of AM supply chains & franchises through Chambers of commerce & business associations**
- Financing of AM investments – credit subsidies; collaterals

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Technology development & transfer -1

- Research & Development critical for success of SAMS
- Successful R & D dominated in AM by private sector although large expenditure by public sector also;
- Integration & coordination of private and public R & D investments and initiatives in SAM critical
- R&D at national and regional levels to determine what works best under prevailing conditions in the region
- South-south and regional collaboration in R &D to avoid duplication and achieve economies of scale and scope
- Regulatory framework for patenting and licensing of technologies at regional level including inventory what is available in the region – who, where & what

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Technology development & transfer -2

- A large manufacturing base in the region and trade in AM technologies requires a regional mechanism for standards and testing of AM technologies
- ANTAM offers a good starting point in the process of establishing and sustainably financing testing centers
- Harmonization of testing protocols across the region will facilitate trade in AM technologies regionally and globally
- Networks of extension services, researchers and CSOs involved in SAM required – use of ICT could facilitate this;
- Formation of a Network for sharing experiences and approaches on SAMS should be a high priority area

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Capacity building at national and regional levels

- New crop of experts required due to retirement, new emerging technologies such as those of SAM;
- Capacity development of human resources and strengthening institutions required both for the public and private sectors
- Regional training programs where economies of scale and scope dictate so;
- Need to revise curricula of colleges and universities to introduce new concepts – CA; Precision farming etc.
- Training of farmers, supply chain technicians etc. necessary on SAM technologies critical

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Policy and strategy formulation and coordination

- SAMS will require long-term commitment by a wide variety of stakeholders – at policy & operational levels;
- Policy makers have to take a long term perspective and remain steadfast – e.g. experience of farm power
- Options include improved coordination of all key stakeholders in the public and private sectors;
- Defining short, medium and long priorities for SAMS across countries; agro-ecologies, farming systems etc.
- Drawing and documenting lessons from the past experience and successful case studies for scaling-up.
- Coordination across sectors – agriculture; trade; industry etc.

High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific



Concluding Comments

- There is no doubt that the Asia and the Pacific region has made a lot of progress in AM over the past 60 years
- **The agriculture and food sector is going to face even more daunting challenges over the next 3-4 decades**
- SAMS should contribute to helping the sector and region in tackling those challenges.
- Regional collaboration would greatly help in this regard.

THANK YOU !

High Level Multi-Stakeholder Consultation on Sustainable Agricultural Mechanization in Sustainable Agricultural Mechanization in Asia and the Pacific

Network on Sustainable Agricultural Mechanization for Asia and the Pacific Region (SAMNET)

(DRAFT)



Food and Agriculture Organization
of the United Nations



UNITED NATIONS

ESCAP

Economic and Social Commission for Asia and the Pacific
Centre for Sustainable Agricultural Mechanization

CSAM

A. BACKGROUND

Although Asia and the Pacific region has emerged over the past two decades as the largest market in the world, in terms of sales of agricultural machinery, implements and equipment, agricultural mechanization is at a very basic stage of development in most countries of the region.

With urbanization, the feminization of agriculture and an increasing scarcity of labour in rural areas across the region, there is a growing need for the development of farm mechanization to address productivity enhancement in a sustainable manner. It is equally important to address the quality of, and use of machinery and equipment in post-harvest and processing operations.

Sustainable Agricultural Mechanization Strategy or SAMS, is a planning strategy that contributes to the agricultural goal of sustainability, while meeting food self sufficiency, generating economic development and inclusive growth as well as social benefit. SAMS is part of the enabling environment for sustainable agricultural production.

A round-table jointly convened by the Food and Agriculture Organization of the United Nations (FAO) and the Centre for Sustainable Agricultural Mechanization (CSAM), in December 2011, developed a strategic framework founded on five key pillars in order to address SAMS development in Asia and the Pacific Region:

Pillar 1 Assessments and analyses of the current status of agricultural mechanization

Pillar 2 Enabling policies and institutions

Pillar 3 Human capacity development

Pillar 4 Investment in SAMS

Pillar 5 Advocacy on sustainable agricultural mechanization

A Network for Sustainable Agricultural Mechanization for Asia and the Pacific Region (SAMNET) would facilitate knowledge sharing and the sharing of experiences on sustainable agricultural mechanization; promote collaboration and concerted efforts on the sustainable use of agricultural machinery across the food chain, as well as advocacy for the economic, social and environmental values and benefits of sustainable agricultural mechanization (SAM) among all stakeholders (manufacturers, users of machinery, policy makers, researchers, academic institutions, etc.), associated with the use of agricultural mechanization in Asia and the Pacific Region. It is envisaged that SAMNET would be linked and closely associated with existing networks. Within this context and against this background, SAMNET is being formed.

B. STRUCTURE

1. Name

The name of the Network will be Network for Sustainable Agricultural Mechanization for Asia and the Pacific Region (SAMNET).

2. Establishment

SAMNET will be established at the High Level Multi-stakeholder Consultation on Sustainable Agricultural Mechanization Strategy in Asia and the Pacific Region, convened in Bangkok, by FAO in collaboration with the Centre for Sustainable Agricultural Mechanization (CSAM), on 26 and 27 June, 2014,.

3. Goal and objectives

SAMNET will be a voluntary partnership of stakeholders promoting knowledge sharing and the sharing of experiences on sustainable mechanization across the food chain, as well as advocacy for the economic, social and environmental values and benefits of sustainable agricultural mechanization (SAM), with an overarching goal of assuring the sustainable use of agricultural mechanization in contributing to food security and to economic development in the region. SAMNET aims to bring together key partners and stakeholders, including researchers, policy makers, public and private sector entities and representatives of civil society organizations (CSOs), and development partners from across Asia and the Pacific Region, with the following specific objectives:

- To exchange knowledge, share experience and promote collaboration and concerted efforts among all stakeholders on SAM and to advocate for its economic, social and environmental values and benefits;
- To promote effective linkages among public and private stakeholders associated with Sustainable Agricultural Mechanization in countries of Asia and the Pacific Region and across the region.
- To facilitate the implementation of SAMS at the regional, sub-regional and national levels as well as the implementation of policies and institutional mechanisms associated with SAMS.
- To identify priority areas for action and to implement joint activities.

4. Membership

SAMNET will have a neutral identity. It will operate in an open, transparent and flexible manner. It will be linked and closely associated with existing networks.

The inaugural members of SAMNET will include representatives from :

- Member countries in the Region – nominated by member governments
- Private sector (including associations).
- Civil Society Organizations

- Academic and research institutions
- Development partners

5. SAMNET Activities

SAMNET will interact with a wide range of partners and stakeholders working on various aspects of SAM. It will, in the process, provide an informal mechanism for cooperation and collaboration among international and regional organizations, research and academic institutions, CSOs, public and private-sector entities and other associated groups.

C. WORKING MODALITIES

6. Application for membership

Membership of SAMNET will be expanded on an on-going basis. Other organizations/institutions interested in applying for membership in SAMNET will submit a formal application to the Chair. Membership will be approved by the unanimous decision of all SAMNET members, either at the annual meeting or through email consultation.

7. Division of work and focal agencies

SAMNET will base its activities on an annual action plan and/or work plan, developed in line with prioritized activities outlined in its Regional Strategic Framework. Members of SAMNET will identify activities on a voluntary basis and will select focal agencies for respective activities/action areas to facilitate collaboration among concerned institutions.

8. Language

The working language of SAMNET will be English.

9. Chair

FAO in collaboration with CSAM will tentatively chair the SAMNET for an initial incubation period of 1 year, with the understanding that a member country will be elected by the membership to Chair on a bi-annual basis.

Two Vice-chairs would be elected on a bi-annual basis. Vice chairs could stand for election to the Chair after two years.

10. Secretariat

FAO and CSAM will host the SAMNET for an initial incubation period of 1 year. and will provide the technical and operational support required for its establishment and functioning, as outlined in the terms of reference in Annex II, during that period.

11. Web-site

The SAMNET web-site will be established and maintained by FAO and CSAM under management of the Secretariat. FAO and CSAM will provide oversight to website development.

12. Operational Cost of the Secretariat and Web-site

The operational cost for the Secretariat and for web-site management will be covered by the hosting institution on a voluntary basis. The SAMNET will, however, accept sponsorship and financial contributions and donations for joint activities as appropriate, from other member institutions.