



CSAM



The role of Mechanization in Strengthening Smallholders' Resilience through Conservation Agriculture in Cambodia

*Presented by
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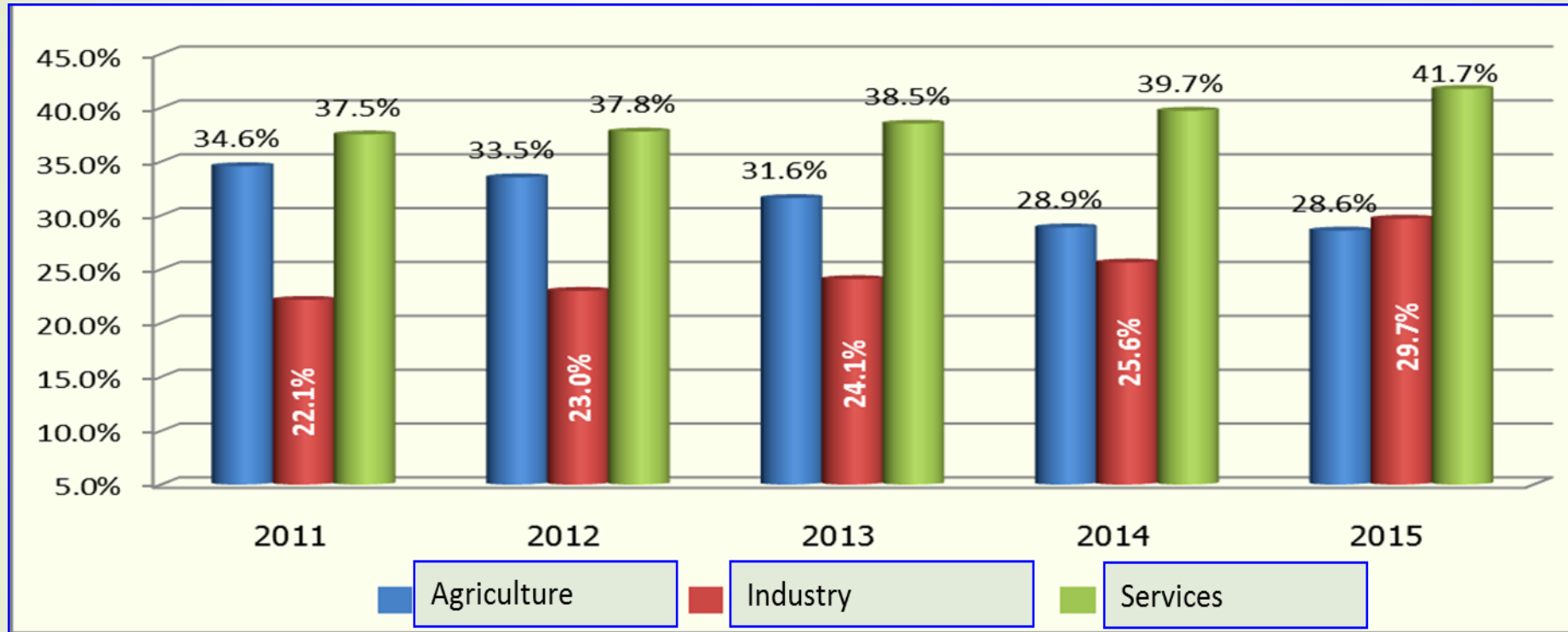
*Regional Workshop on the Role of Mechanization in Strengthening Smallholders' Resilience through Conservation Agriculture in Asia and the Pacific
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I. Introduction

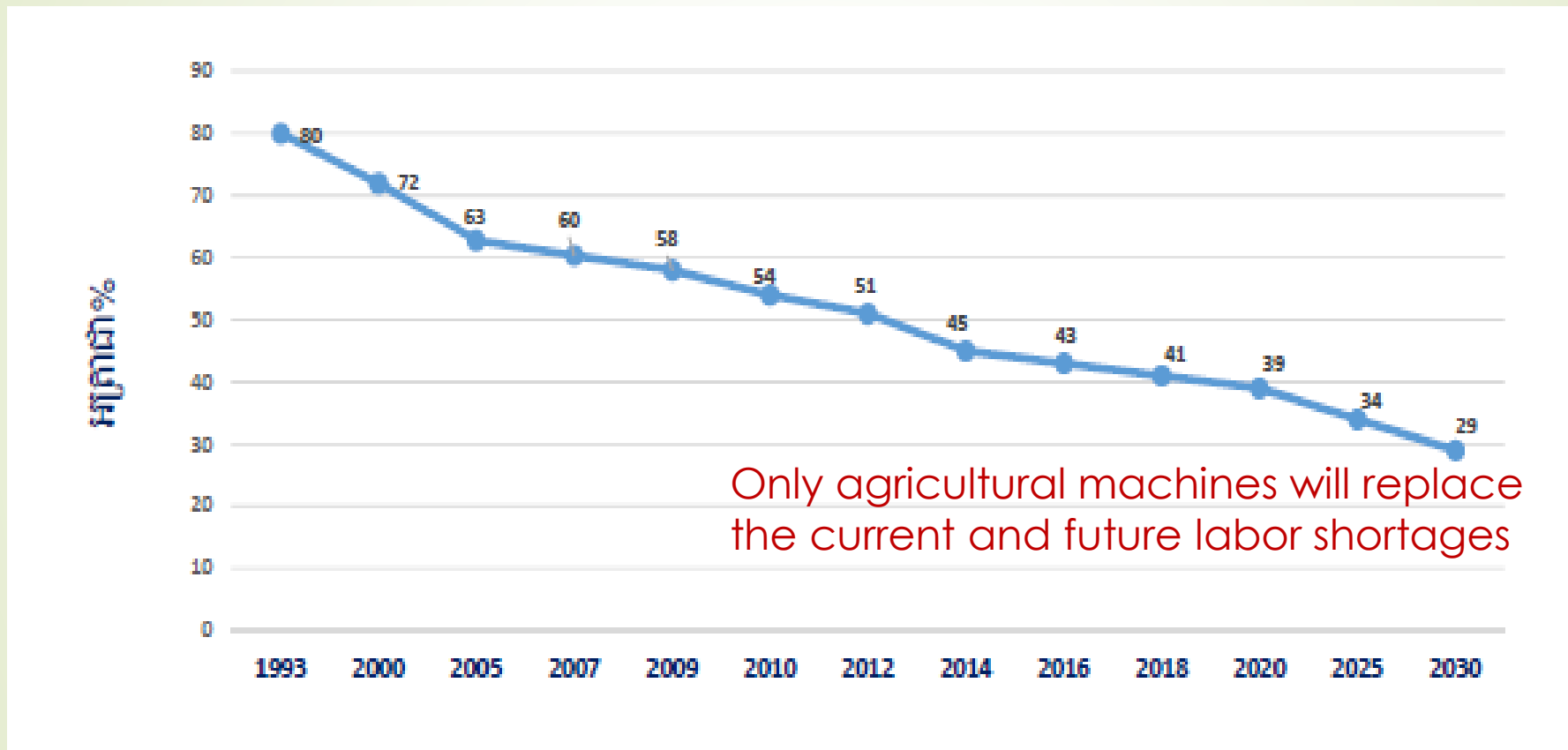
- **Agriculture remains one of the most important sectors in Cambodia**
 - ❖ Main source of income for rural households
 - ❖ Employs **49%** of total labour force
 - ❖ Contributed **28.6%** to GDP in 2015 (decreasing from 34.6% in 2011)
- **Total cultivated area of 4,505,267 ha in 2013**
 - ❖ Rice: **68 %**
 - ❖ Subsidiary and industrial crops: **21 %**
 - ❖ Permanent crop: **4 %**
 - ❖ Rubber plantation: **7 %**
- **Employment in agriculture:** approximately 70% of population

1.1 Share of Agriculture sector in GDP



- The agriculture sector contribute to the GDP is about 28.6% in 2015, while industry sector is about 29.7% and services sector is about 41.7%. While in 2011, agriculture sector contribute to about 34.6%, industry sector is about 22.1% and services sector is about 37.5%.

1.2 Labor force in agriculture from 1993 to 2030



Source: MAFF, 2017

1.3 Prime mover of agricultural mechanization in Cambodia

- At present, more farmers are using agricultural machineries in farming. However, the use of traditional tools and local made machineries and equipment are still practice by some farmers, especially those whose farms are not suitable to use machineries since their farm size is small or not leveled. These farmers cannot afford to use expensive machines and cannot use them to their full capacities.
- Agricultural mechanization in Cambodia has been increasing widely since 1990s especially in land preparation, irrigation, threshing and recently harvesting. The numbers of tractors increase repeatedly in the last 10 years (3,857 units in 2004 and 9,467units in 2013).
- The provinces around Tonle Sap Lake and dry season rice areas in the south have higher growing rate. The number of power tiller significantly increased from 77,421 units in 2011 to 366,195 units in 2017.

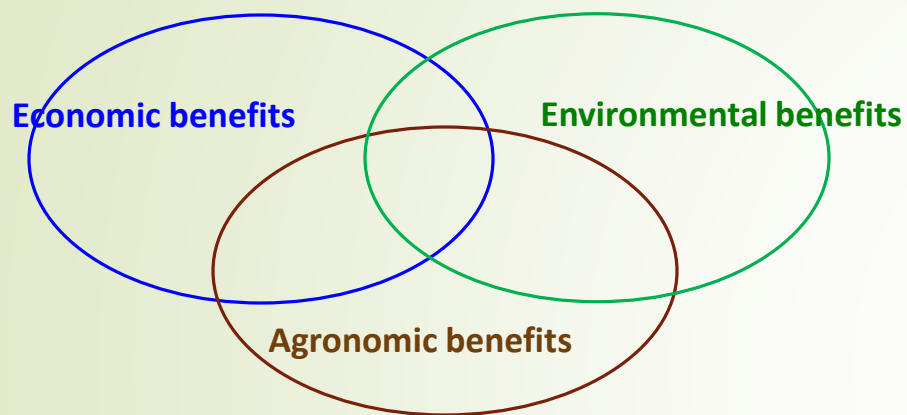
1.4 Statistical data of ag machinery from 2011 to 2016

Year	Tractors	Power Tillers	Engine Pumps	Harvesters	Threshers	Dryings	Millings
2011	6,786	77,421	183,502	1,548	15,210	-	48,753
2012	8,961	128,806	231,942	4,820	16,146	-	54,328
2013	9,466	151,698	255,955	4,598	17,067	94	55,270
2014	11,940	228,456	326,832	5,503	17,532	178	54,062
2015	13,701	266,004	344,633	5,893	17,169	180	55,364
2016	18,317	343,764	352,240	6,605	13,765	18,442	34,7203
2017	20,046	366,195	367,117	6,905	52,612	20046	36,6195

II. Situation analysis on CA in Cambodia



2.1. Benefits of Conservation Agriculture



1. Economic benefits

- Time saving and thus reduction in labor requirement.
- Reduction of costs, e.g. fuel, machinery operating costs and maintenance, as well as a reduced labor cost.
- Higher efficiency in the sense of more output for a lower input.

2. Agronomic benefits

Adopting conservation agriculture leads to improvement of soil productivity:

- Organic matter increase.
- In-soil water conservation.
- Improvement of soil structure and thus rooting zone.

3. Environmental benefits:

Reduction in soil erosion, and thus of road, dam and hydroelectric power plant maintenance costs.

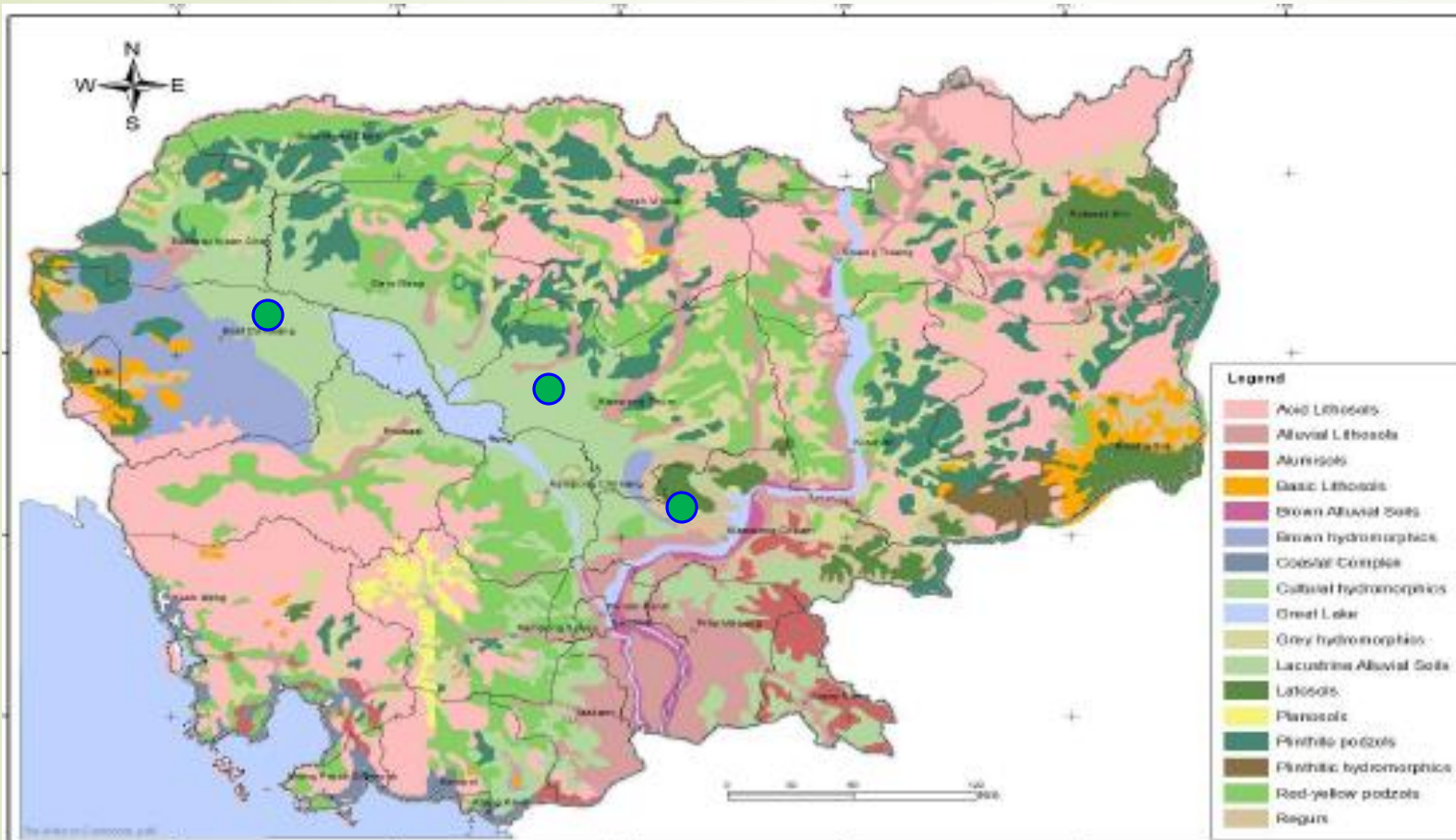
- Improvement of water quality.
- Improvement of air quality.
- Biodiversity increase.
- Carbon sequestration.

2.2 New generation of CA systems: Planting green

Develop a new generation of CA systems based on the establishment of main crops on living cover crops improving the efficiency of the system (less use of fossil fuel, higher flexibility, lower operational costs, eliminate the use of herbicide...).



2.3 Soil classification & CA in Cambodia



- ❖ Tonle Sap Lake area: medium - high fertility;
 - ❖ Mekong River Basin: medium fertility; and
 - ❖ Mountainous plateau area: low - medium fertility.
- 3 places have been introducing and applying CA in Cambodia more than 10 years.

III. Good practices and successful cases in adoption of CA in Cambodia

Battambang 'Mollisoils'.

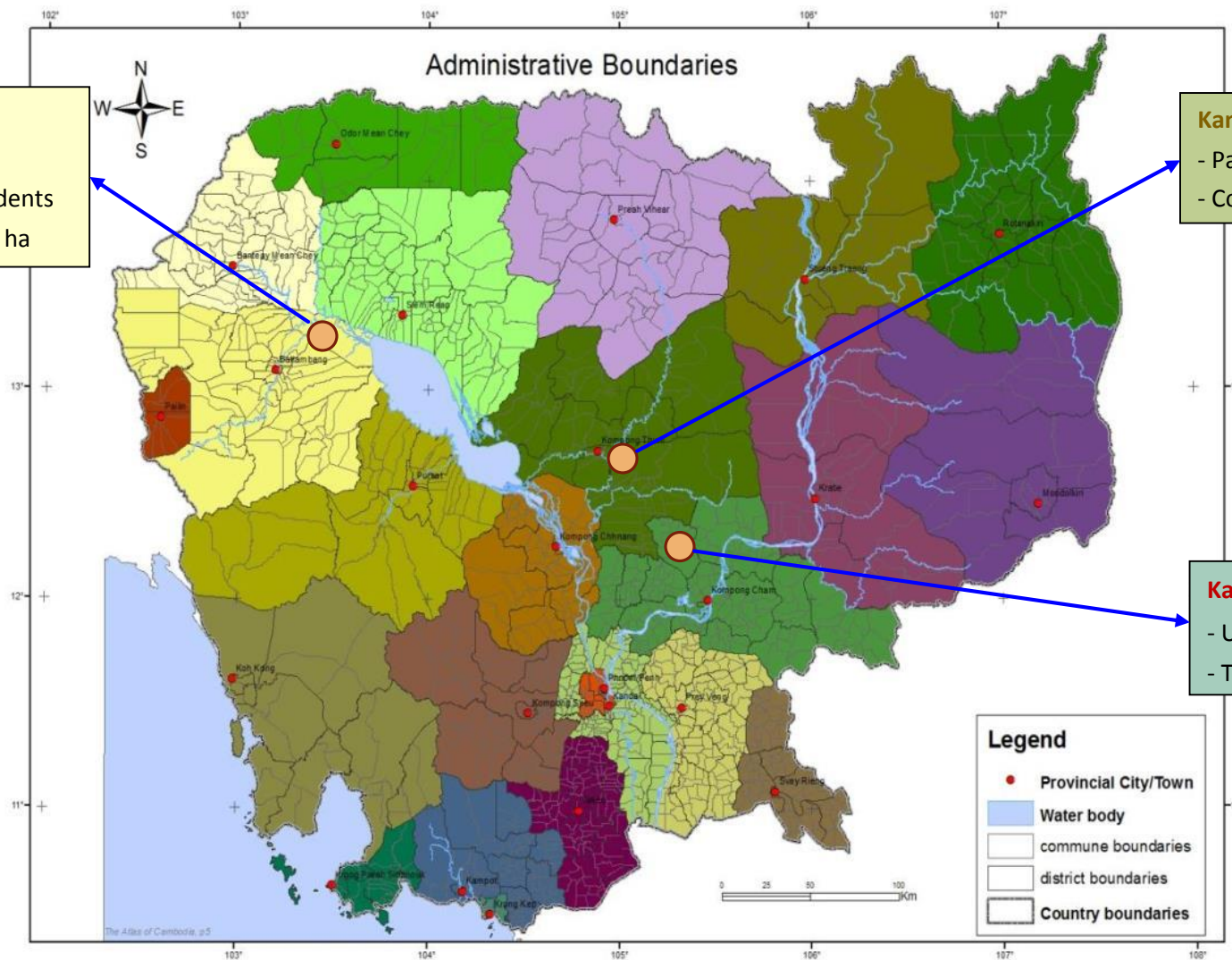
- Upland crops + paddy rice
- Train University of Battambang students
- Cooperative farmers ~ 90 HHs, 300 ha

Kampong Thom 'Red-yellow podzol (80% sand)'

- Paddy rice
- Cooperative farmers 22 HHs, 20 ha

Kampong Cham 'Red Latosol (>70% clay)'

- Upland research station, 15 ha
- Train Royal University of Agriculture students



3.1 Sharing, learning learnt and adaptation processes on CA



3.2 Appropriate scale machineries in CA system



Battery-powered broadcaster



Small roller



Roller with cutting disc



Chisel-plough



Versatile no-till planter



NT planter, broadcaster
& roller crimper

3.3 R & D on machines and equipment for CA by Dept of Ag Engineering



3.3 R & D on machines and equipment for CA by Dept of Ag Engineering – cont'd



IV. Constraints and challenges to adoption and promotion of CA and CA mechanization

There are a number of Constraints and challenges in adoption of conservation agriculture. as below:

1. The most important is the mindset of farming community who were educated extensively and convinced about the intensive agriculture and use of external inputs. Most of farmers have realized huge economic benefits by intensive agriculture practices.
2. A complete shift from intensive tillage to zero or minimal tillage needs extensive educational programme by demonstrating the benefits accrued by conservation agriculture.

IV. Constraints and challenges to adoption and promotion of CA and CA mechanization – cont'd

3. High cost of machines and equipment. Farmers may not immediately shift from the existing or available machines to the conservation agriculture machines;
4. Access to information about the conservation agriculture. Farmers need complete information related to tillage practices, cultivation methods and improved varieties;
5. Skills development. New machines (zero-tillage machine) and cultivation practices need skills development of the farmers in order to adopt and implement those in their production environment; and
6. Most of the farmers lack of skills in using zero-till machines and cultivation practices that prevents adoption of conservation agriculture practices.

V. Recommendations

- Awareness raising activities on various machines and equipment used for conservation agriculture with relevant stakeholders including Agricultural Educational Institutions are needed;
- Better information sharing and extension of the technology through national and regional workshops on the benefits of machines and equipment used for conservation agriculture;
- In close cooperation with development partners and private sector on R & D of machines and equipment for conservation agriculture that required to practice conservation agriculture can be reasonable price and affordable for individual smallholder farmers; and
- Introduce various machines and equipment with several crops through training workshop and field demonstration to farmers and relevant stakeholders.

VI. Conclusion

- Conservation agriculture is a good way to achieve increased land and labor productivity while preserving natural resources;
- Well-trained and equipped conservation agriculture service provision entrepreneurs, as well as farmers themselves, are a promising way forward to put conservation agriculture mechanization within the reach of smallholders;
- The research and development of agricultural machines used for conservation agriculture should be adapted with local condition in order to make sure the user could afford to use it.
- Conservation agriculture has been piloted in Cambodia for more than 10 years to contribute improving soil structure and maintain water conservation in soil; and
- Agricultural machines and equipment used for conservation agriculture activities have been introduced and piloted in several places in Cambodia.

Thank you for your attention