

## SATNET Asia National Training Program on Cost Benefit Analysis of Agricultural Technologies

25-27 November, 2013, Thimphu, Bhutan

### Workshop Report



The Network for Knowledge Transfer on Sustainable Agricultural Technologies and Improved Market Linkages in South and Southeast Asia (SATNET Asia) aims to support innovation by strengthening South–South dialogue and intraregional learning on sustainable agriculture technologies and trade facilitation. Funded by the European Union, SATNET facilitates knowledge transfer through the development of a portfolio of best practices on sustainable agriculture, trade facilitation and innovative knowledge sharing. Based on this documented knowledge, it delivers a range of capacity building programmes to network participants.

SATNET Asia is implemented by the Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA) in collaboration with the AVRDC – The World Vegetable Center, the Asian and Pacific Centre for Transfer of Technology (APCTT), the Food Security Centre of the University of Hohenheim and the Trade and Investment Division of UNESCAP.

This report has been produced with the assistance of the European Union. The contents of this report are those of the authors and can in no way be taken to reflect the views of the United Nations or the European Union. The report has been issued without formal editing.

## **Acknowledgements**

This report has been prepared by Dr.Krishnan Srinivasaraghavan, In-charge of Technology Transfer Services Group, Asian and Pacific Centre for Transfer of Technology (APCTT)-UNESCAP, New Delhi and Mr.Suraj Pandey, Consultant, SATNET Asia Project, Asian and Pacific Centre for Transfer of Technology (APCTT)-UNESCAP.

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## Executive Summary

The SATNET National Training Programme on Cost Benefit Analysis (CBA) of Agricultural Technologies was organized by the Asian and Pacific Centre for Transfer of Technology (APCTT) of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) during 25-27 November 2013 in Thimphu, Bhutan in partnership with the Council of Renewable Natural Resources Research of Bhutan (CoRRB) of the Ministry of Agriculture and Forests, Bhutan. This capacity building programme was organized as part of The Network for Knowledge Transfer on Sustainable Agricultural Technologies and Improved Market Linkages in South and Southeast Asia (SATNET) project funded by the European Union. This First In-Country SATNET Training programme for Bhutan was inaugurated by Hon'ble Member of Parliament of Bhutan, H.E.Dasho Dophu Dukpa had the active participation of 29 participants representing various Departments and Divisions of CoRRB and MoAF from different provinces of Bhutan. The participants in the workshop were trained on the basic concepts and theory of cost benefit analysis of agricultural technologies along with hands on exercises based on UNIDO and L-M approaches of CBA. In addition, the training programme also specifically focused on the CBA techniques of the low cost sustainable agricultural technologies as well as pest management practices using microbial pesticides as practical examples of CBA analysis.

The CBA training comprised of the following modules related to cost benefit analysis:

- Introduction: Cost Benefit Analysis
- Cost Benefit Analysis of Ani-Chocolate Project of Kepong Cattle feeds
- UNIDO Approach to Cost Benefit Analysis
- L-M Approach of to Cost Benefit Analysis
- Package of Technologies for Sustainable agriculture
- Technology valuation
- Sustainable Agriculture with Low-cost technologies
- Cost benefit Analysis of capital Budgeting
- Case studies of Cost Benefit Analysis
- Efficacy of microbial pesticides to control pest in the farmer's field.

This training programme was designed in the form of interactive sessions in which the resource persons trained the participants on various aspects of CBA with specific emphasis on the CBA tools and techniques useful in the context of Bhutan. Group discussions were also facilitated by the resource persons on specific case studies and also the participants were encouraged to present few success stories on the cost benefit analysis in Bhutan. The concluding session chaired by APCTT summarized the key learning outcomes of the training programme and the way forward for continuing the learning on CBA as well as the opportunities to apply the tools, techniques and skills learned from this training programme in real life situation involving investment decisions on agricultural projects and technologies.

## **SATNET Asia National Training Program on Cost Benefit Analysis of the Agricultural Technologies**

**25-27 November 2013, Thimphu, Bhutan**

### **Introduction**

The Network for Knowledge Transfer on Sustainable Agricultural Technologies and Improved Market Linkages in South and Southeast Asia (SATNET) is working with institutions that share knowledge on sustainable agricultural technologies and improved market linkages in the region. SATNET facilitates knowledge transfer through the development of a portfolio of best practices on sustainable agriculture, trade facilitation and innovative knowledge sharing. Based on this documented knowledge, it delivers a range of capacity-building programmes to network participants. This will enable them to transfer this knowledge to those who need it most – smallholder farmers and small-scale entrepreneurs.

Sustainable development requires knowledge and capacity in government agencies, businesses and local communities to enable all stakeholders to participate in the decision making and to put in place appropriate strategies, thereby strengthening their communities to the desired change processes and their ability to identify with them. The work package 4 (WP4) of the SATNET Asia focuses on knowledge transfer as well as capacity development aspects of the project, with a particular emphasis on South-South collaboration.

Asian and Pacific Centre for Transfer of Technology (APCTT), a Regional Institution of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) based in New Delhi, India is responsible for implementing capacity building programmes under WP4 of SATNET in 6 countries in South Asia namely, Afghanistan, Bangladesh, Bhutan, Nepal, Pakistan and India. The SATNET Asia National Training Program on Cost Benefit Analysis of the Agricultural Technologies organized during 25-27 November 2013 was the first National Training Programme for key stakeholders in Bhutan organized by APCTT in partnership with the Council for Renewable Natural Resources Research of Bhutan (CoRRB) of the Ministry of Agriculture and Forests (MoAF) in Bhutan.

The training was organized by APCTT involving the following methods to train the participants on various aspects related to the cost benefit analysis

#### **Group Discussions**

- Individual presentation-Case Study
- Audio/Video presentations
- Practical Exercises

A total of 29 participants representing different offices of CoRRB and MoAF actively participated in this training of which 5 of them were female.

## Programme

Below is the program summary of the cost benefit analysis training programme.

Day-1	Day-2	Day-3
<ul style="list-style-type: none"> <li>• Inaugural Session</li> <li>• Welcome Note</li> <li>• SATNET Introduction</li> <li>• Cost Benefit Analysis- Introduction</li> <li>• UNIDO- Cost Benefit Analysis</li> <li>• L M Approach Cost Benefit Analysis</li> <li>• Group Exercise- CBA</li> </ul>	<ul style="list-style-type: none"> <li>• Package of technologies for sustainable agriculture</li> <li>• Technology Valuation</li> <li>• Sustainable Agriculture with Low Cost Technologies</li> <li>• Case Studies on the Cost Benefit Analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Microbial Pesticides for the Farmers field</li> <li>• APCTT 's Online Technology Platforms</li> <li>• Case studies on Cost Benefit Analysis</li> <li>• Group Exercise</li> <li>• Summary and Way Forward</li> <li>• Workshop Evaluation</li> </ul>

## Key Learning Outcomes

### 1.1 Cost Benefit Analysis

CBA is primarily a decision making tool to ensure the most efficient use of limited resources available for investment by decision makers. Performing Cost Benefit Analysis (CBA) is very useful for decision makers to decide on the potential benefits of a new project if the benefits are greater than the envisaged costs. It can be broadly classified into three types:

- Financial Analysis: Financial implications to an individual/ a group/ an organization (market prices) of a project / technology package
- Economic Analysis: Economic implications to anyone/ everyone in the society (shadow prices) of project / technology package
- Social Analysis: Incorporating social objectives or value judgments of the society

There are five broad steps in CBA:

**1. Identification of costs and benefits-** Identify all benefits and costs irrespective of whether they can be quantified and valued or not. A benefit occurs either as an additional benefit (output, revenue, etc.) or saving of a cost (lower cost of pesticide due to GM seed). Similarly, a cost is incurred either as an additional cost or loss of a benefit.

For Example: Financial, economic and social benefits and costs of organizing a Tree Growers Cooperative.

**Financial:** sale of tree produce (benefit), purchase of saplings (cost).

**Economic:** Carbon sequestration/ better environment, increased milk production (benefits). **Social:** employment generation, reduction in poverty (benefits)

### 2. Quantification and valuation of costs and benefits

Quantify and value as many of the identified costs and benefits as possible. Identify the base year or reference year and use the prices of that year as Constant Prices for all the years

**3. Aggregation of costs and benefits:** It is the equalization of costs across levels. They include Shadow Exchange Rate (SER), across income or consumption groups, across time - discount rates.

**4. Criteria for selection:** There has to be basis for estimating the cost of past and future values. The usual methods are Net Present Value (NPV), Internal Rate of Return (IRR) and Benefit-Cost Ratio (BCR).

**5. Sensitivity and risk analysis:** Every project has an element of risk, which has to be factored in. Various considerations are the different scenarios in sensitivity of selection criteria to changes in the different assumptions made, quantification of the risk, cost over-runs due to inaccurate estimation of prices and delay in implementation due to slow technology adoption and expected yields and prices.

## **1.2 Ani-Chocolate Project of Kepong Cattle feeds - Cost-Benefit Analysis**

This session dealt with a case study on dairy industry. Managua is the capital of Nicaragua and has an economy based on livestock and dairy industry. To improve the yield of milk, supplementary cattle feed was innovated and provided by the government. Feeding the cows with a specific quantity of this feed Ani-chocolate was found to increase the daily milk yield by 10%. The dairy organization of the Managua (Government Agency) was ready to pass on this innovation to Kepong Cattle-feeds to mass produce it. A plant was constructed with a life span of 20 years keeping in mind the profitability to all parties and economic feasibility of the plant based on the CBA analysis of the project.

## **1.3 Package of technologies for sustainable agriculture along with its economic benefits**

This session dealt with Sustainable Agriculture, a concept of farming through maintaining or improving the natural resources (Land, Water, Air and biodiversity) base while harnessing the same for production of food, fibre and feed or other agro-based commodities. This session also emphasized that the agricultural practices undertaken should take care of the following aspects: Production of clean foods and other products, sustaining soil health, productivity, water, biodiversity and at the same time being economically viable and socially acceptable. Excessive usage of chemicals and other methods leads to degradation of soil due to water and wind erosion, loss of productivity, chemical and physical degradation, water logging and soil salinity. To prevent degradation and improve the soil fertility, natural agricultural practices like crop rotation, using cover crops for afforestation, recycling of crop residue, utilizing organic manure, biofertilizer and green manuring should be undertaken. These are natural and also inexpensive solutions. During this session, a list of low cost package of technologies for sustainable farming was shared with the participants as provided below:

- i) Land preparation- Raised bed technique, zero/minimum tillage
- ii) Soil drenching with liquid manures for land reclamation and/manuring
- iii) Appropriate crop selection according to soil type and land situation; and seed treatment with beej *Sanjivani*
- iv) Integrated Nutrient Management:
  - a. Manuring- Compost, vermin-compost, biofertilisers in soil, on standing crops, with seeds and manures.
  - b. Preparation and use of different liquid manures.
  - c. Green manuring and green leaf manuring- Culturing *Azolla*, ploughing down green manured plants, using green legume leaves, growing leguminous plants on bunds, borders of the field/farm etc.

- d. Creating congenial environment for growth and multiplication of earthworms and beneficial microbes.
- v) In situ water management- Every drop of water conserved through adoption of different soil and water conservation practices reduces requirement of irrigation.
- vi) Mulching – Covering plots with crop residues or other biodegradable materials to control weeds, conserve moistures, add biomass etc.
- vii) Integrated Pest management - biopesticides, botanical pesticides, organic pesticides and natural control.
- viii) Weed management- Furrow irrigation in raised beds, mulching, cover crops, use of well rotten cow dung manures, proper crop rotation, uprooting weeds before seed formation etc.
- ix) Seed storage - Using botanical and organic preparation.
- x) Appropriate crop rotation according to soil and land situation.

#### **1.4 Sustainable agriculture with low cost technologies: The case of application of organic liquid manure**

This session dealt with the application of low cost technologies such as organic liquid manure that consists of cow dung and cow urine based fermented products mixed in different proportions. The major advantages of using liquid manure are:

- They are multi-purpose and multi-functional
- Give higher yield and higher income than chemical varieties
- Need less labor, less water, less weeds and less investment
- Better quality produce and ideal for resource poor farmers

In addition organic liquid manure is a natural source of nutrients, amino acids, hormones and useful microbes like bacteria and fungi. Some examples are *sanjibani*, *shasyagavya*, *kunapajala* and *panchagavya*.

#### **1.5 Sustainable Agriculture with Low Cost Technologies: The Case of Land Shaping**

During this session, the economic benefit of land shaping was shared with the participants. Land shaping is changing the shape of the land by excavating or using existing water bodies. This helps in critical irrigation in dry months, fish culture, vegetable and fruits on the pond embankments, use of aerial space for poultry and vegetables etc. It is used as part of integrated farm management. A case in example is *Sunderbans* in India. The average rainfall in the *sunderbans* is 1750 mm/year is concentrated in seven months from June-December. As 61.9 percent of the total available agricultural land area is low - lying, the entire land is subject to inundation and water logging during these seven months. Only low yielding tall *Indica* variety of paddy is grown by the farmers. During dry season these lands become saline. To overcome this problem, an integrated farming is being promoted. Substantial space is created by raising and broadening the bunds on which vegetables are grown year round. The pond, trenches around the field and crop fields are interconnected to facilitate water flow and movement of fish.

#### **1.6 UNIDO Approach To Cost-Benefit Analysis**

During this session, participants were exposed to one of the most important method of CBA analysis known as UNIDO Approach of CBA. This method has the following distinctive features:

- I. Considering the aggregate Consumption – taking a base income level.
- II. Constant Domestic Rupee as reference unit – for convenience of foreign exchange.

- III. Disaggregative Approach i.e. considering several components individually like profitability, incomes and impact. This can be divided into five stages
- Stage 1: Financial profitability at market prices - Financial Profitability of different Stakeholders is done by checking the balance sheet, cash flow statement, internal rate of return and discount rates.
  - Stage 2: Net Benefits at economic prices – use of shadowy pricing i.e. using indirect indicators for price determination. The shadow prices used are tradability, indirect taxes, labor, capital, foreign exchange and externalities.
  - Stage 3: Impact on savings and investment - While income transfers may be desirable as such, they change the level of savings and investment in the economy which in turn affects future consumption of society. Shadow price of investment indicates present value of future consumption stream generated by investment of rupee one in the current year.
  - Stage 4: Impact on income distribution - This stage is relevant when we value income in the hands of different groups of people differently.
  - Stage 5: Merit and Demerit goods - This stage adjusts for differences between economic and social values. A good is called a Merit Goods if its social value is greater than economic value, e.g., petroleum products, which are in chronic shortage. A good is called a Demerit Goods if its social value is less than its economic value, e.g., liquor, tobacco
- IV. Adjustment Factor (AF)  
As part of this session, participants were also given a hands on exercise to apply the UNIDO model and assess the cost benefit analysis of the project.

### 1.7 Efficacy of Microbial Pesticides and Natural Enemy to Control Pests in Farmers' Fields

This session dealt with the economic and social benefits of applying microbial pesticides for control of pests and diseases. The chemical pesticides used to control agricultural pests destroy environment, soil health, plant health and ultimately human health. Biological control is the suppression of pest population by the introduction, augmentation or artificial release of their natural enemies. Biological suppression involves the action of parasitoids, predators or pathogens in maintaining another organism's population density at lower average than would occur in their absence. Sustainable management of pests is critical to reduce harmful effects of chemicals while preserving soil fertility. During this session, the economic and social aspects of the following two case studies were discussed:

**Case study I:** Paddy crop in Paruldaha village, West Bengal was infested by leaf folder and stem rot. Microbial pesticides were applied and the crop showed significant improvement in four days from the date of application.

**Case study II:** Potato crop of a farmer in Paruldaha village, West Bengal was infected by collar wilt, bacterial wilt and Crinkle disease. Microbial and botanical pesticides were sprayed and there was a 40% increase in the quantity of the produce.

The interactive discussions that followed during the case studies provided opportunities for the participants to get the necessary clarifications and to enhance their understanding on CBA

### 1.8 A Community Forest Carbon Project – Harda Forest Division of Madhya Pradesh

This session dealt with the CBA of a community forest carbon project with an objective of receiving revenue from the Clean Development Mechanism (CDM). CDM is a market based mechanism, set up under the Kyoto Protocol, linking mitigation of greenhouse gases with sustainable development.

Reduction of emissions achieved in developing countries through various ways (e.g., renewable sources of energy, better technologies, afforestation) can be purchased by other countries to meet their requirements of the Kyoto Protocol.

This project was based on regeneration and protection of forests in Harda Forest Division of Madhya Pradesh and was prepared for financing under Community Development Carbon Fund (CDCF). CDCF was set up by the World Bank specifically for small scale projects in poor and rural areas of developing countries. This project was prepared collaboratively by Community Forestry International, USA; Indian Institute of Forest management, Bhopal; Centre for Ecological Sciences, IISc, Bangalore and Ministry of Environment and Forests, New Delhi.

Harda Forest Division is located 150 km southwest of Bhopal spread over a total area of 1122 sq km. Preparing a project in Land Use Change and Forestry (LUCF) sector for CDM support requires the following.

- Determining compatibility with sustainable development
- Defining the project boundary
- Assessing the carbon stock baseline
- Estimating the additional carbon stock to be created
- Determining the performance of carbon stocks in the project area
- Developing a system to measure, monitor and verify changes in carbon stocks

For effective implementation of the project, strengthening institutional capacity to manage local forests is essential. This was promoted through various measures like responsibility to FPCs for full financial management, conflict resolution in multi-caste communities, range level federation of FPCs and extension, training and awareness campaigns. To strengthen financial additionality, it is required to establish community managed micro credit facilities and to link forest protection to the financing of popular revolving micro credit schemes. Technical inputs are also provided to implement soil conservation activities to reduce soil erosion, encourage enrichment planting and construction of small check dams to enhance local hydrology.

This case study helped the participants to understand the application of CBA in the context of natural resource management in developing countries.

### **1.9 Cost-Benefit Analysis of Vermin-composting**

This session dealt with Vermicomposting, a process that involves the consumption of organic material by earthworms. Vermicomposting speeds up the process of decomposition and provides a nutrient-rich end product, called vermicompost, in the form of 'worm castings'. In the cost of producing vermicompost, over 75% of the cost constitutes material costs which include procuring agricultural waste and earthworms. The CBA analysis of vermicomposting was shared with the participants with the objective of training participants on performing CBA for organic agricultural practices and to make informed decisions on technology packages such as Vermicomposting.

## Annexes

### Annex-1 Workshop Evaluation

The evaluation of the workshop was conducted based on two different approaches including (i) General feedback and (ii) Knowledge, Attitude and Practice (KAP) Survey. The criteria of evaluation were completed on the scale of Excellent, Good, Fair and Poor. Further, general feedback part was divided into two segments i.e. content and process and hence this part was evaluated based on the delivery of technical sessions covered by the resource persons. The second part of the evaluation was prepared using perception based approach known as Knowledge, Attitude and Practice. This segment of evaluation mainly discusses about individual knowledge gained from the workshop as well as implementation of specific knowledge in the participants own areas of research.

On the final day of the workshop, 22 evaluation forms were received from the participants including 5 female participants to assess the workshop according to its usefulness in dissemination of knowledge, quality and innovation of the cost benefit analysis. Overall the workshop was rated as good by more than 75% of the participants followed by excellent category.

### Usefulness of the content and quality of processes and logistics

Participants were given evaluation forms to rate the usefulness of the workshop content and quality of processes on the scale of “Excellent to Poor”. Overall, statistics in the table shows workshop was rated as good since more than 75% of the responses were observed under this category in terms of the workshop content and processes. 50% of the participants rated the processes as good while 35% rated as excellent.

In addition, topics 8 & 6 were rated 86% and 81% respectively by the participants in the “good” category because of the innovative knowledge sharing these topics offered in terms of choices of sustainable agricultural technologies and their economic benefits. Rest of the topics was rated either excellent or good by the participants because of their value addition to the existing knowledge base.

### Expectations

About 70% of the participants indicated that the workshop on the cost benefit analysis of agricultural technologies met their overall expectations on a large scale, while 30% of the participants felt that the workshop met its objectives beyond their expectations.

	Topics	Excellent	Good	Fair	Poor
<b>Content</b>	Topic 1: An Introduction to Cost Benefit Analysis	18	78	4	
	Topic 2: Ani-Chocolate Project of Kepong Cattle Feeds: An Exercise on Cost-Benefit Analysis	21	75	4	
	Topic 3: UNIDO and World bank Approaches	9	64	27	

	Topics	Excellen t	Good	Fair	Poor
	Topic 4: An Exercise to Compare UNIDO and L-M Approaches to Cost-Benefit Analysis	9	68	18	5
	Topic 5: Package of Technologies for Sustainable Agriculture along with its Economic Benefits	14	81	5	
	Topic 6: Technology Valuation-Case study on Onion Oil	41	54	5	
	Topic 7:Sustainable Agriculture with Low Cost Technologies: The case of Application of Organic Liquid Manure	27	73		
	Topic 8:Sustainable Agriculture with Low Cost Technologies: The case of Land Shaping	14	86		
	Topic 9: Cost-Benefit Analysis of Organic Farming	27	52	21	
	Topic 10: Cost-Benefit Analysis of GM Crop Cultivation	14	63	18	5
	Topic 11: Cost Benefit Analysis of an Animal Disease Control Project and vermin compost	9	77	14	
	Topic 12: Cost Benefit Analysis of an Animal Disease Control Project and vermin compost	23	72	5	
	Topic 13: Efficacy of microbial pesticides to control pest: Case Study I and -I	18	77	5	
	Topic 14: Efficacy of microbial pesticides to control pest: Case Study I and II	27	68	5	
	Topic 15: Work Package 4 of SATNET Asia on Knowledge Transfer	14	77	9	
<b>Process</b>	Agenda and flow	27	52	21	
	Facilitation, feedback and discussion	21	75	4	

### Aspects to be improved in the future

Participants felt that inclusion of more case studies and a brainstorming session to consolidate the learning from these case studies would have been more useful. Some of the participants also felt that more hands on sessions on software for CBA analysis would be useful. A brief summary of key suggestions from the participants is provided below:

### Content

- Provide more information on application oriented CBA tools and techniques.
- Include some sessions on software for Cost Benefit Analysis
- More case studies of the CBA at the farm level
- Emphasis on mathematical calculations should be less and usage of software should be more
- Few participants indicated that the training programme on CBA should also focus on the different aspects such as Integrated Pest Management and Climate Change

### Process

- Presentations should be more simplistic and less of jargons

- More comprehensive discussions on case studies.
- More group discussions on CBA analysis.

### **Logistics**

- Presentation files should be distributed well in advance to the participants
- The duration of the workshop on CBA should be more than 3 days for facilitating group discussions and collective learning.

### **Way Forward**

- Most of the participants indicated that they will apply this knowledge in their research work and will also provide assistance to other organizations in evaluating the economic feasibility of agricultural technologies and/or projects.
- Some participants said that they would also disseminate this training to interested colleagues in their respective offices and divisions of MoAF.

## Annex-2 List of Participants

S.No.	Name of the Participants	Designation	Agency	Email Address	Contact No.
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### Annex-3 Programme Agenda

#### Day 1: 25 November 2013

Time	Programme	Speakers
<b>Session-I</b>	<b>Inaugural Session</b>	
09:00-09:10	Inaugural Chief Guest	H.E. MP Dasho Dophu Dukpa
09:10-09:20	Opening Address	Dr. Krishnan Srinivasaraghavan, APCTT-ESCAP
09:20-09:40	An overview of SATNET Asia project	Mr. Suraj Pandey APCTT-ESCAP
<b>Session-II</b>	<b>Fundamentals of Cost Benefit Analysis</b>	
09:40-10:40	An Introduction to Cost Benefit Analysis	Dr. Rakesh Saxena IRMA
10:40-11:00	<b>Tea/Coffee Break</b>	
11:00-12:00	Ani-Chocolate Project of Kepong Cattle Feeds: An Exercise on Cost-Benefit Analysis	Dr. Rakesh Saxena IRMA
12:00-13:00	UNIDO Approach to Cost Benefit Analysis	Dr. Rakesh Saxena IRMA
13:00-14:00	<b>Lunch Break</b>	
14:00-15:00	L-M/OECD/World Bank Approach to Cost-Benefit Analysis	Dr. Rakesh Saxena IRMA
15:00-15:15	<b>Tea/Coffee Break</b>	
15:15-16:15	An Exercise to Compare UNIDO and L-M Approaches to Cost-Benefit Analysis	Dr. Rakesh Saxena IRMA

#### Day 2: 26 November 2013

Time	Programme	Speakers
<b>Session-III</b>	<b>Technology Valuation in Sustainable Agriculture and Food Processing Sectors</b>	
09:00-10:00	Package of Technologies for Sustainable Agriculture along with its Economic Benefits	Dr. Nasim Ali IRDM, RMVU
10:00-10:40	Technology Valuation-Case study on Onion Oil	Dr. Krishnan Srinivasaraghavan, APCTT-ESCAP

Time	Programme	Speakers
10.40-11.00	<b>Tea/Coffee Break</b>	
11.00-12.00	Sustainable Agriculture with Low Cost Technologies: The case of Application of Organic Liquid Manure	Dr. Nasim Ali IRDM, RMVU
12.00-13.00	Sustainable Agriculture with Low Cost Technologies: The case of Land Shaping	Dr. Nasim Ali IRDM, RMVU
13.00-14.00	<b>LUNCH BREAK</b>	
14.00-14.30	Cost-Benefit Analysis of Organic Farming	Dr. Rakesh Saxena IRMA
14.30-15.00	Cost-Benefit Analysis of GM Crop Cultivation	Dr. Rakesh Saxena IRMA
<b>Session-IV</b>	<b>Selected case studies from Agriculture sector</b>	
14.00-15.15	Cost Benefit Analysis of an Animal Disease Control Project and vermin compost	Dr. Rakesh Saxena IRMA
15.15-15.30	<b>Tea/Coffee Break</b>	
15.30-16.00	APCTT's Regional Mechanism for Facilitation Technology Transfer and Commercialization	Dr. Krishnan Srinivasaraghavan, APCTT-ESCAP

### Day 3: 27 November 2013

Time	Programme	Speakers
<b>Session-VI</b>	<b>Selected case studies of Cost Benefit Analysis from other sectors</b>	
09:00-10.15	Efficacy of microbial pesticides to control pest: Case Study I	Dr. Nasim Ali IRDM, RMVU
10.15-10.30	<b>Tea/Coffee Break</b>	
10.30-11.45	Efficacy of microbial pesticides to control pest: Case Study II	Dr. Nasim Ali IRDM, RMVU
11.45-12.30	Cost-Benefit Analysis of a Community Forest Carbon Project	Dr. Rakesh Saxena IRMA
12.30-13.00	Work Package 4 of SATNET Asia on Knowledge Transfer	Mr. Suraj Pandey APCTT-ESCAP
<b>13.00-14.00</b>	<b>Lunch Break</b>	
	<b>OPEN FORUM (GROUP EXERCISE)</b>	Dr. Rakesh Saxena

<b>Time</b>	<b>Programme</b>	<b>Speakers</b>
14.00-15.30		IRMA  Dr. Nasim Ali IRDM, RMVU
15.30-15.45	<b>Summary and Way forward</b>	Dr. Krishnan Srinivasaraghavan, APCTT-ESCAP
15.45-16.15	<b>Concluding Remarks</b>  <b>and</b>  <b>Vote of Thanks</b>	CoRRB, Bhutan   Dr. T.N. Acharya, CoRRB
16.15-16.30	<b>Workshop Evaluation and Feedback</b>	Mr. Suraj Pandey APCTT-ESCAP