ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH

CAPaBLE Programme Final Report



Project Reference Number: CBA2016-04MY-Jayasinghe

Mainstreaming Weather and Climate Information Application for Agro-Ecosystem Resilience in a Changing Climate

The following collaborators worked on this project:

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Final Report submitted to APN

OVERVIEW OF PROJECT WORK AND OUTCOMES

1. Project Information

Project Duration	**:**	2 years (July 2016 – July 2018), Extended up to Aug 2019
Funding Awarded	**:**	USD 42,000 for Year 1; USD 30,000 for Year 2
Key organizations involved	**:**	a. Dr. Senaka Basnayake, Asian Disaster Preparedness Center, Thailand, senaka_basnayake@adpc.net b. Prof. Buddhi Marambe, University of Peradeniya, Sri Lanka, bmarambe@pdn.ac.lk c. Dr. Madan Lal Shrestha, Small Earth Nepal, Nepal, madanls@hotmail.com d. Dr. Bao Thanh, Sub-Institute of Hydrometeorology and Climate Change, Vietnam, sihymecc@gmail.com e. Dr. Srikantha Herath, United Nations University, Japan, herath.unu@gmail.com f. Dr. Dillip Kumar Swain, Indian Institute of Technology, Kharagpur, India, swain@agfe.iitkgp.ernet.in

2. Project Summary

Ecosystems are fragile to environmental shocks. Climate change is one such example that affects ecosystem due to changes in regular weather and climate patterns creating compound effects through droughts, floods, heatwaves, etc. In view of the above, this project aimed to create awareness and build capacity of relevant government officials in four target countries of Nepal, Sri Lanka, Thailand and Vietnam for effective utilization of weather and climate information and adaptive technological solutions to enhance agro-ecosystem resilience in their respective countries. The training course modules on “Agro-ecosystem Resilience in a Changing Climate”, targeted national level participants from relevant organizations such as Agriculture Ministries/Departments, National Hydro-meteorological Agencies, Water Resource Management Departments, academia, etc. in the four target countries. The course has been designed as a Training of Trainers (ToT) and therefore can be customized by national-level organizations to train sub-national/provincial level officials to support long-term sustainability towards mainstreaming agroecosystem resilience. Through this course, the participants had greater opportunities to interact with resource persons and exchange their experiences, views and ideas throughout the course and during delivery of the presentations. The primary outputs of this project are the course workbook on “Agroecosystem Resilience in a Changing Climate” and capacity enhancement and training of about 150 national-level participants on mainstreaming agroecosystem resilience in a changing climate from four countries. These outputs intended to have an improved national capacity towards mainstreaming agroecosystem resilience in each country as the major outcome of the project.

This capacity-building program intended to support the 4th Strategic Plan of APN in many ways as this project has direct relevance to 3 out of 4 Research Agendas of its action plan, namely; Climate Change and Climate Variability, Biodiversity and Ecosystems, Resources Utilization and Pathways for Sustainable Development, and Risk Reduction and Resilience.

The project also has relevance to the Science-Policy agenda as it brings benefit to strengthening science-policy linkages, identifying best practices to promote science-policy interaction and raising awareness of and disseminating information to policy- and decision-making.

Keywords: Agroecosystem, Resilience, Capacity Building, Training of Trainers, Climate Change

3. Activities Undertaken

a. Developing a training course workbook on “Agroecosystem Resilience in a Changing Climate”;
b. Conducting agroecosystem resilience training courses for government officials in four target countries viz. Vietnam, Nepal, Sri Lanka and Thailand;
c. Conducting course evaluations to see the immediate and long-term impacts through the project and;
d. Submission of a publication in a peer-reviewed journal on lessons learned based on the participant's perspective on agroecosystem resilience for wider communication and outreach.

4. Key facts/figures

- 150 national-level professionals trained on mainstreaming agroecosystem resilience
- 1 paper submitted in a peer-reviewed journal for publication

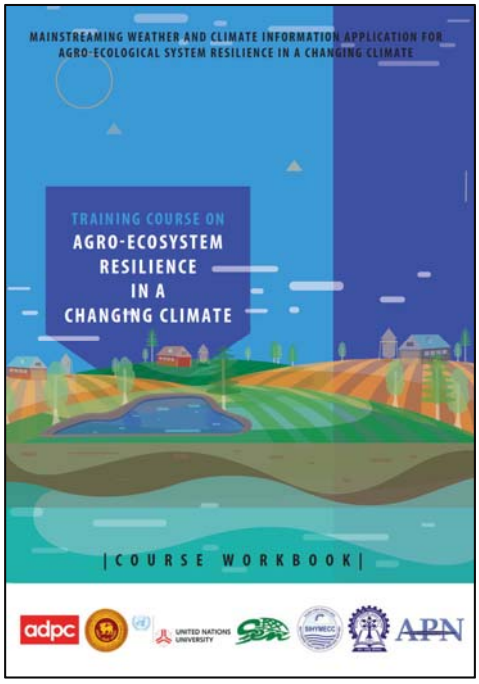
5. Potential for further work

With the successful delivery of 5 training courses in 4 countries as ToT through which we interacted with about 150 professionals working in the field of agriculture, water and climate change, ad very positive feedbacks and comments on the course materials and course workbook were received. There were many requests to provide them with course materials and course workbooks to have their trainings in countries, which is a very positive response from the recipients of these training. So, the potential future activities could be as follows;

1. Revise and update the course materials and course workbook
2. Having meetings with local partners and focal agencies (Ministry of Environment, Ministry of Disaster Management, Ministry of Agriculture and others.) of the project countries to handover the updated materials as a follow-up.
3. Expand the project and enhance the capacity of other countries such as Cambodia, Myanmar, Lao PDR and some other countries of the region.

6. Publications

1. Training course workbook on “Agroecosystem Resilience in a Changing Climate”



2. Peer-reviewed paper on “Lessons learnt from implementing an Ecosystems Resilience in Changing Climate training for mainstreaming weather and climate information for sectoral development in four countries of South Asia and South East Asia”.

   Jayasinghe, S., Basnayake, S., Gupta, N., Weerasinghe, KDN., Weerasinghe, B. (2019). Lessons learnt from implementing a training course on Ecosystems Resilience in Changing Climate for mainstreaming weather and climate information for sectoral development in four countries of South Asia and South East Asia. *(to be published)*

7. Pull quote

“This series of training courses aim to improve agricultural livelihoods while enhancing agroecosystem services and functions. The course will also provide possible guidance for interventions to mitigate undesirable impacts within the ecosystem and improve ecological resilience of agro-ecosystems. The thematic area of focus for the course will be on climate change and climate variability and its impacts on ecosystem services. It will also cover areas of resources utilization and pathways for sustainable development, risk reduction and resilience. The course will be both evidence-based as well as knowledge-based, which would help officials and professionals to develop skills to enhance their knowledge on agro-ecosystem resilience. The course will allow participants to transfer knowledge gained to an actual situation to enhance comprehension on designing interventions to build resilience of ecosystems. Therefore, I believe, this training will go a long way in enhancing the participant’s capacity in terms of awareness towards ecosystem resilience as well as allow policymakers to better understand the subject for effective decision-making.” *(Mr. Hans Guttman, Executive Director, Asian Disaster Preparedness Center)*

“This training course provided an opportunity for me and other participants such as middle and senior-level practitioners, professionals, researchers to get deeper understanding on ecosystem resilience and to develop suitable interventions through systematic process of identifying problems and solutions. The knowledge which I gained from this training really helps me to guide my staff and to take proactive decisions on developing suitable interventions to agroecosystems vulnerable to frequent floods in Sri Lanka.” *(- Dr. M. S. Nijamudeen, Principal Agriculture Scientist, Department of Agriculture, Sri Lanka)*

8. References

ADPC'S NEWS: Training course on agro-ecosystem resilience in changing climate, 27 - 30 Mar 2018, Phetchaburi, Thailand. (https://www.adpc.net/igo/contents/Media/media-news.asp?pid=1345&topic=)

ADPC'S NEWS: Agro-ecosystem Resilience Building course continues in Sri Lanka, 12 - 15 Jun 2017, Colombo, Sri Lanka. (https://www.adpc.net/igo/contents/Media/media-news.asp?pid=1208&topic=)

ADPC'S NEWS: Building Agro-ecosystem Resilience in a Changing Climate, 29 May - 1 Jun 2017, Ho Chi Minh, Viet Nam. (https://www.adpc.net/igo/contents/Media/media-news.asp?pid=1203&topic=)

ADPC'S NEWS: ADPC launches course workbook on Agro-Ecosystem Resilience in a Changing Climate, 23 May 2017. (https://www.adpc.net/igo/contents/Media/media-news.asp?pid=1198&topic=)

9. Acknowledgements

On behalf of the project, Asian Disaster Preparedness Center (ADPC) would like to graciously thank the donor, Asia Pacific Network, for their generous financial support for the project “Mainstreaming Weather and Climate Information Application for Agro-Ecosystem Resilience in a Changing Climate” as part of the CAPaBLE program. ADPC would also like to thank the collaborators and their organizations namely Prof. Buddhi Marambe, University of Peradeniya, Sri Lanka, Dr. Madan Lal Shrestha, Small Earth Nepal, Nepal, Dr. Bao Thanh, Sub-Institute of Hydrometeorology and Climate Change, Vietnam, Dr. Srikantha Herath, United Nations University, Japan, Dr. Dillip Kumar Swain, Indian Institute of Technology, Kharagpur, India. Their contributions were invaluable to the success of the project.

Special thank also goes to the national level participants who participated in representing Agriculture Ministries/Departments, National Hydro-meteorological Agencies, Water Resource Management Departments, Academia. In the four target countries. Special thank also goes to all the resource persons for their valuable contribution to develop the materials and to deliver the training courses.

ADPC would also like to thank all reviewers for contributing valuable and constructive suggestions for improving the final report.

Table of Contents

1. Introduction

Climate change has a considerable impact on weather patterns worldwide. Therefore, planning and decision-making process based on the information on traditional and indigenous knowledge of farmers may no longer be accurate and useful. Respective national, sub-national and local authorities have not been giving due attention to address this issue and farmers and their dependents have been facing difficulties to sustain their livelihoods in the face of climate change and its consequences. Therefore, mainstreaming climate information application and utilization of adaptive technological solutions are remedial measures to improve agriculture livelihoods thereby enhancing agro-ecosystem services and functions. This CAPaBLE project, as it is called, proposed to create awareness and build capacity of government officials on mainstreaming weather and climate information to enhance agro-ecosystem resilience through effective utilization of weather and climate information and adaptive technological solutions. The training course modules on “Agro-ecosystem Resilience in a Changing Climate”, proposed by Asian Disaster Preparedness Centre (ADPC) was based on an Australian AID funded project (2012-2014) modified through a curriculum review process, suitable for national-level participants, in close consultation with relevant national organizations (eg. Agriculture Ministry/Department, National Hydro Meteorological Agencies, Water Resource Management Departments, etc.) in the target countries. This was designed as a Training of Trainers (ToT) and therefore had the scope to be customized by national-level organizations to train sub-national/provincial level officials to support long term sustainability of this effort. The four-day training course contained four (4) modules namely; 1) Concepts of Social Ecological Systems and Resilience, 2) Climate Change, Impacts and Application of Weather and Climate Information in Reducing the Impacts, 3) Design of Interventions to Build Resilience of Ecosystems and 4) Scenario-Based Group Work. The course was designed ao that participants have a greater opportunity to interact with resource persons and exchange their experiences, views and ideas throughout the course and especially on the last day during their presentations.

This capacity building program supported the 4th Strategic Plan of APN in many ways. For an example, this project has direct relevance to 3 out of 4 Research Agendas of the action plan, namely; Climate Change and Climate Variability, Biodiversity and Ecosystems, Resources Utilization and Pathways for Sustainable Development; and Risk Reduction and Resilience. The project proposed to discuss climate change, climate variability and associated extreme patterns in the target countries with their respective agro-ecosystem. The project also included discussion on how the measures should be taken to minimize disaster risks and make agriculture livelihoods resilient for sustainable development. The project also has relevance to the Science-Policy agenda as it brings added value to strengthening science-policy linkages, identifying best practices to opportunities to promote science-policy interaction and raising awareness of and disseminating information to the policy- and decision-making.

1.1 Concise literature review:

Climate has an important environmental influence on ecosystems. Climate change has been making measurable impacts on agriculture in a wide range of economies, crops and farming systems affecting crop productivity, food security and livelihood security. (Weerasinghe et al. 2014). Climate change not only affects ecosystems and species directly, but it also interacts

with other human stressors such as development. Although some stressors cause only minor impacts when acting alone, their cumulative impact may lead to dramatic ecological changes. Therefore, awareness creating through training and capacity building programmes would help study problems and addressing policy issues while also mainstreaming ecosystem resilience through effective use of climate and weather information. This would also allow strengthening interactions among the scientist and policymakers to improve policy-decision making for ecosystems resilience (Weerasinghe et al. 2014).

1.2 Objectives of the Project:

The main goal of this project was to enhance agro-ecosystem resilience while the main objective of the project was to create awareness and build the capacity of government officials on mainstreaming weather and climate information to enhance agro-ecosystem resilience through effective utilization of weather and climate information and adaptive technological solutions. These goals and objective were achieved through a set of sub-objectives (result areas) such as;

a. Conducting agro-ecosystem resilience training courses for government officials
b. Conducting course evaluations to see immediate impact & long-term impacts (Theory of Change)
c. Publishing a peer-reviewed paper on lesson learned on the participant's perspective on agro-ecosystem resilience in target countries for wider communication and outreach.

1.3 Capacity Development and Awareness Raising Outcomes:

This project aimed to develop capacity and raise awareness of relevant government officials of four target countries on agro-ecosystem resilience through effective utilization of weather and climate information and adaptive technological solutions. Therefore, the expected outcome of this project was to enhance capacity and raise awareness of selected governmental officials on ago-ecosystem resilience in the target countries. Since this training course was designed as ToT, Master Trainers of national training were encouraged to conduct sub-national training to train more relevant officials. These officials would then take necessary actions to improve agricultural livelihood and enhance agro-ecosystem resilience by minimizing climate and disaster risks. Therefore, this project benefited selected communities as well as national and sub-national government institutes who are engaged with agriculture sector.

2. Methodology

The training course on “Agro-ecosystem Resilience in a Changing Climate”, was developed by Asian Disaster Preparedness Centre (ADPC) based on a project implemented under the Australian AID funding. The course modules were customized to suit Nepal, Sri Lanka, Thailand and Vietnam to create awareness and build capacity on mainstreaming weather and climate information application and utilization of adaptive technological solutions, among the government officials and stakeholders (average about 30) working in environment, agriculture, irrigation and disaster management sectors and policymaking and legal bodies at national and sub-national level. This training course aimed to improve agricultural livelihoods while

enhancing agro-ecosystem services and functions. The course provided possible guidance for interventions to mitigate undesirable impacts within the ecosystem and improve ecological resilience of agro-ecosystems. The thematic area of focus for the course was on climate change and climate variability and its impacts on biodiversity and ecosystems. It also covered areas of resources utilization and pathways for sustainable development, risk reduction and resilience. The course was both evidence-based as well as knowledge-based, which would help officials and professionals to develop skills to enhance their knowledge on agro-ecosystem resilience. The 4-day long training course was divided into four modules that would help to improve agro-ecosystem services, livelihood and food security. The training was based on interactive presentations, brainstorming, group work, field visits and viewing relevant video materials. The exercises allowed participants to transfer knowledge gained to an actual situation to enhance comprehension of designing interventions to build resilience of agro-ecosystems.

2.1 Outline of activities conducted:

a. **Course Review Workshop:** A course review workshop was held in Bangkok, Thailand on 5th April 2017 to brainstorm on the training course materials developed by ADPC that is part of the development of a training course workbook on "Agroecosystem Resilience in a Changing Climate." The course materials underwent extensive review from external experts and their comments and recommendations received as part of the review process were incorporated to finalize the materials.

   The course workbook developed contained the following modules and was distributed to each participant who attended the training course in each country.

   Module 1: **Relevance of Disaster and Climate Risk Management for Sustainability of Social Ecological System**
   This module introduced basic terminology of disaster risk management, climate change science and impacts of climate-related disasters in the agriculture sector. It also described the agro-ecosystem as a social ecological system, and Ecosystem based approaches (EBA) are required to build their resilience.

   Module 2: **Generation and Application of Weather and Climate Related Information**
   This module provides a discussion of climate information generation, their dissemination and potential applications to build resilience of agro-ecosystems.

   Module 3: **Planning for Vulnerability Reduction and Resilience Building of Agroecosystems**
   This module provides background information for project formulation using accepted approaches and tools such as Theory of Change (TOC), Logical Framework Analysis (LFA), Cost Benefit Analysis (CBA) and Multi Criteria Analysis (MCA). This will form the basis for the scenario-based group work.

   Module 4: **Synthesis of Learnings through Scenario-Based Exercise**

During this module, participants applied their learnings from previous modules to develop a climate resilience strategy based on a given scenario suitable for their respective country.

b. **Training Course on "Agroecosystem Resilience in a Changing Climate" in Ho Chi Minh City in Vietnam:** A four-day training course on Agroecosystem Resilience in a Changing Climate was organized in the Ho Chi Minh City of Vietnam from 28th May to 01st June 2017. The course was jointly organized by ADPC and the Sub-Institute of Hydrometeorology and Climate Change (SIHYMECC) who is also one of the project collaborators. The training was attended by representatives from the agriculture department, disaster management department, SIHYMECC and other relevant Government departments.

c. **Training Course on "Agroecosystem Resilience in a Changing Climate" in Colombo City in Sri Lanka:** A four-day training course on Agroecosystem Resilience in a Changing Climate was organized in the Colombo, Sri Lanka from 12th to 15th June 2017. The course was jointly organized by ADPC and the University of Peradeniya who is also one of the project collaborators. The training was attended by officials from the agriculture department, Ministry of Agriculture, department of meteorology and other relevant Government departments.

d. **Training Course on "Agroecosystem Resilience in a Changing Climate" in Bangkok in Thailand:** A four-day training course on Agroecosystem Resilience in a Changing Climate was organized in the Petchaburi province of Thailand from 27th to 30th March 2018. The training was attended by officials from the agriculture department, Ministry of Agriculture, department of meteorology, department of irrigation, other relevant Government departments and academia.

e. **Training Course on "Agroecosystem Resilience in a Changing Climate" in Kathmandu in Nepal:** A four-day training course on Agroecosystem Resilience in a Changing Climate was organized in the Kathmandu City of Nepal from 05th to 08th June 2018. The course was jointly organized by ADPC and the Small Earth Nepal (SEN), Nepal who is also one of the project collaborators. The training was attended by officials from the agriculture department, Ministry of Agriculture, department of meteorology and other relevant Government departments and NGOs.

f. **Training Course on "Eecosystem Resilience in a Changing Climate" in Chilaw, Sri Lanka:** A four-day training course on Ecosystem Resilience in a Changing Climate organized in the Chilaw, Sri Lanka from 27th to 30th May 2019. The course was jointly organized by ADPC, Ministry of Public Administration and Disaster Management which is the mandated national level organization to take the lead in building resilience to disaster and climate risks: and the University of Peradeniya who is also one of the project collaborators. The training was attended by officials from the agriculture department, ministry of agriculture, department of meteorology, disaster management center (DMC) and other relevant government and semi-government departments, universities and research institutes. Some materials were slightly modified to include

general ecosystem resilience aspects and the same four modules were covered during the training on various aspects of ecosystem resilience. This was an additional training conducted due to the requests received during the first training in Colombo, Sri Lanka.

g. Training course evaluation was conducted on the last day of each training to evaluate the course content, delivery, etc., and to see the immediate and long-term impacts of applications of subject matters. Some participants agreed to share with us their possible applications of subject matters within their organization's mandated in the near future to document the impacts of the training courses.

h. Peer-reviewed paper on "Lessons learnt from implementing a training course on Ecosystems Resilience in Changing Climate for mainstreaming weather and climate information for sectoral development in four countries of South Asia and South East Asia" has been developed. It is expected to be published in PLOS One journal.

3. Results & Discussion

1. ADPC published the training course workbook on "Agroecosystem Resilience in a Changing Climate" which was also one of the major deliverables of the project aimed at capacity building of government officials and decision and policymakers. The course workbook provides an overview of four modules of the training course, which adopts a broader paradigm where resilience of agro-ecological systems has been entwined with concepts of sustainable livelihoods and food security. It embraces a view of agroecosystems inclusive of land farming systems and livestock, aquaculture, fishery and forestry practices which strengthen rural livelihoods, their sustainability and diversity, and contribute to food security. The workbook endeavours to provide the participant with knowledge on analysing factors that influence sustainability and resilience of agroecosystems and develop interventions to sustain the productivity of these systems in the face of climate change by integrating weather and climate information
   Source:
   a. http://www.apn-gcr.org/2017/05/19/project-output-course-workbook-on-agro-ecosystem-resilience-in-a-changing-climate/
   b. http://www.adpc.net/igo/category/ID1199/doc/2017-txo0Re-ADPC-Training_Course_on_Agro-Ecosystem_Resilience_in_a_Changing_Climate.pdf

2. Successful completion of four country training courses on "Agroecosystem Resilience in a Changing Climate" with the average 30 participants in each course. Course evaluations are also conducted at the end of each training course to get the feedback about course content, delivery, etc., and to hear from the participants about possible application of subject matters within their respective fields.

3. Peer-reviewed paper on “Lessons learnt from implementing a training course on Ecosystems Resilience in Changing Climate for mainstreaming weather and climate information for sectoral development in four countries of South Asia and South East Asia” is expected to be published. The draft version of the paper can be found in Appendix-4.

Below is a summary of the findings of the course evaluation. The response of the participants to evaluation questionnaire was mostly constructive and in most of the cases positive. The data analysis has been carried out for only the workshops held in Sri Lanka, Thailand and Nepal as the Vietnam training course was a pilot run of the developed training modules and responses to the questionnaire are not comparable with the other three countries. Some of the questions of the questionnaire were modified or added after the Vietnam pilot training and thus the response is not comparable.

Overall Evaluation of the Course:

- The participants from Sri Lanka and Thailand expressed more positive views while evaluating the training course in entirety than the participants of Nepal training course
- the participants expected knowledge on means of communication of ecosystem resilience practices to last mile or the farmers, knowledge on flood forecasting, cost-benefit analysis carried out in real projects, country-specific examples, change management and training on proposal development on ecosystem resilience

Time Allocation:

- It was observed that most of the participants in all the three countries have given an average scoring to the time allocation for each of the training components. But it is seen that experience sharing has been just adequate and may have required more time allocation

Course Organisation:

- The course organization including effectiveness and overall coordination received a considerable satisfaction level from more than 40% of the participants while more than 40% were highly satisfied with the helpfulness of the course organizers. The majority have believed that the logistics have been adequate, and the overall coordination has been satisfactory

Course Delivery:

- Most of the participants of the training course in three countries found the content useful or very useful and found the method of delivery and Workbook content good or excellent.

Target Audience, Knowledge Transfer Mechanism and Relevance:

- Responses of the participants indicated that facilitators were competent enough to deliver the course and most of the participants indicated they were satisfied with the facilitators. Regarding the target audience, it was indicated that though there was mix of participants from sectors but participation from some important stakeholders were missing such as wildlife, agro-researchers and coastal management authorities.

Regarding transfer of knowledge gained through the training course most of the participants indicated that they foresee transfer of knowledge by development of proposals in the subject area with relevant stakeholders, organising training courses within their respective organisation for knowledge dissemination and ground-level implementation.

4. Conclusions

The training course evaluation questionnaire and personal feedback from participants taught us that the biggest impediments to the universal adoption of eco-system resilience would be variability across users. While there is no immediate solution for this, but the key to success would be mainstreaming eco-system resilience into the workflow of major sectors like agriculture, water resources, coastal systems and integrated approach amongst the stakeholders.

As per feedback received from participants, the following is required to be included in the future training courses:

1. Reduced theoretical lecture time
2. More practical oriented lectures including introduction DSSAT
3. Increased group activities and critical thinking assignments
4. Cost-benefit and multi-criteria analysis
5. Enhanced time management
6. Orientation on eco-system resilience-related proposal writing for better mainstreaming in sectoral development plans

Thus, it can be said that though the majority of the goals of the project were achieved but there is a scope of development in terms of enhancing the training module and workbook. Additionally, mainstreaming is not possible by imparting one set of training in each country and the government requires support by having these training at regular interval.

5. Future Directions

The training courses gave a unique opportunity to initiate mainstreaming eco-system resilience into various sectors of the government as well as integrating the idea amongst the research community. The key findings of the four trainings demonstrated that 1) practitioners and research community with no prior experience could be effectively trained in four days to initiate integration of eco-system resilience in their respective sectoral development plans; 2) The average set objectives of the training has been achieved in all the training courses and majority of participants have expressed satisfaction on the course content, delivery mechanism, time allocation and overall learning from the course; 3) some deviation can be observed in the training course organised in Nepal where the training course hasn't been able to meet the expectations of many of the participants which may be due to time management and the facilitators may not have correctly identified the audience before sharing knowledge; 4) it was

also noticed that some participants have stated explicitly that in one or two instances facilitators contradicted on some information amongst themselves thus requiring a more co-ordinated approach to the training in future and 5) suggestions have been provided to share pre-course material to reduce time on theoretical aspects and devote more time in practice, seminar and group interactions. It was also found that the most successful workshop was held in Sri Lanka and this may be attributed to better co-ordination, choosing the appropriate trainee organisation and a well-defined mix of stakeholders.

During future workshops, we suggest a daily summary and group discussion to reiterate important concepts applied every day and to elicit further inquiries. The discussion offers participants the option to reflect, enquire and receive feedback from the facilitators in an informal setting. This also helps foster peer relationships and improve peer support, leading to greater knowledge gain.

The success of these training was strengthened by collaborative interactions amongst newly trained practitioners, facilitators and members of the eco-system management fraternity. The training course also opened new avenues of collaboration for the stakeholders as eco-system resilience in changing climate is to be carried out in an integrated manner by all the stakeholders rather than in silos.

References

Weerasinghe, KDN., Basnayake, S., Arambepola, NMSI., Rathnayake, U., Nawaratne, C. (2014). A local level technology and policy intervention approach to restoring paddy ecosystems in the Nilwala downstream, affected due to Nilwala flood protection scheme, Southern Sri Lanka. Procedia Economics and Finance, 18: 336-344.

Appendix

1. Training Courses

a) Course Review Workshop on 5th April 2017 in Bangkok, Thailand

b) Training on Agroecosystem Resilience in a Changing Climate in Ho Chi Minh City, Vietnam from 28 May-01 June 2017

Group photo with the participants

Official launched of the course workbook by Deputy Director-General of Sub-Institute of Hydrometeorology and Climate Change (SIHYMECC)

Participants engaged in the training sessions and certificate distribution at the concluding ceremony of the training.

c) Training on Agroecosystem Resilience in a Changing Climate in Colombo, Sri Lanka from 12-15 June 2017

Group Photo with the participants

Sessions in progress

Group exercises and concluding session with certificate distribution

d) Training on Agroecosystem Resilience in a Changing Climate in Bangkok, Thailand from 27-30 March 2018

Group photo with the participants

During sessions and group exercises

e. Training on Agroecosystem Resilience in a Changing Climate in Kathmandu, Nepal from 05-08 June 2018

Group photo with the participants

During sessions and group exercises

f. Training Course on Ecosystem Resilience in a Changing Climate in Chilaw, Sri Lanka from 27-30 May 2019

Group photo with the participants

During sessions and group exercises

2. Detailed agenda used in the training courses

Below shows the detailed agenda used in the training course Kathmandu, Nepal

Training Course on "Agro-ecosystem Resilience in a Changing Climate"

Kathmandu, Nepal
05-08 June, 2018

Detailed Agenda

DAY 1	
Time	**Opening Session**
09.00-09.30	Registration and Course Opening
09.30-09.40	Opening Remarks
09.40-09.45	Project Overview
09.45-09.55	Getting to Know Each Other & Expectations
09.55-10.00	Group Photo
10.00-10.15	***Tea***
Module / Session	
	Module 1: Relevance of Disaster and Climate Risk Management for sustainability of Social Ecological Systems
10.15-11.45	Session 1.1 Basic Concepts of Disaster Risk Management (DRM) and Impacts on Agriculture
11.45-13.00	Session 1.3. Agro-ecosystem as a Social Ecological System, and its Resilience and Sustainability
13.00-14.00	***Lunch***
14.00-15.30	Session 1.4. Introduction to Ecosystem based Approaches to Build Resilience of Agro-ecosystems
15.00-15.15	***Tea***
15.15-15.30	Session 1.5 (Video screening) Case Study- Building Resilience of an Agro-ecosystem
DAY 2	
	Module 2: Generation and Application of Weather and Climate Related Information
09.00-10.30	Session 1.2/2.1. Weather, Climate, Climate Change Information Dissemination and Impacts on Agriculture
10.30-10.45	***Tea***
10.45-12.30	Session 2.2. Group Work-Climate Outlook Applications
12.30-13.30	***Lunch***

	Module 3: Planning for Vulnerability Reduction and Resilience Building of Agro-ecosystems
13.30-15.00	Session 3.1. Project Formulation for Design of Interventions to Build Resilience of Ecosystems
	Session 3.1. Group Work-Scenario Based Case Study (Problem Tree and Objective Tree)
15.00-15.15	***Tea***
15.15-16.45	Session 3.2. Theory of Change
	Session 3.2. Group Work-Scenario Based Case Study (Theory of Change)
DAY 3	
09.00- 10.30	Session 3.6. Introduction to Cost Benefit Analysis
	Session 3.2. Group Work-Scenario Based Case Study (CBA)
10.30-10.45	***Tea***
10.45-12.15	Session 3.4. Logical Framework Analysis
12.15-13.15	***Lunch***
13.15-14.45	Group Work-Scenario Based Case Study (LFA)
14.45-15.00	***Tea***
15.00-16.45	Session 3.6. Introduction to Multi Criteria Analysis
	Group Work-Scenario Based Case Study (MCA)
DAY 4	
	Module 4: **Synthesis of learnings through a scenario-based exercise**
09.00-12.00	Group Work-Scenario Based Case Study (Project Formulation, Activity Plan and Budget Estimation)
12.00-13.00	***Lunch***
13.00- 15.00	Group Presentation to a Panel
15.00- 15.30	Closing Ceremony
15.30	***Tea***

3. Course Evaluation Form

OVERALL COURSE EVALUATION

1. How much did you learn from the course?

Please mark √ to answer the question and write your comments in the space provided.

[ ] Much more than expected
[ ] More than expected
[ ] Same as expected
[ ] Less than expected
[ ] Much less than expected

Comments: _____
_____
_____
_____
_____

2. What are the other subjects that should be added to the course?

_____
_____
_____
_____

3. What are the subjects that should be removed from the course?

_____
_____

4. What do you think of the time allocation?

Please circle to answer the question and write your comments in the space provided.

#	Sessions	Not enough	A little not enough	Average	A little too much	Too much
4.1	Theoretical Content	1	2	3	4	5
4.2	Group Activities	1	2	3	4	5
4.3	Group Discussion	1	2	3	4	5
4.4	Experience Sharing	1	2	3	4	5
4.5	Game Activities	1	2	3	4	5

Comments:

_____
_____
_____

5. What do you think of ADPC logistic support?

#	Meeting Venue	Highly dissatisfied	Dissatisfied	Average	Satisfied	Highly Satisfied
5.1	Effectiveness	1	2	3	4	5
5.2	Helpfulness	1	2	3	4	5
5.3	Overall Coordination	1	2	3	4	5

Comments:

_____
_____

6. Course Delivery Evaluation

Please rate the following sessions by circling the appropriate number on the scale below.

Content: 1 = not useful, 2 = not so useful, 3 = average, 4 = useful, 5 = very useful

Method of Delivery, Workbook Content 1 = strongly need improvement, 2 = need improvement, 3 = neutral, 4 = good, 5 = very good

Day	Topic *(Facilitator)*	Content	Method of Delivery	Workbook Content
1	Session 1.1: Basic Concepts of Disaster Risk Management (DRM) and Impacts on Agriculture	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Session 1.3: Agro-ecosystem as a Social Ecological System, and its Resilience and Sustainability	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Session 1.4 Introduction to Ecosystem based Approaches to Build Resilience of Agro-ecosystems	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2	Session 1.2/2.1 Weather, Climate, Climate Change Information Dissemination and Impacts on Agriculture	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Session 2.2 Group Work-Climate Outlook	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Session 3.1 Project Formulation for Design of Interventions to Build Resilience of Ecosystems	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Session 3.2. Theory of Change	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3	Session 3.3. Group Work-Scenario Based Case Study	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Session 3.4. Logical Framework Analysis	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Session 3.5. Group Work-Scenario Based Case Study	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Session 3.6. Introduction to Cost Benefit Analysis and Multi Criteria Analysis	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
4	Session 4.1. Group Work-Scenario Based Case Study and Group Presentation	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
5	Were the facilitators competent enough?	1 2 3 4 5		

Comments:

_____

_____

7. Have the organizers correctly identified the target audience? Or any other gap in the competency of the audience?

_____

_____

_____

8. How do you apply the knowledge you have gained from the course?

In short term:

_____

_____
_____

In long term:

_____
_____
_____

9. What are the suggestions to implement new concepts learnt from the workshops at your institutions?

_____
_____

10. How do you plan to clarify any doubts on the content, or about the implementation? have you built contacts with facilitators?

_____
_____

12. How do you plan to approach the heads of your organization in applying the content learnt in the workshops?

_____
_____

13. Do you think the content delivered in workshop is relevant/irrelevant to your organization? List pros and cons.?

_____
_____

14. Other comments and suggestions?

_____
_____

Thank you!