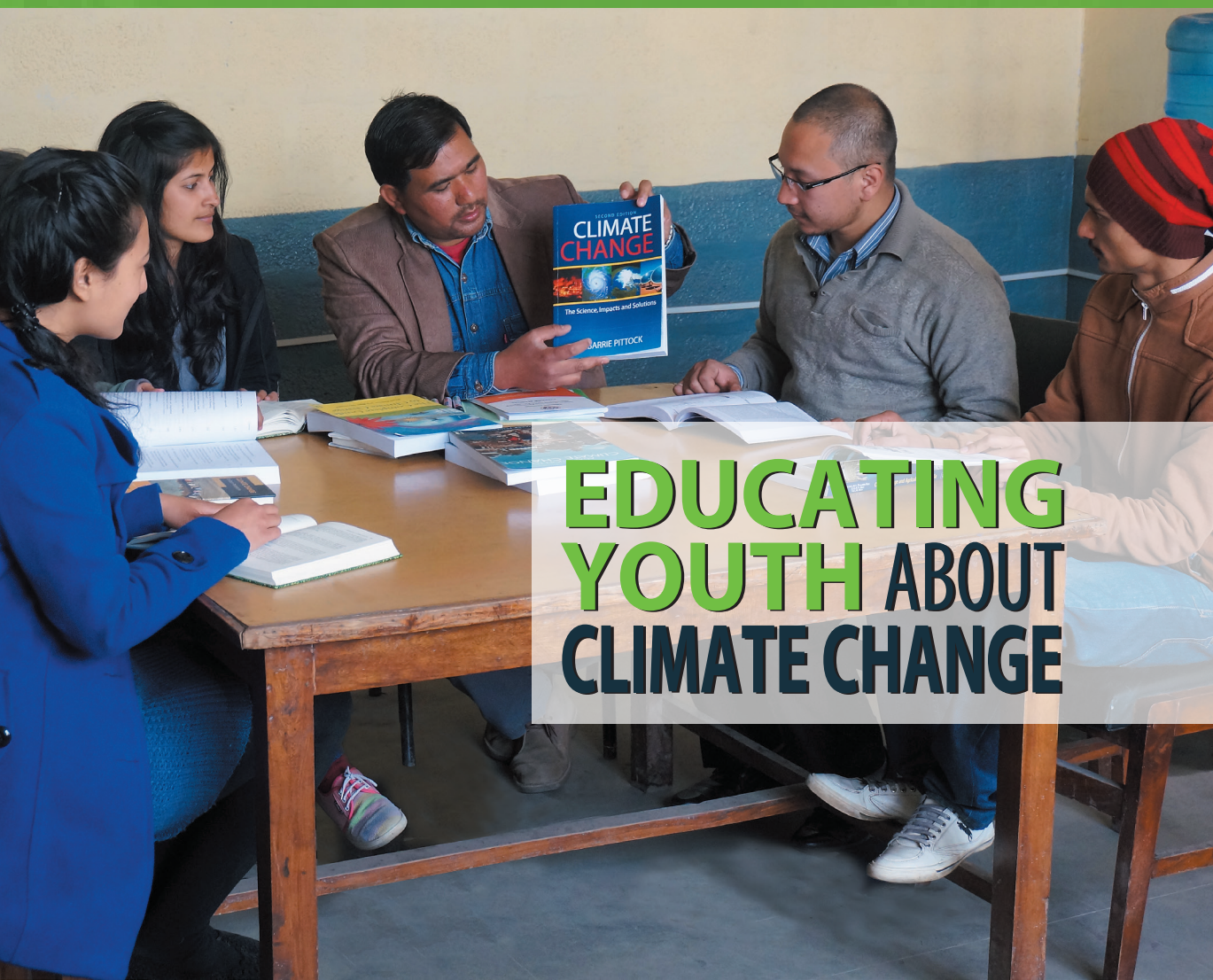
CASE STUDY 1

Government of Nepal
Ministry of Science, Technology and Environment
Pilot Program for Climate Resilience

Mainstreaming Climate Change Risk Management in Development

ADB TA 7984: Main Project



EDUCATING YOUTH ABOUT CLIMATE CHANGE

Content

Abbreviation

ADB	Asian Development Bank
MOSTE	Ministry of Science, Technology and Environment
MCCRMD	Mainstreaming Climate Change Risk Management in Development
CCWG	Climate Change Working Group
CDC	Curriculum Development Center
TA	Technical Assistance
TU	Tribhuvan University
PU	Pokhara University
KU	Kathmandu University

Background

Climate change is one of the most critical problems facing Nepal and the global community. Equipping citizens and professionals with the knowledge and skills to understand and respond to climate change is an essential part of adaptation efforts. A well-designed curriculum enables students to better understand real world problems and make informed decisions about solutions. The integration of climate change into curriculum contributes to forming professionals prepared to address the problems climate change will pose for Nepal. In addition, through their learning, students transfer knowledge into the home, the community and into professional spheres as they enter the work force. Enhancing students' knowledge on climate change raises awareness of society as a whole.

Under a past technical assistance, Strengthening Capacity for Managing Climate Change and the Environment (ADB TA 7173-NEP), the Ministry of Science, Technology and Environment (MOSTE) had commissioned a review of the status of climate change content in secondary and university curriculum. The review concluded that climate change was not adequately covered in secondary or university course materials. For this reason, when planning the Pilot Program for Climate Resilience, the Government of Nepal decided that the technical assistance *Mainstreaming Climate Change Risk Management in*

Development (MCCRMD ADB TA 7984-NEP) would include an activity to enhance and update information about climate change through formal curriculum revisions. Since early 2014 MCCRMD has been working with the Ministry of Education, the Curriculum Development Centre and three universities – Kathmandu University, Pokhara University and Tribhuvan University – to integrate new information on climate change into secondary and university curriculum.

Revising secondary school science courses to teach more about climate change

Nepal's Curriculum Development Centre (CDC) under the Ministry of Education is responsible for preparing and disseminating national curriculum from primary to secondary school. The CDC designs and updates curriculum based on their assessment of the knowledge and information that is vital to preparing youth to face society's future challenges and opportunities. In consultation with the Ministry of

Science, Technology and Environment and the MCCRMD technical team, the CDC decided to enhance the information about climate science and climate change in the Grade 9 and 10 Compulsory Science courses.

With MCCRMD technical and financial support, the CDC implemented an action plan to develop the new climate change content. As a first step, the CDC formed a Climate Change Curriculum Working Group of internal experts on curriculum development and external experts on climate change to prepare the new materials. The Working Group members gathered updated climate change reference materials and examples of curriculum from other countries. They used this information to design climate change content appropriate to the knowledge level of Grade 9 and 10 students. The new curriculum with information about climate change was officially approved in July 2014 and is now part of Nepal's national curriculum. As explained by Damber Angdembe from the Curriculum Development Centre, "The updated curriculum teaches students about climate change by first introducing the basic concept. Students will learn about the differences between, weather, climate and the effects of global warming on climate patterns. As a result, students develop an early understanding of climate change that is grounded in factual information."

The Working Group also updated the relevant textbook sections, and prepared two publications to help teachers apply the new curriculum in the classroom: a Student Self-Learning Guide on Climate Change and a Glossary of Climate Change Terms.

Mainstreaming climate change into six university programs

Climate change - its causes, impacts and adaptation options - is not a stand-alone topic but an integral part of diverse disciplines. At the University level, the MCCRMD technical assistance team consulted

with stakeholders in Kathmandu, Tribhuvan and Pokhara Universities to identify those academic programs where integrating climate change content would have the most impact on student learning. Six academic programs were selected:

Tribhuvan University
- Bachelor of Science in Meteorology
- Bachelor of Science in Environment Science

Pokhara University
- Bachelor of Science in Environmental Management
- Master of Science in Environmental Management
- Master of Science in Natural Resource Management

Kathmandu University
- Master of Education in Environment Education and Sustainable Development

The selected academic programs were all in the process of revising curriculum and so integrating new climate change content was to be part of this overall revision process.

Box 1 summarizes the standard approach to revising university curriculum. The concerned departments each formed a Climate Change Working Group (CCWG) to undertake the curriculum design and development tasks required for climate change integration. The steps followed under MCCRMD curriculum revision process are outlined in Figure 1. The CCWG undertook research on climate change, listed the relevant subjects, determined under which courses and topics this content would be included, and then developed the material. The Working Groups each took a tailored approach to integrating climate change topics depending on the needs of their program. In most cases, climate change information was introduced as one of many course topics in early years, and then expanded as a specialized course

BOX 1 • APPROACH TO CURRICULUM DEVELOPMENT

Preparing the curriculum has two phases:

Curriculum Design
- Research to ensure that the curriculum will be relevant, appropriate and workable.
- Curriculum is conceptualized and attention paid to arrangement of the varied components: considerations include the focus on the philosophical underpinnings, goals, objectives, subject matter, learning experiences and evaluation.
- Developing pedagogical approaches that ensure emphasis is being placed on the learner.

Curriculum Development
- Planning, construction and logical step-by-step documents.
- Final content include goals, learning activities and instructional strategies, interdisciplinary connections, and others that guide curriculum implementation.

in later years. For example, Pokhara University's Bachelor of Science in Environmental Management program added a specialized course on Climate Change and Society. Tribhuvan University's Department of Meteorology decided to devote half of its fourth year bachelor program to climate change science and developed a complete course manual for professors to teach the new material. The updated climate change content and course revisions were vetted by other faculty members and external stakeholders during curriculum review workshops before receiving official approval by the university's higher authorities. MCCRMD also supported the academic departments to purchase new library resources on climate change and prepare guidelines for student research projects.

FIGURE 1• CURRICULUM DEVELOPMENT ACTION PLANS

Phase 1: Working Group Development of Content

Prioritize topics to develop for each year and entry points in courses	Assign research and writing for each topic to Working Group members	Share write-ups and provide comments across group members	Finalize the draft to share with Wider Faculty members

Phase II: Review with Faculty and Stakeholders

Draft presented at Faculty Meeting for comments	Revisions by Working Group members	Curriculum consultation workshop-comments from internal & external stakeholders	Finalization of curriculum content

Phase III: Approval and Preparation for Teaching

Review and approval by Subject Committee	Review and approval by Academic Council	Preparation of detailed course material (micro-syllabus)	Compilation of reference materials and student project guidelines

Students' Views on the New Curriculum

Pokhara University has already launched its new climate change curriculum in one Master and one Bachelor program. Students who took the new courses report that they have gained a better understanding about climate change due to the curriculum revisions.

Khyam Bishwokarma is in the first year of the Master in Natural Resource Management program. Khyam is preparing for a profession in forestry. He had been concerned that earlier teaching on climate change was too general given the critical importance of climate change in the forestry sector. The new course content was more comprehensive and provided relevant information on climate change science and international policies that he needs to know for his chosen profession.

Nisha Aryal, a Bachelor student enrolled in Pokhara University's Environmental Management program, aspires to be an environmental journalist. After taking Pokhara University's new course on Climate Change and Society, Nisha is now more confident about her knowledge on climate change "I had heard different information about climate change in the media - like climate change causes the number of mosquitoes to increase" explained Nisha, "but I did not understand the reason for it. Now I know more about the science of climate change and that it is a long-term phenomena. This information was new to me."

According to fellow student **Manisha Shrestha** "Nepal is a developing country and has hardly contributed to climate change. But we have to deal with it." Manisha plans for a profession in the environment field and believes that educating the population about climate change is a top priority for Nepal to tackle this issue.

The students also expressed that they plan to conserve water at home and volunteer to plant trees to make a personal contribution Nepal's response to climate change.

Studying up-to-date knowledge about climate change has allowed these students specializing in environment to better interpret the varied information and opinions presented about climate change in the media or other forums. As a result, they will enter their chosen field with a solid knowledge base to guide their future learning on climate change.

Summary of Key Changes to Curriculum made with MCCRMD Support

Table 1 outlines some of the key change made to secondary and university curriculum following MCCRMD's collaboration with its partner education institutions.

TABLE 1 • KEY CHANGES IN SECONDARY AND UNIVERSITY CURRICULUM

Secondary School - Grade 9 and 10 Science
• Enhanced explanation of the difference between the concepts of weather, climate, climate variability and climate change, as well as a description of greenhouse gases and their effect on global warming. • Added definitions of climate change adaptation and mitigation and sample actions for Nepal. • Introduction to key global and national initiatives on climate change.
Bachelor of Environmental Science, Tribhuvan University
• More focused courses relating to interaction between environment, climate science and climate change. • Additional teaching hours in key courses such as Atmosphere and Environment and Climatology. • Optional stream on Environmental Resources and Conservation Management (Year 3) addresses climate change impacts on natural resources. • New courses on Environmental Risk and Vulnerability Assessment and Climate Change Impact, Adaptation and Mitigation (Year 4).
Bachelor of Meteorology, Tribhuvan University
• Climatology course (Year 1) has a course on Climate Change and its Impacts. • New courses on Agriculture meteorology, Satellite meteorology and Hydrometeorology (Year 2) are added to teach the climate science basics needed to understand climate change content added in later years. • Updated content for Applied Hydrology and Dynamical Meteorology (Year 3) so that students understand the methods used to undertake climate change impact analysis on water resources and to develop climate models for the simulation of climate change projections. • Half the course time in Year 4 Meteorology deals entirely with the science of climate change.
Bachelor of Environmental Management, Pokhara University
• New course developed on Climate Change and Society for fourth year that provides basic concept of climate change theories, international and national policy frameworks, understanding of climate change impacts and provides methods on developing adaptation strategies.
Master of Environmental Management, Pokhara University
• Full course on climate change that imparts understanding on the drivers of climate change and its consequences on various sectors like health, energy, food security, agriculture and provides students with knowledge and tools for understanding climate change projections, impacts and adaptation strategies.
Master of Natural Resource Management, Pokhara University
• Added full course on climate change that looks at the causes and effects of climate change parameters and the risks and implications for food security, agriculture and natural resources management, knowledge of adaptation concepts and how to integrate climate change issues into existing policy processes and development strategies.

Updating Curriculum on Climate Change – Some Lessons

MCCRMD efforts to improve teaching about climate change in secondary and university courses are part of the project's efforts to mainstream climate resilience across various sectors. Some key lessons were learned in completing this process:

Information about climate change has to be made concise and integrated with other topics to be incorporated into the curriculum as well as supplemented with self-learning material for students interested to explore further. Teaching about climate change must be contextualized within the wider knowledge the student must acquire in their discipline. Students need to first understand basic facts about weather, climate and the effects of global warming on climate patterns. Once the basic facts are understood, learning evolves towards more complex issues related to climate change mitigation and adaptation, and international frameworks to respond to climate change. Depending on the field of study, students may delve more deeply into the scientific evidence of global warming and the methods used to project climate change impacts. The extent to which these various climate change subjects are treated needs to be well tailored to the student level and learning objectives of the each program.

The task of updating or improving climate change content must be done internally within education institutions with the revisions led by working group members who have a formal mandate to revise curriculum. Curriculum development and curriculum revision is a formal process within education institutions and the final curriculum must have official approval to be taught in the classroom. Supporting the integration of climate change content requires working within the institutional framework for revising and approving curriculum that is formally endorsed by the institution.

Integrating climate change content into curriculum is best undertaken when programs of study have already made the decision to revise their program content, and climate change is one of a number of topics to be reviewed and updated. Education institutions have systems for regularly revising and updating their syllabuses. The timing for doing a full curriculum review and revisions is an opportunity to update and potentially expand climate change content. When the full program curriculum is examined, decisions are made on what to update, add, take out and how much time to spend on each topic.

Consultations on revised curriculum are essential to ensure that faculty members who will teach the courses are familiar with the climate change content and feel part of developing materials they will teach. Education institutions are forums for debate and professionals may have divergent views on how to treat various topics within their discipline. Also, professors will have varying levels of knowledge about climate change. Holding consultation workshops to present draft curriculum and seek feedback is essential to ensuring that all angles of proposed topics are considered and that professors acquire some level of common understanding on how to approach the topic of climate change.

Way Forward

While adding new curriculum content is important, the quality and effectiveness of teaching about climate change will depend on teacher's understanding of the subject matter and their skills in transferring the knowledge to students. For this reason MCCRMD will continue the collaboration with the Curriculum Development Centre and the three universities to train their teachers on the revised climate change curriculum to ensure they have the knowledge and skills to rollout the new curriculum in the classroom. In addition, the new university climate change course material is being shared with a wider group of faculty as a knowledge base

for other academic departments to draw from to integrate climate change into more programs.

Examples of the new climate change curriculum developed under MCCRMD can be downloaded from the project website:

1. Self learning on climate change
2. Glossary on climate change
3. **TU:** Syllabus for B.Sc. Meteorology
4. **TU:** Microsyllabus and Teaching Materials on Climate Change for B.Sc. Meteorology
5. **PU:** Curriculum on Master of Science in Natural Resources Management (M.Sc. NRM)
6. **PU:** Curriculum on Master of Science in Environmental
7. **PU:** Curriculum on Bachelor of Science in Environmental Management (B.Sc. Env. Mgmt.)
8. **PU:** Course Manual on Master of Science in Natural Resources Management (M.Sc. NRM)
9. **PU:** Course Manual on Climate Change Master of Science in Environmental Management (M.Sc. Envt. Mgmt.)
10. **PU:** Course Manual on Climate Change and Society Bachelor of Science in Environmental Management (B.Sc. Envt. Mgmt.)

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