

**Sustainability in Cambodia's Higher Education System: A Pedagogical  
Assessment**

**By**

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## **Abstract**

Natural resource depletion, global warming, and climate change have all now come to the forefront of development agendas across the globe. There is a growing consensus at global, regional and national levels that environmental sustainability should be given top priority in the future development agenda. As a small developing country in Southeast Asia, Cambodia is highly vulnerable to the adverse effects of global warming and climate change. Recognizing this, Cambodia is committed to making sustainability an integral part of its development agenda. This commitment is articulated in Cambodia's Country Report for the 2012 Earth Summit. The Green Growth Roadmap endorsed by the Royal Government of Cambodia in 2009 and the National Policy and Strategic Plan on Green Growth that was developed in 2013 to operationalize the Green Growth Roadmap have integrated sustainability in the country's development plans and policies. In particular, the Green Growth Roadmap and the strategic plan align all the relevant ministries, development partners, academia, and civil society more generally to cooperate in addressing the challenges of sustainability. Against this backdrop, this paper examines the extent to which sustainability is at present incorporated in Cambodia's higher education system and identifies the constraints that need to be addressed in the future. Within the higher education system, the paper's focus is mostly on the universities – the key institutions in the country's education system.

Key words: Sustainability, Higher Education, Cambodia

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## ACRONYMS

ASEAN	Association of Southeast Asian Nations
AASHE	Advancement of Sustainability in Higher Education
CDRI	Cambodia Development Resource Institute
CP	Cleaner Production
CSUK	Chea Sim University of Kamchaymear
DES	Department of Environmental Science
EMM	Environmental Management Measures
GDP	Gross Domestic Product
GIS	Geographic Information System
HEI	Higher Education Institutions
IPCC	Intergovernmental Panel on Climate Change
IREA	International Renewable Energy Agency
IMF	International Monetary Fund
MDG	Millennium Development Goals
NRM	Natural Resource Management
MoEYS	Ministry of Education Youth and Sports
MoLVT	Ministry of Labor and Vocational Training
MRC	Mekong River Commission
OECD	Organization for Economic Cooperation and Development
PUC	Paññāsāstra University of Cambodia
PUES	Pollution and Urban Environmental Studies
RGC	Royal Government of Cambodia
RUA	Royal University of Agriculture
RUPP	Royal University of Phnom Penh
TVET	Technical and Vocational Education and Training
UNESCO	United Nations Educational Scientific and Cultural Organization
WB	World Bank

## 1. Background and the Rationale

Natural resource depletion, carbon emissions, global warming, and climate change have all now come to the forefront of development agendas across the globe. Rich and poor countries alike are concerned about the harmful consequences of these environmental trends. Indeed, there is a growing consensus around the world that climate change is already happening; it is going to get worse; humans are causing it; scientist are in agreement; we can do something about it, and if we act urgently, there is still hope (Rigg 2014).

In 2013, evidence and perspectives on global warming, climate change, and environmental sustainability became clearer than ever. By gathering vast amounts of data and information and convening global thought leaders, reports by the Intergovernmental Panel on Climate Change (IPCC), Organization for Economic Cooperation and Development (OECD), International Monetary Fund (IMF), World Bank (WB), and the International Renewable Energy Agency (IREA) brought much clarity, credibility, and above all, solution-oriented perspectives on global warming and climate change (Williams 2014). The IPCC has already approved its first Working Group Report on the Physical Science Basis of Climate Change, and its Fifth Assessment Report will be ready for the October 2014 Copenhagen Summit. The IPCC now concludes with more than 95 percent probability that human activity has been the dominant cause of climate change since the mid-20<sup>th</sup> century; it also confirms the strong link between climate change and extreme precipitation events with more than 90 percent probability (IPCC 2013; Williams 2014). The 2013 United Nation's High Level Panel's Report also echoes the growing concern and consensus; it thus recommends that the post-Millennium Development Goals (MDGs) development agenda should accord top priority to 'ecological integrity and environmental sustainability' (United Nations 2013).

As a small developing country in Southeast Asia, Cambodia has experienced a gradual worsening in several dimensions of its domestic environment – deforestation, land degradation, overfishing, water and air pollution – its per capita ecological footprint is still very low (CDRI 2013). Indeed, at 1.2 global hectares per capita, Cambodia's ecological footprint is one of the lowest in the world (NEF 2012).

Cambodia is a sufferer from global environmental problems, it is highly vulnerable to the adverse effects of global warming and climate change as well as other natural changes. For one thing, being situated in the Greater Mekong Subregion with its unique hydrological landscape, Cambodia is already experiencing extreme rainfall patterns, frequent widespread floods and damaging droughts (Heng and Doch 2013). For another, large portions of the country's population who are exposed to climate change are extremely poor with the least capabilities to adapt to climate change (Chem and Kim 2014). The 2000 and the 2011 floods – widely considered to be the symptoms of climate change – cost the country dearly (CDRI 2013). Besides, ASEAN's countries along the Mekong River namely Cambodia, Vietnam, Laos, and Thailand are planning to build 11 dams along the mainstream, which will cause a serious threat to the Mekong River's ecology such as changing water flow regime, blocking sediment and nutrients; as well as puts at risk the wellbeing of 60 million of people who depend on the river for food, income, transportation and a multitude of

other needs (International Rivers nd; SIWI 2013). The downstream country like Cambodia will be badly affected.

Recognizing the country's high environmental vulnerability and in line with the emerging global consensus, the Royal Government of Cambodia (RGC) is committed to making environmental sustainability an integral part of its development agenda. This commitment is articulated in Cambodia's Country Report to the 2012 Earth Summit (RGC 2012a). Cambodia is also an integral part of the Association of Southeast Asian Nations (ASEAN) Environmental Education Action Plan that was adopted in 2002 and became a member of Mekong River Commission (MRC) in 1995 (RGC 2006). The Cambodian government also endorsed a Green Growth Roadmap in 2009, and National Policy and Strategic Plan on Green Growth was developed to operationalize the Roadmap and to integrate sustainability into the country's development plans and policies (RGC 2009). In particular, the Roadmap and the strategic plan aligned the relevant ministries, development partners, academia and civil society more generally for addressing the challenges of environmental sustainability. Against this backdrop, this paper explores the extent to which sustainability issues are incorporated in the country's higher education system and the constraints that the system faces in better integrating sustainability within its ambit.

The first step towards fostering environmental sustainability is to learn about it. Once learnt, the next steps are to widely disseminate information about its importance, find ways of fostering it, and ensure that humans nurture nature even as they pursue higher incomes and better living standards. Higher education systems offer the greatest scope for learning to nurture natural capital – the environment. Higher education systems also play a key role in molding public opinion on environmental sustainability as well as equipping future leaders and the people more generally with the necessary technical capacity and the commitment to address environmental sustainability. Indeed, as more college and university students get educated in the various dimensions of environmental sustainability, they will be more capable of teaching and training young children about environmental issues at the very formative years of primary and secondary education.

In some countries, colleges and universities are being rated based on the extent to which they incorporate sustainability issues in their education programs. In the United States, for example, under an initiative of the Association for the Advancement of Sustainability in Higher Education (AASHE) – an advocacy and research organization with about 1,100 institutions as its members - colleges and universities have voluntarily started self-rating themselves in a transparent way in respect of the extent to which they have incorporated sustainability education in their campus programs, courses, and curriculums (Barlett and Chase 2013). As the United Nations Educational Scientific and Cultural Organization (UNESCO) succinctly put it: “Education for Sustainable Development means including key sustainable development issues into teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption... Education for Sustainable Development requires far-reaching changes in the way education is often practiced today” (UNESCO 2014: x). The higher education system is a good starting point to bring about such ‘far-reaching changes’.

The focus of the paper is thus on pedagogical issues of sustainability in the higher education system in Cambodia. It specifically looks at the coverage and the quality of sustainability education in the country's higher education system – the number of higher education institutions offering specialized degrees and courses in sustainability-related subjects, the number of students studying those courses, the number and the quality of teachers teaching these degrees and courses, the content and the quality of the courses offered, and the constraints faced by both the students and the teachers in scaling up sustainability education (Sections 3 and 4). To place these pedagogical issues of sustainability in a proper perspective, Section 2 gives an overview of Cambodia's higher education system and the key issues and challenges it faces. Finally, Section 5 provides a brief conclusion.

## **2. Cambodia's Higher Education System: An Overview**

By regional standards, Cambodia had a vibrant higher education system until the early 1970s (Sam et al. 2012). But during the 1975-1979 period under the Khmer Rouge regime, the higher education system in particular and the entire education system more generally, was destroyed almost beyond repair. Approximately 75 percent of higher education teachers and 96 percent of university students were killed or disappeared during the genocide (Sam et al. 2012). Outside the higher education system, only about 3,000 out of the 21,000 secondary school teachers survived, not to mention the almost total annihilation of the school, college and university infrastructure (Sam et al. 2012). After the Khmer Rouge period, the country went through more than a decade of external aggression and civil conflict.

Thus, not surprisingly, Cambodia had to start rebuilding its education system almost from scratch; unlike hard infrastructure such as roads, dams, bridges and power plants, rebuilding the education system has perhaps been one of Cambodia's most daunting tasks (CDRI 2013). The challenge of developing the higher education segment of the education system has been even more formidable. In the mid-1990s, tertiary education enrollment was a paltry one percent (CDRI 2013). Since then there has been a gradual increase in the tertiary enrollment rate. Yet, at about 14 percent, Cambodia's tertiary enrollment today is the lowest among the ASEAN countries – behind even Laos and Myanmar (CDRI 2013). About 80 percent of the tertiary enrollments are in private institutions, with the remaining 20 percent in public colleges and universities (WB 2013).

The higher education system in the country consists of colleges and universities that offer general education and institutions that offer technical and vocational education and training (TVET). There are 101 such higher education institutions (HEIs), with 39 of them in the public sector and the remaining 62 in the private sector (Table 2). In the 2012/13 academic year, about 246,000 students were enrolled in these institutions, of which about 35,000 (or 14 percent) graduated in that year (Table 1). Of the total higher education enrollments, 88 percent was for graduate degrees, 10 percent for associate degrees, and 2.5 percent for postgraduate degrees; the remaining 142 students were pursuing doctoral degrees. Another 423 students were sent abroad to study (Hang 2014). About 41 percent of the students enrolled for higher education were females, thus indicating a slight tilt of gender balance in favor of males.

**Table 1: Student Enrolment and Graduation, 2012/13**

Total student enrolment	Associate degree students	Bachelor's degree students	Master's degree students	Doctoral students	Students graduated
246,033	23,678	216,053	6,160	142	34,978

(Source: Hang 2014)

**Table 2: Number of Higher Education Institutions under Ministries/Institutions**

No	Parent Ministries	Number of higher education institutions	
		Public	Private
1	Ministry of Education, Youth and Sport (MoEYS)	9	52
2	Ministry of Labour and Vocational Training (MoLVT)	9	10
3	Ministry of National Defence	5	0
4	Ministry of Agriculture, Forestry and Fisheries	3	0
5	Ministry of Religious Affairs	2	0
6	Ministry of Health	2	0
7	Ministry of Interior	2	0
8	Ministry of Culture and Fine Arts	1	0
9	Ministry of Economy and Finance	1	0
10	Ministry of Public Works and Transportation	1	0
11	Ministry of Social Affairs, Veterans and Youth Rehabilitation	1	0
12	Ministry of Industry, Mines and Energy	1	0
13	National Bank of Cambodia	1	0
14	Office of the Council of Ministers	1	0
	Total	39	62

Source: MOEYS 2012 &amp; Sen and Ros. 2013, Hang 2014

Available data also indicates that about 90 percent of the students enrolled for graduate degrees were pursuing general education, while the remaining 10 percent were enrolled for TVET. About 50 percent of the higher education students pursue courses in commerce, business and economics. In terms of geographical distribution within the country, higher education institutions and students are concentrated in one municipality – Phnom Penh and 5 cities (Northwest next to Thailand and Southwest next to Vietnam border) – Siem Reap, Kampong Cham, Battambang, Banteay Meanchey, and Sihanouk Ville (Figure 1). Turning to the teaching staff, it is estimated that the average student-teacher ratio in higher education institutions is about 30:1 (Damico 2010). About 7 percent of the higher education teachers hold doctoral degrees, another 53 percent master's degrees, and the remaining 40 percent have only bachelor's degrees (Damico 2010).



and the Ministry of Labor and Vocational Training (MoLVT). Moreover, since 90 percent of the graduate students pursue general higher education (and only the remaining 10 percent pursue TVET), most of the higher education students and teachers come under the umbrella of one ministry – MoEYS. The multiplicity of ministries and government departments governing higher education may not pose an insurmountable constraint, so long as MoEYS and MoLVT cooperate and coordinate their activities effectively.

### 3. Sustainability in Higher Education

How does the higher education system in Cambodia measure up to the government’s commitment to integrate the actions of all stakeholders in developing a coherent strategy and policy to plan for green growth? Does the higher education system incorporate an adequate number of courses and degrees dealing with environmental sustainability and related fields? What constraints do colleges and universities face in delivering quality education in sustainability?

Available data for the 2011/12 academic year shows that 32 higher education institutions offer courses in environmental sustainability and related subjects (Table 2).

**Table 3: Environmental sustainability and related courses in Cambodia’s Higher Education, 2011/12**

No	Higher education institutions	Number of students enrolled	Female students	Offer degrees in environmental studies or sustainable development	Offer courses on environmental studies, sustainable development or related subjects
1	Royal University of Phnom Penh	4,339	1,702	P	P
2	Royal University of Agriculture	4,234	868	P	P
3	Chea Sim University of Kamchaymear	810	289	P	P
4	Paññāsāstra University of Cambodia	290	116	P	P
5	Svay Rieng University	203	60		P
6	Mean Chey University	120	49		P
7	University of Battambang	521	233		P
8	Institute of Technology of Cambodia	371	45		P
9	National School of Agriculture of Kampong Cham Province	210	96		P
10	Prek Leap National College of Agriculture	430	135		P
11	National University of Management	996	457		P
12	Chamroeun University of Polytechnology	32	11		P
13	Cambodia Mekong University	224	53		P
14	University of Cambodia	10	3		P
15	Western University	34	14		P
16	IIC University of Technology	31	22		P
17	Build Bright University	130	62		P
18	Phnom Penh International University	160	79		P
19	Cambodian University for Specialties	62	18		P
20	Cambodian Mekong University	224	53		P
21	University of Cambodia	10	3		P
22	Angkor Khmara University	205	57		P
23	Angkor University	88	19		P
24	Asia Euro University	288	72		P
25	Human Resources University	308	109		P

26	University of Economics and Management	232	66	P
27	Panha Chiet University	84	40	P
28	Institute of Education of Cambodia	35	17	P
29	Bright Hope Institute	151	72	P
30	Santa Pole Institute	28	15	P
31	Krong Angkor Institute	16	7	P
32	Institute of Social Science and Technology	13	1	P
Total		14,889	4,843	

Source: MoEYS 2012, RUA 2012

In terms of coverage of students, about 15,000 students pursue these courses, constituting about 6 percent of the graduate students enrolled in the entire higher education system. Two universities – the Royal university of Phnom Penh (RUPP) and the Royal University of Agriculture (RUA) – each account for close to 60 percent of these students. About 32 percent of the students (or nearly 5,000) were females, thus indicating a greater gender inequality in the composition of students taking these courses as compared to the overall gender inequality in higher education students as a whole. The students who take these courses pursue a varied specialization – general environmental science, natural resource management, agriculture and rural development (covering forestry and fisheries, too), tourism, and hotel management. Three subjects – natural resources, agriculture, and rural development – have the largest concentration of students.

The focus on agriculture, natural resources, and rural development in higher education is understandable, given that when Cambodia started its reconstruction and rehabilitation in the mid-1990s, agriculture and natural resources constituted the major sectors for growth and development. True, the country’s economic structure has undergone significant changes with the importance of agriculture in the economy declining steadily in both total GDP and employment; yet the country’s agricultural transformation and urbanization has a long way to go to be anywhere near completion (CDRI 2013). Agriculture still accounts for about 25 percent of GDP and about 60 percent of total employment. At about 22 percent, Cambodia’s urbanization rate is one of the lowest in the region. Moreover, the Tonle Sap Lake – the only fresh water lake in Southeast Asia – and the areas surrounding are still home to a large portion of the Cambodian poor. Hence, climate change and water governance around the Lake is a major development challenge for the country.

The Royal University of Agriculture (RUA) was established in 1964, and it was then named the Royal University of Agronomy Science. The university was closed during 1975-79, reopened in 1980, and finally in 1994 it was renamed as RUA. Located in suburban Phnom Penh, it is the country’s premier higher education institution with the mission of developing skilled human resources in three areas of specialization – natural resources, agriculture and rural development. In the 2011/12 academic year, about 4,200 students were enrolled at RUA (Table 3). A small proportion of these students – 94 or about 2 percent – are enrolled for a specialized degree in resource conservation and management in the Faculty of Agricultural Technology and Management.

The remaining 98 percent of the students are enrolled for a variety of subjects including agronomy, animal science, forestry, fisheries, agricultural economics, agro-

industry, rural development, land management and administration, and rubber science. However, these students get some exposure to issues relating to environmental sustainability, as their Departments offer several courses on these subjects, either as compulsory or elective modules. For example, students studying for specialized degrees in forestry and fisheries have to take courses with ecological and environmental contents. For the students enrolled in other faculties, the exposure to natural resource management and environmental sustainability are modest – in the form of one or two subjects either as compulsory or as elective courses (Table 3).

**Table 4: Faculties, Students, and Courses at Royal University of Agriculture (RUA)**

No	Faculty	Number of students enrolled	Female students	Offer degrees in environmental studies or sustainable development	Offer courses on environment, sustainable development or related subjects	
					Compulsory	Elective
1	Agricultural Technology and Management	164	32	Resource conservation and management	Natural resource management and conservation, water supply and sanitation, renewable energy	Environmental science, environmental impact assessment
2	Land Management and Land Administration	327	52		Land administration	Environment
3	Agro-Industry	250	81		Food technology, standardization & regulation for agricultural production	Environmental impact assessment
4	Agricultural Economics and Rural Development	949	271		Agricultural economics, environmental economics	Environmental impact assessment
5	Fisheries	158	35		Fisheries forestry, fisheries management	Fisheries environmental impact assessment
6	Forestry	138	40		Forest statistics, silviculture, protected area conservation	Forest environment, community forestry
7	Veterinary Medicine	1076	149		Animal physiology	Animal welfare, Environment and climate change
8	Animal Science	207	36		Animal farm management	Integrated farming systems
9	Agronomy Science	868	164		Soil conservation	Agroforestry, rural development
10	Rubber Science	97	8		Soil science, rubber plantation management	Rural social economics, agricultural policy
	Total	4234	868			

Source: RUA 2012

Overall, only four higher education institutions – RUPP, RUA, CSUK, and PUC – offer specialized degrees in natural resource management and environmental sustainability. The overall number of students studying for such specialized degrees in these three universities is a little more than 300 – far lower than the number students who take up one or two courses in environmental issues (Tables 3 and 5). Out of these 300 students, it is estimated that about three-fourths or about 225 students are enrolled for specialized degrees in natural resource conservation and management; the remaining one-fourth of the students specialize in other environmental sustainability issues. About 38 percent of the 300 students are females.

**Table 5 : Specialized Degrees in Environmental Sustainability**

Institution	Degree	Number of students enrolled for specialized degree in environmental sustainability and related subjects	Female students
Royal University of Phnom Penh (RUPP)	- Natural Resource Management and Development-NRM - Pollution, Urban, and Environmental Studies-PUES	124	75
Royal University of Agriculture (RUA)	Resource Conservation and Management	94	20
Chea Sim University of Kamchaymear (CSUK)	Natural Resource Management	76	19
Paññāsāstra University of Cambodia (PUC)	Environmental Management	24	6
<b>Total</b>		<b>318</b>	<b>120</b>

(MoEYS 2012)

How do the courses and curriculums of those institutions that offer a specialized degree in environmental sciences measure up to the challenge of sustainability education? The next section addresses this question.

#### **4. RUPP Specialized Degrees in Sustainability: Courses, Curriculums, and Constraints<sup>1</sup>**

Established in 1960, the Royal University of Phnom Penh (RUPP) is one of the oldest institutions in Cambodia’s higher education system. The university was closed during

<sup>1</sup>The discussion in this section draws heavily from the description of courses and the curriculums presented on the homepage on RUPP’s website.

1975-79, and then reopened in 1980 (as École Normale Supérieure), and finally in 1996 it was named RUPP. It now offers higher education in a wide variety of fields: (i) Faculty of Science (7 departments); (ii) Faculty of Social Science (9 departments); and (iii) Institute of Foreign Languages (6 departments). Two of the seven departments in the Faculty of Science – the Department of Natural Resource Management (NRM) and the Department of Environmental Science (DES), which offers specialized degree in Pollution and Urban Environmental Studies (PUES) – are devoted to environmental studies and offer specialized graduate as well as postgraduate degrees.

NRM offers both a graduate and postgraduate degree in Natural Resource Management, while PUES offers only a graduate degree in Pollution and Urban Environmental Studies. The curriculums and individual courses are designed in such a way that students enrolled for graduate degrees in both of these departments spend their first year building their overall capacity for university study. This foundation year has a focus on general subjects including mathematics, chemistry and biology, as well as Khmer literature, history and culture, English, sociology, philosophy and geography. Students also learn how to use the library, laboratory techniques, computer applications and other practical skills to prepare them for the three years of study ahead. Going into the second year, students choose one of the two streams of specialization. In the second and third years, for both options, students are supposed to build on their knowledge of the basic elements of their subject so that, in the fourth year, their focus deepens to embrace general management and strategic planning, and sustainable development.

#### **4.1. A Graduate Degree in Natural Resource Management (NRM)**

In the second and the third years of this specialization, in addition to taking general courses on economics and the market, agriculture, ethics and regulations, research methodology, and quantitative and statistical techniques, students pursue specialized courses in natural resource management and development. These latter courses could be categorized into two broad areas: (i) ecosystems, biodiversity, and environmental chemistry; and (ii) environmental protection and sustainable development. In the final year, these courses are followed by training in the various aspects of natural resources from a primarily ‘management’ perspective.

##### **Ecosystems, biodiversity, and environmental chemistry**

With a focus on ‘biogeography’, courses under this category are expected to give students a grounding in geographical diversification and the distribution of plants according to different climates, soil and water conditions. Students learn to classify soils and plants, and about the relationship between humans and their plant environment. In year three, students move on to GIS – a geographic information system used for capturing, storing, manipulating, querying, analyzing and displaying geographically-referenced data related to positions on the earth’s surface. This is an invaluable tool to help with environmental monitoring. At the same time, courses on ecosystems – and, more specifically, marine ecology – continue to deepen students’ understanding about the delicate balance that supports animal and plant life within ecosystems, and the impact human activities have on this. They also learn to identify what measures are needed to conserve biodiversity – especially given its role in

livelihoods and the national economy – and the techniques, management processes, and national policies that support them. Going still deeper into the complex interrelation between the environment and natural resources, the third-year course on System Dynamics aims to enhance students' ability to shape responses to environmental problems at local, regional and global levels through technical computer-based models.

The foundation year in chemistry leads students into an analysis of chemical processes and associated fieldwork as the degree course progresses. The environmental chemistry course first focuses on the reasons for, and nature of, air pollution and the destruction of the ozone layer, acid rain, and the reasons behind and the effects of climate change. In the second semester, the focus shifts to the organic and inorganic pollutants of natural water and groundwater, as well as the composition of various soil types. This overview is expected to enable students to understand the function and impact of links between chemical substances in the environment, and this is supported by practical experience in the laboratory.

### **Environmental protection and sustainable development**

Building on their foundation year, students deepen their understanding of the chemistry behind environmental problems, and start to explore practical solutions to these. In the second semester of the second year, students go on to gain conceptual and practical knowledge of sustainable development issues. This embraces international conventions and main policy instruments, tailoring these to the Cambodian context, and encouraging students to take a critical approach to the complex issues involved. In year three, there is also a focus on the specific elements of sustainable forest management and conservation – including forest inventory, silviculture and tree nursing – and on marine and aquatic resource management. These latter courses are expected to make the students recognize the challenges involved in balancing livelihood and national nutritional needs with conservation imperatives. A further course teaches students about sustainable land management. This looks at both the social and technical aspects of the subject to counter the negative aspects of rapid population growth, improper land use, and over-application of modern technologies.

Although each element of the course has a specific focus on Cambodia, in year three students are also given a picture of the complex issues in natural resource management from a global perspective. This course is enhanced by lectures from a range of national and international environmental specialists, as well as fieldwork through which students are expected to gain first-hand experience of trends and responses. In addition, throughout these courses, students are introduced to the role of environmental economics and environmental impact analyses in assessing how associated issues affect the livelihoods and general wellbeing of the people. Students build on this knowledge when they learn how to use environmental economics to explain environmental problems and to find solutions. Indeed, throughout the course, students come to understand that economic policy instruments need to be complemented with environmental regulation and environmental education, collectively denoted as environmental management measures. In year three, the course on environmental impact assessment takes students further into the tensions between economic development and environmental protection, equipping them with

the understanding – and tools – to support the formulation of sound recommendations for sustainable environmental planning and management.

### **Management perspectives**

In the fourth and final year, students are guided to the next level, bringing together all of this information to focus on general management themes. This includes an appreciation of the relationship between gender and the environment, the elements of project management and the need for properly planned development that integrates conservation, economical, legal and ethical considerations within natural resource management planning and implementation.

Areas of particular focus during the final year also embrace the management of protected areas and water resources. In addition, students consider the implications of population growth in Cambodia and the country's developmental needs, and the impact these have on the environment.

### **4.2. A Graduate Degree in Pollution and Urban Environmental Studies (PUES)**

After the common foundation year, shared with the students in natural resource management, students specializing in PUES take courses under three broad categories: (i) urban environment, (ii) waste and pollution management, and (iii) energy and cleaner production.

#### **Urban environment**

In year two, students are introduced to the demography of urban areas. A focus on urban growth and development, the effects of changing land values on land use in urban areas, and the traffic, housing and environmental problems that ensue, aims to ensure that students emerge with an overview of urbanism, urban organization and urban problems. This leads, in the second semester, to a focus on urban infrastructure and services – water supply and sanitation, waste collection, transportation and power supply – and the associated policy issues. Students also learn how to analyse the environmental problems that arise from rapid urbanization, and the potential solutions to mitigate them.

#### **Waste and pollution management**

Having grasped the specific environmental challenges posed by urban development, the students then progress to an understanding of the ways to manage these. Specifically, they learn about the causes and implications of air pollution – and measures needed to monitor and control this – as well as the safe and appropriate ways to manage solid waste so that risks to human health and environmental quality are minimized. This study, in turn, provides a basis for students to learn more about adverse effects that polluted air, water and land can have on public health and the particular challenges developing countries face in dealing with these. Although Cambodia is the prime focus, students are introduced to the responses other developing countries have made to these issues to enable them to identify solutions that could have a more universal application. Given the life-sustaining nature of water – along with its potential to spread disease – this is given a particular focus: one

course focuses on water quality management, another on the control of wastewater pollution. Again, there is an emphasis on existing technologies and methods so that students are able to apply their knowledge in a practical way when they graduate.

### **Energy and cleaner production**

Economic development, along with a growing urban population, is increasing demand for energy. Inefficient use of energy is a chief culprit in air pollution and climate change. This is, therefore, the focus of a course that helps students to understand the world's energy demands and the range of renewable and non-renewable energy sources. Students are introduced to technological and regulatory interventions that could global energy consumption.

In common with the progression in the NRM degree course, students studying PUES spend the fourth year of their studies consolidating their knowledge through courses that take a wider perspective. One focuses on 'waste economy' that particularly looks at the informal waste management sector, especially the roles of women and children. The course concludes with an investigation of decentralized community-based waste management systems and their potential problems and benefits. A second course looks at 'cleaner production' (CP). Energy efficiency, controlled water consumption and waste minimization are discussed to enable students to graduate with the theoretical and practical knowledge to improve the eco-efficiency and reduce the risks to humans and the environment from the activities of both industry and the service sector. Through detailed case studies, students gain a firm understanding of CP concepts, an appreciation of the importance of preventive measures, and practical knowledge, all of which combine to provide an essential grounding for their future careers. Finally, students are required to conduct a piece of original research before graduating.

### **4.3. Constraints on Sustainability Education**

Although the courses and the curriculums for the two specialized degrees at RUPP are designed to offer students quality education in sustainability and related areas, several factors seem to constrain the university in fulfilling that objective. Many of these constraints are common to most higher education institutions and thus are not specific to RUPP. Inadequate financial resources, lack of laboratory facilities, outdated curriculums, and above all the absence of a research culture, are the major factors that are singled out as the constraints on imparting quality education. "The quality of many courses is inadequate – inadequate infrastructure and teaching resources, large numbers of students in classrooms, outdated teaching methodologies, general low standards, uncompetitive packages resulting in teachers taking on too many teaching hours, lack of credibility in student grades, etc." (Damico 2010: 71).

It is generally believed that the two departments offering specialized degrees in sustainability and related areas now have a group of relatively younger teachers with good academic qualifications. Most of them hold degrees from overseas universities and have the potential to offer quality training to the Cambodian youth. However, inadequate financial resources are thought to hinder the realization of that potential. For one thing, the average basic salary of a lecturer is only about USD 200 per month. Lecturers are then allowed to earn additional amounts through offering class-lectures.

Such a system offers them an incentive to spend more of their time lecturing so that they can top up their basic salary. As a result, lecturers – young and old – spend most of their time lecturing and even doing part-time jobs outside the university. That, in turn, means that they have little time to spend on research, and even the minimal research that is conducted by the higher educational institutions is of questionable quality (Wilson 2014). Too much emphasis on ‘teachership’ thus limits the time lecturers can spend on acquiring the skills of ‘scholarship’. That is thought to undermine the quality of teachers. In the process, even young lecturers with high academic potential gradually stagnate without developing their skills through continuous research.

Such stagnation is then reflected in a lower quality of teaching contributing to intergenerational transmission of skill-deficiency. Course books and curriculums then become outdated and the quality of education suffers. Today’s use of outdated teaching materials and methods could thus lead to poor education for tomorrow’s generation. Added to these pedagogical issues, the topic of financial transparency is also a cause for concern: there is thought to be inadequate transparency in the way whatever little available financial resources are managed within the universities. This raises a whole gamut of issues relating to higher education governance in the country. Lack of autonomy for public universities and lack of regulation for private institutions are raised as another set of issues in the country’s higher education system. Although the government has since 2007 gradually granted more autonomy to public higher education institutions, perceptions are that these institutions still do not have enough autonomy in the areas of financial resource and staff management (Touch et al. 2013). As one expert puts it: “The emphasis has been weighted too strongly on expanding the system (coverage and quantity), with insufficient regard for improving the system (quality and labor market responsiveness)” (Damico 2010: 72).

Encouragingly, however, the government is cognizant of many of the constraints that are currently hindering higher education. In response, in 2010 the government formulated a policy framework for developing research capabilities in higher education followed by an action plan to operationalize the policy framework (RGC 2010; RGC 2012b). Moreover, under the leadership of the new education minister in the government that was formed after the national elections in July 2013, MoEYS is placing renewed emphasis on reforming the country’s education system. A long-term reform agenda that will take a holistic systemic approach for the entire education system is being prepared. Wide-ranging consultations for developing the reform agenda are being conducted by MoEYS with relevant stakeholders, including the country’s higher education institutions. This provides an opportunity to address some of the concerns relating to the higher education segment. It also provides an opportunity to look at the issue of how the education system in general and the higher education in particular can best be aligned with the government’s 2009 Green Growth Roadmap and the concomitant National Policy and Strategic Plan on Green Growth that was developed. In this context, there is merit in a closer coordination between the Ministry of Environment and MoEYS.

## **5. Conclusion**

Cambodia is suffering from the impacts of climate change, and the related environmental problems. Yet, as a small developing country located in the Greater

Mekong Subregion in Southeast Asia, it is highly vulnerable to the adverse effects of climate change and the concomitant extreme weather patterns. Recognizing this and in line with the emerging regional and global priorities, Cambodia is committed to environmental sustainability in its development agenda. The government has already drawn up a Green Growth Roadmap and a National Policy and Strategic Plan on Green Growth to implement the Roadmap in the next stages of the country's development journey. The government also recognizes the crucial role of academia in an effective implementation of the Green Growth Roadmap.

Against the backdrop of these national-level developments, and given the stage of the country's development, this paper's pedagogical assessment suggests that Cambodia's higher education has made modest efforts at incorporating natural resource management and environmental sustainability issues. Thirty-two out of the 101 higher education institutions in the country now offer courses in environmental sustainability and related subjects. However, only four of these 32 institutions offer specialized degrees in natural resource management and environmental sustainability. The remaining 28 institutions offer a few environmental sustainability-related courses – either as compulsory or elective modules.

About 300 students are at present enrolled for the specialized degrees in natural resource management and environmental sustainability in two universities. Of these, 124 are studying at RUPP – the country's premier higher education institution. The courses and the curriculums taught in the specialized degrees at RUPP are designed to equip students with a comprehensive understanding of the complex issues in natural resource management and environmental sustainability.

It is difficult to assess the quality of these courses and the resulting specialized degrees. Yet anecdotal evidence suggests that Cambodia has a long way to go to catch up with many of the ASEAN countries, including neighboring Vietnam, in terms of the overall quality of higher education. Given this, it is perhaps reasonable to conclude that there is significant scope to improve the quality of sustainability education in Cambodia's higher education system. In the coming years, as the country moves up the industrialization ladder, there will also be a need for increasingly incorporating urban environmental and transboundary issues, for example, dam construction along the mainstream of the Mekong River, in the higher education system. Many of the factors that seem to constrain the quality of sustainability education are common to the entire higher education system in the country – inadequate funds, lack of teaching materials, laboratories, and equipment, underpaid teaching staff, under-prepared students (given the uncertain quality of the primary and secondary education system), and even a lack of autonomy for the higher education institutions, to name just a few.

Encouragingly, however, the government is cognizant of many of these current constraints within higher education. Under the leadership of the new education minister in the government that was formed after the national elections in July 2013, MoEYS is placing renewed emphasis on reforming the country's education system. A long-term reform agenda that plans to take a holistic systemic approach for the entire education system is being prepared. This also provides an opportunity to look at the issue of how the education system in general and higher education in particular could best be aligned with the government's 2009 Green Growth Roadmap and the

concomitant National Policy and Strategic Plan on Green Growth. In this context, there is merit in a closer coordination between the Ministry of Environment and MoEYS.

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