

# Chapter 1

## Asian Program for Incubation of Environmental Leaders

Tomohiro Akiyama, Keisuke Hanaki, and Takashi Mino

**Abstract** This chapter outlines the features of the Asian Program for Incubation of Environmental Leaders (APIEL), including its objectives, core concepts and curriculum structure. APIEL is an educational program developed by The University of Tokyo that aims to foster environmental leaders, who have wide knowledge base, critical perspective, and a strong ethical stance. Those environmental leaders are expected to contribute to building environment-friendly and sustainable societies in the future in Asian countries. In addition, APIEL intends to create a collaborative network of higher education institutions in Asia with a view to tackling environmental issues by developing environmental leadership capacity.

**Keywords** Asia • Education • Environmental problem • Interdisciplinary • Interregional • Leadership • Stakeholder

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T. Akiyama (✉)

Graduate Program in Sustainability Science, Graduate School of Frontier Sciences,  
The University of Tokyo, Environmental Studies Building 334, 5-1-5 Kashiwanoha,  
Kashiwa, Chiba 277-8563, Japan  
e-mail: akiyama@k.u-tokyo.ac.jp

K. Hanaki

Department of Urban Engineering, Graduate School of Engineering, The University of Tokyo,  
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan  
e-mail: hanaki@env.t.u-tokyo.ac.jp

T. Mino

Graduate School of Frontier Sciences, The University of Tokyo,  
5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8563, Japan  
e-mail: mino@mw.k.u-tokyo.ac.jp

## 1.1 Introduction

The technological innovation and economic growth in the twentieth century have led to significant improvement of human welfare; however, they also caused unprecedented environmental problems. These problems include not only local/regional environmental pollution, but also global issues such as climate change, resource shortages, the energy crisis, and the loss of biodiversity. Environmental problem is complex because it relates not only to technical/physical issues but also social issues. In addition, even if an environmental problem appears peculiar to a region, it is closely connected to global issues. Thus, what is important to find solutions on current environmental problems is to integrate the scientific knowledge with findings from other perspectives. It is also important to develop human resources who hold a holistic view.

To foster environmental leadership in graduate students, the Asian Program for Incubation of Environmental Leaders (APIEL) was established in 2008 by The University of Tokyo. This educational program offers a curriculum that develops environmental leaders, who can make significant contributions to resolving global environmental problems as well as regional/local environmental problems in the twenty-first century.

APIEL is not a degree program but a certificate-awarding program originally developed through collaboration between the Graduate Program in Sustainability Science (GPSS) of the Graduate School of Frontier Sciences and the Department of Urban Engineering (UE) of the Graduate School of Engineering. This collaboration has given a unique strength to the curriculum because the former provides transdisciplinary approaches to APIEL, and the latter provides APIEL a solid academic base of environmental technology and management. In this way, APIEL is able to provide structured knowledge, practical skills, and experiences to students. APIEL particularly focuses on the environmental problems in Asia because Asia is the most populated region in the world and Asian countries at different stages of development are facing the challenge to build a sustainable society with limited natural resources.

## 1.2 Core Concepts

### 1.2.1 *Characteristics of APIEL*

To resolve the complex problems mentioned above and to contribute to sustainable development requires highly specialized leaders with wide knowledge, a critical perspective, and a strong ethical sense. APIEL's goal is to be an incubator for environmental leaders who have the necessary practical skills. In particular, APIEL puts emphasis on the following core concepts.

First, in the process of tackling environmental problems, it is important to recognize both universality and locality. Scientific bases and core environmental technologies can be universally applied in many cases but, in practice, specific local conditions must always be considered. Therefore, environmental leaders should be

able to identify the problems within the *global* context based on universal knowledge, as well as understand and analyze the problems within the *local* context. They must be able to think clearly about cultural and social factors, local ecological and geographical characteristics, and interactions among the neighboring regions/communities, and to propose environment-friendly solutions and sustainable systems from a holistic point of view.

Second, respect for cultural and disciplinary diversity is a key concept of APIEL because these are essential for developing an efficient partnership among the various stakeholders. Collaboration among stakeholders is necessary to take on complex environmental problems, and this collaboration can only be achieved by understanding the views of different cultures and disciplines. In the APIEL curriculum, interactions among students, instructors, and stakeholders from varied cultural and disciplinary backgrounds are crucial—both in the classroom and in the field.

Third, hands-on experience and experiential learning should be the key pedagogy in the curriculum. APIEL introduced field exercises that provide students with opportunities to learn how environmental problems become complex and how different stakeholders are involved. Students learn how to deal with contradictions around problems through real experience with environmental cases and exposure to complex situations.

In addition, APIEL aims to create a resonant network of higher education institutions in Asia dealing with environmental research and education. Partners were identified during the development of the field exercises. As well, exchanges of information and the transfer of key experiences in teaching are essential for all similar institutions as there are a limited number of models available for environmental leadership education. The APIEL network should work as the platform for this type of collaboration.

### ***1.2.2 Environmental Leadership***

APIEL is striving to develop human resources who are able to play major roles as environmental leaders in various organizations in the world. APIEL expects environmental leaders to:

1. *Recognize* global and regional/local environmental problems and propose solutions to these problems using not only specialized professional knowledge and skills, but also inter-disciplinary thinking and approaches.
2. *Acquire* a balanced understanding of the knowledge, skills, and ways of thinking of the natural sciences as well as the humanities and social sciences.
3. *Refine* the ability in the field to make judgments, take action, and work in partnerships to resolve real-world environmental problems.
4. *Develop* the communication and leadership skills necessary to raise topics for discussion and to negotiate issues in several international as well as local situations.

These leaders may in the future play a key role in decision-making processes within different levels of society, including companies and NPOs, regional

communities, specialist/professional groups, local and national governments and various international organizations. They will be expected to lead society in an environment-friendly and sustainable direction.

### **1.2.3 Resonance**

Interactions among disciplines, stakeholders, and regions are essential for solutions of environmental issues. These interactions should bring benefits to all sides. These mutual positive influences can be called “resonance.” And this “resonance” is one of the core concepts of APIEL.

Experiencing and learning from the various types of interaction are at the core of the program. Forming heterogeneous student groups for classes and conducting field studies with other universities helps to create resonance. Students from different backgrounds, such as engineering and the social sciences, are intentionally mixed together. Through this education program, the students learn to interact. In addition, faculty members or institutions form a resonance among themselves. An interaction resonance is also formed through alumni activities. The environmental leaders from several countries incubated by this program go back to their home countries, and then host the field study of younger students.

Forming an academic network among universities is an effective way to implement education for environmental leadership developments. Universities can exchange students and faculty members as well as information on academic programs. Such a network in Asia can form a strong base for collaborative education and research on Asian environmental issues. Interdisciplinary resonance, interregional resonance and alumni resonance are enhanced through these exchanges (Fig. 1.1). The detail information of each resonance will be explained in the later part.

#### **1.2.3.1 Interdisciplinary Resonance**

APIEL targets interdisciplinary resonance by providing an integrated, multidisciplinary curriculum as well as educational and research opportunities that promote mutual understanding among individuals in environmental fields. Scientific disciplines have been developed, widened, and deepened especially since the Industrial Revolution. Today, we need interaction among different disciplines. Environmental leaders are supposed to understand each discipline and make “bridges” across them to solve problems in the real world.

Figure 1.2 shows an example of disciplines involved in the occurrence and solution of environmental issues. Environmental deterioration appears as changes in water, air, soil, and the global environment. The natural sciences observe, analyze, and manage these changes. The impact of environmental change on health is a critical issue, and this is covered by the medical sciences. Many fields of engineering contribute to solving pollution problems or climate change through technologies such as wastewater treatment, energy-saving devices, or photovoltaic cells. Agriculture is influenced by, and, on the other hand, causes environmental

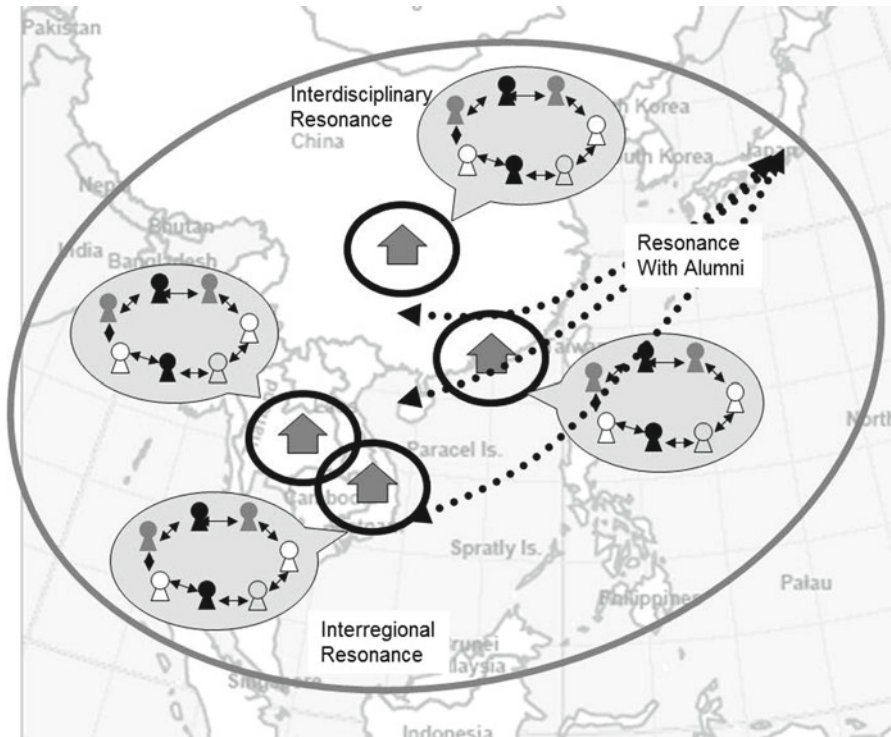


Fig. 1.1 Concept of resonance in educational program for environmental leaders

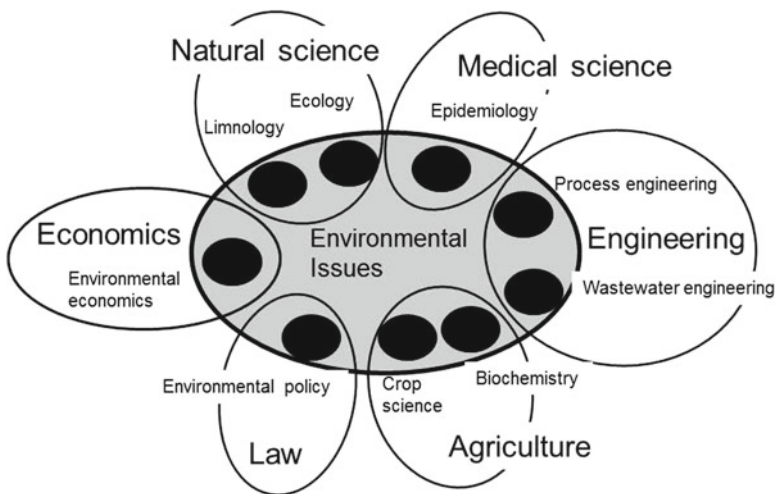


Fig. 1.2 Interdisciplinary characteristics of environmental issues

deterioration. Social sciences are also important to manage and control the environment. Environmental policy in the field of law and environmental economics in the field of economics are the examples.

Though these disciplines are necessary to identify and analyze environmental issues and propose solutions, their contribution is limited if each discipline is separated. Interaction among these disciplines is essential. For example, the wrong technology could be selected if an engineer does not consider local social and economic circumstances. On the other hand, the wrong technology can also be selected if the decision-making team has no expert in engineering and just considers the cost. There is a risk for official development assistance, where important funding negotiations take place between governments, when the recipient nation demands an expensive high-tech solution that requires experts to operate and maintain. The assisting nation then tries to cut the budget without considering operating and maintenance costs. The outcome is that expensive technology and machines are introduced but stop running within a short period. The role of technology experts who understand the social circumstances is essential in such a case. The natural sciences and engineering are superficially under a common discipline, but there are significant differences in basic concepts and methodology. The ultimate objective of the natural sciences is to find the truth; engineering is oriented to problem solving. Understanding every aspect of these different disciplines is impossible for one person. Instead, having the ability to interact with experts from different disciplines is essential for environmental leaders. In other words, environmental leaders must be coordinators among these different disciplines.

A holistic academic organization, such as a national academy, should play a fundamental role in promoting interdisciplinary academic activity. For example, the Science Council of Japan set up a committee on environmental science as a body that cuts across three major groups: social sciences and the humanities, life and medical sciences, and the natural sciences and engineering. However, real environmental issues cannot wait until disciplines merge before finding a solution for environmental issues. Therefore, for solving an individual issue without any delay, an environmental leader can coordinate the disciplines.

### **1.2.3.2 Interregional Resonance**

Environmental issues have commonalty and diversity among countries or regions. The mechanisms of pollution or climate change are common among the regions. However, the history, the causes, and control of these problems are local issues. Effective technology for solutions is to some extent common, but the choice of technology depends on local circumstances.

Even for global environmental issues, such as climate change, reducing greenhouse gases depends on local conditions. The impact of climate change is a locally dependent issue. Analyzing environmental issues requires an understanding of environmental deterioration within the local context. Though data is gathered through surveys, much more valuable and relevant information is obtained through collaboration with local people, governments, or experts. The global environmental

issues cannot be solved by only region-specific efforts. This APIEL targets interregional resonance by developing partnerships and forming networks with educational and research institutes throughout Asia.

### **1.2.3.3 Alumni Resonance**

To solve real environmental problems, coordination and consensus among the diverse stakeholders are also essential. Stakeholders include citizens, and people from local governments, industry, and agriculture as well as others who are affected. The influence on future generations should be considered during decision making, though there is no representative for future generations. The coordination process for reaching a consensus requires many steps and much time. However, this process is essential for developing, implementing, and sustaining a solution. Otherwise, the solution cannot work properly and will need to be changed.

The APIEL also targets resonance with alumni by promoting interaction and information exchange and sharing among alumni. Alumni are expected to come back to the APIEL as instructors or to help refine the program's curriculum and design.

## **1.3 Curriculum Structure of APIEL**

To foster students' environmental leadership, APIEL established a compulsory course called Environmental Challenges and Leadership in Asia, and a companion field exercise course. In the former, students learn, in an interactive way, about environmental leadership and various environmental problems in Asia. In the latter, practical issues are examined with cooperative counterpart(s) in a region that has an environmental problem. These courses are structured to develop students' perception vis-à-vis environmental problems and to develop the skills required of environmental leaders. In addition, elective courses are chosen from degree programs, so that students can deepen both their professional knowledge and their skills. Research for master's and doctoral theses is also required and aims to propose new systems from interdisciplinary perspectives based on a holistic understanding of environmental issues.

### ***1.3.1 Environmental Challenges and Leadership in Asia: Understanding Environmental Leadership***

APIEL established a compulsory course, Environmental Challenges and Leadership in Asia, which is designed for students to acquire literacy and other skills required of an environmental leaders using a hands-on approach so that they can contribute to solving environmental issues or to build a sustainable society, which itself can prevent environmental problems. Students learn about real-world environmental problems in Asia from various perspectives, while considering the historical and

cultural backgrounds. The course emphasizes group work and discussion, and students learn communication and consensus-building skills through experience. It leads to the award of two credits.

Over 15 lectures, this course examines the environmental problems that Asia is experiencing and discusses how we can foster a growing society with finite resources and space. At the same time, it helps develop the environmental leadership and other skills needed for building a sustainable society by taking up case studies of Asian environmental issues. One example: students are required to bring academic articles and books that they feel are the most important for the construction of a sustainable future. By sharing these reading materials, students become aware that perceptions of a sustainable future can differ widely. In addition, discussions among students help hone capabilities when developing cooperative relationships based on mutual understanding. In a sense, students in this compulsory course learn how to learn from others. The details of the compulsory course, *Environmental Challenges and Leadership in Asia*, are outlined in Chap. 3.

### ***1.3.2 Field Exercises: Developing Essential Skills for Environmental Field Sites***

APIEL has a strong focus on field exercises. The field exercises take place several times each year in cooperation with collaborating partners in Asia in locations where there are environmental problems. A small number of students and faculty members form a group (a unit) and carry out hands-on exercise. Each field exercise setting is intended to broaden the perspectives of students and to cultivate an on-the-ground ability to identify and resolve problems in several ways, including pre-visit study and preparation, fieldwork, on-site experiments, discussions with stakeholders from many backgrounds including local educational institutions or governmental officials, a final presentation and report writing to solidify the vision and develop practical skills. Participants stay in the field for 1–2 weeks, with students receiving financial support for travel expenses. Overseas and domestic exercises lead to the award of two credits and one credit, respectively.

Tables 1.1, 1.2, 1.3, and 1.4 provide a list of the field exercises implemented to date. All field exercises have the following characteristics; they are (1) interdisciplinary in nature, (2) involvement of a number of different stakeholders, (3) fostering student initiatives, and (4) featuring practical issues that lack a prepared solution. Although the field study takes place over a relatively short period, it is possible for students to examine real-world environmental issues on-site and discuss them with the stakeholders. This interaction is made possible through the participation of local governmental agencies and companies and through the cooperation of collaborating universities/research institutions. Furthermore, this educational program is designed to ensure the diversity of participants (i.e., to avoid an overconcentration of Japanese graduates). This design feature then pushes students to improve their ability to communicate with people from other cultural backgrounds.



**Table 1.1** List of APIEL's field exercise units (updated version of Akiyama et al. [1]): academic year 2009

Overseas field exercise		Domestic field exercise							
Unit title	Intensive Program on Sustainability (IPoS)	Zhangye unit	Bangkok unit	Thailand unit	Chiang Rai unit	Greater Pearl River Delta (GPRD) unit	Eco-Industrial Cluster	Nissan-IPoS	Internship at Japan International Cooperation Agency (JICA)
Theme	Food, Energy and Water	Water-related issues in and region	Urban development and agriculture-related issues in suburban Bangkok	Sustainable solid waste management in Asian developing countries	Transboundary environmental issues	Environmental LeadershipDevelopment in GPRD, China	Eco-Industrial Cluster	Sustainable mobility with zero emission vehicles	Sewage works engineering and Stormwater Drainage Technology
Place	Rayong Province, Thailand	Zhangye, Gansu Province, China	Bangkok, Thailand	Nonthaburi Province and Bangkok, Thailand	Golden Triangle, Chiang Rai, Thailand	Hong Kong and Guangzhou, China	Asian Development Bank Institute (ADBI) (Tokyo)	Yokosuka City, Kanagawa Prefecture	JICA (Tokyo)
Period	Aug. 1–12, 2009	Aug. 6–15, 2009	Sep. 14–23, 2009	Oct. 21–30, 2009	Dec. 19–30, 2009	Feb. 25–Mar. 7, 2010	Oct. 2009–Jan. 2010	Dec. 7–14, 2009	Nov. to Dec. 2009
Collaborator(s)	1. Asian Institute of Technology (AIT) etc.	1. Cold & Arid Regions Environment & Engineering Research Institute, Chinese Academy of Sciences (CAREERI), 2. Zhangye Water Authority	1. Chulalongkorn Univ. (CU)	1. AIT, 2. Kasetsart Univ. (KU)	1. Mae Fah Luang Univ. (MFLU)	1. The Hong Kong Univ. of Science & Technology (HKUST), 2. Sun Yat-sen Univ. (SYSU)	1. ADBI	1. AIT etc.	1. JICA, 2. Sewerage Business Management Centre
Teaching staff(s)	Univ. of Tokyo (UT) (3); AIT (2)	UT (4); CAREERI (2)	UT (1); CU (2); Wakayama U (1)	UT (5); AIT (1); KU (1)	UT (3); MFLU (2)	UT (5); HKUST (1); SYSU (1)	UT (1)	UT (7); AIT (2)	UT (1)
Students' nationality	1 Ethiopian 2 Japanese N.B. 23 participants from 14 countries/ regions, 11 universities	1 Indonesian 1 Thai 1 Chinese 2 Japanese	1 Columbian 1 Filipino 2 Japanese	1 Filipino 1 Bolivian 3 Japanese	1 Indonesian 1 Cambodian 3 Sri Lankan 3 Japanese	1 Irish 1 Swiss 1 Bangladeshi 1 Portuguese 2 Chinese	1 Portuguese	1 Ethiopian 2 Japanese N.B. 24 participants from 15 countries/ regions, 11 universities	1 Brazilian 1 Chinese 1 Japanese

**Table 1.2** List of APIEL's field exercise units (updated version of Akiyama et al. [1]): academic year 2010

Unit title	Overseas field exercise				Domestic field exercise			
	Oasis unit	Hue unit	GPRD unit	Coca-Cola Young Environmental Leaders Summit	Internship in the project on Low Carbon Green Asia	Tokyo Fringe unit	Nissan-IPoS	Green Energy unit
Theme	Sustainable integrated watershed management in cold and arid region	Flood and History in world heritage Hue city	Sustainable urban regeneration and relocation of industrial regions in GPRD, China	Corporate Social Responsibility	Low-carbon society Scenario in Asia	Urban development and agriculture-related issues in suburban Tokyo	Sustainable cities & mobility in 2050	Sustainable energy supply
Place	Zhangye, Gansu Province & Ejina, Inner Mongolia, China	Hue, Vietnam	Hong Kong and Guangzhou, China	Kuriyama Town, Hokkaido	ADBI (Tokyo)	Kashiwa, Chiba & Nerima, Kokubunji, Hachioji, Tokyo	Hayama town, Kanagawa Prefecture	Kashiwazaki, Niigata & Ueno, Gunma
Period	Aug. 10–23, 2010	Aug. 11–19, 2010	Feb. 21–28, 2011	Aug. 19–23, 2010	Nov. 2010 to Feb. 2011	Sep. 5–12, 2010	Dec. 4–13, 2010	Feb. 21–23, 2011
Collaborator(s)	1. CAREERI, 2. Zhangye Water Authority, 3. Alashan SEE Ecological Association, 4. Wusurongui Village & Jirigalangtu Village, Ejina	1. Hue Univ.	1. HKUST, 2. SYSU	1. All counterparts of the overseas field exercise units in academic year 2009 & 2010, 2. Hokkaido Univ. (HU), 3. NPO Kuriyama, 4. Sumitomo Chemical Company Limited	1. ADBI	1. CU	1. AIT etc.	1. Tokyo Electric Power Company, 2. Korea Environmental Policy and Administration (KEPA) Society, 3. Prince of Songkla Univ. (PSU), 4. Kashiwazaki City

Teaching staff(s)	UT (5); CAREERI (3); Univ. of Niigata Pref. (UNP) (1)	UT (4); Hue Univ (1)	UT (4); HKUST (1); SYSU (1)	UT (4)	UT (2)	UT (1); CU (2); Wakayama U (1)	UT (7); AIT (2)	UT (5); KEPA (1); PSU (1); UNP (1)
Students' nationality	1 Ethiopian 1 Bhutanese 1 French 1 Vietnamese 1 Mongolian 1 Chinese 2 Japanese	1 Dominican 1 Bangladeshi 2 Filipino 1 Korean 1 Chinese 4 Japanese	1 Ethiopian 1 Australian 1 Filipino 1 Vietnamese 1 Malagasy 2 Chinese 2 Japanese	1 Irish 1 Indonesian 1 Ethiopian 1 Cambodian 1 Thai 1 Bangladeshi 2 Filipino 1 Bolivian 1 Portuguese 2 Japanese	1 Mongolian	1 Cambodian 1 Filipino 2 Japanese	1 Australian 1 Dominican 1 Chinese 1 Japanese N.B. 28 participants from 17 countries/ regions, 10 universities	1 Irish 3 Indian 1 Indonesian 1 Cambodian 1 Thai 1 Dominican 1 Nepali 1 Bahraini 1 Bhutanese 1 Vietnamese 1 Jamaican 1 Chinese 1 Japanese

**Table 1.3** List of APIEL's field exercise units (updated version of Akiyama et al. [1]); academic year 2011

Unit title	Oversseas field exercise						Domestic field exercise			
	IPoS	Oasis unit	Thailand unit	Cambodia unit	GPRD unit	Ohtsuchi unit	Minamata unit	Nissan-IPoS	Coca-Cola Young Environmental Leaders Summit	
Theme	Sustainable livelihoods through integrative practices with emphasis on Food, Water and Sanitation in a peri-urban community	Water-related issues in arid region	Sustainable Urban Water Use and Management in Bangkok	Sustainable Development of Cambodia	Sustainable urban development toward Green City: GPRD, China	Reconstruction of 3.11 Great Earthquake	Sustainable stakeholder management for water environment	Technology & Society - case of energy & transportation in Kashiwanoha	Corporate Social Responsibility	
Place	Rayong Province, Thailand	Zhangye, Gansu Province, China	Bangkok, Thailand	Phnom Penh and Siem Reap, Cambodia	Hong Kong and Guangzhou, China	Ohtsuchi Town and Kamaishi City, Iwate Prefecture	Kumamoto City and Minamata City, Kumamoto Prefecture	Kashiwa City, Chiba Prefecture	Kuriyama Town, Hokkaido	
Period	Aug. 1-12, 2011	Aug. 27-Sep. 7, 2011	Aug. 18-28, 2011	Sep. 2-14, 2011	Feb. 15-25, 2012	11 times of 3-4 day fieldwork	Jan. 4-8, 2012	Dec. 5-12, 2011	Feb. 27-Mar. 3, 2012	
Collaborator(s)	1. AIT etc.	1. CAREERI, 2. Zhangye Water Authority	1. AIT, 2. KU	1. Royal University of Phnom Penh (RUPP), 2. Seoul National University (SNU), 3. JICA, 4. Korea International Cooperation Agency (KOICA)	1. HKUST, 2. SYSU, 3. SNU, 4. Univ. of Hong Kong (UHK), 5. Hong Kong Green Building Council (HKGBC), 6. Guanzhou Urban Land Administration Bureau (GULAB)	1. Ohtsuchi town 2. Coastal Regional Development Bureau of Iwate Prefecture	1. Kyushu Univ., 2. Kumamoto Univ., 3. Univ. of Kitakyushu, 4. Univ. of Tsukuba	1. AIT etc.	1. All counterparts of the overseas field exercise units in academic year 2011, 2. HU, 3. Yokohama National Univ. (YNU), 4. JICA	

Teaching staff(s)	UT (9); AIT (2)	UT (3); Public Works Research Inst. (1); CAREERI (3); UNP (1)	UT (5); AIT (1); KU (1)	UT (4); RUPP (2); SNU (2)	UT (5); HKUST (2); SYSU (3); SNU (2); UHK (1); HKGBC (1); GULAB (1)	UT (9)	UT (4); Kyushu U (3); Kumamoto U (4)	UT (5)	UT (6), HU (2), YNU (1), JICA (1)
Students' nationality	1 Chinese 2 Japanese N.B. 22 participants from 10 countries/ regions, 9 universities	1 Brazilian 2 Cambodian 1 Korean 1 Japanese 1 Sri Lankan	2 Chinese 1 Indian 1 Nepalese	1 Chinese 1 Indian 4 Japanese 1 Nepalese	1 Bangladeshi 1 Chinese 1 Indian 2 Japanese 1 Korean	2 Chinese 7 Japanese 1 Mongolia 1 Sri Lankan	1 Chinese 1 Japanese 1 Indian 1 Nepalese	1 Chinese 2 Japanese N.B. 18 participants from 9 countries/ regions, 8 universities	1 American 2 Cambodian 8 Chinese 2 Indian 3 Japanese 2 Korean 3 Nepalese 1 Mongolia 2 Myanmar 1 Sri Lankan 3 Thai 2 Vietnamese

**Table 1.4** List of APIEL's field exercise units (updated version of Akiyama et al. [11]): academic year 2012

Unit title	Overseas field exercise							Domestic field exercise		
	IPoS	Thailand unit	Cambodia unit	GPRD unit	Bangladesh unit	Nissan-IPoS	Minamata unit	Coca-Cola Young Environmental Leaders Summit		
Theme	Livelihood strategies for adaptation to climate change	Sustainable Urban Water Management: special focus on flood management	Sustainable Development in Cambodia	Sustainable urban development in GPRD, China	Risk assessment through food and water in rural community in Bangladesh	Climate Change & Society—case of energy issues in Kashwanoha	Role of scientists, policy makers and citizens: Case of long lasting Minamata Disease	Corporate Social Responsibility		
Place	Nakornnayok and Pathum Thani, Thailand	Bangkok & Ayuthaya, Thailand	Phnom Penh and Siem Reap, Cambodia	Hong Kong and Guangzhou, China	Dhaka, Manikganj & Comilla, Bangladesh	Kashiwa City, Chiba Prefecture	Minamata City, Kumamoto Prefecture	Kuriyama Town, Hokkaido		
Period	Jul. 28–Aug. 8, 2012	Aug. 19–27, 2012	Aug. 4–14, 2012	Feb. 21–Mar. 3, 2013	Mar. 1–10, 2013	Dec. 10–16, 2012	Nov. 21–25, 2012	Feb. 17–23, 2013		
Collaborator(s)	1. AIT etc.	1. AIT	1. RUPP, 2. SNU, 3. JICA, 4. KOICA	1. HKUST, 2. SYSU, 3. SNU, 4. UHK, 5. Chinese Univ. of Hong Kong (CUHK), 6. HKGBC 7. GULAB	1. Dhaka University of Engineering & Technology (DUET)	AIT etc.	1. Kyushu Univ., 2. Kumamoto Univ., 3. Univ. of Kitakyushu, 4. Univ. of Tsukuba	1. All counterparts of the overseas field exercise units in academic year 2012, 2. HU		
Teaching staff(s)	UT (7); AIT (6); Phranakthon Rajabhat U (1); Srinakharinvirot U (1); Thammasat U (1)	UT (5); AIT (2)	UT (4); RUPP (2); SNU (2)	UT (5); HKUST (2); SYSU (3); SNU (2); UHK (1); CUHK (1); HKGBC (1); GULAB (1)	UT; DUET	UT (4); AIT (4); Srinakharinvirot U (1); Chiangmai U (1)	UT; Kyushu U; U of Tsukuba; Kumamoto U; U of Kita-kyushu	UT (4)		



APIEL also organized activities that have horizontal links with different field exercise units, including joint presentation meetings that involve a variety of field exercise units, the Coca-Cola Young Environmental Leaders Summit Unit (Tables 1.1, 1.2, 1.3, and 1.4), as well as student sessions in workshops and international symposia that help deepen discussions with domestic and international experts. Through these joint activities, it is possible for participants to share not only the lessons learned from their own fieldwork, but also to learn other approaches to several types of environmental issues. Teaching staff, in particular, join most final presentation meetings, participate in field exercise units, and further develop their own educational skills. In this way, APIEL is also directing its energies into developing new educational methods that will nurture a more comprehensive range of human resources. The details of compulsory field exercises are covered in Chaps. 4–7 (Thailand Unit, Oasis Unit, GPRD Unit, and Cambodia Unit).

### ***1.3.3 Elective Courses: Enabling Interdisciplinary and Specialized Approaches***

APIEL offers a group of elective courses based on the specialty of GPSS and UE. This has the advantages of both the interdisciplinary approach toward sustainability science provided by GPSS and the specialized knowledge of environmental engineering provided by UE. Students learn about a broad range of environmental issues in Asia regardless of their major field of study. All APIEL elective courses are offered in English. Although each course is single-discipline oriented, the overall selection of a group of courses takes interdisciplinary elements into account. To date, the following courses have been offered by GPSS and UE:

#### **1.3.3.1 Graduate Program in Sustainability Science (GPSS)**

Sustainability Perspectives in Environmental Issues; Strategies for Global Sustainability; Introduction to Natural Environmental Studies; Residential Environment; Environmental Economics, Environmental Business; Business and Finance for Sustainable Development; Innovation and Sustainability; Environmental Sustainability; Urban Sustainability in Relation to the Water Sector; Sustainable Health and Environment; Sustainability Education; Frontier of Sustainability Science; Environmental Sustainability, Concepts and Methodologies of Sustainability Science; Planning and Design and for Sustainability; Advanced Concepts and Methodologies of Sustainability Science; Management and Policy Studies of Sustainability; Sustainability of Resources; Planning and Design for Sustainability.



### 1.3.3.2 Department of Urban Engineering (UE)

Management of Global and Urban Environments; Water Environment Technology; Urban Water Systems; Fundamentals of Water Pollution Control; Solid Waste Management; Environmental Risk Management; Hazardous Waste Management; Regional Planning; Urban Development Policy and Planning; Urban Transport Policy; Urban Transport Planning and Analysis; Environmental Sanitation in Developing Countries; Urban Planning in Developing Countries; Advanced Water Quality Engineering; Advanced Wastewater Engineering; Systems and Tools toward the Recycle-based Society; Advanced course in Health-related Water Microbiology.

## 1.4 Requirements for Completing the Program

Figure 1.3 shows the requirements for completion of the program. Students satisfying the completion requirements for APIEL are presented with The University of Tokyo Certificate of Completion for Asian Program for Incubation of Environmental Leaders. Requirements for completing the program are (1) to complete the APIEL’s compulsory course of “Environmental Challenges and Leadership in Asia” (earning

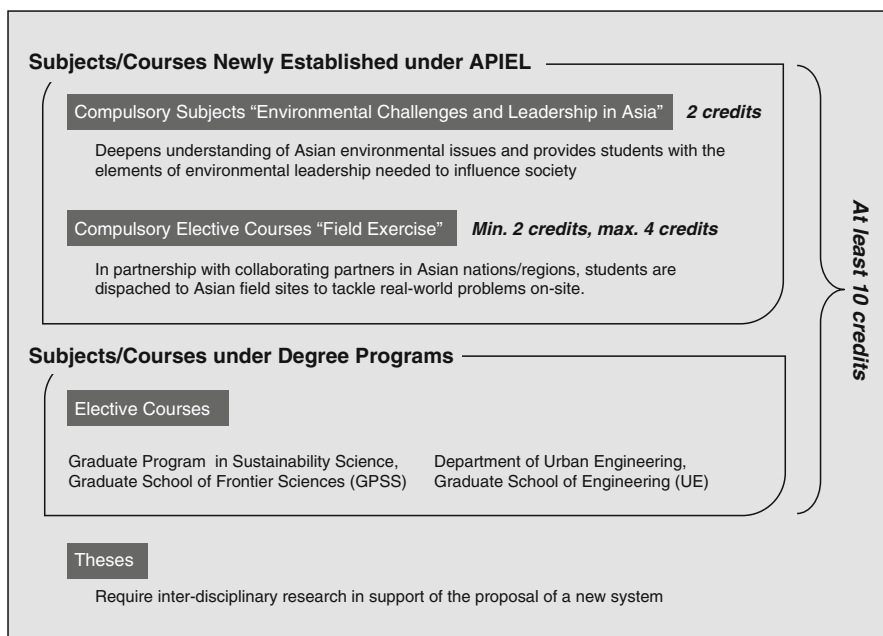


Fig. 1.3 Requirements for completing the program

two credits) and compulsory elective courses from the field exercises (minimum two credits, maximum four credits), (2) to earn at least ten credits in total from compulsory courses, compulsory elective courses, and other elective courses, and (3) to complete a postgraduate degree program either in GPSS or UE.

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