Transforming Forestry Education in the Philippines: Navigating the Demands of an Evolving World

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1

1 Forests of Southeast Asia

2 The Evolution of Forestry Education in the Philippines

3 The Demand for Change

4 Online Education: A Catalyst for Change

5 The Intrusion of Artificial Intelligence into Forestry Education

6 The Interplay of Disciplines in Forestry Education

7 Conclusion: Mapping the Transformation of Forestry Education

Presentation Outline

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- **Forest loss of 61-million ha in SEA during the period 2001–2019** ([Feng et.al., 2021](#)):
  - Accelerated forest loss in lowlands shifted to accelerated forest loss in uplands for crop plantation since there's limited lowland forests that can be converted
  - There's carbon loss resulting from forest clearance
- **Threatens the production of valuable forest goods and services** (timber, water, soil, biodiversity, forest carbon, rural livelihoods) (FAO, 2010; FAO, 2011)
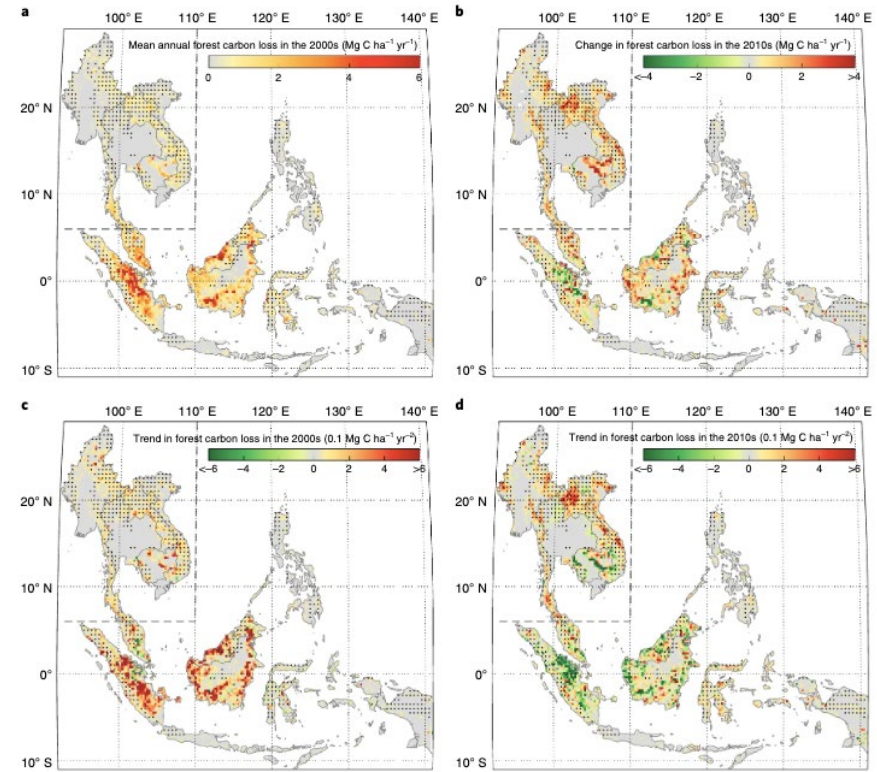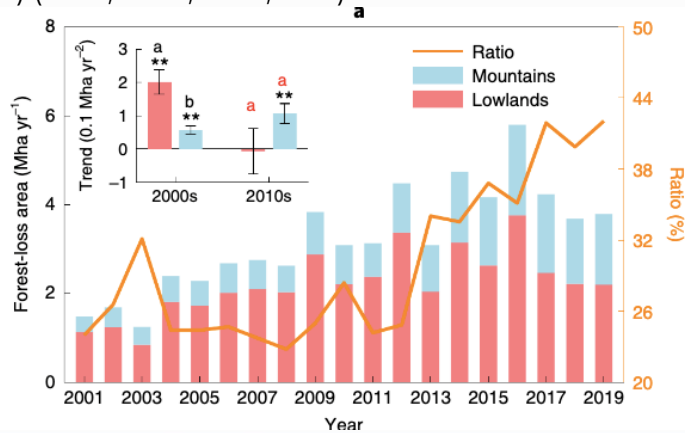
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Forests and the forest sector are an important source of employment, livelihoods and incomes for millions, especially in rural areas (ILO, 2022)

33M
Employed in the forest sector around the world

Asia
Almost two-thirds (61%) of global forest sector workers were from this region

(International Labor Organization, 2022)

Forest sector employment by region

Region	Share of world's forest areas	Share of world's forest sector employment	Employment (thousands)				
			Total forest sector	Forestry and logging	Manufacture of wood and products of wood	Pulp and paper manufacture	No. of countries
Americas	39%	14%	2,823	842	1,292	689	33
Europe	25%	11%	3,485	965	1,558	962	39
Africa	16%	14%	4,752	1,973	2,361	418	54
Asia	15%	61%	22,063	4,200	14,104	3,760	48
Oceania	5%	1%	188	78	85	25	11
World			33,312	8,058	19,400	5,854	185

Contribution of the forest sector to total employment in national economies

Between 2000 and 2019, the value added produced by forestry, agriculture, and fishing increased by 73 percent in real terms, reaching USD 3.5 trillion in 2018, globally.
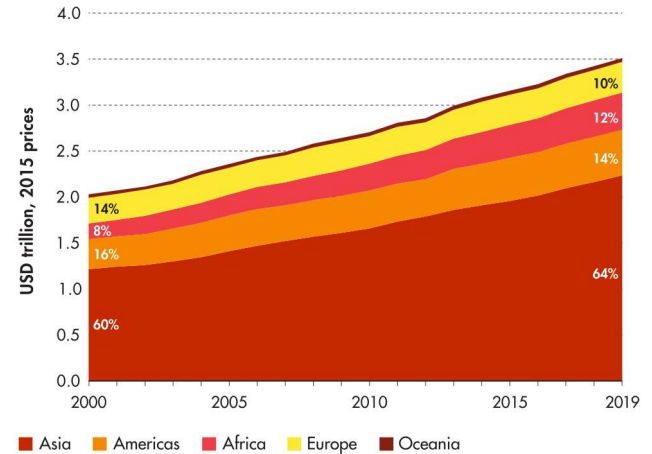
Asia

64%

2019 main contributor to global economy: agriculture, forestry and fishing

USD 2.2 trillion
Worth of value added in 2019

FIGURE 1.
VALUE ADDED OF AGRICULTURE, FORESTRY AND FISHING BY REGION

Source: FAOSTAT
Note: Percentages on the figure indicate the shares in the total; they may not tally due to rounding.

https://doi.org/10.4060/cb4477en-fig01

FAO, 2021

Contribution of Forestry, Agriculture, and Fishing Economy in Asian Region

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5

FORESTRY INSTITUTIONS

Photos from UPLB-CFNR website

- provide appropriate competencies and values to promote sustainable forest management

- educate the young to produce "'environmentally smarter' next generation of consumers and decision-makers" (FAO, 2011)

- …"education in relation to the values of forests and the opportunities and challenges faced should be a key focus in Southeast Asia" (FAO, 2011) and other parts of the world.
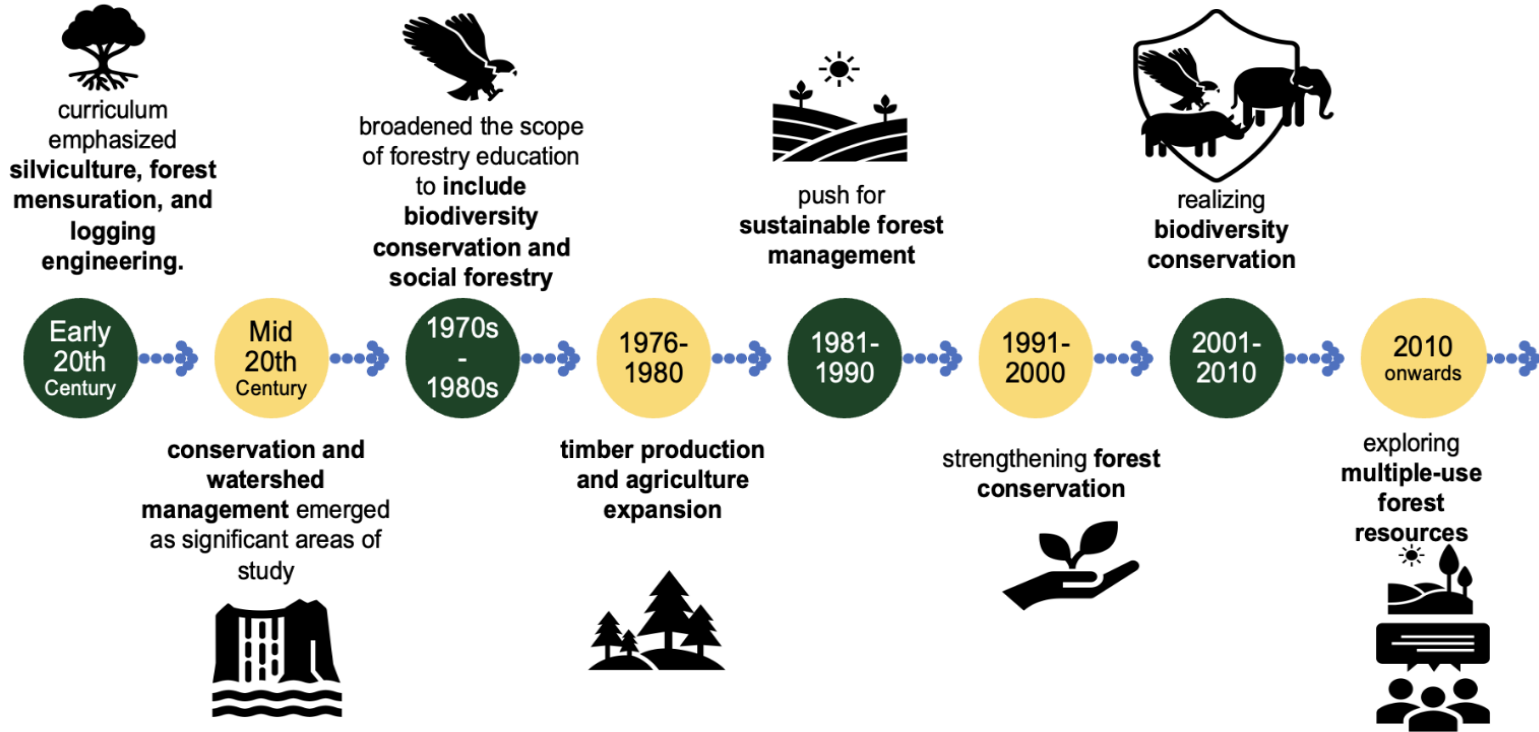
The Evolution of Forestry Education

Trends in Forestry Education and Practices in Southeast Asia

Early 20th Century — curriculum emphasized **silviculture, forest mensuration, and logging engineering.**

Mid 20th Century — **conservation and watershed management** emerged as significant areas of study

1970s - 1980s — broadened the scope of forestry education to **include biodiversity conservation and social forestry**

1976-1980 — **timber production and agriculture expansion**

1981-1990 — push for **sustainable forest management**

1991-2000 — strengthening **forest conservation**

2001-2010 — realizing **biodiversity conservation**

2010 onwards — exploring **multiple-use forest resources**

Adapted from Jegatheswaran et al. 2018

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Forestry Education Approaches

Traditional

- Resource-centered approach (how humans could manage forested lands)

- Largely focused on the supply and economic aspects of forestry

- Core academic disciplines: basic science, forestry science, and botany

- Mainly concentrated on timber production, silviculture, forestry economics, and forest planning subjects in preparation for a professional forester career

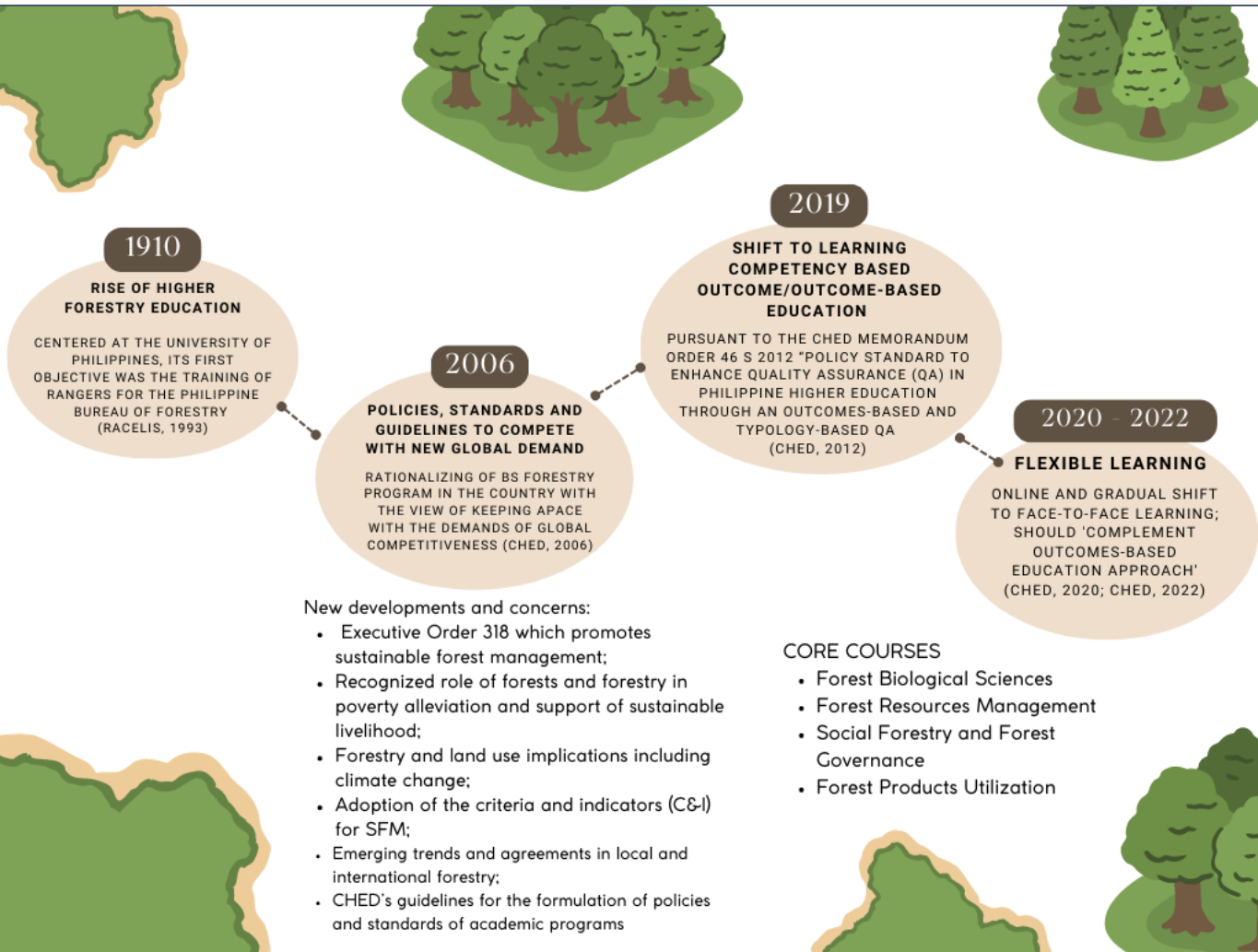(APFNet, 2018; Jegatheswaran et *al.*, 2018; Kostilainena, 2005)

Higher /Contemporary

- Sustainable Forest Management approach through enhancing scientific research, developing human resources, and increasing public knowledge of forestry

- Understanding the environmental, economic, social, and cultural aspects of forestry

- Inclusion of local communities in forest management through social and community forestry, agroforestry, etc.

- Shifting the focus to alternative uses of forests, such as ecotourism, urban forestry, etc.

TRADITIONAL AND HIGHER/CONTEMPORARY APPROACHES TO FORESTRY EDUCATION

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Developments in Forestry education implementation in the Philippines

1910 — RISE OF HIGHER FORESTRY EDUCATION

CENTERED AT THE UNIVERSITY OF PHILIPPINES, ITS FIRST OBJECTIVE WAS THE TRAINING OF RANGERS FOR THE PHILIPPINE BUREAU OF FORESTRY (RACELIS, 1993)

2006 — POLICIES, STANDARDS AND GUIDELINES TO COMPETE WITH NEW GLOBAL DEMAND

RATIONALIZING OF BS FORESTRY PROGRAM IN THE COUNTRY WITH THE VIEW OF KEEPING APACE WITH THE DEMANDS OF GLOBAL COMPETITIVENESS (CHED, 2006)

2019 — SHIFT TO LEARNING COMPETENCY BASED OUTCOME/OUTCOME-BASED EDUCATION

PURSUANT TO THE CHED MEMORANDUM ORDER 46 S 2012 "POLICY STANDARD TO ENHANCE QUALITY ASSURANCE (QA) IN PHILIPPINE HIGHER EDUCATION THROUGH AN OUTCOMES-BASED AND TYPOLOGY-BASED QA (CHED, 2012)

2020 - 2022 — FLEXIBLE LEARNING

ONLINE AND GRADUAL SHIFT TO FACE-TO-FACE LEARNING; SHOULD 'COMPLEMENT OUTCOMES-BASED EDUCATION APPROACH' (CHED, 2020; CHED, 2022)

New developments and concerns:
- Executive Order 318 which promotes sustainable forest management;
- Recognized role of forests and forestry in poverty alleviation and support of sustainable livelihood;
- Forestry and land use implications including climate change;
- Adoption of the criteria and indicators (C&I) for SFM;
- Emerging trends and agreements in local and international forestry;
- CHED's guidelines for the formulation of policies and standards of academic programs

CORE COURSES
- Forest Biological Sciences
- Forest Resources Management
- Social Forestry and Forest Governance
- Forest Products Utilization

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9

The **goal in transforming forestry education** should not only be producing foresters who are competent in traditional forestry practices but also **nurturing professionals who are versatile, adaptive and sensitive to the ecological, social and economic dimensions of forestry**. (Bullard et al. 2014, Sample et al., 2015)

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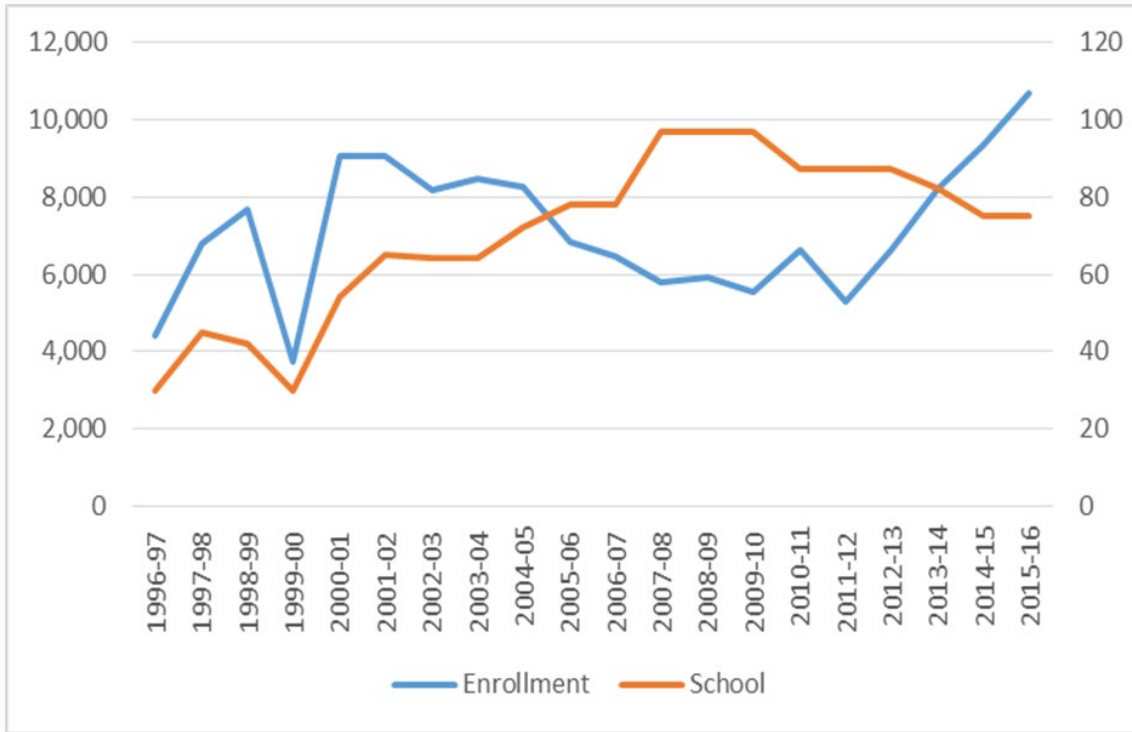
Currently, **75 state colleges and universities** are offering BS Forestry Program

Total number of students enrolled in Philippine schools/ colleges offering forestry and related programs, 1996-2016 (DENR-FMB 2016)

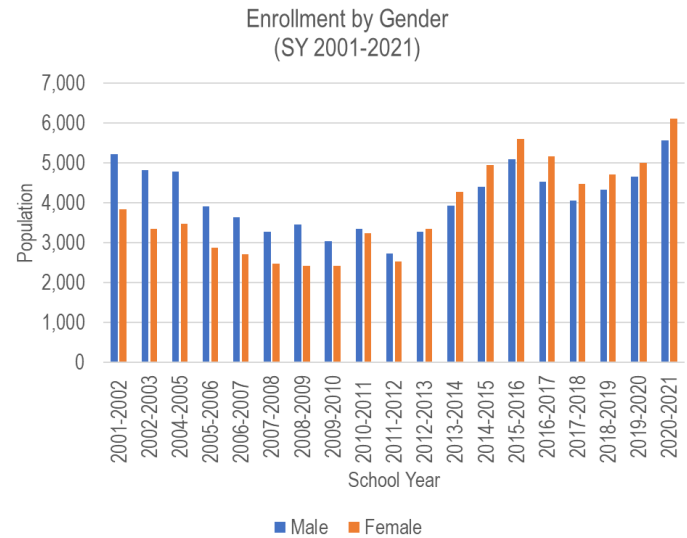**The Evolution of Forestry Education in the Philippines**

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ENROLLMENT AND GRADUATES IN FORESTRY AND OTHER RELATED COURSES
(SY 2001-2021)
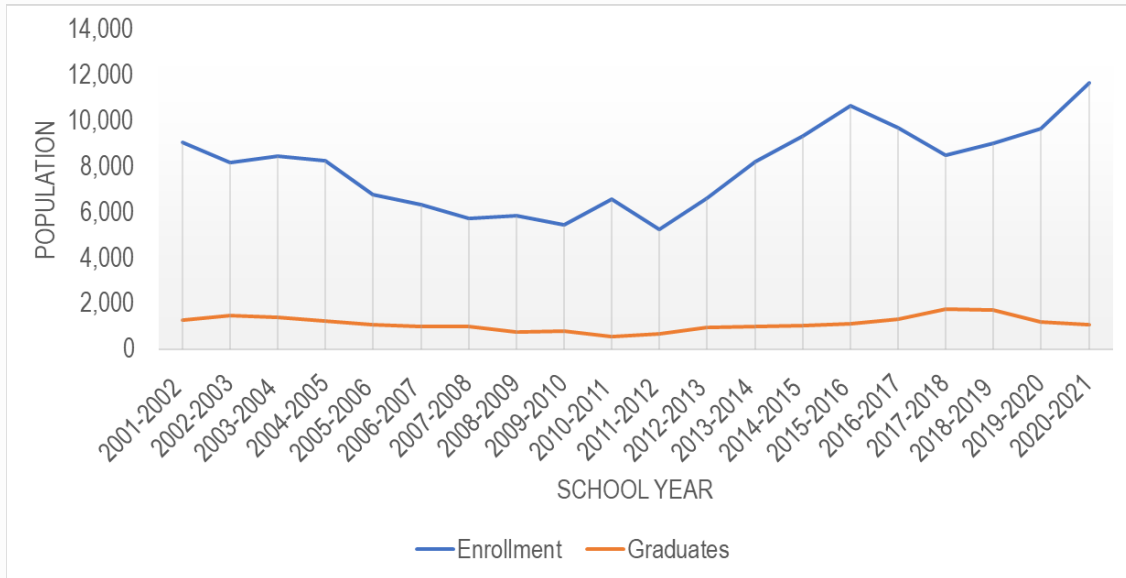
Note. From 2005 onwards- courses include: Forestry, Agro-forestry, Forest Ranger, Forest Biological Science, Forest Resource Management, and Forest Technology. Gender data is not available for enrollment in SY 2003-2004 and graduates in SY 2002-2003 and 2004-2005.
(Philippine Forestry Statistics, DENR-FMB, 2021)
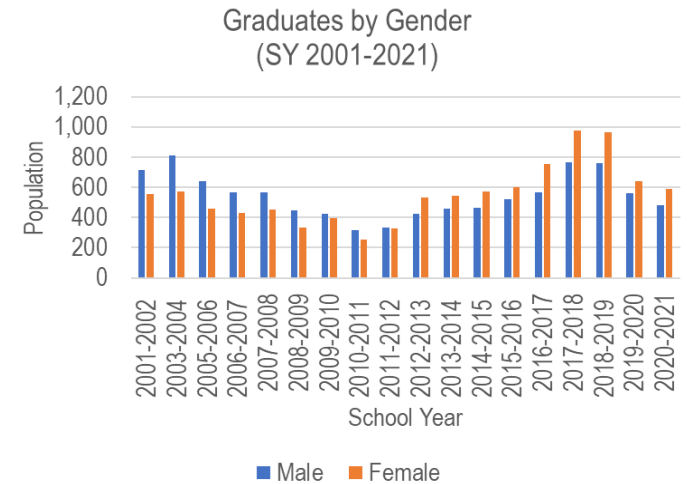
- Founded by the Americans in 1910

- Oldest and leading institution of higher learning in Forestry in the Philippines

- Bachelor of Science in Forestry degree started in 1921

- Only forestry school in the country until post World War II

- One of the Commission on Higher Education (CHEd) **Center of Excellence in Forestry Education** and the **only certified BS Forestry program by the ASEAN University Network Quality Assurance (AUN-QA)**

- With over **800** undergraduate Forestry students and around **100 students**
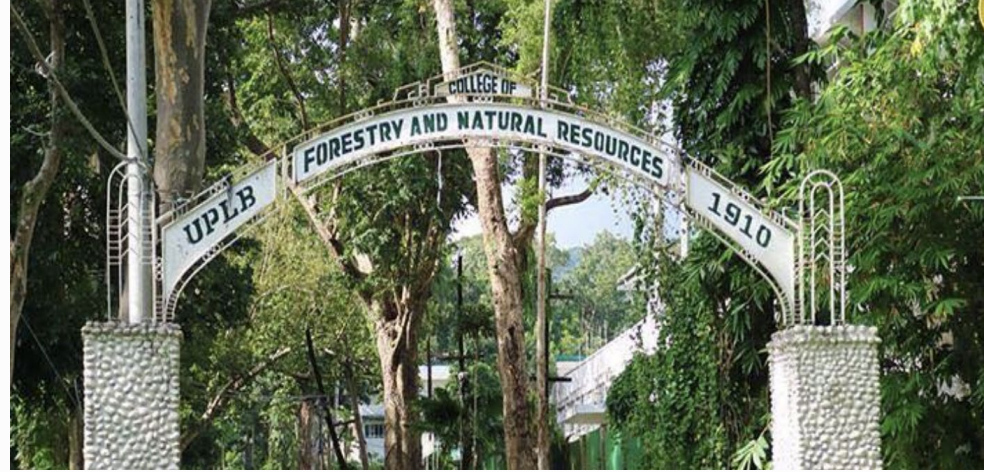
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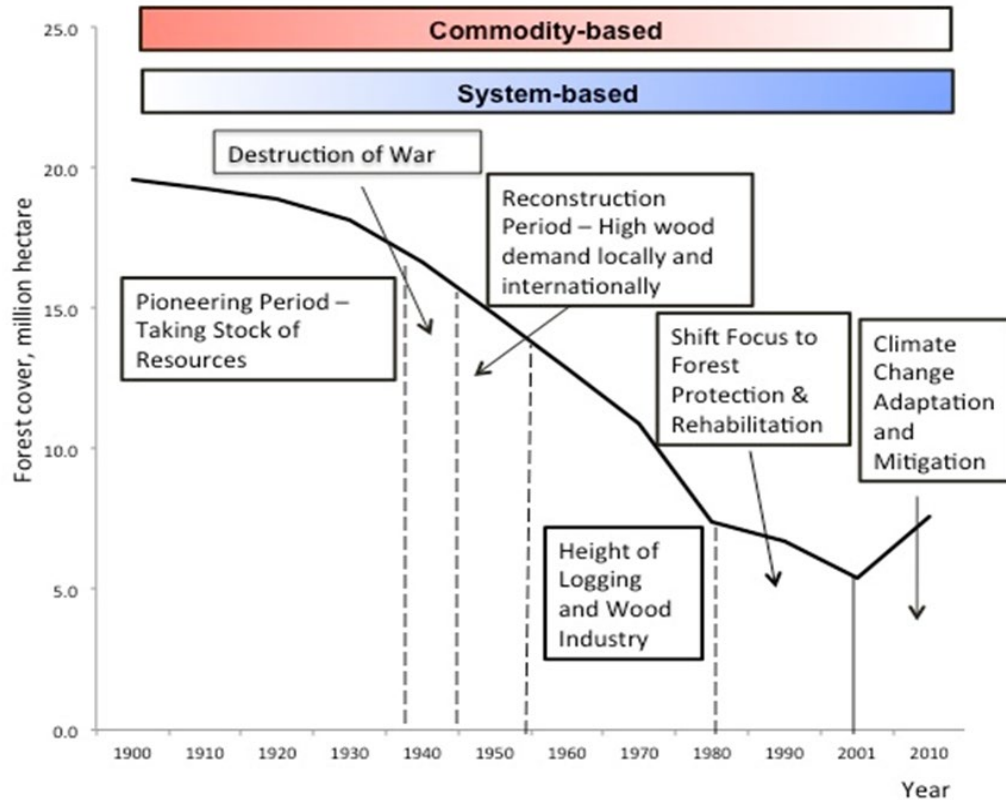
UPLB-CFNR continues to reinvent itself with the changing times

Transition of CFNR curriculum and research from focus on commodity to system-based studies (Pulhin., Cruz, and Mendoza, 2010).

The Evolution of Forestry Education in the Philippines

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Strategies to facilitate transformation in forestry education

Interdisciplinary approach

Incorporating other disciplines such as social sciences, economics, and environmental studies can provide a broader perspective on forestry issues.

Problem-based learning

This method can help students apply theoretical knowledge to practical problems, enhancing their problem-solving skills and making them more employable.

Partnerships

Collaboration with other institutions and the industry can provide students with real-world experiences and expand their learning opportunities (Bullard, Coble & Darville, 2007).

Technology Integration

Introduce students to advanced technologies such as AI, data analytics, digital platforms, GIS, remote sensing.

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Strategies to facilitate transformation in forestry education

Ethics

Include discussions on ethical considerations in forestry; respecting the rights of various stakeholders, especially Indigenous People (IPs).
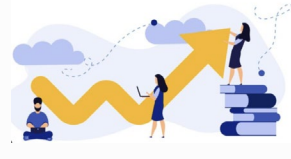
Lifelong Learning

Emphasize the importance of continuous learning and staying updated on industry trends. This can be done by providing access to resources and information, offering flexibility, and providing a supportive environment.

Global Perspective and student mobility

Many forestry issues transcend borders. Teach students about global forest trends, deforestation, and forest conservation efforts worldwide.

Foster a culture of research and innovation

Encourage students to conduct research on emerging forestry issues and develop innovative solutions.

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Several factors affect the forests, such as the **changing climate,** the rate of **deforestation** and **illegal logging**, **changing public attitudes** towards forestry, and international policies (APFNet, 2018)

Forests and landscapes will be vital in meeting the **goals** of the **2030 Agenda for Sustainable Development** —address poverty, food security, health and wellbeing, and water and sanitation (Graham et al., 2018)

New forestry education focus: ensure **sustainable management of forests** for both **people** and the **environment** by cultivating **human resources**, **enhancing scientific research**, and raising **public awareness** surrounding forestry (APFNet, 2018)

SDG #15: LIFE ON LAND

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Photos from Google

Demands for Change

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In almost all SEA countries there is a growing shift from **traditional resource centered approach** to a **sustainable management of forests** for both **people and the environment** (APFNet, 2018; Jegatheswaran et al., 2018)

Major changes in forestry education in recent years have been due to:

- the consolidation of traditional forestry programmes with other disciplines or termination of forestry programmes
- a multidisciplinary approach
- increasing demand for generic skills and social aspects of forestry
- e-learning and blended learning
- internationalisation

(Jegatheswaran et al., 2018; Abdul Razak et al. 2005, Anon 2017)

These changes call for foresters competent in dealing with **human aspects of forestry** and who use **multidisciplinary** and **participatory approaches** (Innes 2005).

Demands for Change

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Sudden implementation of **eLearning during the COVID-19 pandemic** had **discouraging implications for users' mental health and socialization,** has affected **91% of the student population worldwide** (Mushtaha et al. 2022)

Online learning presents a **wealth of opportunities**

Most significant advantage of online learning implementation was its **flexibility in place and time** (Mushtaha et al. 2022)
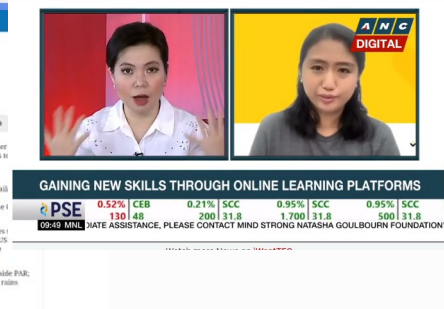

Photo credits to inquirer.net, philstar.com, and ABS-CBN News

Online Education as a Catalyst for Change

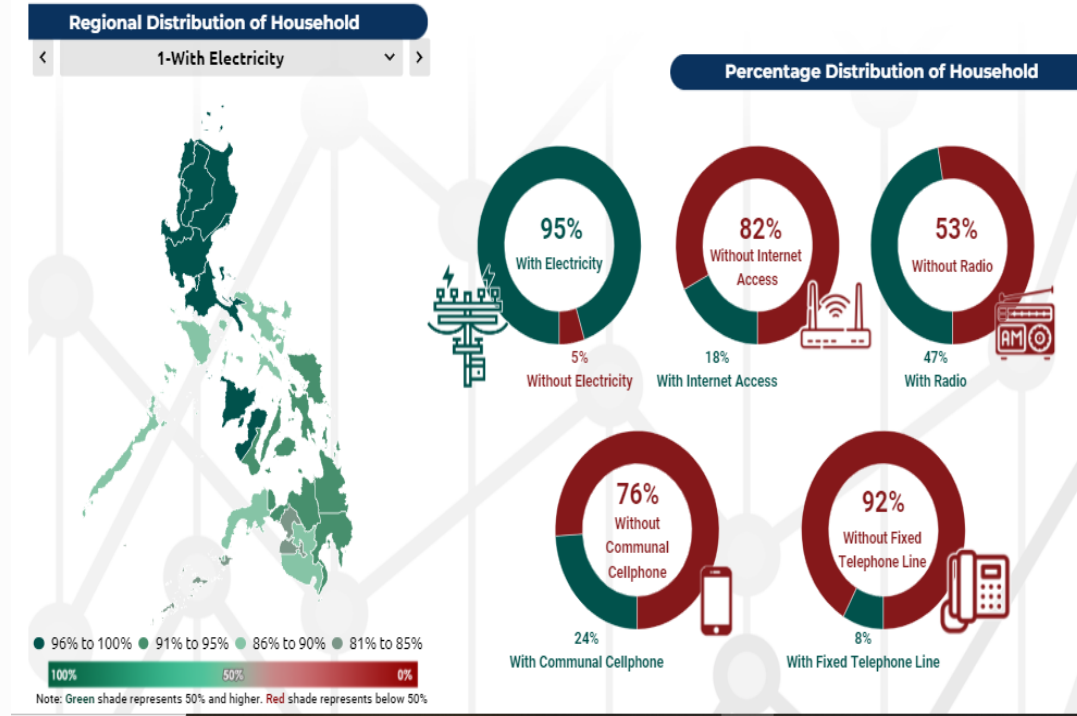Despite the rise of technology, **not all students in the Philippines have equal access to digital resources.**

Inability of online courses to provide **hands-on skills and develop well-connected** cohorts students. (Shrestha, 2023).

Difficult to replicate face-to-face interactions and relationships in a classroom setting (Shrestha, 2023).

Regional Distribution of Household
1-With Electricity

Percentage Distribution of Household

95% With Electricity
5% Without Electricity

82% Without Internet Access
18% With Internet Access

53% Without Radio
47% With Radio

76% Without Communal Cellphone
24% With Communal Cellphone

92% Without Fixed Telephone Line
8% With Fixed Telephone Line

96% to 100%   91% to 95%   86% to 90%   81% to 85%
100%   50%   0%
Note: Green shade represents 50% and higher. Red shade represents below 50%.

(National ICT Household Survey, 2019)

Main Challenges Experienced in the Online Setting

"**Online forestry education** can serve as an effective tool by providing **cutting-edge alternate delivery methods** to complement traditional classroom instruction **to reach a larger audience for developing key competencies of employees and future employees** in the forestry sector using various forms of training and academic degrees (Shrestha et al. 2023)".

Asia-Pacific Forestry Education Coordination Mechanism (AP-FECM)

As a regional forestry education cooperation and exchange platform, its purpose is to promote the development of forestry education in the Asia-Pacific region by strengthening cooperation and carrying out collaborative activities for promoting forest restoration and sustainable forest management (SFM) in the Asia-Pacific region.

Steering Committee

Opportunities Using Online Learning Modalities

The Intrusion of Artificial Intelligence into Forestry Education
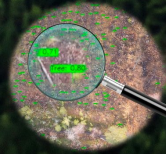
WAYS IN WHICH AI REDUCES DEFORESTATION
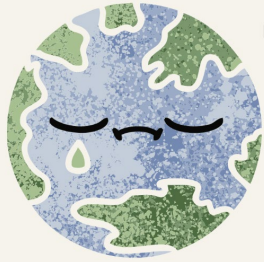
By finding areas prone to deforestation through AI-powered satellites

By regulating power distribution to prevent forest fires

Forestry Management with AI byte LAKE

AI analyzing drones footage & reducing manual work in reforestation

Photo credits: Joshi (2022) and ByteLAKE (2022)

- The application of AI in forest management is mainly focused on **improving predictions** (Frontiers, 2013)

- Due to the potential power of AI, opportunities are open to broadening the suite of applications, such as **enhancing the understanding of forest processes** (Frontiers, 2013)

Advantages	Disadvantages
• **Availability and Accessibility** (Radford et al., 2019) • **Interactive Learning** (Zhou et al., 2020) • **Data analysis** (Bennett et al., 2018)	• **Lack of Contextual Understanding** (Lipton & Steinhardt, 2018) • **Dependency Risk** (Zhou et al., 2020) • **Data Privacy Concerns** (Bennett et al., 2018)

The Intrusion of Artificial Intelligence into Forestry Education

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- Forestry education is a rich tapestry of **multiple disciplines**, including **biophysical sciences, engineering, and social sciences**.
- UPLB-CFNR is **at the forefront of transforming forestry education** in the Philippines, striving to meet the evolving demands of our world, **aligning its curriculum with national and international priorities and challenges**.

NATIONAL PRIORITIES

- **Deforestation** (modules and research projects focused on sustainable forest management and reforestation techniques)
- **Biodiversity Loss** (comprehensive studies on biodiversity conservation, aiming to equip students with knowledge and skills to mitigate this challenge)
- **Climate Change** (climate change adaptation strategies, carbon sequestration in forests, and forest-fire management)

INTERNATIONAL PRIORITIES AND CHALLENGES

- **Forestry Governance** (international forestry laws, policies, and treaties)
- **Global Biodiversity Conservation** (biodiversity loss and importance of international collaboration in conservation efforts)
- **Global Climate Change** (global impacts of climate change on forests and the role forests play in mitigating these impacts)

The Interplay of Disciplines in Forestry Education

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The Leap Towards Sustainable Forest Management Pra

Incorporating technology and innovation

Engaging Local Communities

Adapting to Climate Change

Ensuring Accountability

The transformation of forestry education across the globe is inevitable, considering technological advancements and dynamic changes in socio-political-environmental aspects, and overall uncertain futures.

In the case of the Philippines, the UPLB-CFNR particularly, underwent transformations in various aspects:

Focus on timber production and silviculture	Holistic view of forests, including ecosystems and wildlife management
Limited use of technology	Incorporation of cutting-edge technologies like using drone, RS, GIS
Little engagement with local communities	Strong emphasis on community engagement and experiential learning
Minimal focus on climate change	Integration of climate change adaptation and mitigation into the curriculum

Conclusion- Mapping the Transformation of Forestry Education

In forestry education, we are consistently driven to be adaptable and flexible while addressing the uncertainties of the future, with the ultimate goal of effectively preparing the next generation of foresters to safeguard our forests, preserve ecological systems, support biodiversity, and promote the sustainable livelihoods of local communities, all of which play a crucial role in enhancing human well-being and ensuring the survival of our planet.

Conclusion

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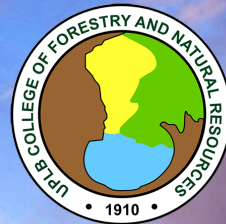
Thank you for listening!

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