



# Curriculum & Course Description

## Magister of Natural Resources and Environmental Science Program IPB UNIVERSITY

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|-------------------------------------|-----------------------|
| <i>Common Course</i>                | : 2 Credit Unit       |
| <i>Foundational Course</i>          | : 13 Credit Unit      |
| <i>In-depth Course</i>              | : 7-9 Credit Unit     |
| <i>Thesis (include publication)</i> | : 14 Credit Unit      |
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| <b>Total Credit Unit</b>            | <b>: 36-39 Credit</b> |

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| <b>Common course (3 Credit)</b>                                     |   |        |      |
|---|---|--------|------|
| PSL1509   | Research and Innovation Design  | 2(1-1) | Odd  |
| <b>Foundational Course and Academic Core Courses (11-15 credit)</b> |   |        |      |
| PSL150A   | Ecology and Dynamics of Natural Resources and Environmental Management System | 3(2-1) | Odd  |
| PSL150B   | Natural Resources and Environmental Laws and Policies                         | 2(2-0) | Odd  |
| PSL150C   | Analysis of Natural Resources and Environmental Management                    | 2(1-1) | Even |
| PSL1604   | Environmental Ethics and Morals   | 2(2-0) | Odd  |
| PSL1607   | Economics and Institutional of Natural Resources and Environmental Management | 2(2-0) | Odd  |
| PSL1608   | Spatial Modeling of Natural Resources and Environmental Management            | 2(1-1) | Even |
| <b>In-depth Courses (6-9 sks) (1): Environmental Diplomacy</b>      |   |        |      |
| PSL1614   | International Policies and Agreements on Natural Resources and Environment    | 3(2-1) | Odd  |
| PSL1615   | Political Ecology on Natural Resources and Environment                        | 2(2-0) | Even |

|   |  |         |          |
|---|--|---------|----------|
| PSL1616   | Art and Science in International Diplomacy   | 2(2-0)  | Even     |
| PSL1617   | The Politics and Practice of Natural Resources and Environmental Policy                  | 2(2-0)  | Even     |
| <b>In-depth Courses (6-9 sks) (2): : Environmental Change, Pollution, and Disaster Management</b> |  |         |          |
| PSL1621   | Environmental Pollution and Health Impact  | 3(2-1)  | Odd      |
| PSL1624   | Environmental Management Instrument  | 2(1-1)  | Even     |
| PSL1625   | Climate Change and Disaster Risk Management  | 2(1-1)  | Even     |
| PSL1626   | Eco-toxicology Assessments and Management  | 2(1-1)  | Odd/Even |
| <b>In-depth Courses (6-9 sks) (3): Sustainable Agro-maritime System</b>                           |  |         |          |
| PSL1631   | Agro-Maritime Biodiversity and Sustainable Food System                                   | 3(2-1)  | Odd      |
| PSL1632   | New and Renewable Energy of Agro-Maritime Resources                                      | 2(2-0)  | Even     |
| PSL1635   | Green Consumption and Hygiene Sanitation   | 2(2-0)  | Even     |
| PSL1636   | Policy and Management of Agro-Eco-Cultural-Tourism                                       | 2(2-0)  | Even     |
| <b>Elective Courses</b>   |  |         |          |
| PSL1642   | Spatial Planning and Environmental Information Systems                                   | 2(1-1)  | Odd      |
| PSL1651   | Ecosystem Dynamics and Social in Management of Natural Resources and Environment         | 2(2-0)  | Odd      |
| PSL1671   | Management of Sustainable Land and Water Resources                                       | 2(2-0)  | Even     |
| PSL1672   | Ecology of Resources and Environment in Tropical Forest                                  | 2(2-0)  | Even     |
| PSL1673   | Management of Social Conflict and Political Ecology in Natural Resources and Environment | 2(2-0)  | Even     |
| PSL1674   | Ecological Risk Assessment   | 2(1-1)  | Even     |
| PSL1675   | Environmental Administration System  | 2(2-0)  | Even     |
| PSL160Y   | Management of Sustainable Natural Resource and Environment in Development                | 2(1-1)  | Odd      |
| PSL160Z   | Environmental Quantitative and Qualitative Analysis                                      | 2(1-1)  | Odd      |
| PSL150D   | Special Topic  | 2(2-0)  | Even     |
|   | <b>Enrichment</b>  | 1-M     | Odd/Even |
| <b>Thesis</b>   |  |         |          |
| PSL1591   | Colloquium   | 1(0-1)  | Odd/Even |
| PSL1592   | Proposal   | 2(0-2)  | Odd/Even |
| PSL1593   | Thesis Defense   | 2(2-0)  | Odd/Even |
| PSL1594   | Thesis   | 6(6-0)  | Odd/Even |
| PPS1691   | Thesis Seminar   | 1(0-1)  | Odd/Even |
| <b>Publication</b>  |  |         |          |
| PPS1692;<br>PPS1693;  | National Scientific Publications   | 2 (0-2) | Odd/Even |

|                                 |                                       |        |          |
|---------------------------------|---------------------------------------|--------|----------|
| PPS1694                         |                                       |        |          |
| PPS1695;<br>PPS1696;<br>PPS1697 | International Scientific Publications | 3(0-3) | Odd/Even |
| PPS1698                         | International Seminar Proceedings     | 2(0-2) | Odd/Even |

### **PSL1509 Research & Innovation Design 2(1-1)**

This course discusses the concept and application of the philosophy of science in research and innovation activities to find solutions to problems in natural resource management and seek scientific truth. Formulation of problems and hypotheses, use of logic and intuition in analyzing problems, data collection methods, thesis writing techniques and scientific publications are discussed intensively through lectures and discussions in practicum. The output of this course is the preparation of research proposals.

*Syartinilia (Coord), Hadi Susilo Arifin, Sri Mulatsih, Hariyadi*

### **PSL150A Ecology and Dynamics of Natural Resources and Environmental Management System 3(2-1)**

This course explains the concepts, principles and quantitative methods of ecology, and applied ecology in the study of natural resources and environmental management; discusses a systems approach to the solution of complex environmental problems involving various interrelated variables, carried out with a holistic study; comprehensive discussion of basic systems science and modeling and how they are applied in the field of natural resource management and the environment.

*Hadi Susilo Arifin (Coord), Hartrisari H., Wonny A. Ridwan*

### **PSL150B Natural Resources and Environmental Laws and Policies 2(2-0)**

This course discusses various government policies in the environmental field and various sets of rules and legislation that form the basis for environmental law enforcement efforts, including customary law and local community traditions.

*Sambas Basuni (Coord), Iin Ichwandi*

### **PSL150C Analysis of Natural Resources and Environmental Management 2(1-1)**

This course studies the basic principles of statistics, descriptive analysis, parameter estimation and hypothesis testing, as well as analysis and modeling commonly used in natural resource and environmental management such as: analysis correlation, regression analysis, cluster analysis, structural equation modeling, AHP, and SWOT analysis.

*Hari Wijayanto (Coord), Sri Mulatsih*

### **PSL1604 Environmental Ethics and Morals 2(2-0)**

This course discusses two conflicting views about human activities and moral responsibility to nature: secular views and religious views. Students will also be introduced to the main perspectives of Western ethical theory, as well as perspectives and debates on land/earth ethics,

wildlife ethics, anthropocentrism, biocentricity, deep ecology, environmental justice, and ecofeminism. It will also introduce environmental ethics in divine religions (Islam, Catholicism, Christianity), non-Western, traditional traditions, and the relationship between environmental philosophy and the environmental movement.

*Cecep Kusmana (Coord), Soeryo Adi Wibowo, Hadi S. Ali Kodra*

### **PSL1607 Economics and Institutional of Natural Resources and Environmental Management 2(2-0)**

This course discusses the concepts and theories of institutional economics in the management of natural resources and the environment that have the characteristics of common-pool resources (CPRs). The concept of new institutional economics (institution and organizational arrangement) is the focus of this course, where the coverage covered includes fundamental issues in the study of institutional economics, development and interaction between institutions (macro and micro institutions) and the role of the game in sustainable management of natural resources and the environment. Students will also be given an explanation of externality issues, market failures, and transaction costs in natural resource and environmental management.

*Eka Intan Kumala Putri (Coord), Sambas Basuni, Nuva.*

### **PSL1608 Spatial Modeling of Natural Resources and Environmental Management 2(1-1)**

This course will provide an understanding and practice of spatial modeling for natural resource and environmental management which includes: development of spatial data either vector or raster-based, drone and satellite-based spatial data acquisition, processing and analysis of spatial data based on GIS platforms, methods of selecting spatial models, and some examples of spatial modeling related to natural resource management and the environment; such as: disaster mitigation, climate change, biodiversity and ecosystems, and changes in environmental quality.

*Yudi Setiawan (Coord), Syartinilia, Lilik B Prasetyo, Alinda MF Zain, Muh. Taufik*

### **PSL1614 International Policies and Agreements on Natural Resources and Environment 3 (2-1)**

This course will discuss policies and agreements at the global level, particularly related to natural resources and the environment; topics that will be discussed include global issues, governance and mechanisms of Multilateral Environmental Agreements (MEAs); Several important MEAs will also be reviewed, including the Convention on Biological Diversity (and related protocols), conventions on climate change (and related protocols), conventions on pollution (Minamata, Stockholm and Basel Conventions) and marine resources (UNCLOS), and other conventions related to agriculture and forest resources (Ramsar, World Heritage, CITES); The relationship between MEAs and national policies, as well as the implications and impacts of MEAs at the national level will also be studied and assessed.

*Ani Mardiastuti (Coord), Rizaldi Boer, Arif Satria, Soeryo Adi Wibowo*

**PSL1615 Political Ecology on Natural Resources and Environment 2(2-0)**

This course describes the history, domain/arena of study, norms, and political ecology framework, as well as various political ecology approaches ranging from neo-Marxian, neo-Weberian, to post-structural approaches. Introduced the application of political ecology in the fields of agrarian, forestry, coastal and marine, food security and climate change.

*Arif Satria (Koord), Soeryo Adi Wibowo, Hariadi Kartodihardjo*

**PSL1616 Art and Science in International Diplomacy 2(2-0)**

Art and science courses in diplomacy are intended to provide students with a comprehensive understanding of how art and science are applied in the process of international negotiation and lobbying, methods and techniques of international negotiation/lobbying as well as understanding the motives, historical backgrounds, interests and power relations used in international diplomacy, improve the ability to analyze the role, position, strength and interests of Indonesia in processes international negotiations & lobbying with reference to science, and synthesizing the implications of decisions and political steps taken.

*Rizaldi Boer (Coord), Nurul Isnaeni, Nur Masripatin*

**PSL1617 The Politics and Practice of Natural Resources and Environmental Policy 2(2-0)**

This course presents a political approach and practice of natural resource and environmental management policy by emphasizing knowledge of motives, historical backgrounds and interests as well as power relations practices used by the parties, policy analysis and access and governance, as well as their implications for community behavior, sector and regional development as well as policy

practices towards environmental justice, social justice and sustainability.

*Hariadi Kartodihardjo (Coord), Endriatmo Sutarto, Soeryo Adiwibowo*

**PSL1621 Environmental Pollution and Health Impact 3(2-1)**

This course will teach the basic principles of environmental pollution (air, water and soil) and the relationship between the three; sources and characteristics of environmental pollution (water, soil, and air pollution); the impact of polluters on changes in the quality of water, soil and air; the impact of pollution on the health of environmental components (humans, plants, animals, ecosystems and buildings); and regulations on water, soil and air pollution quality standards.

*Etty Riani (Coord), Syaiful Anwar, Moh. Yani*

**PSL1624 Environmental Management Instrument 2(1-1)**

This course teaches the ability to solve complex natural resource and environmental problems through an inter or multidisciplinary approach via the application of various environmental management instruments both at the regional level and at the project level (business/activity) as a manifestation of compliance with environmental regulations and conventions, following market and international trends, as well as as part of the SDGs (Sustainable Development Goals) steps in the context of achieving sustainable development.

*Hefni Effendi (Coord), Surjono Hadi Sutjahjo, Andrea Emma Pravitasari, Akhmad Arif Amin*

**PSL1625 Climate Change and Disaster Risk Management 2(1-1)**

This course discusses the concept of climate change and disaster risk management based on the shaping factors of disaster events (with a focus on climate-related disasters) in the context of the synergy of climate change adaptation and disaster risk reduction. An international framework, basic concepts, regulations, and practical tools through the use of analytical models (temporal and spatial) are introduced for risk level assessment, complemented by a validation process on the results of the risk assessment, used as a basis for developing action interventions. Case studies are provided as risk management enrichment material

*Perdinan (Coord), Boedi Tjahjono, Yudi Setiawan*

**PSL1626 Eco-toxicology Assessments and Management 2(1-1)**

The Ecotoxicology Management and Assessment course provides students with theoretical foundations and expertise on ecotoxicology and its role in environmental management and human health. Lecture contents include: ecotoxicological landscapes, types and sources of contaminants, bioindicators, ecotoxicology management including regulation and assessment methods, nano materials in ecotoxicology, to models and estimates of toxicological risks.

*Hasim (Coord), Sigid Hariyadi, Zaenal Abidin*

**PSL1631 Agro-Maritime Biodiversity and Sustainable Food System 3(2-1)**

Discussing the concept of agro-maritime biodiversity and sustainable food systems, the concept of natural resource balances and the agro-maritime environment; agro-maritime biodiversity assessment; assessment of the carrying capacity and capacity of land resources for national food; the concept of food self-sufficiency, food self-sufficiency and food sovereignty; types and diversification of food; production systems and food supply chains, as well as the development of technology applications for food sustainability programs.

*Hariyadi (Coord), Widiatmaka, Mirza D. Kusrini, Mala Nurilmala*

**PSL1632 New and Renewable Energy of Agro-Maritime Resources 2(2-0)**

This course discusses the potential of new and renewable energy sources (such as biomass energy, solar energy, hydro energy, wind energy, geothermal energy), environmental impacts, future challenges and trends, as well as their utilization technology.

*Edy Hartulistiyoso (Coord), Anas M Fauzi, Hariyadi*

**PSL1635 Green Consumption and Hygiene Sanitation 2(2-0)**

Green consumption and hygienic sanitation courses will solve various problems of environmental damage through a consumer perception approach. This approach is used as an environmental reform strategy to help solve environmental problems globally. Green consumption is widely associated with efforts to reduce the level of consumption of materials and energy and minimize environmental risks.

*Erliza Noor (Coord), Andes Ismayana*

### **PSL1636 Policy and Management of Agro-Eco-Cultural-Tourism 2(2-0)**

This course describes sustainable tourism development in relation to global development and the achievement of SDGs, as a sustainable creative economy effort in conservation areas and cultivation areas for a variety of agro-tourism, ecotourism, cultural tourism and the factors that influence it; expose the factors in tourism management related to supply - demand tourism, tourism destination management, visitors management, hospitality management; analyze the linkage of policies, regulations, and legislation in the context of tourism development, as well as synthesize tourism management through a stakeholder role analysis approach; develop sustainable tourism planning and management strategies.

*Hadi Susilo Arifin (Coord), EKS. Harini Muntasib, Rinekso Soekmadi*

### **PSL1642 Spatial Planning and Environmental Information Systems 2(2-0)**

This course discusses the concept of Spatial Planning and Environmental Information Systems in Natural Resources Management, Environment and Development; Basic Concepts of Space, Land, Land, Territory and Territorial for the management of Natural Resources and the Environment; Spatial Planning and Spatial Planning; Location Theory, Classical and Contemporary Land Use Theory, and Land Rent Theory; Environmental Carrying Capacity Study for Spatial Planning; Institutional Aspects and The Commons; Governance of Natural Resources (SDA) in Indonesia; Problems and Implementation of Space Utilization in Indonesia; System and Organization for the Implementation of Spatial Planning and Its Arrangements in Indonesia. In addition, this course also provides an overview of the concepts and types of information systems, as well as information systems for the management of natural resources and the environment; Database Management System; Introduction to Application of Basic Data Mining Techniques in Natural Resources and Environmental Management; Data Warehousing (multidimensional data model, data warehouse schema and data warehouse design for natural resource and environmental management).

*Ernan Rustiadi (Coord), Andrea Emma Pravitasari, Ruchyat Deni Djakapermana, Imas S Sitanggang*

### **PSL1651 Ecosystem Dynamics and Social in Management of Natural Resources and Environment 2(2-0)**

This course discusses how ecosystems and social systems change over time which is controlled by various internal and external factors through environmental processes, biodiversity change processes and social processes. The first half of the semester teaches the evolution of ecosystems in the context of time and space, as well as the interaction of biodiversity, humans and culture (biocultural diversity). Major changes in the anthropocene era will be an important topic of discussion where changes in land use (landuse) on landscape structure and composition, and their effects on ecosystem services will be discussed. Management options for damage mitigation will be discussed as an integral part of environmental governance. In the second half of the semester, different worldviews are taught among various social strata and

groups in viewing the functions of nature: nature as an economic resource, nature as an arcadian thing, and nature as a product of social construction. The discussion continues with a trajectory of approaches to analyze the interaction and adaptation of social systems to ecosystems; from an anthropological perspective (cultural ecology approach, & ecosystem approach), from an economic sociology perspective (ecological modernization approach), and from a political economy perspective (political ecology approach). The analysis of control & recovery of environmental damage and pollution is discussed from the point of view of the theory of ecological modernization, versus the analysis of damage to natural resources and the environment from the point of view of political ecology. At the end of the course, the management of natural resources and the environment is discussed to increase environmental resilience, adaptability, sustainability, and environmental justice.

***Damayanti (Coord), Iskandar Z. Siregar, Soeryo Adi Wibowo***

### **PSL1671 Management of Sustainable Land and Water Resources 2(2-0)**

In the first half of the semester, this course discusses the characteristics of land and land resources, land use and land cover, characteristics of sustainable land resource management, land units, followed by Evaluation of Land Suitability and Land Capability (FAO method land suitability, Land Capability). The land aspect in spatial planning is also discussed. The discussion is continued with the carrying capacity of land (concepts and methods), as well as the application of the carrying capacity of land in sustainable development. Furthermore, it discusses the sustainability of land resources, land degradation, land use based on spatial planning, and conservation of land resources. In the second half of the semester, integrated water resource management was discussed, the concept of Watershed (DAS) as a water resource development unit, water resource development based on river area units and raw water and drinking water was discussed as well as water conservation, water carrying capacity and water supply-demand. ***Widiatmaka (Coord), M. Yanuar J. Purwanto, Kaswanto, Dyah Tjahjandari***

### **PSL1672 Ecology of Resources and Environment in Tropical Forest 2(2-0)**

This course discusses the basic concepts of forest ecosystems and ecology, the mechanism for the formation of forest ecosystems, as well as the classification of services and the carrying capacity of tropical forest ecosystems including the potential of tropical forest resources. Forest ecosystem services, both tangible and intangible services (provisioning services, regulating services, supporting services and cultural services) which are the basis for the valuation of the total economic value of a forest ecosystem, along with the essential function of the forest as a custodian of environmental quality, will be presented in a comprehensive manner. comprehensive in this course.

***Cecep Kusmana (Coord), Lina Karlinasari, Fifi Gus Dwiyaniti***

### **PSL1673 Management of Social Conflict and Political Ecology in Natural Resources and Environment 2(2-0)**



In this lecture, at the initial stage, Political Ecology is discussed, the concept of sustainability path in natural resources and environmental management: limits and tolerance. Furthermore, the concept of participation and institutional design of natural resources and environmental management based on social capital and state capacity, theory of power, interests, and actors in natural resources and environmental management, concept of property rule and liability rule, principle of compensation and compensation in natural resources and environmental management and conflict resolution of natural resources and environmental management with an explicit interest approach is discussed. implicit, and intrinsic. The next discussion is about environmental violence from a political perspective; Explanation of concepts and cases of natural resource & environmental conflicts; Analysis of natural resource & environmental conflicts at local to global levels centered on actors and power; Stakeholder analysis on natural resource & environmental conflicts; Natural resource & environmental conflict management; Building collaborative natural resource management; and the environmental movement at national and global levels. At the end of the lecture, various tenurial systems that regulate the control and utilization of shared resources are discussed, both at the local and supra local (national) levels; contestation between tenurial systems and the implications of their application in the field; construct a typology of subjects using natural resources together and the dynamics of their relationship to one another; Analysis of the exclusion, disposal, and marginalization processes that occur among the subjects of the Joint SDA Utilization; as well as an assessment of the situation of 'open access' and/or conflicts between beneficiaries. Furthermore, the collaborative management approach of natural resources is also given: the 'collective action' school, the 'entitle school' school, and the 'participatory' approach.

*Didik Suhardjito (Coord), Endriatmo*

#### **PSL1674 Ecological Risk Assessment 2(1-1)**

This course discusses the concept of Ecological Risk Analysis (ARE) which consists of ecological ongoing or already ongoing activities in an environment and there are complaints from society so that a proof is needed through assessment and evaluation. This course covers the principles and characteristics of ecological risk, human health risk, environmental pollution, and ecological damage to the area with the scope of the watershed unit (DAS), the working mechanism of ERA/HHRA, teams involved in ERA/HHRA, exposure hazard in ERA and HHRA, tiers of ERA/HHRA, impact evaluation, risk management, risk communication, and design of ERA and HHRA activities.

*Lina Karlinasari (Coord), Hadi S. Alikodra, Anas M. Fauzi, Sri Budiarti, Nyoto Santoso*

#### **PSL1675 Environmental Administration System 2(2-0)**

This course discusses the concept of sustainability in development; application of the concept of sustainability in the administrative system; institutional theory (understanding, policy institutions) in the context of sustainable development (environmental welfare, ecosystem welfare, human welfare, forest health, limited hazard); institutional parameters, institutional scope (HR, organization, and rules/norms); understanding and characteristics of change of management, change of management strategy, case studies of countries that carry out change of management;

dynamic spiral theory; spiral dynamics definition. The discussion also includes the values of natural and environmental losses in the environmental administration system; development balance sheet; Green GDP; tariff and subsidy policies and the concept of participation; social capital and political capital in environmental development; implementation of the environmental administration system in Indonesia.

***Dodik Ridho Nurrochmat (Coord), Hadi S Alikodra, Cecep Kusmana***

***PSL160Y Management of Sustainable Natural Resource and Environment in Development 2(1-1)***

At the beginning of this course, the basics of sustainable natural resource management include the principles of sustainability and the development of the concept of sustainable development. Living and non-biological natural resources are discussed in the context of basic development capital. The environmental carrying capacity and policies that need to be taken are also discussed. In the second half, in addition to the theoretical aspects in lectures, experts in their fields are invited to discuss sustainable natural resource management for development, covering the fields of agro-ecosystems, marine resources, human ecosystems and information technology-based natural resource management. Discussions by experts also include sustainable natural resource management for food and energy sufficiency, as well as the impact of development on the sustainability of natural resources.

***Cecep Kusmana (Coord), Widiatmaka, Lina Karlinasari, Surjono Hadi Sutjahjo***

***PSL160Z Environmental Quantitative and Qualitative Analysis 2(1-1)***

This course discusses the basic concepts of statistics, simple data analysis, regression analysis, ANOVA, categorical data analysis, cluster analysis, structural equation models, basic concepts in spatial modeling, as well as some general spatial models; also discussed data analysis for social and environmental studies.

***Hari Wijayanto (Coord), Muhammad Nur Aidi, Sri Mulatsih***