

Sustainable Bioproduction and Ecosystems Management (SBEM) - 2017

As of 11 July 2017

Dr. Osamu SAITO

Objective:

This course is to overview global consequences of ecosystem changes and drivers of these changes including international trade on global ecosystem services. The course also introduces sustainable approaches to land and ecosystem management at different levels. The students will be familiarized with the key concepts and practical methods of ecosystem assessment and landscape ecology including the techniques of accounting various ecosystem services, and be able to choose appropriate analysis tools and management options for sustainable society living in harmony with nature.

Learning Outcomes:

- Understand the key concepts and practical methods of landscape ecology and ecosystem assessment including accounting tools and market-based policy instruments to address negative and positive externalities,
- Learn sustainable ecosystems management approaches to integrate bioproduction, biodiversity, and associated ecosystem services at different scales
- Learn how to develop case studies on sustainable bioproduction and ecosystems management through group work, and collectively develop an integrated final course report

Course Outline and Schedule:

Course Unit	Date	Topic/Activity	Instructor
1	3 Oct(Tue), 14:00-15:30	Introduction and overview of the course Conceptual Framework of Biodiversity and Ecosystem Services, and current research activities at UNU-IAS	Dr. Osamu Saito
2	10 Oct (Tue), 14:00-15:30	Ecosystem Assessments (I): Inventory accounting, material flow analysis, evaluation methods and case studies	Dr. Osamu Saito
3	12 Oct (Thu), 14:00-15:30	Ecosystem Assessments (II): Mapping natural capital and ecosystem services, methods and case studies	Dr. Osamu Saito
4	24 Oct (Tue), 14:00-15:30	Vegetation, GHG inventory system and biomass measurement	Dr. Osamu Saito
5,6	4 or 5 Nov., 13:00-16:30	Field Trip 1: Institute for Nature Study in Meguro, Tokyo	Dr. Osamu Saito
7	14 Nov (Tue), 14:00-15:30	Ecosystem Assessments (III): Global trade of natural resources; tradeoff analysis and multi-criteria analysis	Dr. Osamu Saito
8, 9	16 Nov (Tue), 14:00-17:30	Tools and models of ecosystem service assessments	Dr. Kikuko Shoyama
10	21 Nov (Tue), 18:00-19:30	Non-market provisional services, supply chain of ecosystem services, and social relations	Dr. Chiho Kamiyama
11	28 Nov (Tue), 14:00-15:30	Bio-energy production and ecosystem services	Dr. AlexandraAlexandros Gasparatos
12, 13	TBD Dec, 12:00-16:00	Field Trip 2: Visit to Hanno, Saitama	Dr. Osamu Saito
14, 15	19 Dec (Tue), 14:00-17:30	Wrap-up Session Final Assessment Session	Saito Student Presentation
Extra	30 Jan. (Tue), 14:00-15:30	Feedback session	All students

Assessment:

- Class Participation: 30%
- Final Group Presentation: 30%
- Final Individual Report: 40%

Readings:

1: Introduction and overview of the course

- Di'az et al. (2015) The IPBES Conceptual Framework — connecting nature and people, *Current Opinion in Environmental Sustainability*, 14:1–16.
- Anantha Kumar Duraiappah, Stanley Tanyi Asah, Eduardo S Brondizio, Nicolas Kosoy, Patrick J O'Farrell, Anne-Helene Prieur-Richard, Suneetha M Subramanian and Kazuhiko Takeuchi (2014) Managing the mismatches to provide ecosystem services for human well-being: a conceptual framework for understanding the New Commons, *Current Opinion in Environmental Sustainability*, 7:94–100
- Saito, O. and Ichikawa, K. (2014) Socio-ecological systems in paddy-dominated landscapes in Asian Monsoon. In Miyashita, N., Nishikawa, U. et al. (ed.) *Social-Ecological Restoration*, Springer.
- Eduardo S. Brondizio, Nathan D. Vogt, Andressa V. Mansur, Edward J. Anthony, Sandra Costa, Scott Hetrick (2016) A conceptual framework for analyzing deltas as coupled social–ecological systems: an example from the Amazon River Delta, *Sustainability Science* ,11: 591. doi:10.1007/s11625-016-0368-2

2:Ecosystem Assessments (I): Inventory accounting, material flow analysis, evaluation methods and case studies

- INTERNATIONAL STANDARD ISO 14040 (Second edition, 2006-07-01): Environmental management — Life cycle assessment — Principles and framework
- INTERNATIONAL STANDARD ISO 14044 (First edition, 2006-07-01): Environmental management — Life cycle assessment — Requirements and guidelines
- Saito, O. (2013) Resource Use and Waste Generation by the Tourism Industry in the Big Island of Hawaii, *Journal of Industrial Ecology*, 17(4): 578–589.
- Jasaw, G.S., Saito, O., and Takeuchi, K. (2015) Shea (*Vitellaria paradoxa*) Butter Production and Resource Use by Urban and Rural Processors in Northern Ghana, *Sustainability*, 7: 3592-3614.Doi:10.3390/su7043592.

3: Ecosystem Assessments (II): Mapping natural capital and ecosystem services, methods and case studies

- Peter Kareiva, Heather Tallis, Taylor H. Ricketts, Gretchen C. Daily, Stephen Polasky (2011) *Natural Capital: Theory & Practice of Mapping Ecosystem Services*, Oxford Univ Pr. 365pp.
- Hashimoto,S., Nakamura, S., Saito, O., Kohsaka, R., Kamiyama, C., Tomiyoshi, M. and Kishioka, T. (2015) Mapping and characterizing ecosystem services of social-ecological production landscapes: Case study of Noto, Japan, *Sustainability Science*, 10(2): 257-273. DOI: 10.1007/s11625-014-0285-1.
- Havas, J., Saito, O., Hanaki, K., and Tanaka, T. (2016): Perceived Landscape Values in the Ogasawara Islands, *Ecosystem Services*, 18: 130-140.
- Landreth, N. and Saito, O. (2014) An Ecosystem Services Approach to Sustainable Livelihoods in the Homegardens of Kandy, Sri Lanka, *Australian Geographer*, 45(3): 355-373.

4: Vegetation, GHG inventory system and biomass measurement

- Aulay Mackenzie, Andy S. Ball & Sonia R. Virdee, 1998. *Instant Notes in Ecology*, Bios Scientific Publishers, 321pp.
- Martin Kent & Paddy Coker, 1992. *Vegetation Description and Analysis*, John Wiley & Sons, 363pp.
- Rattan Lal, Klaus Lorenz, Reinhard F. Huettl, Bernd Uwe Schneider, Joachim von Braun (2013) *Ecosystem Services and Carbon Sequestration in the Biosphere*, Springer, 464pp.

7: Ecosystem Assessments (III): Global trade of natural resources, tradeoff analysis and multi-criteria analysis

- Thomas Koellner (edt) (2011) *Ecosystem Services and Global Trade of Natural Resources: Ecology, economics and policies*, Routledge, 286pp.
- Stoorvogel et al. (2004) The tradeoff analysis model: integrated bio-physical and economic modeling of agricultural production systems, *Agricultural Systems*, 80, pp.43-66.

8, 9: Tools and models of ecosystem service assessments

Peter Kareiva, Heather Tallis, Taylor H. Ricketts, Gretchen C. Daily, Stephen Polasky (2011) *Natural Capital: Theory & Practice of Mapping Ecosystem Services*, Oxford Univ Pr. 365pp.

To be informed

10: Non-market provisional services, supply chain of ecosystem services, and social relations

- Saito, O., Havas, J., Shirai, K., Kurisu, K., Aramaki, T. and Hanaki, K. (2015) Non-market Food Provisioning Services in Hachijo Island, Japan and their Implications toward Building a Resilient Island, *Journal of Japan Society of Civil Engineers, Ser. G. (Environmental Research)*, 71(6):II_349-357.
- Kamiyama, C., Hashimoto, S., Kohsaka, R., and Saito, O. (2016) : Non-market food provisioning services via homegardens and communal sharing in satoyama socio-ecological production landscapes on Japan's Noto peninsula, *Ecosystem Services*, 17:185-196.

11: Bio-energy production and ecosystem services

To be informed

Almuni session: Case studies of ecosystem services in Ghana

- Boafoa, Y.A., Saito, O., Jasaw, G.S., Otsuki, K., Takeuchi, K. (2016) Provisioning ecosystem services-sharing as a coping and adaptation strategy among rural communities in Ghana's semi-arid ecosystem, *Ecosystem Services*, 19: 92–102. doi:10.1016/j.ecoser.2016.05.002
- Boafo, Y.A., Saito, O., Kato, S., Kamiyama, C., Nakahara, M. and Takeuchi, K. (2016): The role of traditional ecological knowledge in ecosystem services management: The case of four rural communities in Northern Ghana, *International Journal of Biodiversity Science, Ecosystem Services & Management*, DOI:10.1080/21513732.2015.1124454.
- Boafo, Y.A., Saito, O., and Takeuchi, K. (2014) Provisioning Ecosystem Services in Rural Savanna Landscapes of Northern Ghana: An Assessment of Supply, Utilization, and Drivers of Change, *Journal of Disaster Research*, 9(4): 501-515.

Field Trip 1: Institute for Nature Study (自然教育園) in Meguro, Tokyo

The Institute for Nature Study, Shizen kyoiku en in Japanese, is a branch of the National Science Museum, Tokyo. It occupies a 200,000 square meter area with various original habitats of the Tokyo area, such as forest, marsh and ponds. Because the Institute's garden has been an isolated natural habitat in the urban area and has remained well conserved for many years, it is a valuable place where rich biota are maintained. At the Institute, the museum staff conduct original research on ecology and education.

Access:

7 minutes' walk from the east exit of Meguro Station on the JR Yamanote Line.

4 minutes' walk from exit 1 of Shirokanedai Station on the Tokyo Metro Namboku Line

Address:

5-21-5 Shirokanedai, Minato-ku, Tokyo 108-0071

Tel: 03-3441-7176 Fax: 03-3441-7012 Email: ins@kahaku.go.jp

Meeting Place:

JR Meguro Station (目黒駅)

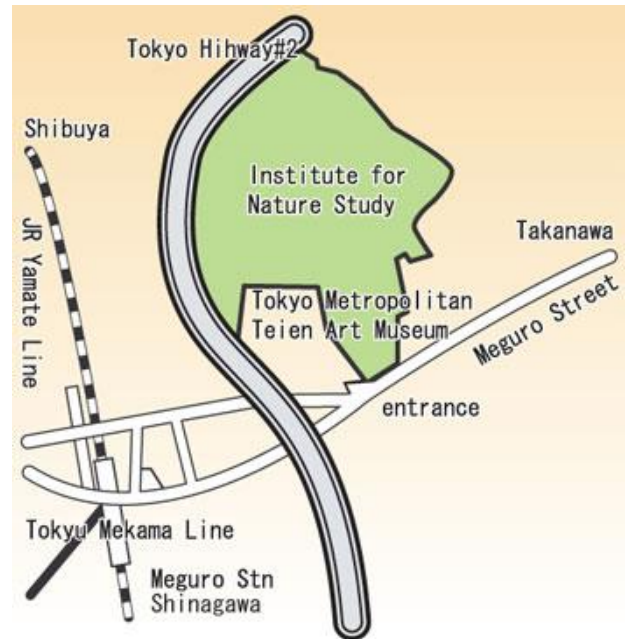
Central Exit (中央改札口) ※Attention: There are two exits at the station. Come to the central exit!!

Belongings:

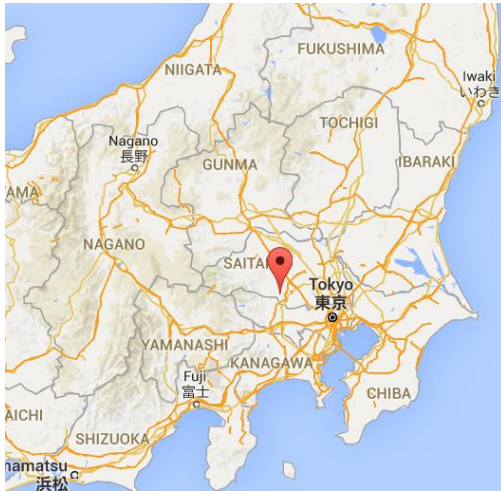
writing materials, drinks, camera, handout

Contact:

Osamu SAITO: 080-3155-5873



Field Trip 2: Satoyama Walk Ecotour in Hanno, Saitama



Area: 193.18 km²

Population: 81,000

Forest Cover: 76%

Famous for forestry and textile industry

Most of the area is designated as Oku-Musashi Natural Park by Saitama Prefecture

Challenges:

- 2.5million visitors/year
- Most of them visit Hanno without interaction with local people and nature
- Even negative impacts on natural environment by visitors
- Depopulation and forest degradation by lack of forest management
- How to empower local industry and economic development by using rich natural capital and historical assets in Hanno?
- Ecotourism will one of the effective measures