



# Fostering coffee agroforestry for agrotourism development in degraded land in a buffer zone of a national park: A case study from Poncokusumo, Malang, Indonesia

Luchman Hakim <sup>1\*</sup>, Dian Siswanto <sup>1</sup>, Brian Rahardi <sup>1</sup>, Hasan Zayadi <sup>1,2</sup>

<sup>1</sup> Department of Biology, Faculty of Mathematics and Natural Sciences, Brawijaya University, Malang, East Java, INDONESIA

<sup>2</sup> Department of Biology, Faculty of Mathematics and Natural Sciences, Malang Islamic University, Malang, East Java, INDONESIA

\*Corresponding author: [lufehakim@yahoo.com](mailto:lufehakim@yahoo.com)

## Abstract

Landscapes of Poncokusumo district (Malang, East Java) to support biodiversity conservation in Bromo Tengger Semeru National Park are under threat. Two threats have been identified, namely increase of sand mining in farmland and the rapid changes of sustainable agroforestry system in intensified farms. Coffee-based agroforestry as one of the important land use categories in biodiversity conservation still exists in limited numbers. This study identified some species of woody trees in the agroforestry system, in which it is important to build and restore the agroforestry in Poncokusumo district, especially for coffee-based agroforestry restoration programs. There are opportunities and possibilities to integrate coffee-based agroforestry and tourism-development programs. The area of Poncokusumo has been identified as containing numerous tourist attractions, in which it is important to stimulate tourism development in potential coffee-based agroforestry areas. The coffee-based agrotourism is located in the corridor system of tourism in the western area of the national park. Some fundamental aspects toward the success of the integration of coffee-based agroforestry and tourism should be highlighted, namely assessing the physical character of the area, evaluating tourist attractions and accessibility, promoting integrated spatial planning approach and implementing sustainable agriculture farming.

**Keywords:** biodiversity conservation, coffee agroforestry, degraded uplands, tourism development

Hakim L, Siswanto D, Rahardi B, Zayadi H (2019) Fostering coffee agroforestry for agrotourism development in degraded land in a buffer zone of a national park: A case study from Poncokusumo, Malang, Indonesia. *Eurasia J Biosci* 13: 1613-1620.

© 2019 Hakim et al.

This is an open-access article distributed under the terms of the Creative Commons Attribution License.

## INTRODUCTION

Land degradation in rural areas adjacent to national parks has been identified as a threat to biodiversity conservation in protected areas. Rural areas adjacent to conservation areas, nowadays, are still close to the issues of undeveloped areas, high illiteracy, lack of capital, worse health, and sanitation system, poor and low economic growth and lower human development index (Ellis 2000, Golley and Bellot 2012). In particular, rural areas in Asian developing countries receive much attention from international bodies and agencies, scholars and academics after the economic crisis in 1997 because rural areas were the most affected and led to the number of poor people dramatically increasing. The impact of disasters on environmental destruction has been widely reported. Scholars point out that Indonesia is one of the countries facing severe problems of natural resources depletion, social clashes related to resources use and increasing incidents of rural

dweller threats to forested areas (Ellis 2000, Suryahadi and Sumarto 2003).

The past perspectives view that agricultural activities are the primary source to generate rural economic and development. To increase agricultural yield, a green revolution has been adopted, and modern techniques have replaced the traditional approach to managing land. In many areas, the agroforestry system has been changed to the monoculture approach. Recent evidence suggests that rural agricultural productivities are facing severe problems caused by intensive use of pesticide, soil degradation, water pollution, low productivities and environmental degradation (Feintrenie et al. 2010, Whitten et al. 1996). The decrease of farmers' income has led to a poor society, and in many cases, such a situation has led to forest disturbance, illegal logging,

Received: July 2019

Accepted: October 2019

Printed: November 2019

illegal poaching and unsustainable practices of resources uses. As a result, biodiversity is in a dangerous case, and it is a threat to the sustainability of rural dwellers. It is also reported that numerous fertile areas have been changed into settlements, thereby improving the rural environment characteristics (Laurance et al. 2014, Whitten et al. 1996). The emerging discussion of agroforestry restoration in degraded areas has become relevant with recent rapid land use changes, especially in many areas adjacent to protected areas (i.e., national parks).

Recently, a strategy for sustainable rural development has accepted tourism as one of the tools to support rural development. Rural tourism is a viable tool to support rural development under many limitations of development (Long and Lane 2000). The demand for rural tourism continuously grows in America, Africa, Europe and recently in southeast Asia countries. Rural areas provide scenery, peace, fresh water, and air, traditional life and cultural entertainment, heritage and numerous attractions (Ryan 2003). Recent discussions of tourism in rural areas are addressed to meeting strategic objectives to meet biodiversity conservation, combat rural poverty, promote rural culture and tradition and preserve heritage (McAreevey and McDonagh 2011). Rural tourism is tourism activities based on the rural environment. It is a form of agricultural diversification into the tourism business. Numerous rural capital and its system—i.e., paddy terrace, fruit orchards, coffee orchards—have been promoted as rural tourism attractions. It has been reported that the programs have been able to support rural development.

Rural areas adjacent to Bromo Tengger Semeru National Park (BTSNP) in Malang Regency (East Java, Indonesia) plays an important role in supporting biodiversity conservation in the park. In the past, many areas in the buffer zone were dominated by coffee orchards, which traditionally are managed through the agroforestry system. Sadly, many agroforestry systems are facing severe problems of land degradation which shortly will contribute to biodiversity disturbance (Hakim 2011). Recent literature has stressed the importance of agroforestry in degraded farmland repair (Bishaw 2001, Hasan and Alam 2006, Jose 2009). Coffee-based agroforestry especially plays an essential role in environmental conservation (Garcia et al. 2010, Gillison et al. 2004). There is also the importance of agrotourism to support the rehabilitation of degraded lands, biodiversity conservation and increase the environmental quality of rural areas (Bruci et al. 2012, Kuo et al. 2006). Environmentalists wish to balance rural economic development with conserving biodiversity inside national parks and rural areas as the park's buffer zone (Dixon and Sherman 1990). In such a case, fostering coffee agroforestry and agrotourism development to counteract land degradation in rural areas adjacent to BTSNP is essential.

Nevertheless, few studies have been conducted to assess and evaluate such opportunities; leading data and information on agroforestry and agrotourism development in rural environments is scarce. In such a case, identifying causes of land degradation has been considered important to design a proper approach to land management. The paper aims to describe the contributors to land degradation, past and present agroforestry systems, recent tourism and rural areas in western Mt. Semeru, and propose a framework for agroforestry and agrotourism development.

## MATERIALS AND METHODS

### Study Sites

The study was focused on Poncokusumo sub-regency, which is located adjacent to the BTSNP in Malang Regency. The area was chosen as the focus of the research for several reasons. Poncokusumo ecologically is a vital buffer zone area for biodiversity conservation in the national park system. Human activity, land degradation and sustainable activity in the area influence the success of conservation programs in BTSNP. Administratively, the study sites cover an area of about 102.99 km<sup>2</sup> and are located at the eastern part of Mt. Semeru. The population was recorded at about 92,779 individuals. Abundant agricultural lands characterized areas adjacent to the national park with scattered houses. Agricultural lands dominate the area with corn, sugarcane, vegetables, citrus and apples as the main commodities. The area is located adjacent to the western tropical forest of Mt. Semeru, in which tropical mountain forest still exists with little disturbance. Some natural objects have been developed as nature-based tourism, e.g., Amprong River and Ledok Ombo compared with the other areas surrounding the national park; however, this area receives few tourists.

### Methods

Field surveys were conducted from March to July 2017 in Poncokusumo district, Malang Regency. Interviews with local people in Poncokusumo who are identified as having information and knowledge related to the history of agricultural practices and changes have been undertaken using an in-depth interview technique. Interviews with older people in villages were conducted to generate data regarding past farming practices and aspects related to the changes in agroforestry culture. Informants were asked to recall the past multipurpose plant species diversity in the agroforestry system before people changed the agricultural practices into intensive monoculture farming practices. The value of plant species was assessed through interviews. A floristic survey of plant species in the agroforestry system was done in the area that is located adjacent to the national park area. Multipurpose plant tree species which were found in agroforestry orchards were identified and listed, with both local and scientific names.



**Fig. 1.** The farmlands' landscape of the rural area adjacent to BTSNP in Poncokusumo sub-district. Notes: Agr. = Agroforestry lands, Mon. = monoculture orchards

To develop a framework for sustainable coffee-based agrotourism planning, numerous documents related to biodiversity, culture, and tourism potential were examined. This included national parks' and protected areas' documents, annual statistical reports of Malang Regency, and regency's documents and reports related to regional planning. The authors have lived there and conducted numerous studies related to conservation issues, and such data were used as a contextual evaluation for discussion to contribute to rural planning and developments. A literature survey was conducted to identify potential tourism objects in Poncokusumo and the surrounding area. Interview with local people, local organization tourism and stakeholders who are interested in tourism development have been conducted to assess the potential for the integration of coffee-based agroforestry into tourism.

## RESULTS

### Contributors to Land Degradation

The agro-ecosystem landscapes of areas adjacent to the conservation area in Poncokusumo consist of various types of landscape components (Fig. 1). From field observations and interviews, two important aspects related to land degradation were recorded: (1) increase in sand mining sites and (2) increase in abandoned land as a consequence of unsustainable agricultural practices. Many farmland areas adjacent to the national park are heavily disturbed by sand mining, where most of the sand mining sites are located on the steepest

slope orchards, areas with abundant bamboo and annual trees or other sites that are identified as containing sand sediments. Informants point out that abundant sand deposits in farmlands in Poncokusumo are alternative sources of family income. Sand mining was recently viewed as an alternative for economic income.

According to informants, unsustainable agricultural practices in Poncokusumo have been initiated by changes in the agroforestry system into an intensification of sugarcane, fruit and vegetable farming. Changes in the agroforestry system into intensive crop cultivation occur after local farmers cultivate apples, citrus, and vegetables. Some informants said that the desire to develop new agricultural commodities with high economic income led to agroforestry clearance (especially coffee-based agroforestry) to open orchards to cultivate new products of fruit and vegetables. The first impact of intensification could be seen as success through increasing fruit production, but recent reports argue that productivity is decreased and environmental destruction is increased. From the interviews, clearance and reestablishment of agroforestry among the local community in Poncokusumo are unpredictable. Informants point out that economic aspects have shaped the dynamics of land use change in Poncokusumo. Informants recognized declines in small mammals and bird populations. Informants pointed out three consequences related to the loss of the agroforestry system: (1) soil erosion, (2) soil fertility loss, (3)

**Table 1.** Annual plants in the recent agroforestry system in Poncokusumo

Species	Local names	Phytoregion origins	Local uses
<i>Paraserianthes falcataria</i>	Sengon	Native to Asia tropic	Bm, Ec
<i>Paraserianthes lophantha</i>	Kemlandingan	Native to Asia tropic and Australasia.	Bm, St
<i>Magnolia champaca</i>	Cempaka	Native to Asia temperate and Asia tropic	Bm, Af
<i>Melia azedarach</i>	Mindi	Native to Asia temperate, Asia tropic and Australasia	Bm, St
<i>Hibiscus macrophyllus</i>	Waru gunung	Native to Asia temperate and tropic	Bm, St
<i>Gmelina arborea</i>	Gmelina	Native to Asia temperate and Asia tropic	Bm, Ec
<i>Artocarpus elasticus</i>	Bendo	Asia tropic	Bm, Vg
<i>Artocarpus heterophyllus</i>	Nangka	Asia tropic	Bm, Af, Fr, Vg
<i>Artocarpus communis</i>	Sukun	Asia tropic, Pacific	Vg
<i>Ceiba pentandra</i>	Randu	Native to Africa, North and South America	Bm
<i>Toona sureni</i>	Suren	Asia temperate, Asia tropic	Bm
<i>Gigantochloa apus</i>	Bambu Apus	Native to Asia tropic	Bm, Cv
<i>Bambusa bambos</i>	Bambu Ori	Asia temperate, Asia tropic	Bm, Cv
<i>Dendrocalamus asper</i>	Bambu petung	Naturalized in Asia tropic and Australasia	
<i>Gigantochloa atter</i>	Bambu Jawa	Southeast Asia	Bm, Cv
<i>Aglala palembanica</i>	Sapen	Southeast Asia	Bm, St
<i>Erythrina subumbrans</i>	Dadap	Asia tropic	Bm, St
<i>Dalbergia latifolia</i>	Sono	Asia tropic	Fu, St
<i>Parkia speciose</i>	Petai	Asia tropic	Vg, St
<i>Leucaena leucocephala</i>	Lamtoro	North and South America	Vg, Af, St
<i>Maesopsis eminii</i>	Marsusi	Africa tropic	Bm, Ec, Af, St
<i>Swietenia macrophylla</i>	Mahoni	North and South America	Bm, Ec
<i>Cocos nucifera</i>	Kelapa	Native to Asia tropic, Australasia, Pacific	Bm, Ec, St, Fr, Vg

Notes: numerous categories of ethnobotanical aspects of plants in past agroforestry system in Poncokusumo: Bm = building materials, Ec = economic, Af = animal food/fodder, St = shading tree, Fr = fruit, Vg = vegetables, Fu = furniture

**Table 2.** Tourism attraction in Poncokusumo and its surrounding area that can integrate into coffee-based agrotourism in Poncokusumo

Name of sites	Attractions	Notes
Mt. Bromo	The landscape of Mt. Bromo—Tengger Caldera and Mt. Semeru	Main natural attraction, internationally recognized as spectacular landscapes. In 2017, international tourists were recorded as 13,412 visitors and 197,458 domestic tourists visiting Mt. Bromo.
Mt. Semeru	Hiking, trails from Ranupani to Semeru offer numerous spots of natural beauty	Trails from Ranupani to the summit of Mt. Semeru provide numerous spectacular landscapes and natural objects. In 2017, this area was visited by 3,744 international tourists and 179,528 domestic tourists.
Ranupani	Sightseeing rural landscape, including Lake Pani and Regulo	Recently Ranupani has been threatened heavily by intensive agricultural farming.
Ngadas	Sightseeing rural and agricultural landscape	Recently growing as rural tourism.
Coban Pelangi	Sightseeing	Local nature-based tourism destination. Visited by domestic tourists.
Cokro River	Rafting	Located close to the Coban Pelangi, newly developed recreation sites, visited by domestic tourists.
Kali Amprong	Water tubing	New adventure tourism sites; developed by the local community. Visited by domestic tourists.
Ledok Ombo	Camping ground	Pine forest used as an educational campsite. Visited by domestic tourists.

biodiversity disappearance, especially small mammals and birds.

### Past and Present Agroforestry Systems

Informants stated that previously, the coffee agroforestry system was one of the land management techniques that were widely practiced in Poncokusumo. The main crops under annual trees are Javan coffee (*Coffea arabica*) and Bestak coffee (*Coffea canephora*). People also recognized Buriah coffee (*Coffea excelsa*), but it is not widely cultivated under the agroforestry system. Some annual trees were mentioned as a component of the past coffee-based agroforestry system (Table 1).

A recent survey found less farmland with agroforestry system still existing in Poncokusumo. Some small patches of agroforestry lands can be found on the rural landscapes, which are dominated by vegetable and fruit orchards, abandoned land and settlement areas on the Poncokusumo landscape. Informants pointed out that recent tree species in the agroforestry system are relatively lowest when compared with past decades.

This is probably a result of the monoculture farming trends that promise higher income. Several economically valuable fast-growing tree species were cultivated, but Sengon tree (*Paraserianthes falcataria*) predominates. Sengon tree recently is the dominant tree in home gardens and replaces many native tree species as a component of the traditional home garden in the area surrounding BTSNP.

### Tourism and Rural Area in Western Mt. Semeru

An opportunity to involve coffee-based tourism in rural development planning in Poncokusumo comes from the facts that (1) Poncokusumo was endowed with outstanding resources for tourist attractions and (2) Poncokusumo is located in the corridor system of tourism in attraction in the western part of the BTSNP (Table 2).

## DISCUSSION

Recent agroforestry degradation in Poncokusumo is related to economic perspectives. In areas located



tourism attraction, linking new attractions to the existing attractions is important. The challenge for the new attraction sites is providing new attractions, in which it is becoming crucial for product diversification strategy of particular destinations. These approaches also reduce competition risk among attractions and overall increase the attractiveness of destinations.

The success of Poncokusumo in promoting coffee-based agrotourism in degraded land areas is greatly influenced by the way existing tourism attractions in the surrounding regions that target development (**Table 1**) are integrated and connected by rural corridors. Therefore, mapping the potential sites to promote coffee-based agrotourism in the Poncokusumo area should be implemented. In the context of the sustainability and competitiveness of coffee-based agrotourism, some aspects are important to incorporate in the integration. Integration of agroforestry and agrotourism development is a complex system, especially in degraded lands. In such a case, some fundamental aspects of the success of integration are necessary to be highlighted. It includes the following:

#### **Physical Aspects of the Area**

Physical characteristics are close to the abiotic component of ecosystems in which its role is crucial to building the coffee-based agroforestry farming and agrotourism development. This includes weather, air, water, climate, soil, topography, and other aspects. From the perspective of planning, physical characteristics are significant to ensure rural sustainability (Marcouiller et al. 2002). Furthermore, to set up rural tourism destination complexes such as rural trails, ecolodges or recreation parks, information about the physical characteristics in the proposed sites is crucial (Baud-Bovy and Lawson 1998). The challenges for the integrating of coffee-based agrotourism and agrotourism development in Poncokusumo is determining and integrating numerous physical aspects which play an important role in the success and sustainable relationship between agroforestry and agrotourism, which is rarely discussed in the literature.

#### **Tourism Attraction and Accessibility**

The role of tourism attraction and accessibility in tourism destination planning and development is significant, and therefore assessing such aspects is significant to plan sustainable rural tourism (Baud-Bovy and Lawson 1998, Hakim and Nakagoshi 2008). In Poncokusumo district, some nature-based tourism objects have been visited by visitors (**Table 2**), which has the potential to link with coffee-based agrotourism. From the perspective of spatial planning, it is crucial to perform tourism attraction and sites' accessibility evaluation. The objectives of tourism attraction inventory, rural corridors, and tourist trails, and accessibility are related to the effort for coffee-based agrotourism area establishment comprehensively.

Coffee-based agrotourism sites in Poncokusumo ideally should be connected with other attractions by the rural corridors systems (Baud-Bovy and Lawson 1998). This is becoming an important aspect to integrate coffee farm tours into agrotourism development in rural areas.

#### **The Integrated Spatial Planning Approach**

All of the potential resources of tourism should be put as a component of integrated rural development. The integrated spatial planning should be designed to enhance the balance of development and conservation in Poncokusumo district. Rapid land use changes should be able to be managed, especially those that potentially decrease biodiversity levels of rural areas. Tourism in rural areas is known to be influenced by the beauty of the landscape. Planning should be able to protect interesting objects for tourism and reduce the danger of population growth to the rural ecosystem. In this case, integrated spatial planning is crucial (Hakim and Nakagoshi 2008, Risteskia et al. 2012).

#### **Sustainable Agriculture Farming**

Sustainable agriculture through organic farming should be promoted, with the objectives of (1) improving soil quality, (2) increasing biodiversity, (3) producing healthy crop products and importantly (4) providing material for sustainable agriculture education for tourists. Healthy foods and beverages are crucial aspects of rural tourism, affecting tourism destination images, competitiveness, and sustainability. The healthy foods and drinks of rural tourism areas come from sustainable agriculture practices (Sims 2009). In the recent increase of interest in educational aspects to produce healthy food, the agricultural community practice to provide healthy food has become a potential tourism object and attraction. Hence, it is important for local movement, tourism planners and local communities to plan and implement sustainable agriculture farming.

To conclude, in Poncokusumo, conservation of the agroforestry system conflicted with local people's interest in improving the households' income. In general, it is clear that resources for rural tourism development at Poncokusumo are abundant, but so far not developed. Combined with the existence of potential natural attractions, coffee-based agroforestry offers numerous potential attractions to be developed. The agroforestry system of Jabung, Poncokusumo, and Wajak should be optimized in sustainable uses through tourism, particularly tourism based on the rural setting. The preservation of local tradition to manage agroforestry lands needs to be protected. The integration of coffee-based agroforestry and tourism should consider some fundamental aspects, namely the physical element of area assessment, tourism attraction, and accessibility evaluation, integrated spatial planning and management, and sustainable agriculture farming implementation.

## REFERENCES

- Baud-Bovy M, Lawson F (1998) *Tourism and Recreation: Handbook of Planning and Design*. Butterworth-Heinemann Ltd., Oxford.
- Bishaw B (2001) Deforestation and land degradation in the Ethiopian highlands: a strategy for physical recovery. *Northeast African Studies*, 8: 7-25. <https://doi.org/10.1353/nas.2005.0014>
- Bruci E, Nesturi E, Kadiu E, Apostoli S (2012) The role of agritourism on biodiversity and ecosystem. *International Journal of Ecosystems and Ecology Science (IJEES)*, 2: 443-448.
- Dixon JA, Sherman PB (1990) *Economic of Protected Areas: A New Look at Benefits and Cost*. Earthscan Publication, London.
- Ellis F (2000) *Rural Livelihoods and Diversity in Developing Countries*. Oxford university press, Oxford.
- Feintrenie L, Schwarze S, Levang P (2010) Are local people conservationists? Analysis of transition dynamics from agroforests to monoculture plantations in Indonesia. *Ecology and Society*, 15: 37. <https://doi.org/10.5751/ES-03870-150437>
- Garcia CA, Bhagwat SA, Ghazoul J, Nath CD, Nanaya KM, Kushalappa CG, Vaast P (2010) Biodiversity conservation in agricultural landscapes: challenges and opportunities of coffee agroforests in the Western Ghats, India. *Conservation Biology* 24: 479-488. <https://doi.org/10.1111/j.1523-1739.2009.01386.x>
- Gillison A, Liswanti N, Budidarsono S, Van Noordwijk M, Tomich T (2004) Impact of cropping methods on biodiversity in coffee agroecosystems in Sumatra, Indonesia. *Ecology and Society*, 9. <https://doi.org/10.5751/ES-00657-090207>
- Golley FB, Bellot J (2012) *Rural Planning from an Environmental Systems Perspective*. Springer Science & Business Media, New York.
- Hakim L, Soemarno M (2017) Biodiversity conservation, community development and geotourism development in Bromo-Tengger-Semeru-Arjuno Biosphere Reserve *Geojournal of Tourism and Geosites*, 20(2): 220-230.
- Hakim L, Nakagoshi N (2008) Planning for nature-based tourism in East Java: recent status of biodiversity, conservation, and its implication for sustainable tourism. *ASEAN Journal on Hospitality and Tourism*, 7: 155-167.
- Hasan MK, Alam AA (2006) Land degradation situation in Bangladesh and role of agroforestry. *Journal of Agriculture & Rural Development*, 4: 19-25. <https://doi.org/10.3329/jard.v4i1.763>
- Jose S (2009) Agroforestry for ecosystem services and environmental benefits: an overview. *Agroforestry Systems* 76: 1-10. <https://doi.org/10.1007/s10457-009-9229-7>
- Kuo NW, Chen YJ, Huang CL (2006) Linkages between organic agriculture and agro-ecotourism. *Renewable Agriculture and Food Systems*, 21: 238-244. <https://doi.org/10.1079/RAF2006148>
- Laurance WF, Sayer J, Cassman KG (2014) Agricultural expansion and its impacts on tropical nature. *Trends in Ecology & Evolution*, 29: 107-116. <https://doi.org/10.1016/j.tree.2013.12.001>
- Lin BB (2010) The role of agroforestry in reducing water loss through soil evaporation and crop transpiration in coffee agro-ecosystems. *Agricultural and Forest Meteorology*, 150: 510-518. <https://doi.org/10.1016/j.agrformet.2009.11.010>
- Long P, Lane B (2000) Rural tourism development. In: W. C. Gartner and D. W. Lime (eds). *Trends in Outdoor Recreation, Leisure and Tourism*, CABI Publishing, Wallingford. pp. 299-308. <https://doi.org/10.1079/9780851994031.0299>
- Marcouiller DW, Clendenning JG, Kedzior R (2002) Natural amenity-led development and rural planning. *Journal of Planning Literature*, 16: 515-542. <https://doi.org/10.1177/088541202400903572>
- McAreavey R, McDonagh J (2011) Sustainable rural tourism: Lessons for rural development. *Sociologia Ruralis*, 51: 175-194. <https://doi.org/10.1111/j.1467-9523.2010.00529.x>
- Risteskia M, Kocevskia J, Arnaudov K (2012) Spatial planning and sustainable tourism as basis for developing competitive tourist destinations. *Procedia-Social and Behavioral Sciences* 44: 375-386. <https://doi.org/10.1016/j.sbspro.2012.05.042>
- Ryan C (2003) *Recreational Tourism: Demand and Impacts* vol. 11. Channel View Publications. Bristol. <https://doi.org/10.21832/9781873150580>
- Sims R (2009) Food, place and authenticity: local food and the sustainable tourism experience. *Journal of Sustainable Tourism*, 17: 321-336. <https://doi.org/10.1080/09669580802359293>

Suryahadi A, Sumarto S (2003) Poverty and vulnerability in Indonesia before and after the economic crisis. Asian Economic Journal, 17: 45-64. <https://doi.org/10.1111/1351-3958.00161>

Whitten T, Soeriaatmadja RE, Afiff SA (1996) Ecology of Java & Bali vol. 2. Oxford University Press. Oxford.

[www.ejobios.org](http://www.ejobios.org)