

Sustainable Development in the Cameron Highlands, Malaysia

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ABSTRACT

This paper examines the progress and prospects for sustainable development in the Cameron Highlands, Peninsular Malaysia, focusing especially on agriculture. Vegetable, flower and fruit production in the Highlands have caused extensive forest clearance and the excavation of valley sides and floors. This causes loss of biodiversity, unstable ground that is liable to landslide, soil erosion and agrochemical pollution of streams. Unsustainable agriculture has severe impacts on the Cameron Highlands environment, wildlife, tourism, and local people's well being, and its effects are felt further afield, especially through the degradation of quality and quantity of water supplies which flow to surrounding lowlands. The silting of streams and reservoirs also increases the risk of flood damage. Because impacts will be felt across broad swathes of the lowlands it is in the interests of the federal government and surrounding states to invest in Cameron Highlands improvements. The new highway from Ipoh, opened in 2003, is likely to prompt further horticultural development in once remote parts of the Cameron Highlands. There are opportunities to develop sustainable agriculture and to integrate it with tourism development and the improvement of local people's livelihoods, including indigenous peoples. These opportunities should be grasped before it is too late.

ABSTRAK

Kertas ini meneliti kemajuan dan prospek pembangunan berterusan di Cameron Highlands, Semenanjung Malaysia dengan tumpuan utamanya kepada pertanian. Pengeluaran sayuran, bunga dan buah-buahan di tanah tinggi ini menyebabkan penebangan hutan secara meluas dan penggalian dasar dan lereng lembah. Tindakan tersebut menyebabkan kehilangan kepelbagaian biologi, ketidakstabilan yang membawa kepada tanah runtuh, hakisan tanah dan pencemaran agrokimia alur sungai, ketidakmampuan pertanian menyebabkan kesan besar kepada persekitaran, hidupan liar, pelancongan, dan penduduk tempatan Cameron Highlands dan kesannya lebih menyeluruh terutamanya melalui kemerosotan kualiti air dan kuantiti bekalan air yang mengalir ke persekitaran tanah rendah. Pemendapan saliran dan waduk juga meningkatkan risiko kemusnahan banjir. Disebabkan kesannya yang melewati sempadan tanah rendah adalah menjadi minat kerajaan persekutuan dan negeri berhampiran untuk melabur di Cameron Highlands. Lebuhraya baru dari Ipoh yang dibuka dalam tahun 2003, dilihat mempercepatkan pembangunan hortikultur di

kawasan pedalaman di Cameron Highlands. Terdapat peluang untuk membangunkan pertanian mampan dan menyepadukannya dengan pembangunan pelancongan dan mempertingkatkan taraf hidup penduduk tempatan termasuk masyarakat orang asli. Peluang ini seharusnya diambil sebelum terlambat.

INTRODUCTION

In India, Ceylon, Malaya, and elsewhere 'hill stations' were developed in the early twentieth century to provide a refuge in hot seasons, for convalescence, recreation, and for testing and adapting potential crops (Spencer & Thomas 1948; Tempany & Curtler 1933; Voon & Khoo 1980; Shirasaka 1988; Freeman 1999). Peninsular Malaysian hill resorts – the Cameron Highlands, Fraser's Hill, Genting Highlands, Bukit Larut, Penang Hill; and Maxwell Hill, lie in fragile and vulnerable forested highlands (Raine 1995) (Figure 1). Having lost much of the lowland biota, Malaysia's highland areas are important refuges for biodiversity.

The Cameron Highland forest traps passing cloud, which would otherwise fail to precipitate; it thus acts as a crucial catchment for large parts of lowland Malaysia. Cleared of forest cover less precipitation is captured (perhaps a reduction of 900 mm y⁻¹) which means erratic streamflow, higher peak flows, and water shortages in dry periods – this impacts on the lowlands and affects large numbers of people (Chan 2000a; Chan et al. 2003). Steep slopes and deeply weathered soils and underlying rock coupled with heavy rainfall mean that landslides and high rates of erosion are an ever-present threat if development disturbs highland forest. The rich hill-slope flora and fauna is easily lost and that of streams is vulnerable to eroded silt, agricultural pollution and sewage. Damage to forests in the Cameron Highlands has been caused by selective logging, plantations (there are around 2800 ha of tea estates in the Cameron Highlands), farming, and extraction of forest products like rattan, bamboo (which is widely used for scaffolding and locally by farmers as rain shelter supports) fruit, resins, medicinal herbs, and orchids (Wazir-Jahan 1990).

There is little expansion of tea estates nowadays, and this causes limited environmental damage because it is a perennial crop that is treated with little or no chemical fertilizers, herbicides or pesticides. Annual cropping producing temperate vegetables and cut-flowers has expanded markedly since the 1960s and is a major cause of environmental degradation. There are also indications that forest product extraction by indigenous peoples is increasing. As well as damaging the environment the farming is generally unsustainable with current practices. Many of the farmers have installed yield-boosting facilities, so

reduction of environmental damage and efforts to improve sustainability are not hampered by poverty.

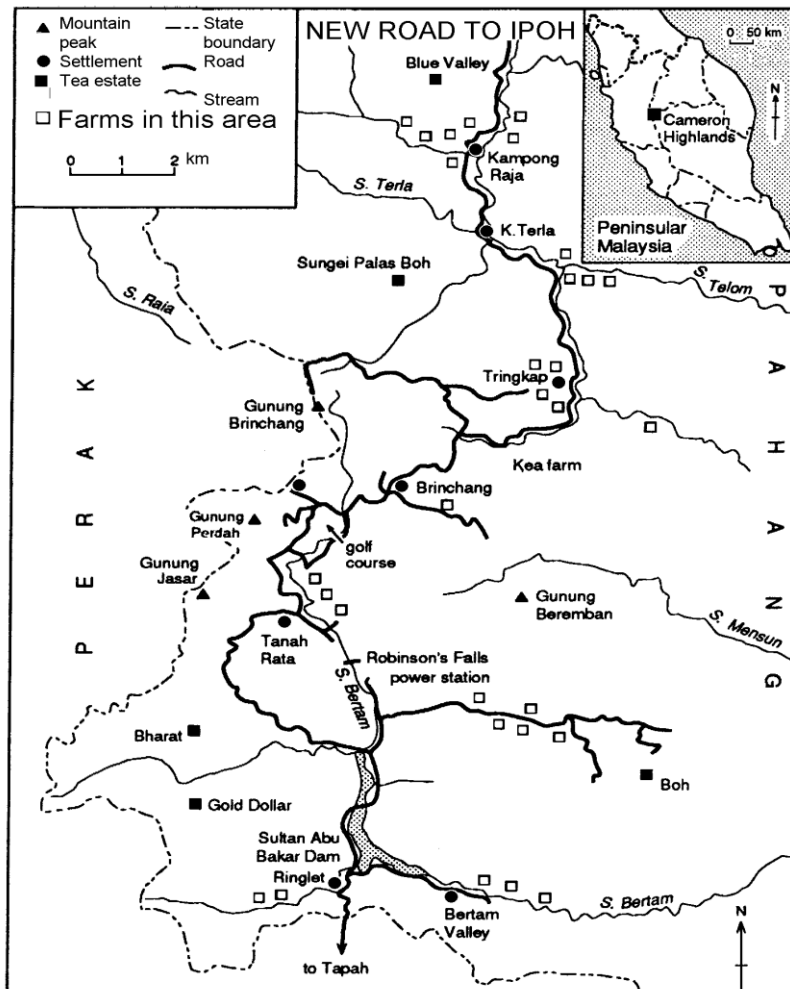


Figure 1. Location of Cameron Highlands and main towns and villages

Rapid and insensitive development has not gone unopposed in the highlands, a number of NGOs have been actively seeking to improve environmental management and local people's well being. These include the Society of Regional Environmental Awareness of Cameron Highlands (REACH) and the Malaysian Nature Society. However, the farming is

profitable and the produce saves Malaysia considerable amounts of foreign exchange, so there may be reluctance to control it.

Roads and telecommunication installations have improved access to farm sites and aid forest product extraction. The Cameron Highlands are partly under the jurisdiction of the State of Pahang, and with many administrative offices at least five-hour drive away in Kelantan and Terengganu, co-ordination can be a problem. Administrative responsibilities are divided between five state governments, local authorities, and Federal Government departments (Oh 2000). Most of the Cameron Highland farmers are Chinese and have links with Perak, rather than Pahang (Clarkson 1968).

While Malaysia has excellent lowland national parks management, the development of highland areas has resulted in extensive deforestation, growing pollution, and settlement growth. Hill resorts like the Genting Highlands (ca.2000 m) and Fraser's Hill (1524 m) have suffered considerable real-estate development. The Cameron Highlands are a 1500 m-high plateau surrounded by forest-clad peaks rising to 2032 m. More extensive and less spoilt than the aforementioned hill resorts, the Cameron Highlands are nevertheless 'at risk' especially from unsustainable farming, speculative building, and insensitive tourism. Farming is expanding up valleys and into the forested hills (the actual distribution of farms has not been recently mapped and a survey of the farming areas to establish trends would be valuable).

SUSTAINABLE DEVELOPMENT IN THE CAMERON HIGHLANDS

There are ways to reduce the impact of agriculture in the Cameron Highlands. It is also possible to develop conservation and tourism so as to help the transition to sustainable but possibly less profitable farming or offer alternative or supplementary livelihoods. Environmental damage caused by farming damages tourism and conservation so these have a mutual interest in improving agriculture: they could all be better integrated to help reduce environmental impacts, achieve sustainable development and improve livelihoods. The *Orang Asli* (indigenous peoples) in the Cameron Highlands should be more involved in such developments, and can contribute much (Passoff 1991; Foucat 2002; Chan et al. 2003). Presently they have limited involvement with commercial agriculture, and that is unlikely to change much.

Sustainable development attracted serious media and academic attention after about 1987, partly as a consequence of the 'Brundtland Report'. There is no single universally acceptable definition of sustainable development, although it is widely recognised: that there are environmental limits to development; that environmental protection and

development are interrelated and mutually dependant; that together with environmental care there must be concern for the poor; and that there needs to be intergenerational equity – i.e. people should pass on to future generations at least as good potential and range of options they enjoy. It also depends on establishing (if none are already present) and maintaining appropriate social institutions to support management and help adapt to challenges (World Bank 2003). Sustainable development is not ‘cost-less’ it demands trade-offs. In the Cameron Highlands some of the present day profits will have to be reinvested to achieve sustainable development; agriculture, biodiversity conservation and tourism have the potential to generate funds for sustainable development and pressures for change – these are unlikely to come from the agricultural community alone. Integrated efforts in the Cameron Highlands may just be sufficient; however, lowlands will benefit from improvements and it would make sense to citizens in those areas to also contribute. The authorities need to explore these issues.

Malaysia is pledged to take appropriate action to ensure that development is sustainable and balanced (Government of Malaysia 1996: 589). A Business Council for Sustainable Development Malaysia was founded in 1992, and there has subsequently (1995) been the establishment of a Business Charter for Sustainable Development. Malaysia thus has a firmly voiced commitment to supporting sustainable development.

It is important that those involved in sustainable development can call upon adequate social capital - the arrangements, traditions, and obligations which back-up individuals, families and groups in time of need so that they can survive and to support innovation. Often social capital is in decline, which can mean problems maintaining environmental quality socio-economic conditions, which favour tourism. Village and regional officials may not perceive loss of social capital, so studies would be valuable for sustainable development efforts in the Cameron Highlands. Presently tourism suffers from farming impacts, but potentially agriculture could reduce the damage in return for a share in tourism income; agritourism could also help tourism diversify and attract longer stay and more affluent visitors. The key is to develop co-operation and integrated development. Various organisations and businesses can work for sustainable development but action needs to be promoted and co-ordinated (Selman 1996). In the Cameron Highlands farmers and tourism entrepreneurs will have to embrace a paradigm shift and invest some of their profits in environmental management and sustainable development or in the longer term their lifestyles will suffer (Shepherd 1998).

El Niño events occasionally cause drier conditions, and acid deposition and global warming pose a growing threat to Cameron Highland vegetation. Presently there is little threat in highland Malaysia from forest fire or goat grazing, problems, which commonly blight other tropical uplands. If conditions become more arid through such factors and as a consequence of forest clearance causing regional warming bush fires may become a threat; however, for foreseeable future such threats are minimal. Sustainable development must be adaptable to such threats and to socio-economic changes: especially uphill shift of vegetation zones; altered precipitation; new patterns of disease transmission; and the introduction of problematic exotic flora and fauna.

Ecological footprint analysis has been used to measure progress toward sustainable development by a number of cities, businesses and various sectors (Gösling et al. 2002). It would be interesting to apply eco-footprinting to Cameron Highlands agriculture so that its overall impact can be weighed against economic profits. Agricultural produce from the Cameron Highlands is in demand in Malaysian cities and earns export income; it would be useful to see the true costs of production allowing for stream pollution, forest loss, etc.

Tourists are increasingly seeking more differentiated and interesting attractions, and host countries and funding agencies like the promise of non-destructive natural resource exploitation offered by green tourism. A form of green tourism - ecotourism appeared during the 1980s and has spread rapidly – 2002 was declared the UN International Year of Ecotourism. Ecotourism is difficult to presently define; the Ecotourism Society¹ suggested it be: "...responsible travel to natural areas which conserves the environment and improves the welfare of local people." Ecotourism is essentially a set of principles, which can be allied to any nature-related tourism. But, unlike other forms of green tourism, ecotourism should be a symbiotic relationship, whereby environment attracts tourists, and they pay a significant amount for environmental management; hopefully the process can help initiate and support sustainable development (Lindberg & Hawkins 1993; Fennell 1999; Wearing & Neil 1999; Page & Dowling 2001; Pforr 2001; Weaver 2001). Ecotourism should put back more than it takes out of the environment and local culture; for example, tourists will often pay to do voluntary conservation or farm work, or other environmental management tasks and can be charged quite a lot for relatively basic accommodation. Some ecotourism supporters argue that it must not only fund environmental management and contribute to local livelihoods, but that it should also educate the tourists to develop ongoing environmental and cultural awareness and responsible behaviour (Orams 1995).

Several developing countries have invested in ecotourism: the Galapagos Is. (Ecuador), Tanzania, Belize, Rwanda, Costa Rica, Cuba, Yucatan (Mexico), Zimbabwe, and others². Some of these depend upon it for much of their conservation funding and it is a major foreign exchange earner. Malaysian structure plans and tourist authorities acknowledge the potential for green tourism, but have made limited progress in co-ordination and development of policies seeking to promote ecotourism as a key element in a sustainable development strategy. In the Cameron Highlands there are many opportunities to link conservation and tourism and to use it to encourage and aid farming to become more sustainable. Ecotourism can make use of facilities like redundant mansions, old plantation management buildings, and suchlike. The profits from tourists staying in such places helps pay to maintain production and adequate environmental management; the production of crops like tea provide a tourist interest and resort 'image'. The attraction of ecotourism for many administrators is that it can yield foreign exchange, looks sustainable and 'green', and can be established with reasonable investment and limited socio-economic change. In the Cameron Highlands it could provide ways of encouraging and cushioning change from environmentally damaging cultivation to greener, sustainable, but less profitable production. For example, tourists might be attracted to agritourism or ecotourism and could be charged enough to make alteration to sustainable farming viable. In time organic production from sustainable plots may command better prices and need less support from tourism. Part of a strategy seeking sustainable agriculture in the Cameron Highlands should be to assess the potential for developing organic production. In the EU consumers seem willing to pay up to 30% more for organic produce (Dabbert et al. 2004). Ultimately organic and sustainable agriculture could be as profitable or better than the present chemical-enhanced semi-permanent cultivation.

The basic elements of a Cameron Highlands sustainable development strategy should be:

- ❖ Assess the current situation and trends.
- ❖ Identify suitable ecotourism solutions.
- ❖ Plan to keep tourist impacts to a minimum and ensure local activities do not deter visitors.
- ❖ Manage and steer ecotourism, conservation and agriculture – which require the assessment of sustainability performance (using effective indicators, benchmarks, and monitoring methods).
- ❖ Ensure there is adequate co-ordination and planning, and an overall strategy.
- ❖ Explore land use zoning to support conservation, tourism and agriculture.

One strategy, which could be useful in the quest for sustainable development in the Cameron Highlands, is (as already mentioned) to zone areas according to their sensitivity, and then try to give maximum protection to pristine and vulnerable localities. Buffer zones around these would help to protect them from more intensive exploitation. Less sensitive zones could be used for tourism activities that are less environmentally sound and for agriculture; buffer areas could support ecotourism and carefully controlled forest extraction (perhaps with some enhancement of products like bamboo and rattan – tolerant forest management). Migration corridors should ideally link pristine areas; and sufficient regard must be given to the possibility of climate change, increasing regional air pollution (acid deposition, etc.), and natural disasters. Too rigid and unimaginative zoning, with insufficient adaptability will not sustain flora and fauna. Mapping such zones in the Cameron Highlands and other Malaysian highlands would be a valuable exercise.

Golf, trekking, agritourism, cultural tourism, wildlife photography and birdwatching are potential tourism growth fields in the Cameron Highlands (Berry & Ladkin 1997; Garrod & Feyall 1998; Mowforth & Munt 1998; Stabler 1998; McCool 2001). Well-planned and effectively managed ecotourism is compatible with many other land uses, and can play an integrative role (Ashton & Ashton 2002). The ideal is to 'dovetail' mutually supportive activities to integrate local resources, and involve local people (Boo 1990; Cater 1995; Duffy 2002). The Cameron Highlands have opportunities for such dovetailing, and could more actively seek eco-tourists from Malaysia and further afield.

South East Asian lowlands are hot, humid and increasingly urban-industrial environments; areas like the Cameron Highlands offer a relatively cool, varied and attractive refuge. The risk is that poor planning control will allow speculative building, excessive farming, tourism-related pollution, track and forest damage and littering.

Cameron Highland agricultural produce is in great demand in Malaysian cities and is exported to Singapore and further afield. Given the profits involved, the employment provided, and the foreign exchange earned, the authorities are unlikely to suddenly restrict it. However, present land use is virtually shifting cultivation, with plots are mainly leased from the Government for only 15-years. Farmers use large amounts of chicken waste, chemical fertilisers, pesticides and herbicides to enhance crop yields, few practice effective soil and water conservation, and there is virtually no use of compost, mulch, or green manure (Plate 1). Many farmers invest in plastic sheet rain-shelters and drip or trickle-irrigation but this is primarily focused on boosting crop yield and quality, rather than sustaining production and preventing soil erosion. Streams

draining the farmed areas are polluted by chemical runoff, excess nutrients and soil washed from the fields. Once yields decline farmers apply for a new licence and dig new fields from the hillsides, resulting in destruction of biodiversity and severe loss of soil to streams.



Plate 1. Farms in the Cameron Highlands cut into steep forested hillside. Streams draining the area have heavy silt loads, even long after the cutting of terraces and establishment of crops. Every 15 years or so new plots are cut and even more silt is generated.

Until recently the only main road into the Cameron Highlands was narrow and twisting and helped restrict the spread of farming; in 2003 a new highway was opened into the areas furthest from the old road, this may well stimulate further agricultural expansion. The expansion of unsustainable farming must be halted, but to do so other sources of income will have to be tapped. Ecotourism and agritourism could offer a sustainable way to help stabilise livelihoods and improve environmental management. Questionnaire surveys conducted between 2003 and 2005 indicate visitors to the Cameron Highlands were attracted by environmental features and disliked pollution and forest degradation (Clifton et al. 2003). However, the majority of tourists interviewed made short-stays of 2 to 3 nights and were relatively low spenders. Most were under 35-years of age and came from Malaysia, Singapore, SE Asia, and to a lesser extent, Europe or the Americas, and were not well informed about the attractions available. Advertising might alter the tourist clientele to improve its earnings and help select those interested in ecotourism.

World wide there is a keen interest in trekking, and the Cameron Highlands offers some of the most spectacular and safest 'exotic' trekking trails in the tropics. Trekking is presently poorly regulated and so far there had been little investment in developing it. Guides are often untrained and poorly registered and marketing is weak. There is great potential for improvement, especially better marketing overseas and more regulation (Chan 2000b, 2000c). Agritourism is already established in a limited way, but could be developed further to support more sustainable horticulture (Fennell et al. 2003). A number of *Orang Asli* has found employment as golf course caddies or 'pros', and many work in service jobs such as cooking, labouring, and taxi driving. However, there has been limited development of their handicrafts or cultural tourism, and few *Orang Asli* act as ecotourism guides or trekking guides. *Orang Asli* and other peoples in the Cameron Highlands have cultures, handicrafts, and skills which could become tourist attractions (Nicolas 2000). They could play a greater part in development, which would improve their livelihoods, aid their integration into wider society, and possibly help discourage the expansion of forest products collection (Barrow et al. 2003).

There is a need for more co-ordinated, proactive, adaptive and integrated management of Cameron Highland development (Oh 2000; Government of Malaysia 2001). A strategic overview is crucial to ensure various efforts do not conflict and, if possible, support each other. The authorities should review the potential for sustainable development based on expanded ecotourism, agritourism and cultural tourism. A co-ordinating body can also prepare visitor itineraries linking one activity and site with another to compile a varied, attractive, and longer vacation. It also enables pressure to be removed from sites which are being degraded and offers ways to steer tourists and cope with bad weather, seasonal changes, and so on. Ecotourism should be part of an overall sustainable development strategy. Such a co-ordinating body could direct some of the profit from tourism to support a shift to sustainable agriculture, ideally with and the adoption of organic farming, and improved environmental management.

The Malaysian Government called for an Intergovernmental Committee on Highlands in 1996, and a Cabinet Committee was established in 2000 to co-ordinate, monitor and ensure sustainable development of hill and island resorts in Malaysia. However, little progress seems to have been made so far. Within the Cameron Highlands hoteliers and other local entrepreneurs have themselves taken the initiative to establish a group which seeks to improve standards for trekking guides, taxi firms, and hotels and act as a 'watchdog' body. A study to promote more effective co-ordination, including sustainable

development in the Main Range of Peninsular Malaysia was launched in 2000 (Government of Malaysia 2001), and, in 1996 a National Eco-tourism Plan was drawn-up to provide a framework (Government of Malaysia 2001: 441). There is clearly Government desire to reduce environmental impacts associated with tourism (Government of Malaysia 2001). A useful step would be to conduct a thorough eco-audit of the Cameron Highlands - or better, the whole Main Range, to help stocktake, set goals, and establish priorities for action.

Ecotourism in the Cameron Highlands could be developed in the following ways:

- ❖ There should be well-planned and co-ordinated trekking, nature and scenic photography tourism. *Orang Asli* guides could be used to support this.
- ❖ Agritourism can be better promoted. Already, tourists visit gardens, nurseries and tea plantations, but mainly as short-stay attractions. There could be developments, which attract visitors to spend longer participating in activities like conservation, agritourism, guided wildlife observation, and so on. In some countries plantations run hotels, have way-marked walks and wildlife guides, which support stays of a week or more. The Cameron Highlands should try to attract richer tourists for longer stays.
- ❖ It may be possible to interest tourists in the sponsorship of wildlife – paying for environmental management activities. For example, for a fee a tree could be dedicated to a loved one, perhaps as a memorial or to celebrate an event like the birth of a child or an anniversary, or as a sign a company supports nature. Initially some famous people could be induced to establish a fashion for commemorative tree planting.
- ❖ There should be profitable opportunities for bird watching tourists.
- ❖ Profits might be made from spa development and health farm centres.
- ❖ Cycle and mountain bike tracks could be established with controls placed on these activities elsewhere. Off-road use of motorcycles and 4-wheel-drive vehicles should be strictly controlled.
- ❖ In many countries communities generate funds through cultural events – for example, literature festivals, drama, opera, and much more – such events can pack in tourists for weeks at a time and provide funds for environmental management.
- ❖ There could be facilities for weddings and other key events.

- ❖ Residential courses could be offered on photography, art, traditional culture, and so on.
- ❖ Occasional events are already established and could be a means of publicising other attractions – the Cameron Highlands cycle races are widely viewed on TV in the USA, Europe and elsewhere.
- ❖ It is important to establish websites to encourage and steer tourism, especially to promote ecotourism.

DISCUSSION

If it is to work, sustainable ecotourism demands a proactive, adaptive, and multidisciplinary approach. Even the best techniques and skilled planning will fail to predict everything, monitoring may not give adequate advanced warning of problems, and tourist behaviour can be fickle. So, sustainable ecotourism must maximise its adaptability. Both ecotourism and sustainable development are fields which can act as a unifying and integrative catalysts which disparate interests can identify with (Cater 2000). Ecotourism and sustainable development share a key core feature: they demand reinvestment of adequate surplus into maintaining, and if possible improving, the environment and society (and in the Cameron Highlands case – into helping agriculture become sustainable). Guidelines that can be enforced and independent certification are likely to be crucial. The latter could be through an environmental management system (EMS), like the ISO 14000 series. Codes, guidelines and ethical standards have been published; e.g. by the Ecotourism Society of Australia, and in the USA, by the Ecotourism Society). Using strategic environmental assessment and strategic environmental management approaches could strengthen co-ordination and help develop a Cameron Highlands sustainable development strategy.

Provided there is not economic depression or increased travel fears there should be a growing number of tourists from the west, SE Asia, and Malaysia interested in ecotourism, craftwork, archaeology, and so on (Luck 2002). There appears to be a promising future for sustainable development in the Cameron Highlands, *if the environment is not further degraded*. But environmental degradation must be adequately addressed soon. It is crucial to control the use of fertilisers, pesticides and herbicides used by farmers and to reduce land clearance and the erosion of soil which carries silt to streams. People, in the Cameron Highlands and surrounding lowlands, including the *Orang Asli*, who drink the water or consume fish from streams, are vulnerable to agriculture-and tourism-related pollution. Forest clearance already seems to have caused a

warming of the Cameron Highlands' climate over the last 50 years or so - further deforestation and global warming is likely to make it worse.

Orang Asli collect and sell forest products to visitors, farmers, and others; this needs monitoring to reduce impacts on biodiversity. Collecting rattan, bamboo, butterflies and orchids should be more closely controlled. But for this to be possible alternative livelihood opportunities must be offered them; bamboo and rattan might be semi-cultivated in areas zoned for tolerant forest management and there are ecotourism opportunities. It is less likely that *Orang Asli* will participate in commercial farming for cultural reasons.

The Cameron Highlands needs to develop a proactive, integrative, and sufficiently powerful body to control development, co-ordinate necessary research, and draw-up and maintain a sustainable development strategy. The goals would be to reduce environmental damage; improve local people's benefits; encourage ecotourism, agritourism and cultural tourism; attract more long-stay tourists, and identify ways to make farming and tourism less environmentally-damaging and more sustainable. It would be wise to gazette as much land as possible soon to enforce biodiversity conservation (plans for a Biodiversity Action Plan were announced in the *Eighth Malaysia Plan*). There is a need for much tighter control of deforestation and forest disturbance – mainly by restricting further expansion of agriculture. Farmers rely on Temporary Ownership Licenses (TOLs), valid from 5 to 15 years (Midmore et al. 1996); if these were restricted it would help discourage the cutting of new plots from hillsides and encourage sustainable practices. In 2000 Cameron Highland farmers were supplying around 60% of Malaysia's agricultural produce – so there may be some resistance to control. The priority is to sustain and improve production on existing farms and strengthen soil and water conservation practices used by farmers. Authorities should encourage and increasingly demand environmentally-friendly farming methods: it would be relatively easy to require each farm to install a system of drains and sumps to collect as much polluted runoff as possible before it can reach streams (Plate 2). More use might be made of green manure and mulching. Composting organic waste from settlements and hotels might help sustain farmed plots and assist with highland refuse disposal. If there is insufficient material to compost it may be possible to compost organic waste in the lowlands and use the new highway to deliver it. To date, few TOLs have been revoked for poor soil and water conservation practices. This needs to be reviewed. There should be some control of plastic rain-shelters used by farmers to ensure there is no littering or burning of the materials when these are periodically replaced.



Plate 2. Rain shelters and drip-irrigation using plastic bags to hold plants. These cultivation techniques are very widely used in the Cameron Highlands, although some crops are planted directly in the soil in beds. Here at a research station a catch-drain surrounds the shelter; with a suitable sump and waste disposal regime, this sort of installation could prevent much of the agrochemical pollution of streams at reasonable cost.

There is already commercial cultivation of watercress in some of the cleaner streams of the Cameron Highlands (Rahman 1980). Watercress and other plants like reeds or *Azolla* might be planted in silt-trap lagoons to catch eroded soil and lock-up some of the nutrients from agricultural and sewage pollution. Periodic harvesting of these plants and silt could provide useful crops or compost for sustaining farms, as well as reducing downstream problems. It is crucial to ‘dovetail’ development activities to enhance sustainable development. With good co-ordination a range of ecotourism activities could be fitted together in a flexible and adaptive way to encourage longer stays and more spending, some of the profits can then be used to help establish sustainable agriculture and improve biodiversity conservation.

NOTES:

- ¹ The Ecotourism Society – founded in the USA in 1991 - holds regular workshops and publishes guidelines – e-mail: ecotsoc@igc.apc.org
- ² Guidelines on ecotourism, with source address details are listed in Lindberg & Hawkins (1993: 42-54).

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REFERENCES

- Ashton, P.S. & Ashton, R.E. 2002. *Ecotourism: sustainable nature and conservation based tourism*. Melbourne (FL): Krieger Publishing.
- Barrow, C.J., Chan, N.W., Clifton, J., Chang, W.F., Wong, C.F. & Ting, P.L. 2003. Effects of environmental degradation on Orang Asli livelihood: a case study in the Cameron Highlands. In: Wan Ruslan Ismail, Samar, N., Majid, A.A., Abdulla, M.A. & Abdullah, A.L. (Eds.). *Proceedings of a Conference on Society, Space and Environment in a Globalised World*, 437-448. Penang: Universiti Sains Malaysia.
- Berry, S. & Ladkin, A. 1997. Sustainable tourism: a regional perspective. *Tourism Management*, 18(7): 433-440.
- Boo, E. 1990. *Ecotourism potential and pitfalls* (2 vols.). Washington (DC): World Wildlife Fund.
- Cater, E. 1995. Environmental contradictions in sustainable tourism. *The Geographical Journal* 161: 21-28.
- Cater, E. 2000. Ecotourism. In: Smelser, N.J. & Bates, P.B. (Eds.). *International encyclopedia of the social and behavioral sciences*, 4165-4168. New York: Elsevier.
- Chan, N.W. 2000a. Degradation of highland areas in Malaysia. Effects on water resources. In: Consumer Association of Penang (ed.). *Tanah air ku: land issues in Malaysia*, 66-86. Penang: Consumer Association of Penang.
- Chan, N.W. 2000b. Ecotourism best option for Cameron's. *New Straits Times* 19/01/00, p.2.
- Chan, N.W. 2000c. Protect Cameron Highlands. *The Sun* 12/01/00, p.16.
- Chan, N.W., Clifton, J., Barrow, C.J., Chang, W.F., Wong, C.F. & Ting, P.L. 2003. Development issues and prospects in Cameron Highlands. In: Wan Ruslan Ismail, Samar, N., Majid, A.A., Abdulla, M.A. & Abdullah, A.L. (Eds.). *Proceedings of a Conference on Society, Space and Environment in a Globalised World*, 240-251. Penang: Universiti Sains Malaysia.
- Clarkson, J.D. 1968. *The cultural ecology of a Chinese village: Cameron Highlands, Malaysia*. Department of Geography Research Paper No. 114. Chicago (IL): University of Chicago.
- Clifton, J., Barrow, C.J., Chan, N.W., Chang, W.F., Wong, C.F. & Ting, P.L. 2003. Ecotourism in Cameron Highlands (Malaysia) and Wakatoli Marine National Park (Indonesia): issues and challenges. In: Wan Ruslan Ismail, Samar, N., Majid, A.A., Abdulla, M.A. & Abdullah, A.L. (Eds.).

- Proceedings of a Conference on Society, Space and Environment in a Globalised World*, 383-392. Penang: Universiti Sains Malaysia.
- Dabbert, S., Häring, A.M. & Zanoli, R. 2004. *Organic farming: policies and prospects*. London: Earthscan.
- Duffy, R. 2002. *A trip too far: ecotourism, politics & exploitation*. London: Earthscan.
- Fennell, D.A. 1999. *Ecotourism: an introduction*. London: Routledge.
- Fennell, D.A., Dowling, R.K. & Kingston, B.A. 2003. *Ecotourism policy*. Wallingford: CABI Publications.
- Foucat, V.S.A. 2002. Community-based ecotourism management: moving towards sustainability in Ventenilla, Oaxaca, Mexico. *Ocean & Coastal Management* 45(8): 511-529.
- Freeman, D. 1999. Hill station or horticulture? Conflicting imperial visions of the Cameron Highlands, Malaysia. *Journal of Historical Geography* 25(1): 17-35.
- Garrod, B. & Feyall, A. 1998. Beyond the rhetoric of sustainable tourism. *Tourism Management* 19(3): 199-212.
- Gösling, S., Borgström, H.C., Hörstmeier, O. & Sagel, S. 2002. Ecological footprint analysis as a tool to assess tourism sustainability. *Ecological Economics* 43(3): 199-211.
- Government of Malaysia. 1996. *Seventh Malaysia Plan 1996-2000*. Kuala Lumpur: Government of Malaysia.
- Government of Malaysia. 2001. *Eighth Malaysia Plan 2001-2003*. Kuala Lumpur: Government of Malaysia.
- Lindberg, K. & Hawkins, D. (eds.). 1993. *Ecotourism: a guide for planners and managers*. Bennington (VT): The Ecotourism Society.
- Lück, M. 2002. Looking into the future of ecotourism and sustainable tourism. *Current Issues in Tourism* 5(3-4): 371-374.
- McCool, S.F. 2001. *Tourism, recreation and sustainability: linking culture and the environment*. Wallingford: CABI Publications.
- Midmore, D.J., Jansen, H.G.P. & Dumsday, R.G. 1996. Soil erosion and environmental impact of vegetable production in the Cameron Highlands, Malaysia. *Agriculture, Ecosystems and Environment* 60(1): 29-46.
- Mowforth, M. & Munt, I. 1998. *Tourism and sustainability: new tourism in the Third World*. London: Routledge.
- Nicholas, C. 2000. *The Orang Asli and the contest for resources: indigenous politics, development and identity in Peninsular Malaysia*. International Work Group for Indigenous Affairs, Copenhagen (iwgia@iwgia.org).
- Oh, C. 2000. Policy and legislation for the protection and conservation of highland areas and hill lands in Malaysia. pp. 87-99. In: Consumers' Association of Penang (ed.). *Tanah airku: land issues in Malaysia*. Penang: Consumers' Association of Penang.
- Orams, M.B. 1995. Towards a more desirable form of ecotourism. *Tourism Management* 16(1): 3-8.
- Page, S. & Dowling, R.K. 2001. *Ecotourism*. Harlow: Addison Wesley.
- Pasoff, M. 1991. Ecotourism re-examined. *Earth Island Journal* 6(2): 28-29.

- Pfarr, C. 2001. Concepts of sustainable development, sustainable tourism, and ecotourism: definitions, principles and linkages. *Scandinavian Journal of Hospitality and Tourism* 1(1): 68-71.
- Rahman, S.A. 1980. The cultivation of watercress in Cameron Highlands. Research Paper No. 67, MARDI, Serdang. 13 pp.
- Raine, A. 1995. *Hill resorts and nature parks in Malaysia*. Kuala Lumpur: S. Abdul Majeed.
- Selman, P. 1996. *Local sustainability: managing and planning ecologically sound places*. London: Paul Chapman.
- Shepherd, A. 1998. *Sustainable rural development*. London: Macmillan.
- Shirasaka, S. 1988. The agricultural development of hill stations in tropical Asia: a case study of the Cameron Highlands, Malaysia. *Geographical Review of Japan* 61, Series B2: 191-211.
- Spencer, J.E. & Thomas, W.L. 1948. The hill stations and summer resorts of the Orient. *Geographical Review* 38(4): 637-651.
- Stabler, M.J. (ed.). 1998. *Tourism and sustainability*. Wallingford: CABI Publishing.
- Tempany, H.A. & Curtler, E.H. 1933. Tea cultivation in the highlands of Malaya. *Tropical Agriculture* 81(3): 366-371.
- Voon, P.K. & Khoo, S.H. 1980. Upland development and settlement in Malaysia. *Malaysian Journal of Tropical Geography* 1(1): 47-58.
- Wazir-Jahan, B.A.K. 1990. Environmental economics and forest resource industries among the Orang Asli of Peninsular Malaysia. Monograph, School of Humanities, Universiti Sains Malaysia, Penang.
- Wearing, S. & Neil, J. 1999. *Ecotourism: impacts, potentials and possibilities*. London: Butterworth-Heinemann.
- Weaver, D.B. 1998. *Ecotourism in the Less Developed World*. Wallingford: CABI Publishing.
- Weaver, D.B. (ed.). 2001. *The Encyclopaedia of ecotourism*. New York: CABI.
- World Bank. 2003. *World Development Report 2003. Sustainable development in a dynamic world: transforming institutions, growth, and quality of life*. Oxford: Oxford University Press.

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