

# Who Counts? Demography of Swidden Cultivators in Southeast Asia

Ole Mertz · Stephen J. Leisz · Andreas Heinimann · Kanok Rerkasem · Thiha ·  
Wolfram Dressler · Van Cu Pham · Kim Chi Vu · Dietrich Schmidt-Vogt ·  
Carol J. P. Colfer · Michael Epprecht · Christine Padoch · Lesley Potter

Published online: 27 May 2009  
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**Abstract** Swidden cultivators are often found as a distinct category of farmers in the literature, but rarely appear in population censuses or other national and regional classifications. This has led to a worldwide confusion on how many people are dependent on this form of agriculture. The most often cited number of 200–300 million dates back to

the early 1970s, but the source is obscure. We assess available, published data from nine countries in Southeast Asia and conclude that on this basis it is not possible to provide a firm estimate of the number of swidden cultivators in the region. A conservative range of 14–34 million people engaged in swidden cultivation in the region

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O. Mertz (✉)  
Department of Geography and Geology,  
University of Copenhagen,  
Copenhagen, Denmark  
e-mail: om@geo.ku.dk

S. J. Leisz  
Department of Anthropology, Colorado State University,  
Fort Collins, CO, USA  
e-mail: sleisz@colostate.edu

A. Heinimann · M. Epprecht  
Swiss National Centre of Competence in Research North South,  
Institute of Geography, University of Berne,  
Berne, Switzerland

A. Heinimann  
e-mail: andreas.heinimann@cde.unibe.ch

M. Epprecht  
e-mail: michael.epprecht@cde.unibe.ch

K. Rerkasem  
Faculty of Social Science, Chiang Mai University,  
Chiang Mai, Thailand  
e-mail: kanok@chiangmai.ac.th

Thiha  
Walai Rhukhavej Botanical Research Institute,  
Mahasarakham University,  
Maha Sarakham, Thailand  
e-mail: thiha@msu.ac.th

W. Dressler  
School of Social Science, The University of Queensland,  
Brisbane, Australia  
e-mail: w.dressler@uq.edu.au

V. C. Pham · K. C. Vu  
Centre of Applied Research in Remote Sensing and GIS,  
CARGIS, Hanoi University of Science,  
Hanoi, Vietnam

V. C. Pham  
e-mail: pvchanoi@vnn.vn

K. C. Vu  
e-mail: vukimchi@gmail.com

D. Schmidt-Vogt  
Natural Resources Department, Asian Institute of Technology,  
Klong Luang, Pathum Thani, Thailand  
e-mail: schmidt@ait.ac.th

C. J. P. Colfer  
Center for International Forestry Research,  
Bogor, Indonesia  
e-mail: c.colfer@cgiar.org

C. Padoch  
Institute of Economic Botany, The New York Botanical Garden,  
The Bronx, NY, USA  
e-mail: cpadoch@nybg.org

L. Potter  
Australian National University,  
Canberra, Australia  
e-mail: lesley.potter@anu.edu.au

is suggested, however. We argue that along with improved knowledge of swidden livelihoods, there is an urgent need to develop techniques that will allow for better estimates of swidden populations in order to secure appropriate rural development and poverty reduction in swidden areas.

**Keywords** Shifting cultivation · Population · Census · Southeast Asia

## Introduction

Swidden cultivators appear in much of the literature on farming in the tropics as a distinct group of farmers, often associated with specific ethnic groups, and often living in sparsely populated upland areas and in conflict with the interests of other land users, especially those in the forestry sector. There also have been many attempts at classifying swidden cultivators into various categories, partly to counter the negative opinions of swidden land use by distinguishing, for example, between “integral” and “partial” swiddeners (Conklin 1957) and “shifted” versus “shifting” cultivators (Myers 1992). The idea is that “integral swiddeners” and “shifting cultivators” are people who have used swidden for generations and therefore have systems well-adapted to their environment, whereas the “partial” and “shifted” are people either focusing more on other parts of the farming system or who have become swiddeners by necessity rather than choice (and therefore are more likely to degrade the environment). Whether these classifications hold can be discussed (Mertz *et al.* 2009), but in the analysis of these issues an important parameter is often missing: how many people are involved in these different types of swidden activities and how much land is affected by their activities? The latter will be addressed in another article in this issue (Schmidt-Vogt *et al.* 2009), while this article focuses on the (lack of) swidden demographic data.

One of the difficulties linked to assessing the number of swiddeners is that official censuses usually group practitioners of swidden/fallow systems into the category “farmers,” which does not recognize the specific land use and natural resource management practices that they utilize. Additionally, they are typically merged with others who use very different cultivation practices and the diversity of livelihoods in rural areas where swidden cultivation is found—as demonstrated elsewhere in this issue (Cramb *et al.* 2009)—further complicates both the demographic and land use/cover classification exercises. People who might identify themselves or be identified by others as swiddeners are often engaged in a range of other activities such as plantation agriculture, permanent cash cropping and off-farm jobs that may contribute more to household income

than swidden cultivation. In this article a swidden cultivator is defined as a person belonging to a household that practices swidden and derives—either in real or perceived terms—an important part of their subsistence income from swidden cultivation. For a definition of swidden cultivation, please see the introduction to this special issue (Mertz *et al.* 2009).

An additional complication is that any data regarding the number of swiddeners will always be outdated by the time it is published as they are a very dynamic and constantly changing group, especially in recent decades. Even though state policies on swidden cultivation may be driven mainly by other factors (Fox *et al.* 2009) we believe that knowledge of this number at different points in time is a prerequisite for developing useful scenarios for future development of areas currently dominated by swidden cultivation. In cases where such basic information is unavailable, planners and policy-makers have no sound basis for decisions on land use, livelihood improvements and environmental management in what are often the poorest regions of their countries.

The purpose of this article is to review the evidence available regarding the number of people dependent on swidden cultivation. The study takes a point of departure in global data and then focuses on Southeast Asia to assess the data available for each country in that region. The article is based on data derived mainly from the scientific literature and published reports from the region. The broader intent is to provide input to a regional assessment of the current practice of swidden that may assist in identifying research gaps and needs in Southeast Asia and which may be applied to other regions of the world where similar situations exist.

## The Global Population of Swidden Cultivators

The reliability of estimates of the number of people depending on swidden cultivation has frequently been questioned (Byron and Arnold 1999; Mertz *et al.* 2008; Padoch *et al.* 2007; Sanchez *et al.* 2005). There are numerous references in the literature to how many people are dependent on swidden worldwide, but few of them—when looking carefully at the data sources—are empirically based assessments. Figures range from about 40 million to one billion and Table 1 shows a selection of sources and the data they cite. Tracing back to the cited sources often leads to a “dead end” without any apparent empirical data to support the statements. The estimate of 500 million swiddeners from the 1980s comes from a UNEP/FAO study in 1982. It is based on a rough estimate of the global forest-fallow land and the assumption that average fallow periods are 5 years and the average family size is six people

**Table 1** The evolution of estimates of the number of swidden cultivators worldwide

Reference	Estimate, million swiddeners	Source of data
Sanchez <i>et al.</i> (2005)	37	Cites Dixon <i>et al.</i> (2001)—however the number appears not to be available in this reference
IFAD <i>et al.</i> (2001)	Possibly 1,000	Not indicated
Dupriez and de Leneer (2001)	300	Not indicated
Kleimann <i>et al.</i> (1996)	>300	(Andriess and Schelhaas 1987)
Myers (1994)	300	Cites Denevan (1980), who, however, only provides data for Latin America
Warner (1991)	250–300	(Myers 1986; Russell 1988)
Andriess (1989)	300	Not indicated
Goldammer (1988)	500	Lanly (1985)
Russell (1988)	200 in 1957 300 in 1987	Cites Anonymous (1987) for 1987 number
Andriess and Schelhaas (1987)	300	Not indicated
Anonymous (1987)	300	(Fortmann 1986)
Myers (1986)	250	Not indicated
Fortmann (1986)	300	Not indicated
Lanly (1985)	500	Based on estimate in FAO/UNEP study
Dove (1983)	240–300	(Sanchez 1976)
Hartmanns (1981)	300	Not indicated
Sanchez (1976)	250	(Hauck 1974)
Hauck (1974)	250	Not indicated
Conklin (1963)	200	FAO Staff (1957)
FAO Staff (1957)	200	Not indicated

in the 90 countries covered by the study in 1980 (Lanly 1985). Although it is the best estimate made so far in the literature, the figure will have changed significantly during the last 25 years. The figures of 250–300 million have been repeated in a large number of articles and go back to the early 1970s, but as can be seen from the table, the empirical origin is obscure. Sanchez *et al.* (2005) argues that the number of swiddeners today is much lower, but cites a study which appears not to mention any figures on swidden cultivation (Dixon *et al.* 2001). Contrary to this statement, a joint publication of several research centers and donors consider the 250–500 million a conservative estimate and suggest that as many as one billion people may rely directly or indirectly on swidden cultivation (IFAD *et al.* 2001).

As a matter of fact, we have found no empirically based studies on the global swidden population since the 1980s.

Myers suggested an annual growth rate in 1985 of 3–7% in the number of swiddeners worldwide, but did not cite the origin of this figure. It appears to be based on general figures for population growth in rural communities of developing countries, but does not account for deagrarianization processes and migration to urban areas, which may have led to a decline in the number of people relying on swidden. The net consequences of rural population growth on the one hand and deagrarianization, rural–urban migration on the other are in fact rarely treated in the literature for swidden areas. Smallholder land use intensification and large scale conversion of swidden lands will also drive swiddeners to other land use activities, but it seems that the two recent and rather extreme figures in Table 1 (37 and 1,000 million) have extrapolated swidden population trends based on one or a few parameters (e.g. population growth) without considering other developments that work in the opposite direction (e.g. rural–urban migration).

While the global data are obviously inadequate to get an idea of the number of people relying on swidden today, it should, in principle, be easier to obtain regional and local estimates. In the following section, we examine available regional and local data from Southeast Asia, and identify the gaps in data and research needed to arrive at a reliable estimate for the region.

### The Swidden Population of Southeast Asia

The number of swidden cultivators in Southeast Asia has been debated in several works, but most studies refrain from providing numbers. Spencer (1966) estimated that in the 1960s some 50 million people made a living from swidden cultivation in Southeastern Asia, which in his assessment included much of South Asia, southern China and New Guinea. The FAO has published “guesstimates” on people dependent on forests in the Asia-Pacific region in the 1990s, arriving at a total of 481–579 million people of which 149–189 million are in Southeast Asia, including Yunnan, China (Ma 1999). Another study estimates that 500–600 million people were living in or near forest reserves in Asia in the early 1990s (Lynch and Talbott 1995) and a similar estimate is found in a recent ICIMOD report suggesting that there are 400 million forest dependent people in Asia most of whom practice some form of swidden cultivation (Kerkhoff and Sharma 2006). These data are now being complemented by the global project “Poverty and Environment Network (PEN)” facilitated by CIFOR that aims to understand how forest use and dependency can help reduce poverty (CIFOR 2007). However, the number of people dependent on forests or living near forests does not equate to the number of swidden cultivators (Byron and Arnold 1999), and this is

reiterated in the PEN work where “swidden agriculturalists” are only one of six categories of beneficiaries of forest products (Cavendish 2003). Hence, the regional estimates above may not be very useful proxies for the present assessment.

We therefore take a country by country approach and evaluate published data from each country and identify data gaps, which need to be addressed in order to improve the estimates. Our use of proxies for swidden cultivators is very conservative as such data often need considerable reanalysis and ground truthing to assess the reliability, which is beyond the scope of this review. We define Southeast Asia as mainland Southeast Asia (Myanmar, Thailand, Cambodia, Vietnam, Laos and Yunnan-China) and Insular Southeast Asia (Malaysia, Indonesia, Philippines). Brunei and Singapore are not included in the review and East Timor is included under Indonesia as post-independence data are unavailable.

### Country Estimates

In Myanmar, swidden cultivation has been practiced in the hilly regions by tribal groups (such as Kachin, Kayah, Karen, Chin and Shan) for a century or more, and is still found throughout the country (Hlaing 2004; Htun 2007), although ecological and demographic data regarding this land use are largely unavailable. In 1994, Uhlig *et al.* (1994) estimated that 15 million people were dependent on swidden cultivation in the late 1980s, but this was a proxy based on the population in upland areas dominated by the Karen. It does correspond to the FAO estimate of 25 million people directly dependent on forests (Ma 1999). Hlaing (2004) arrive at a much smaller number of 1.5 to two million people directly or indirectly dependent on swidden cultivation in Myanmar, but no source of the data was cited. This figure contrasts sharply with the government statistics cited in Htun (2007) stating that two million families or ten million people are practicing swidden cultivation. As it appears, data for Myanmar are highly inconclusive.

Swidden cultivation has declined rapidly in Thailand in the past decades and is now mainly found in the northern and western parts of the country close to the border with Myanmar and Laos. The swidden population was estimated to be four–five million people in 1982, but these figures also included lowland farmers who moved to the uplands to practice permanent cultivation (Srisawas and Suwan 1985). In the late 1990s the swidden population was estimated to be 1.5 million (Uhlig *et al.* 1994) and more recent census data suggest that there are only 260,000 people fully dependent on “traditional” swidden cultivation and 560,000 people partially dependent on swidden cultivation left (Department of Social Development and Services 2002). Those who were identified as partial swiddeners are still practicing swiddening with fairly short fallows (3–

5 years). In this type of community, some farmers have also shifted to intensive cash cropping. In these cases, the villages’ traditional swidden landscape is transforming to a mosaic pattern of traditional and ‘modern’ farming practices. It is not certain whether farmers identify themselves primarily as swiddeners or not, but the government identifies them as swiddeners as long as they cut and burn fallow areas. In Thailand the data suggest that the number of people depending on swidden cultivation has been halved over a period of 10 years, and the FAO estimate of 12–15 million people dependent on forests in 1999 (Ma 1999) seems not to have much link to the actual number of swidden cultivators, perhaps because many forest dwelling people have changed to permanent farming.

In Cambodia swidden cultivation is mainly found in the northeast of the country and a rapid decline in swidden land was found between 1965 and 1992 associated with a sharp increase in population (Fox and Vogler 2005). FAO estimates that five–six million people were forest dependent in Cambodia (Ma 1999), but no other provincial or country-wide data appear to have been published on the number swidden cultivators.

Swidden cultivation is found throughout the uplands of Laos and numerous estimates of swidden cultivators have been made. In the early to mid 1990s some sources agree that one–1.2 million people or about 25% of the population were involved in swidden cultivation (Fujisaka 1991; Pravongviengkham 1998). FAO estimates of forest dependent people in the same years were as high as three million (Ma 1999). Other sources mention that 300,000 families in Laos are considered as farmers of forests (Chazee 1994) or as partial or full swidden cultivators, equaling 1.8 million people or 40% of the population. This is partly corroborated by an estimate of 1.64 million made by Souvanthong (1995), whereas in the late 1990s an official Lao government Report (MAF 1999; Roder 2001) estimated that 25% of the rural population, or roughly 150,000 households are swidden cultivators. In 2000, it was reported that 39% of the total population depended on swiddening (JICA and MOAF 2001; Thomas 2005), which, with a total population in 2000 of 5.2 million, suggests that there were about two million swiddeners in Laos. In none of the cases is it clear how the estimates were made. Today, we estimate that approximately 20% of the rural population active in agriculture or about 800,000 to one million people are still involved in swidden practices. This figure is based on the analysis of the 2005 census (Messerli *et al.* 2008) in conjunction with a recently developed land cover mosaic approach (Messerli *et al.* 2009). The land cover mosaics approach, analyzing the spatial coexistence of respective characteristic land cover types, allows approximating “swidden landscapes” on a national level and is combined with the spatially referenced village level census data of 2005 as well as the agriculturally active population.

In Vietnam swiddening is associated with ethnic minorities living in the northern and central highland areas. Almost all Kinh (the ethnic majority) who have moved into the mountains from the delta areas, mostly during the last century, have not taken up the practice, but have concentrated their farm activities on plantation crops, such as coffee and recently pepper, or are government employees. Consequently, it may be possible to gain an estimate of the number of swiddeners in Vietnam by looking at the ethnic minority populations in the northern and central highlands. It is estimated that 50 of the 54 ethnic minorities of Vietnam practice, to varying degrees, some form of swidden cultivation resulting in an approximate figure of three million swiddeners in Vietnam (Rerkasem 2003; Sam 1994; Sargent *et al.* 1991). Based on the available ethnicity data derived from the 1999 census (Epprecht and Heinemann 2004) one could imagine updating the above estimate by considering only minorities who traditionally practice swidden cultivation and reside in the highlands of Vietnam. FAO on the other hand estimated that 20 million people (~25% of total national population) in Vietnam were dependent on forests (Ma 1999). As a proxy for swidden cultivators, this figure is far too high as it is not possible that 25% of the Vietnamese population is still involved in swidden. The entire upland population is around 25 million people of whom only about ten million belong to ethnic minority groups (Cuc 2002; The *et al.* 2004). Moreover, the so-called “sedentarization programme” in Vietnam targeted some 3.1 million people in 1995 of whom 1.3 million were said to practice “nomadic farming” and 1.8 million had fixed residence but still shifted the fields. In 2002, after 30 years of implementing policies on sedentarization, only 33% of the involved swiddeners had joined and settled with “fixed field, fixed residence” (Hoa 2002). Based on the above we estimate that current numbers of people practicing swidden cultivation in Vietnam surely is below five million and probably below three million.

In Yunnan, China, FAO estimated in the mid-1990s that 20 million people were dependent on forests (Ma 1999), but the forests and swidden areas in the province are rapidly being transformed to other land uses, especially rubber plantations (Guo *et al.* 2002; Weyerhaeuser *et al.* 2005; Xu *et al.* 1999; Xu 2006). The number of forest and swidden dependent people is therefore likely to have declined drastically since the mid 1990s. There are no available estimates of how many people in the province are dependent on swidden cultivation.

Swidden cultivation in Malaysia is mainly found in Sabah and Sarawak and only very few Orang Asli farmers still practice swidden in Peninsular Malaysia. Swiddening in Sabah and Sarawak is mainly practiced by the more than 50 ethnic groups that traditionally have inhabited the rural areas, including the Iban, Bidayuh, Kayan, Murut and

Dusun. However, it is rapidly being replaced by other land uses such as oil palm plantations and although elements of the system are maintained, the degree to which people are dependent on the system is declining (Cramb 2007; Hansen and Mertz 2006; Padoch *et al.* 2007). Specific data on swidden cultivators are not available in Sabah and Sarawak. The rural population in Sarawak in 1985 was about 1.2 million (Chan 1987) and at that time a large majority of these were swiddeners. According to the Sarawak Government website the population of ethnic groups that used to be predominantly swiddeners was close to 900,000 in 2005 (<http://www.sarawak.gov.my>, viewed 16-09-2008), and an unknown fraction of these are still practicing swidden cultivation to a smaller or larger extent. In Sabah, the total population was three million in 2005 and the ethnic groups traditionally practicing swidden cultivation made up about half of this (Leete 2008). The largest of these groups is the Kadazan/Dusun, many of whom are now urban based, so the number of people practicing swidden cultivation in Sabah is well below one million. FAO estimated four–five million people in Malaysia to be directly dependent on forests (Ma 1999), but this number has probably decreased in recent years.

In Indonesia, the areas with the highest population of swidden cultivators are Kalimantan, Sumatra, Sulawesi, Papua and Nusa Tenggara. Weinstock (1990) cites data from the Ministry of Forestry studies in 1983 and arrives at the following figures: Sumatra (without Lampung) 1,310,650; Kalimantan 1,142,350; Sulawesi 1,217,850; Moluccas 93,520; Papua (Irian Jaya) 598,200; West Nusa Tenggara 64,800; East Nusa Tenggara 1,189,850; and East Timor 175,315. The total for Indonesia around 1980 should then be 5,792,535 swidden cultivators (excluding Lampung, including East Timor) out of a total population given to be 55.8 million at the time. The data are assessed not to be very reliable and the exclusion of Lampung could have been politically motivated to avoid showing that many transmigrants have turned to swiddening. Moreover, the Sulawesi data include an apparently excessive 776,850 for North Sulawesi and East Timor data are very questionable (Weinstock 1990).

More recent data quoted by Sunderlin *et al.* (2000) and drawing on Forest Department statistics estimate that there are 1.26 million households dependent on swidden cultivation in Sumatra, Kalimantan, Sulawesi, Irian Jaya and the Moluccas, or about 14% of the rural population. Based on their own estimates that an average forest household is composed of 4.8 household members, this adds up to a total of about 6.0 million shifting cultivators in these five areas (Sunderlin *et al.* 2000). Except for the exclusion of Nusa Tenggara, this corresponds well with the data from Weinstock; especially if it is assumed that population growth and abandonment of swidden cultiva-

tion cancel each other out and make the number of people dependent on swidden fairly constant.

According to the FAO estimates, Indonesia is the country in the region with the most people being dependent on forests, but the estimates are also highly uncertain with a range of 40–70 million (Ma 1999). Moreover, Fox and Atok (1997) pointed to several confusing estimates of the swidden population made around 1990 that range from seven–60 million. Looking specifically at West Kalimantan, and employing four different methods, they estimated a forest-dwelling population of about 850,000, but cautioned that their census-GIS based approach may need to be adapted to local conditions if used elsewhere in Indonesia. Moreover, forest-dwellers may not always be synonymous with swidden cultivators as some areas where short-fallow swidden cultivation is practiced may no longer be classified as forests, and the rapid expansion of plantation agriculture in Kalimantan has most certainly caused a decline in people living in forests. On the other hand, the estimate of Fox and Atok (1997) is not far from the data cited by Weinstock and a late 1980s population of around one million relying primarily on swidden cultivation may therefore be a reasonable guesstimate.

The most recent census data in Indonesia only identify people as farmers and thus give little information about whether they practice swidden cultivation. To extract and verify data from these censuses are beyond the scope of this review article as it would require substantial work with raw data. To extrapolate the 1980 data by Weinstock to current figures is also very risky. The total population in Indonesia has grown to 225 million and if we assume that swidden cultivators still make up 10% of the population, the number would be about 20 million. The data quoted in Sunderlin do not indicate that this is the case and because of land development with plantation agriculture and other new land uses, a high number of former swidden cultivators may no longer practice swidden. On the other hand, many transmigrants have turned to swidden cultivation because of the difficulty of sustaining annual cropping on poor soils. A fairly safe range would probably be in the order of five–ten million people still practicing swidden cultivation.

Swidden cultivation in the Philippines takes place in many parts of the country, but no recent data on the number of swidden cultivators are available. Several older sources indicate data for forest dependent people and “uplanders”. Cruz *et al.* (1988) estimated from 1980 National Census Data a total of 14.4 million uplanders in the Philippines and of these 6.9 million occupied forestlands (in the public domain and therefore “illegally”). They note further that of the total population occupying upland forestlands, 5.0 million are “tribal” Filipinos and 1.9 million are migrant Filipinos. Lynch and Talbott (1988) give a much higher estimate of about 18 million people living in the uplands in

1988 and the FAO estimate of forest dependent people is 20–25 million (Ma 1999). It is estimated that the swidden population does not exceed five million and probably is much lower.

### Regional Estimates

The above review highlights the difficulty of arriving at a reasonable estimate of swidden cultivators in Southeast Asia, because the data are not available at country level. The figures presented in Table 2 should therefore be taken with great care and they are deliberately presented as ranges for most countries.

The regional minimum estimate of 14 million people is conservative as it is the sum of lower estimates for each country and does not include southern China and Cambodia. The upper estimate of 34 million may be excessive as the ranges for several countries are very uncertain. Based on published data it is thus not possible to get closer to the “real” number of swidden cultivators in Southeast Asia, but it is likely to be found within this rather broad range.

### Conclusion and Research Needs

We have shown that there is a surprising lack of conclusive data on the number of people involved in swidden cultivation in Southeast Asia today. Such data are essential if development in rural areas currently and formerly dominated by swidden cultivation is to achieve the international goals of reducing poverty and strengthening local livelihoods. Without an adequate understanding of how many people are using swidden cultivation on how

**Table 2** Summary of best-bet contemporary country estimates of people involved in swidden cultivation in Southeast Asia based on the sources quoted in the text and compared to total population

Country	Estimate, million swidders	Total population estimates in 2007 <sup>b</sup> , million people
Myanmar	2–10	48.8
Thailand	0.7–1	63.8
Cambodia	No estimate	14.5
Laos	0.8–1	5.9
Vietnam	2–5	85.1
Yunnan, China	No estimate	42.9 (2000 population census)
Malaysia	1–2	26.6
Indonesia	5–10	225.6
Philippines	3–5	87.9
REGION	(14–34) <sup>a</sup>	601.1

<sup>a</sup> Without Yunnan, Cambodia, Brunei and East Timor

<sup>b</sup> Based on [www.worldbank.org](http://www.worldbank.org), accessed 14 October 2008

large an area, development organizations will be working in the dark and could propose solutions that are not viable. Other than the technical and statistical problems related to “counting” swiddeners, there may also be significant hidden agendas involved as it is not always in the interest of governments—many of which have outlawed swidden cultivation—to publish numbers that may recognize the presence of an “illegal” group of land users. The dual problem of who counts as swiddeners and who is responsible for counting them has caused the current situation of data gaps.

There are, however, a range of promising methods for obtaining more knowledge about swidden populations. The methods proposed by Fox and Atok (1997) to assess the number of forest-dwelling people have, to our knowledge, not been replicated anywhere in the region. Combining remote sensing data, demographic data, ethnographic studies, and spatial information databases would make it possible to obtain a better picture of the number of people depending fully or partially on swidden cultivation for their livelihoods. The “land cover” mosaic approach presented by Messerli *et al.* (2009) holds the potential to approximate “swidden landscapes” over large areas based on existing remotely sensed national land cover datasets. By overlaying census data at village level onto these mosaic landscapes, an estimate of the population occupying such landscapes is obtained and will most likely be the best approximation of a predominantly swidden based population (Messerli *et al.* 2009). Using national censuses, household income and expenditure surveys and agricultural censuses alone may not be adequate as they all contain information that may identify possible swidden cultivators, but they seldom identify them directly. Another possible approach could be to consider average agricultural land per capita from agricultural censuses combined with ethnographic information from population censuses. The combination of such village aggregates of different censuses coupled with an expansion of the spatial analysis techniques mentioned above to include a temporal change detection dimension holds the clue for more reliable estimates in the future as well as the development of scenarios for change in swidden populations.

Further exploitation of census and household survey information coupled with local case study knowledge may ultimately result in more reliable estimations of the degree of dependency on swidden cultivation and go beyond a binary swidden/no swidden assessment. However, this will require a continued development of our knowledge of swidden livelihoods and the multiple drivers and consequences of swidden transitions to other land use systems as outlined in other articles of this special issue (Bruun *et al.* 2009; Cramb *et al.* 2009; Fox *et al.* 2009; Rerkasem *et al.* 2009; Schmidt-Vogt *et al.* 2009; Ziegler *et al.* 2009).

**Acknowledgements** We would like to thank the Ford Foundation Vietnam which provided funding for a workshop in Hanoi, Vietnam, in March 2008, where the data in this article were discussed.

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