

Does Migration lead to Destabilization of Forest Margins?

-

Evidence from an interdisciplinary field study in Central Sulawesi

**Heiko Faust, Miet Maertens, Robert Weber,
Nunung Nuryartono, Teunis van Rheenen, Regina Birner**

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Table of Contents

Abstract	1
1. Introduction	1
2. Conceptual framework	2
2.1 Theoretical approaches on motives and effects of migration.....	2
2.2 Theoretical approaches on population growth and environmental impact.....	3
2.3 Hypothesis	5
2.4 Geographical setting and methodology	5
3. Actual and historical processes of migration	8
3.1 Migration in Indonesia	8
3.2 Migration in the Lore Lindu Region	9
4. Motives and destinations of the migrants.....	11
4.1. Motives for migration.....	11
4.2 Preferred destination areas of migrants.....	12
4.2.1 Role of economic factors.....	12
4.3.2 Role of political and institutional factors	12
4.3.3 Role of socio-cultural factors	13
5. Effects of migration on land use	14
5.1 Effects that are manifest soon after the migrants' arrival	14
5.2 Effects that become manifest at a later stage	17
6. Discussion of impacts and effects, conclusions and perspectives.....	22
6.1 Regional impacts of migration	22
6.2 Impacts on forest cover	23
6.3 Socio-economic impacts	24
6.4 Conclusions	25
References	26

Abstract

The impact of population growth on natural resource management is still in a contradictory discussion by social and economic scientists: Most researchers observe a negative impact, only some are positive. The paper contributes to this discussion by interpreting data on migration and land use from an interdisciplinary field study in Central Sulawesi, Indonesia. The quantitative and qualitative empirical analysis showed that there are impacts by migration on the population structure, the spatial distribution of the population, the forest cover and the socio-economic system of the local communities around the Lore Lindu National Park. Our findings highlight that while economic factors can be considered as the driving forces of migration to our research area, socio-economic and political and institutional factors play an important role for the choice of destination within the research area. The survey data provide mixed evidence on the question as to which extent migration is responsible for the expansion of agricultural land. The impact of migration on the forest cover can be expected to be related to the technologies and innovations that migrants introduce to the area. The study also points to difficulties in disentangling the effects of migration from the effects of technological innovation. While the findings show a tendency that migration has problematic effects, the results have to be interpreted with caution.

Keywords: Migration, land use, deforestation, environmental impact, population growth, Central Sulawesi, interdisciplinary;

1. Introduction

In many tropical states the natural forests are cleared for the exploitation of the resources or cultivated for other kinds of land use like intensive agriculture or agroforestry systems. This is an immanent world-wide dynamic process and at present the development of the tropical forest is the focus of much concern, produces fears of global warming and loss of biodiversity. One reason might be an increasing population pressure on the so called frontier zone of the forest margin area. Population pressure is due to fertility and to migration from overpopulated areas to less densely populated areas. Two types of internal migration which contribute to the population increase in the frontier areas can be observed in Indonesia. The first is the planned migration by local resettlements and inter-island transmigration programs i.e. streams from the central islands of Java, Bali and Lombok to the periphery islands of Sumatra, Kalimantan or Sulawesi. The second is the spontaneous migration which occurred mainly in between the provinces of the periphery islands like Sulawesi. The consequences of the migration processes are social, political and economic impacts by individual participants, groups and societies on the resource use in the destination area.

The satisfaction of the existence basic needs and the improvement of the living conditions are the main motives of the migration processes. With the establishment of a new demographic structure of village communities it is the question which mechanisms are functioning for a sustainable resources and land use, and which social, economic or cultural factors dominate the forms of living together. One assumption is that different types of migrants may induce different consequences, because there are distinctions from the area of origin.

A contradictory discussion can be observed in the literature on the impact of population growth on natural resource management: Most researchers observe a negative impact, only some are positive. A widespread belief exists that population growth is a significant driver of deforestation. Among the broad-scale factors that drive changes in land cover, of course,

population is a prime candidate, which may be due to the combination of the accessibility of demographic data and a deep-seated belief in the potency of its influence. But the basis for this belief is not always clear in either empirical or theoretical terms. Against this background, this paper aims to contribute to the discussion and investigates the effects of migration, taking the region of Central Sulawesi as an example. The focus of the paper is placed on the comparison and interpretation of the effects on land use by migration and concentrates on the development of the last 30 years, because a significant growing number of migrants is noticed in the research region during this period. Nevertheless the paper gives a perspective for the future land use processes. For this paper, we can draw on a rich set of qualitative and quantitative empirical data that were collected by members from different disciplines, including agricultural economics and cultural anthropology.

The paper proceeds as follows: Chapter 2 presents the conceptual framework and refers to the theories of migration and on the approaches on population growth and its impacts on the environment. Based on selected hypothesis the methodological aspects of the work is explain and a description of the research area leads to section 3, in which the actual migration flows are described on different levels, whereas in the following part 4 the motives for migration in the area are enlightened. The sections 5 and 6 sketch the effects of migration on land use and extract conclusions and perspectives from the empirical data.

2. Conceptual framework

2.1 Theoretical approaches on motives and effects of migration

All the classical migration theories are concerned with the questions why people move, which groups move, in which direction and which social, cultural, economic and political impacts they have in the area of origin and in the area of destination. But given the great variety of migrations, it is not surprising that there is no comprehensive theory of migration and its consequences. Successful attempts have been made to integrate migration into economic and social theory, spatial analysis and behavioral theory. In the late nineteenth century, Ravenstein formulated what he called the “laws of migration”¹ on which much subsequent work has been based (Grigg 1977). Geographers have traditionally paid considerable attention to distance-decay relationships in migration patterns. Most studies show the volume of migration to be inversely related to distance and have used regression techniques to describe this relationship, the basis of the idea of the “mean information field”.

Stouffer (1940) refined further that migration was determined by opportunities at origin and destination and by so called intervening opportunities between the two. Zipf (1949) demonstrates the relationship between population size, distance and migration inspired by gravity models. Others provided more elaborate multivariate models, relating distance to the variety of other factors (Stillwell and Congdon 1991) and seeing migration as a component of population accounts. A more general theory of migration was propounded by Lee (1966), who refined the idea of migration between two places as a response to various “pushes” at origin and

¹ The laws were: a) the majority of migrants go only a short distance, b) migration proceeds step by step, c) migrants going long distances generally go by preference to one of the great centres of commerce or industry, d) each migration current produces a compensating counter-current, e) the natives of towns are less migratory than those of rural areas, f) females are migratory than males within their country of birth, but males more frequently venture beyond g) most migrants are adults – families rarely migrate out of their country of birth, h) large towns grow more by migration than by natural increase, i) migration increases in volume as industries and commerce develop and transport improves, j) the major direction of migration is from the agricultural areas to the centres of industry and commerce, k) the major causes of migration are economic.

“pulls” at destination. The wider understanding of migration flows owes much also to theoretical perspectives from neo-classical economics where migration is seen as a response to differences in wage and income levels in different locations. Thus migrants may move from low-wage, high-unemployment regions to high-wage, low-unemployment regions and bring about an equilibrium between the two. A rather different perspective derives from political economy, in which migrants are seen as an integral part of the working of the capitalist system and reflect capital’s search for cheap and exploitable labor. Migration flows may reflect the changing spatial division of labor.

In the present discussion of the "new migration theories" only little attention is given to the phenomenon of internal migration, justified perhaps by the fact that due to current processes of transnational migrations, in particular into the Western European area, most research works concentrate on the effects of this type of migration and the creation of new social networks for instance in the cities. The view on the population shifts in selected tropical developing countries shows, however, that there is still a large number of rural to rural migration and a rapid change of population structure and distribution. The shaping processes, e.g. forest clearing and settlement following from it, changed from a predominantly directed planning and control to a dynamic spontaneous transformation of cultural landscape. This applies in particular along newly created traffic infrastructure and in colonization areas. The phenomenon of population growth by migration into rural areas is seen as a driving force of changes of landscape and pressure on resources, but it raises the discussion whether it is per se a negative impact.

Definition

Because of the various types of migration and various definitions of migration the term is used in the paper under the following criteria:

- Migration means the permanent (more than 6 month/year) change of residence by an individual or group of people.
- people/households who are coming from another province are considered as migrants
- people/households who are coming from another area in the province are considered as local migrants
- There is no time limit since when these people are considered as migrants. In terms of population growth the terms in-migration and positive net in-migration are also used in literature.

2.2 Theoretical approaches on population growth and environmental impact

There are many interacting causalities which affect both rates of population growth and increases or decreases in the productivity of land resources (Blaikie and Brookfield 1987; Blaikie 1989). Some have taken the point that rapid population growth leads inevitably to increased poverty and natural resource degradation, for instance through land scarcity, falling fallows, deforestation, cultivation of marginal lands, conditions favoring large families and underdeveloped human capital. Population is often assumed to be a primary driver of environmental change in general, and change in land use in particular. This assumption may stem partly from intuition because we tend to expect large populations to have bigger environmental impact than small ones (Mather and Needle 2000: 2).

May be it is due to the influences of neo-Malthusian thoughts that population is necessarily assumed to be limited by the means of subsistence. It increases exponentially when accidents such as inventions or discoveries temporarily increase the means of subsistence but, because diminishing returns to capital and labor, the “new hands which go along with the new mouths do not produce as much, output declines, the land resource is impoverished, and the population increase is reversed by famines, wars, etc.” (Malthus successive editions 1798-1824 *Essay on the Principle of Population* (1798)). An expanding population would necessarily have to take in land of lesser quality, which is giving lower returns to labor. Meadows et al (1972) used similar arguments in “The limits to growth”, pointing to the exponential growth rates in the use of raw materials in the period 1900-1950. In the agricultural field, this has been linked to belief that certain agro-ecological zones have fixed human carrying capacities, which, under a given technology, can only be breached at peril to the environmental base. Because additions of increased amounts of the same input (i.e. seed, weeding labor) suffer from diminishing returns, according to standard farm management theory (Upton 1987), progress in raising output per ha will be dependent on new technologies, and new combinations of inputs and outputs. Technological change becomes necessity to survival as the land/people ratio changes.

That is why Boserup (1965) saw increased population density as pushing intensification methodologies. Out-migration, for work or for settlement is one way of bringing the technology back in balance with the resource base. Boserup saw the new settlement option as usually being preferred while land was available, because it gives a higher return to work than the intensification option. While Malthus regarded new technologies as accidental discoveries, which could not be relied upon to turn up, Boserup² (1965; 1981) explicitly differs from Malthus by taking the opposite position and seeing the adoption of new technologies as impelled by population growth and made feasible by additional labor (Tiffen et al 1994: 263-264). Tiffen as well (1994: 261) argues that “...historically in many societies, population growth has been accompanied by specialization, diversification of the economy, rising living standards, and an increasing rate of technological change which has outpaced any threat to the depletion of resources” and that change is to be seen as positive, not negative. Evidence for a reversal of environmental degradation has been given through a study on Machako in Kenya. Thus Tiffen comes to similar conclusions as Boserup.

More recently Williams (1997) contends that deforestation has a direct relationship to population as well as commercial activity and Harrison (1992) recommends that population growth was responsible for 79 % of global deforestation between 1973 and 1988. Palo and Lehto (1996) have suggested that population pressure is one of the universal underlying causes of pantropical deforestation. Scores of studies of deforestation have been undertaken since the mid-1980s. Brown and Pearce (1994) review some of them and concluded that studies generally indicate that there is a positive correlation between population growth and deforestation. Over the last few years, several researchers have commented on the emphasis placed on population as a supposed driver of forest trends. The emphasis may be self-perpetuating, in the sense that its prominence in the literature attracts further attention (Meyer and Turner II 1992). It is because of the plausibility of population as a driver to the relative ease of quantification compared with most of other potential drivers. Over a time-scale of a few decades, population trends can be forecast with greater confidence than economic trends, and certainly more than

² The findings of Boserup (1990: 11-20) are summarised: Population growth entails larger demand for food and other products. This leads to greater frequency of cropping, a higher labour requirement, and a larger output per unit of land, but a reduced reward for labour day. Therefore, people do not intensify a farm system as long as additional land of equal quality is available. Increased frequency of cropping demands increased labour inputs, not merely into current farming activities, but also into labour investments to conserve and improve farm productivity (terracing, soil improvement, irrigation etc.)

political or cultural trends. Some critics have remarked on the tendency in policy to focus on population rather than to address political factors and issues such as corruption (i.e. Sage 1994).

The significance of political and related factors has increased over the last few years and to this extent the role of population has been played down. Agrawal (1995) explains on his work in Lesser Himalaya that the conclusion that population pressure leads to forest degradation is at best an over simplification. For Thailand Lohmann (1993) concludes that forest colonization cannot be explained simply by population growth: between 1960 and 1985 the amount of land cleared increased by around threefold, but the population only doubled. For wider South East Asia Kummer and Turner II (1994) suggest that population change is not a major driving force of deforestation and report a correlation coefficient of only 0.05 (1970-1980). At a more general level Heilig (1994) asserts that correlation between population growth and land use change cannot be found on a country- by-country level. He urges much greater attention on factors such as changing lifestyles, including for example, changing food preferences and demand for substances such as coffee, cacao and tobacco. He emphasizes that the population-forest relationship cannot be understood simply in terms of land clearance for basic food production, but that other human desires may well also impact upon the forest. Pender et al. (2001) found that population growth had an insignificant influence on most indicators of change and concluded that their findings “support neither the pessimism of some neo-Malthusian observers or the optimism of some neo-Boserupian observers regarding the impacts of population growth.” (Pender et al., 2001: ii). In their review of economic models of deforestation, Angelson and Kaimowitz (1999: 73) found that population growth proved to be ambiguous with regard to deforestation.

2.3 Hypothesis

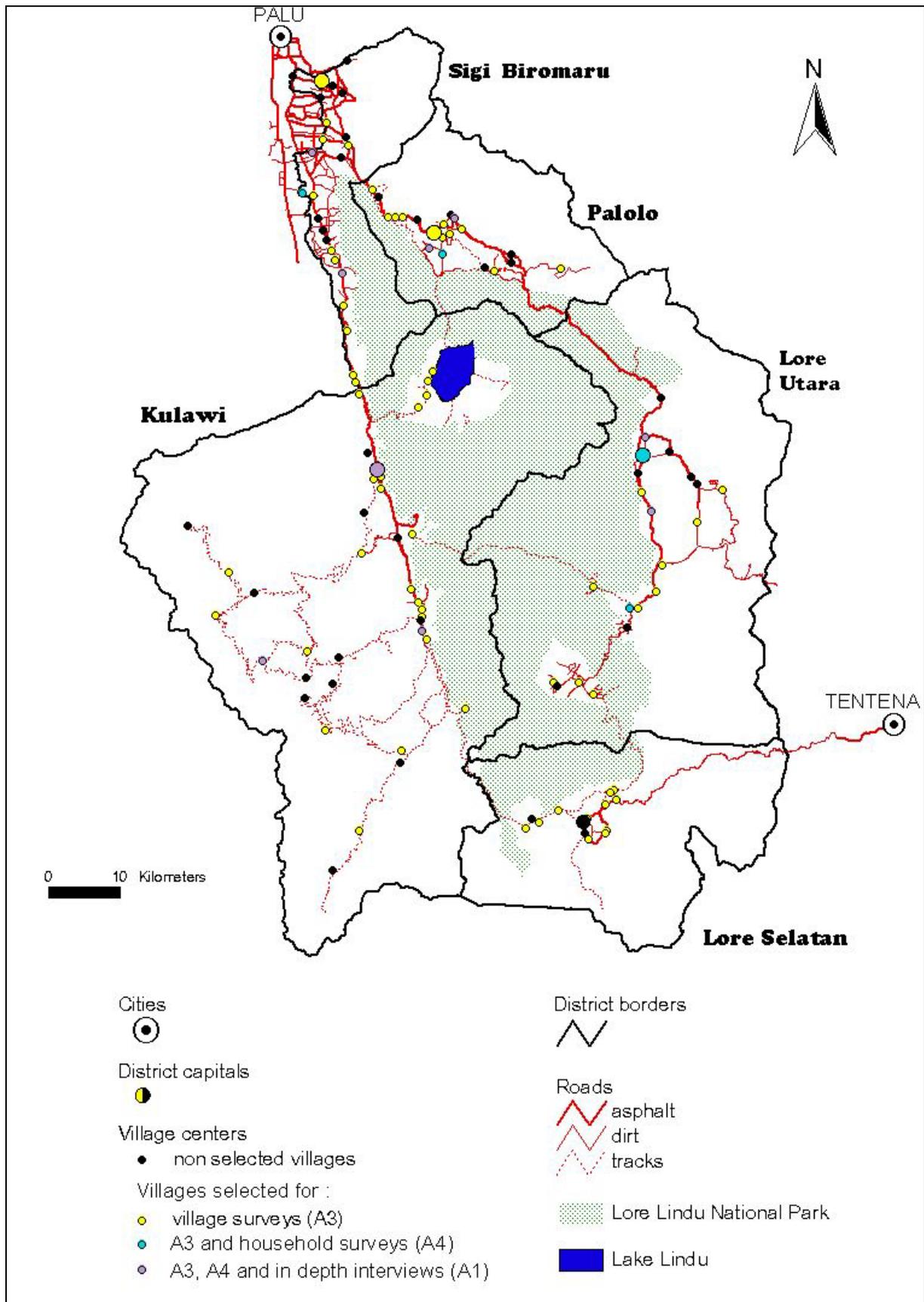
To contribute to the conflicting theoretical debate on whether population growth/migration is a driving force of deforestation, the following core working hypotheses will be evaluated empirically for the Lore Lindu region in Central Sulawesi, Indonesia:

- a) The research area is highly differentiated in terms of motives, destinations and effects of migration
- b) Migration leads to deforestation by expanding the agricultural land.
- c) Migration leads to disruption of the socio-economic system.

2.4 Geographical setting and methodology

The Lore Lindu National Park (LLNP) is located in the province of Central Sulawesi, Indonesia, south of its capital Palu (Figure 1). The park hosts some of the world's most unique plant and animal species. However, changing land use systems are threatening the integrity of the park as is the increase of land used for farming. These processes are being studied by an international group of scientists in a program known as STability Of Rain forest Margins (STORMA). The forest margins of the Lore Lindu National Park were selected as the research area. In this area exists a great variation in ecology, agriculture and socio-economic conditions, while at the same time the area is confronted by many complicated problems. These are problems that will have to be confronted by policy makers at different levels of aggregation (Zeller et al. 2002: 6)

Figure 1: Villages in the Lore Lindu Region selected for a village survey, a household survey and in-depth interviews



To test the hypotheses, we combine different levels of research and attempt to integrate quantitative and qualitative data. To reach this aim, we use an interdisciplinary approach of economic science and social geography, which is certainly a challenge of the paper. By using secondary statistics, quantitative surveys and individual case studies the paper tries to quantify the processes of migration on different levels and for different groups, even if there are no data for every group on each level available. We evaluate patterns of spatial mobility such as internal migration flows, external migration flows and circular migration flows for the Lore Lindu region in Central Sulawesi. Motives of migration and directions of movement as well as their consequences are assessed for different types of migrant groups: spontaneous local immigrants resettled local immigrants, spontaneous immigrants from Sulawesi and transmigrants from other islands. The synthesis of the quantitative and qualitative data will give insights in the processes and effects of migration on regional and local level in the surroundings of Lore Lindu National Park in Central Sulawesi.

Quantitative data

Quantitative data have been taken from the statistical sampling frame of the STORMA sub-project A3-survey on the village level and from the STORMA sub-project A4-survey on household level, in which 12 out of 115 villages of the research area were selected according to a stratified random sampling procedure. In these villages, a random sample of 326 households was surveyed (Zeller et al. 2002: 7-10). Quantitative empirical data of the household survey on socio-economic criteria included demographic characteristics, migration, ethnicity and wealth. With respect to agricultural production, detailed data were collected on the extent and production systems of the major crops, including rice, maize, and cacao. Other questions covered forest gardens, the existence of shifting cultivation, and problems with erosion.

To describe the impact of migration on land use in the Lore Lindu area, we define a sub-sample of 53 villages from STORMA sub-project A3-survey on village level (Zeller et al. 2002 : 3-6). This sub-sample includes all villages that have easy access to roads. We use this subset of villages rather than all 80 villages in the sample to more easily disentangle effects due to access to roads and effects due to migration, because there is almost no migration to villages without road access. We classified this subset of villages according to the land type and according to the percentage of migrants (Table 1).

Table 1: Classification of Villages

Number of villages in the sub-sample		plain	valley/hilly	mountainous	Total
		> 50% of village area is flat (< 3°)	10 to 50% of village area is flat (< 3°)	< 10% of village area is flat (< 3°)	
Native	< 10% migrant households	4	7	11	22
Mixed	10 to 75% migrant households	6	8	11	25
Migrant	> 75% migrant households	0	5	1	6
Total		10	20	23	53

Source: STORMA A3 village survey and secondary data

The first classification divides the villages in three categories: plain, valley/hilly and mountainous. The first class includes villages located completely within valleys (such as in Palolo) or plains (such as in Biromaru), and with more than half of the area being flat (below 3 degrees slope). The second class are villages located partly in the valley and partly in the hills, and with less than half but more than 10 % of the area being flat. The third class are mountainous villages with less than 10 % of the area being flat. The second classification divides villages according to the number of migrants: native villages have less than 10% migrant households; mixed villages have between 10 and 50 % migrant household, and migrant villages have more than 75 % migrant households. These classifications are useful to describe the impact of migration on land use because land use is influenced a lot by topographic features.

Qualitative data

The village and household surveys as well as official statistics give an overview of the population development and the distribution pattern, but the results give limited information for the years before 1980 and do not allow us to get deeper insights and explain processes, influences, and backgrounds of resource management at the micro-level. The standardized information collected in the quantitative surveys, for instance, does not make it possible to compare local groups and migrant groups with respect to their cultural attitudes to land use systems and to potential conflicts. Therefore, we included micro-level case studies as an integrated part of our overall socio-economic analysis. The processes of migration, tradition and cultural change in the framework of the above mentioned aspects were exemplified in detail by STORMA sub-project A1 for nine villages located in the surrounding valleys of Lore Lindu National Park by in-depth qualitative research. Mainly semi-structured interviews were conducted in selected households, with formal and informal leaders of the villages and further key persons concerning the research questions.

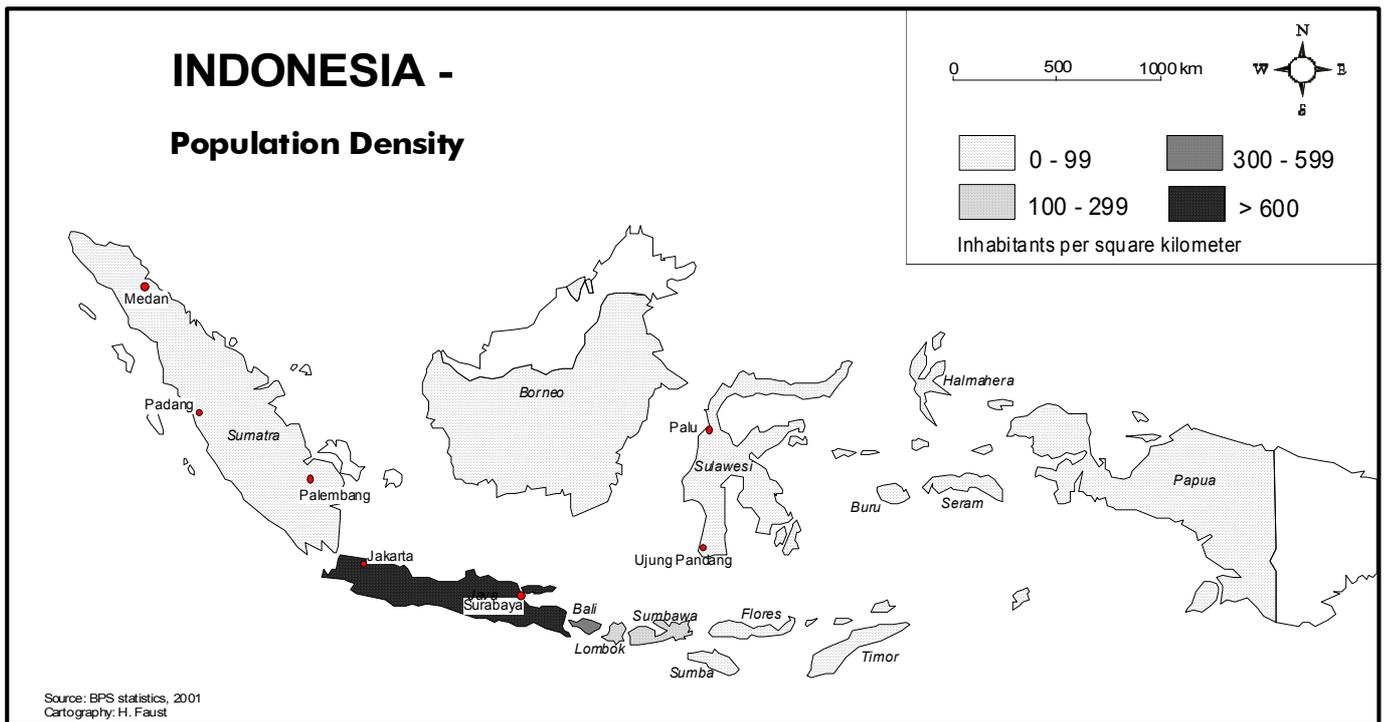
3. Actual and historical processes of migration

3.1 Migration in Indonesia

Indonesia with a total population of 210 million people is the fifth most populated country in the world (World Bank, 2001). The population density in the country is 109 persons per km² and over the past two decades the population grew at an annual rate of 1.7%. Yet, there is a huge diversity in demographic characteristics across the different islands and provinces. The inner islands, Java and Bali, are most densely populated with 944 and 565 people per km², respectively (Figure 2). The outer islands are populated much more sparsely with the density ranging from 117 persons per km² in Nusa Tenggara to 5 persons per km² in Papua. However, population growth is much higher in the outer islands than in the inner islands. E.g. in Papua population grew with 3.23% annually in the past 2 decades while for Java this is only 1.45%.

The disparity in population growth results from considerable migration flows from the inner islands to the outer islands. Part of this migration is planned by the government in Transmigration Programs which initiated under the Dutch Colonial Rule during the early 20th century and were taken over by the Indonesian Government after independence (M. Adriana Sri Adhiati and Armin Bobsien, 2001).

Figure 2:



These programs resettle people from Java and Bali to the outer islands. A transmigrated household receives a small house, a piece of land and the necessary inputs to start cultivation. The aim of the Transmigration Program has been to reduce the pressure on land in the inner islands, boost the development of the outer islands and alleviate poverty by providing land and income opportunities to landless workers. During the last decades, under Suharto's rule, transmigration increased considerably. In the 1980's the Transmigration Program received massive financial support from the World Bank, the Asian Development Bank and bilateral donors. During the past two decades more than 5 million people were resettled, mainly to Sumatra, Kalimantan, Sulawesi, Maluku and Papua. In addition to this planned migration, people also migrate spontaneously between the Indonesian islands. This spontaneous migration is in both directions, from and to the inner islands; but the net migration is negative in the inner islands and positive in the outer islands. Also within the Indonesian islands people are moving. E.g. in Sulawesi, there is a lot of migration from the more densely populated North and South provinces to Central Sulawesi.

3.2 Migration in the Lore Lindu Region

The area around the Lore Lindu National Park in Central Sulawesi is a demographically and culturally very diverse region. From the four districts in the area, Sigi Biromaru is the most densely populated one with a population density of 86 persons per km² (Table 2). This district borders Palu in the North and consists of an extended plain adjacent to mountain ranges in the South and the Southeast. This district was relatively highly populated already in the Dutch period. During the colonial period, the Dutch forced the people to move from the mountains and settle down in the plains. The target of this practice was to limit slash-and-burn farming and promote irrigated paddy rice cultivation. After independence, during the 1960s, the government continued this policy and started attempts to resettle people from remote areas like, e.g., Pipikoro (Kecamatan Kulawi). The Department for Social Affairs, supported by recommendations of other institutions (e.g. Department of Forestry), chose the places of origin in respect to the current status of social and economic infrastructure and/or deforestation. The

places of destination were chosen according to factors such as soil fertility and land availability. The resettlements were organized mainly by the Department of Community Development (Pembangunan Masyarakat Desa, PMD)³. While these institutions emphasize their concern for people who live dispersed or in a semi-nomadic way, it is very likely that other reasons, like better control, played a major role for the selection of people for local transmigration. Under these local resettlement programs, 423 households were resettled into the district Sigi Biromaru, mostly during the 1960's and 1970's. During the last decades, population growth in this district slowed down to 1.3 % annually. The area still receives a lot of spontaneous migrants but during the last 2 decades there has been considerable out-migration, especially to the neighboring Palolo district.

Table 2: Demographic Characteristics per District

	Total	Sigi Biromaru	Palolo	Kulawi	Lore Utara
Total population (2001)	132,214	50,392	24,392	31,726	16,899
# of households	32,104	11,988	6,474	7,055	4,772
Population density (per km ²)	18.69	86.49	42.96	10.35	7.95
Annual population growth					
1980 / 1990	2.04%	2.49%	2.01%	1.27%	3.10%
1990 / 2001	2.75%	1.29%	5.27%	1.84%	6.98%
# of transmigrant households	600	0	0	0	600
# of local resettled households	2144	423	1450	0	271

Source: Survey data of sub-project A3 of STORMA and secondary data (2001/02)

The Palolo district stayed largely unsettled until the 1960's. The area was mostly covered by forest and grassland and partly used as hunting territory. By the end of the 1950's, spontaneous migrants from remote areas of Kulawi and from the highly populated Palu plain opened up the Palolo valley for new settlements. After the first new villages were founded, the government started to resettle people into the area. In total, 52 households were resettled by a Transmigration Program (Bahagia) and 1,450 households were resettled from surrounding mountainous regions as part of local resettlement schemes (Kamarora, Rahmat). Next to this planned migration, the district also attracted a lot of spontaneous migrants from surrounding districts, mainly Kulawi and Sigi Biromaru, as well as from South and North Sulawesi. Although the Palolo valley got inhabited only recently, the population density in the valley is already quite high with 43 persons per km². Since the foundation of the first villages population growth has been very high and increasing. During the last decade, the Palolo population grew with more than 5 % annually.

Kulawi is the largest and most diverse district in the research area. The northern part is the long-standing cultural and political centre of the territory since the age of the Kulawi kingdom. The limited possibilities for agricultural cultivation have kept the number of migrants into this region relatively low. The southern part of the Kulawi district comprises a narrow valley around the village Gimpu and a mountainous area that is home to the Pipikoro people. The area around Gimpu received many of spontaneous migrants from South Sulawesi after the DI/TII rebellion in South Sulawesi in the 1950's. Due to its topographic characteristics, the Pipikoro area is not easily accessible and remains quite isolated and remote until today. Since decades, this region has known a big net out-migration. Despite its long history, the Kulawi district is a region with a relatively low population density (10 persons per km²) and

³ Since 1999, the Department of Transmigration is also conducting local resettlements.

low population growth (1.55% annually over the past 2 decades). The region has never been a target for transmigration and local resettlement programs.

The district Lore Utara comprises the extended Napu valley and the smaller Besoa valley. Although settlement in this area dates back to the old Lore kingdom, the area has a very low population density of only 8 persons per km². But population is growing rapidly. Over the past decade, annual population growth in the district was almost 7%. Since the new road connection to Palu was established in 1982, the area has become very attractive for migrants. During the 1990's the government resettled 600 transmigrant households and 271 local households in the district Lore Utara. The region received also a large number of spontaneous migrants, especially from South Sulawesi and the neighboring Poso district, where a violent conflict causes people to flee to the surrounding regions.

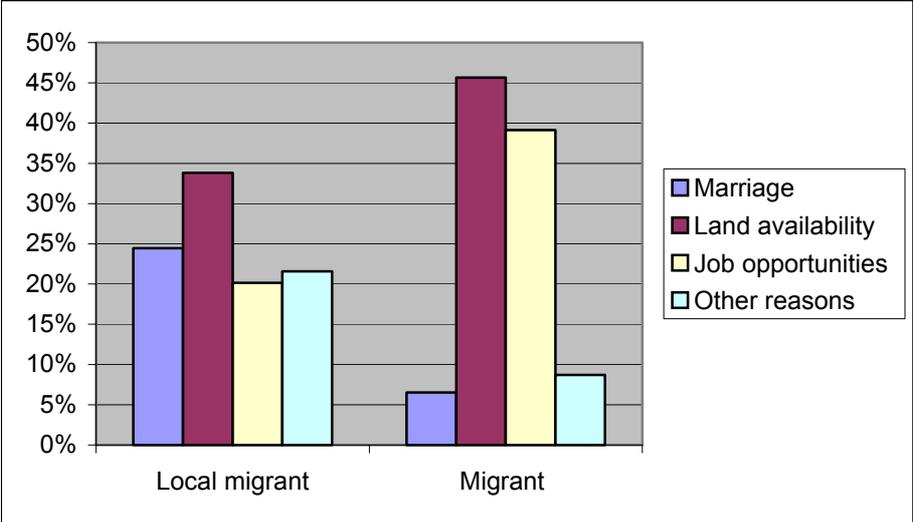
4. Motives and destinations of the migrants

In our subsequent analysis on migration we make a distinction between ‘local migrants’ and ‘migrants’. The former refers to people who came from different places within Central Sulawesi, whereas the latter describes those people that came from other provinces within Sulawesi or from other islands. In addition, we use the terms ‘spontaneous migrants’ for people who migrated without government assistance; ‘trans-migrants’ for people resettled from Java and Bali as part of Transmigration Programs; and ‘resettled people’ for people that were part of a local resettlement scheme.

4.1. Motives for migration

Above we explained the reasons for transmigration and local resettlement programs that are planned and implemented by the government. Now we turn to the driving forces behind spontaneous migration into the Lore Lindu area. In Figure 3 we indicate the main motives for migration as reported by the household head during the household survey. The figure only includes households who migrated spontaneously and distinguishes between local migrants and migrants. It is clear that the availability of land and job opportunities is the most important driving force of migration into the Lore Lindu area. For local migration within the province, marriage also plays a role.

Figure 3: Reasons for Spontaneous Migration



Source: Survey data of sub- project A4 of STORMA, 2000/01

4.2 Preferred destination areas of migrants

4.2.1 Role of economic factors

The Lore Lindu area is attractive for migrants because of the relatively low population density and the availability of land that is suitable for agriculture. Most of the transmigration took place in villages where there were many possibilities to expand irrigated paddy rice cultivation; e.g. Tamadue and Wanga in Lore Utara. Expansion of intensive paddy rice cultivation was also the reasoning behind local resettlement programs in this area. Spontaneous migrants, too, were attracted to villages where topographic conditions allow for intensive paddy rice production⁴. Some of the villages which have specialized in paddy rice have a very high share of migrants among their population, e.g., Kalawara and Sidondo I in Sigi Biromaru; and Ran-teleda, Ampera, and Bahagia in the Palolo valley. The government planned migration as well as the spontaneous migration flows in the 1960's, 1970's and early 1980's were based on the exploitation of the lowlands for intensive paddy rice cultivation.

The more recent spontaneous migration to the Lore Lindu region however is to be explained by another driving force: the abundance of easily accessible forest that can be cleared for cocoa production. Cocoa was first introduced in Sulawesi in the period 1820-1880, but disappeared until the late 1970's and was cultivated mainly on the alluvial plains of South Sulawesi (Ruf 1997; Li 2002: 419). But once these plains had been completely converted into cocoa farms, more and more people got the 'cocoa fever' and set out for new regions suitable for cocoa cultivation. Production of cocoa is associated with a so-called forest rent, which makes cocoa plantations on newly cleared forest much more profitable than replanting old-grown plantations or converting agricultural land or grassland. So, a lot of the 'cocoa migrants' from South Sulawesi settled at forest margins, also in the Lore Lindu area. In all four of the districts in the research region there are some villages at the forest margins with a very high migrant population and many small scale cocoa plantations: e.g., Omu, Simoro (Sigi Biromaru); Rahmat, Sintuvu (Palolo); Tompi Bugis, Tomua, Winatu (Kulawi); and Watumeata, Wuasa, Rompo (Lore Utara). Palolo was the first district where cocoa was introduced by migrants in the early 1980's. More 'cocoa migrants' followed; local farmers, persuaded by the big profits and favorable prices, also switched to cocoa production and since the early 1990's there has been a real 'cocoa boom' in the Lore Lindu area, as elsewhere in Sulawesi.

In addition to the availability of suitable agricultural land, the accessibility of an area plays a role for migration, as well. Access to roads and markets determines transaction costs related to marketing of the agriculture produce and hence the profitability of agriculture. Especially in the case of migration associated with cocoa production, accessibility is important since cocoa is a cash crop almost exclusively destined for the market. With the exception of the mountainous area in Kulawi, all villages in the research region have relatively easy access to asphalt roads. The availability of flat land suitable for irrigated paddy rice production and the location of villages at the forest margin combined with a road network that makes the area reasonably accessible, has made the Lore Lindu region an attractive destination for planned as well as spontaneous migration.

4.3.2 Role of political and institutional factors

Land and forest might be accessible and physically abundant, but that does not necessarily mean that it can be exploited by new migrants. Local regulations and institutions might be a

⁴ Because of the specific way of cultivation in terraces, paddy rice cultivation is limited to flat areas.

constraint for migrants to settle in a certain village. In Wanga (Lore Utara), e.g., there exists an agreement among the village leaders that the amount of land sold to migrants should be kept low. Only migrants who indicate that they plan to stay permanently and try to get integrated into the village community are allowed to buy land in Wanga. In the meantime they get a piece of land from the village government. As a result, the big waves of immigration of the 1990s found their way to Wanga only to a very small extent. Village agreements and regulations might also work in the other direction. In Alitupu (Lore Utara), e.g., the village leaders decided to give away non-cultivated agricultural land to new migrants for free. This was a response to an announcement of the central government that all villages with a population below a certain threshold would lose their autonomous status and fall under the administration of another village. These examples show that local political circumstances might be an important determinant of migration flows. The policy of the New Order era of president Soeharto was a driving force of migration as it allowed the village heads to behave like “little Gods” because the repressive political system kept down almost every critic on governmental representatives (Interview data of sub-project A1 of STORMA, 2002). Thus, villages where the local people were willing to sell parts of their land for fast cash or where the village leaders took advantage of their political position for sales of land, which was not their own property, became the most attractive ones for migrants.

The political situation in the Poso district, adjacent to Lore Utara, is a main push factor for migration into the Lore Lindu area, too. Due to a lasting armed and violent conflict in this region, many refugees enter the district Lore Utara and, to a lesser extent, also Palolo and Sigi Biromaru. Some refugees are only searching for a temporarily safe place but some also intend to settle permanently. Fearing expansion of the violent conflict, many village leaders have put up restrictions for refugees to enter their villages (Interview data of sub-project A1 of STORMA, 2002).

4.3.3 Role of socio-cultural factors

Besides economic factors and political conditions, family relations, religion and ethnicity are determining factors in the migration process. Kinship is an important value in rural Indonesia and chain migration of family members is very common for local migration as well as migration over long distance. Many migrants prefer to settle down in villages where there is already a community of their ethnic group. One of many examples is the village Pandere, where a lot of migrants from North Sulawesi settled down for that reason. In the case of migrants from South Sulawesi, patron-client relationships are sometimes a base for migration to a specific village. Better-off land owners, based in Palu, rent out village land in share tenancy to people of their home town. In some cases like migration from North or South Sulawesi, especially Minahasa or Bugis people, ethnicity and religion build one unit. Minahasa people are dominantly Christians, Bugis people are Muslims.

Within the Lore Lindu region, too, ethnicity and religion are determining factors. Three main ethnic groups can be distinguished: Kaili, Kulawi and Lore. The latter two were own kingdoms earlier and developed an own respective ethnicity. Kaili people are historically linked to the kingdom of Sigi. Although many components are similar to Kaili culture due to social and economic relations between the kingdom of Kulawi and the kingdom of Sigi, the Kulawi people still preserve a tradition that they consider as unique. The Lore people also consider themselves as an individual culture and pass on folk tales about enemies of the Lore people and martial behavior towards neighboring districts. In both cases, Kaili and Lore, physical isolation of the territories can be regarded as reason for this preservation of cultural tradition.

Next to economic reasons, marriage is the most important reason for local migration. In these cases all the other factors play a subordinate role. Usually, the husband moves to the village of his wife, and the couple works on the fields of the bride's parents until they receive some land as heritage. At the pre-colonial period, when war between Kulawi and Lore was common, intermarriages between the two groups usually did not occur. Since on the one hand, mobility in a whole increased due to economic and infrastructure factors, and on the other hand Muslim religion also entered Christian strongholds of Kulawi and Lore, religion seems to be a more regulating factor of intermarriages than ethnicity. This is not surprising as even between Kulawi and Lore more cultural similarities exist than the members of both groups are willing to admit (Interview data of sub-project A1 of STORMA, 2002).

However, besides migration due to marriage, chain migration also takes place within Lore Lindu region. An example is the migration of Kulawi people to the village of Wanga (Lore Utara). The members of this migration group originate from the same village in Kulawi where all their families have kinship relations to each other. Thus, it can be concluded that kinship is the predominant socio-cultural factor for migration, both within or into the research area. The reason for this can be seen in the people's definition of family and kinship, which comprises a wide range of relationships. Ethnicity and religion only play a role in cases of migration due to marriage, or in cases where economic factors are main reason for migration.

5. Effects of migration on land use

The area used for agricultural production depends – amongst other factors – on the size of the population. Migration, leads to an increase of the population, which typically causes an increase in the area cultivated with crops. This will especially be the case in those areas where there are few off-farm income-generating opportunities. As explained in the theoretical framework, migration will have an effect on land clearing, the way land is used, economic and technical change, political, institutional and social change, the land and labor market as well as differences in welfare in the population. When migration takes place, there are changes that are noticeable very soon after the arrival of the new population and certain effects that will manifest themselves at a later stage.

5.1 Effects that are manifest soon after the migrants' arrival

Before the big influx of migrants, the local population in our research area usually owned more land than they actually cultivated ("owned" land means inherited land in this context). Some fields were cultivated in a fallow system while others stayed uncultivated. The main focus was on subsistence crops such as rice, corn, cassava and others and the production of large surpluses was not very common. Natural population growth and improvement of health care led to a faster division of land in the course of heritage. As there was an abundance of land, the increased demand for land did not really cause major problems. Eventually this situation did change during the 1980s. People who were well endowed with capital increasingly migrated to the region, while at the same time the Lore Lindu National Park was established. More and more land was becoming privately owned, and many migrants grew crops for the market rather than own consumption. Such crops included first coffee or clove, later more and more cocoa. They applied more effective cultivation methods than it was known in Lore Lindu area by that time. At the same time, many of the non-migrant population also became more market oriented.

When migration takes place into an area, considering land use, one of the first noticeable effects are that more land is required for the cultivation of crops, the keeping of livestock and the introduction of new technologies. Off-farm employment and income opportunities in the margins of the Lore Lindu National Park are very limited, which implies that population growth – due to migration or otherwise - increases the number of farmers and hence the demand for arable land. As compared to other areas, the impact of population increase on land expansion was found to be comparatively high in our research area. According to a multiple regression model by Maertens et al. (2002), a 1% increase in population led to a 0.99% increase in agricultural land. Table 3 presents the results of the village-level survey for different types of villages, as outlined in Section 3. In plain and hilly villages, a higher percentage of the population cleared forest during the past five years in mixed villages than in migrant villages. In mountainous villages, no difference between the different groups of villages could be observed. We did not find an indication of differences in forest clearing inside the national park between non-migrant and mixed villages, either. For villages in the mountains, mixed villages have a higher percentage of households clearing forest inside the National park than in native village. A possible explanation for this could be the fact that there are more mixed villages that have a border with the park. However, most households that came to the margins of the Lore Lindu National Park acquired land by purchasing land from non-migrants who encroached primary forests (Table 4).

The average area cultivated per household was calculated for several major crops. Migrants might develop land use systems that differ from those of the non-migrant population (Table 5). When households are situated in hilly and mountainous areas, the agricultural area per household is larger than in villages where there is an abundance of flat land. The average area cultivated per household is a little larger in mixed villages than in native villages for the classes ‘plain’ and ‘valley/hilly’, but the difference is not statistically significant. The average area of irrigated rice per household is higher in native village than in mixed villages.

Table 3: Forest Clearing in Different Types of Villages

	Plain		Valley/hilly			Mountainous		Total		
	Native	Mixed	Native	Mixed	Migrant	Native	Mixed	Native	Mixed	Migrant
# of hh cleared forest past 5 years	0	22	0	70	96	49	37	24	44	83
% of hh cleared forest past 5 years	0%	7%	0%	19%	24%	15%	13%	8%	13%	22%
# ha of forest cleared past 5 years	0	19	0	35	53	87	85	44	53	48
% of villages having a border with TNLL	50%	50%	86%	88%	40%	55%	91%	64%	80%	50%
% of hh cleared forest inside TNLL	1.25%	6.83%	24.53%	28.55%	1.57%	4.38%	23.21%	10.22%	20.99%	6.94%

Source: Survey data of sub-project A3 of STORMA, 2001/02

Table 4: Source of agricultural land for different migrant groups (percentage)

	Non-migrant	Local-migrant	Migrant
Rented in	13.45	10.20	8.00
Owned	86.95	89.80	92.00
- transmigration	4.90	9.90	4.60
- cleared from primary forest	16.80	19.60	6.20
- purchased	18.30	29.10	71.20
- gift	3.80	9.10	10.80
- heritage/marriage	56.30	32.30	7,00

Source: Survey data of sub-project A4 of STORMA, 2000

Table 5: Land Use in Different Types of Villages

	Plain		Valley/hilly			Mountainous		Total		
	Native	Mixed	Native	Mixed	Migrant	Native	Mixed	Native	Mixed	Migrant
Total agricultural area per hh (ha)	1.56	1.44	2.29	2.02	1.55	2.60	3.30	2.31	2.44	1.65
Paddy rice area per hh	0.97	0.61	0.50	0.45	0.78	0.73	0.24	0.70	0.39	0.80
Area perennials per hh	0.50	0.44	1.10	0.91	0.58	1.46	2.25	1.17	1.39	0.66
Area coffee per hh	0.00	0.04	0.24	0.24	0.30	0.30	0.41	0.23	0.27	0.25
Area cocoa per hh	0.24	0.24	0.55	0.56	0.23	1.02	1.39	0.73	0.85	0.33
Area coconut per hh	0.23	0.15	0.22	0.02	0.02	0.01	0.05	0.11	0.07	0.02
Area annual crops per hh	0.02	0.20	0.48	0.57	0.08	0.26	0.67	0.29	0.53	0.07
Area vegetables per hh	0.01	0.01	0.03	0.01	0.00	0.01	0.01	0.02	0.01	0.00
Area upland rice per hh	0.00	0.00	0.01	0.01	0.00	0.04	0.26	0.02	0.11	0.00
Area palawija* per hh	0.01	0.19	0.44	0.55	0.08	0.22	0.41	0.25	0.40	0.06
Area home-garden per hh	0.07	0.19	0.21	0.09	0.11	0.15	0.13	0.15	0.13	0.12

* Palawija = annual food crops such as cassava, peanuts, beans,...

Source: Survey data of sub-project A3 of STORMA, 2001/02

Table 6: Average area cultivated for different migration groups (ha)

Crops	Non-migrant	Local-migrant	Migrant
Irrigated	0.41	0.24	0.11
Perennial crops	0.76	0.87	1.40
Annual crops	0.23	0.18	0.49

Source: Survey data of sub-project A4 of STORMA, 2000/01

This difference is significant only for the case of plain villages and mountainous villages. For perennial and annual crops, there are significant differences. There is little difference in land use system between non-migrant and mixed villages.

Data that was collected at the household level, as shown in Table 6 indicates that non-migrants have more land cultivated with wetland rice. Migrants, however, own more land in the uplands, mainly used for perennial and annual crops. When considering total area, migrants cultivate a larger area of land.

5.2 Effects that become manifest at a later stage

There are also impacts of migration that are not directly visible and will only become manifest at a later stage. Perhaps less visible, but not less important, is the way that migration has been a pushing factor for the introduction of technologies. As migration increases the population, this might induce changes in the way that crops are produced. The Boserup hypothesis outlined in Section 2 suggests that, as labor becomes relative more abundant compared to land, labor intensive, yield increasing technology improvements (such as irrigation and chemical input use) will be adopted. However, from the data that was collected at the village level, there is no evidence of that (Table 7). On the contrary, there seems to be more mechanization, a labor-saving technology, in the form of hand-tractors, rice mills and chainsaws in mixed and migrant villages compared to native villages (Table 7).

Migrants were relatively speaking wealthier, and this at a time that land was becoming increasingly scarce (Survey data of sub-project A4 of STORMA, 2000/01, Figure 4). This leads to a situation where migrants were able to buy the land from non-migrants and also pay for their labor. Wage labor emerged as a new dimension in the regional economic system. Locals started to work on migrants' fields or at their rice mills. Due to these circumstances, non-migrants gave up their goal of food self-sufficiency, and became more dependent on the market to buy food. The new trend of employing labor was reinforced by the fact that this practice was also adopted by non-migrants and migrants that live as far away as Palu.

Many local households also started cocoa cultivation but only a few of them applied the new methods of production. This led to jealousy because they recognized that the migrants' prosperity grew fast in a very short time, while their own prosperity increased only moderately. Because their amount of arable land got less, the locals had to turn to shorter fallow periods, which led to the need of the use of fertilizers. Those households that are not able to buy fertilizers go into vicious cycle poverty. Their yields show a declining trend, while at the same time they are less able to purchase external inputs (Qualitative case studies of sub-project A1 and survey data of sub-project A4 of STORMA, 2000/01).

Even during a time that households have come to rely more on the market to purchase food, owning at least a small field with food crops is still considered important among locals. Households will seldom completely convert all their land for the production of crops that they will sell on the market. Both migrants and non-migrants encroach the National Park. The latter group however, consider the land as belonging to their ancestors and hence their own property.

Table 7: Agricultural Technology in Different Types of Villages

	Plain		Valley/hilly			Mountainous		Total		
	Native	Mixed	Native	Mixed	Migrant	Native	Mixed	Native	Mixed	Migrant
Irrigation										
% of paddy rice technical irrigation	38%	40%	16%	13%	30%	31%	7%	27%	19%	25%
% of paddy rice semi-technical irrigation	62%	39%	53%	36%	48%	32%	55%	47%	43%	57%
% of paddy rice simple irrigation	0%	21%	31%	52%	23%	37%	37%	26%	38%	19%
Input use										
% of village using pesticides	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
% of village using improved rice seeds	100%	100%	100%	88%	100%	86%	71%	94%	86%	100%
% of village using fertilizer	100%	100%	100%	88%	100%	100%	91%	100%	92%	100%
Fertilizer (kg/ha) used for paddy	288	250	204	183	185	236	203	237	209	188
Fertilizer (kg/ha) used for other crops	100	83	189	95	105	116	175	137	127	88
Mechanisation										
# of hand-tractors per 100 hh	4.56	1.46	0.96	1.43	4.30	1.02	1.30	1.83	1.40	4.15
# of hand-tractors per 100 ha paddy rice	3.77	3.20	1.81	3.65	6.12	0.61	3.22	1.78	3.38	5.71
# of rice mills per 100 hh	1.59	1.07	0.65	1.07	1.14	1.34	0.70	1.16	0.95	1.17
# of rice mills per 100 ha paddy rice	1.60	2.26	1.20	3.06	1.63	1.86	2.13	1.57	2.52	1.60
# of chainsaws per 100 hh	0.29	0.93	1.64	1.43	1.84	1.65	2.06	1.40	1.59	1.87
Conservation										
% of villages using barriers*	0%	0%	14%	25%	20%	45%	55%	27%	32%	17%
% of villages using terraces*	0%	17%	43%	50%	20%	55%	82%	41%	56%	33%

* to prevent erosion

New cultivation methods were introduced like planting in rows, keeping distance between the cocoa trees or cleaning the ground to protect the trees from vermin. In many regions, migrants were the first who started the cultivation of cocoa. In Watumaeta, some migrants plant vegetables like carrot, cabbage, cauliflower or scallion. To some extent locals adapted these innovations. Most of them also started, supported by the Department of Agriculture, to plant cocoa trees. However, often they did not adopt the newly introduced methods. Very often cocoa fields owned by locals can be detected easily because the trees are planted too dense and/or not in rows. The ground under the trees is also not cleared. Especially in Sintuwu, this distinction is very obvious. There are different reasons for this behavior. Firstly, in contrast to the migrant, most of the locals kept (part of) their wetland rice fields, and therefore were not able to spend too much time on cocoa cultivation. Secondly, the big cocoa boom in the research area started in the mid 1990s. It can be expected that during the current decade the percentage of locals who adopt the new production technologies will increase.

From information that was collected during the household survey differences can be seen concerning the use of inputs between the different groups (Table 8). Migrants tend to apply more fertilizer on their plot. On the wetland rice non-migrants applied fertilizer more than the other groups. At the same time, migrants applied more fertilizer on their cocoa plots. In the research area, generally speaking, especially the migrants have a tendency to introduce and apply new technologies on their upland plots.

Contrary to expectations, increased population density did not lead to well-defined land rights. Significantly more households have land certificates for agricultural land in non-migrant villages compared to mixed villages.

Migrants have a share of irrigated land that is less than their share in the population. They have a share of other agricultural land that is larger than their share in the population (Table 9). Further, there is no sign of more or less equal land distribution in native villages compared to mixed villages (Table 9). Also the occurrence of land conflicts does not differ between native and mixed villages.

A higher percentage of households have sold land in the past five years in mixed villages compared to native villages. The price of irrigated land is higher in villages with more migrants (Table 10). With respect to the land rental market, there are no differences in the occurrence of fixed land rental and share tenancy between the different types of villages. However, land sharing happens more frequently in mixed villages than in native villages (Table 10).

Table 8: Percentage household using Fertilizer and Pesticide for different migrant groups

	Non-migrant	Local-migrant	Migrant
Irrigated rice			
- Fertilizer	62.3	61.8	72.7
- Pesticide	60.9	76.5	90.1
Cocoa			
- Fertilizer	8.2	9.8	48
- Pesticide	16.3	26.1	48.6

Source : Survey data of sub-project A4 of STORMA, 2000/01.

Table 9: Land Rights in Different Types of Villages

	Native	Mixed	Migrant	Total
% of hh having land certificates (homestead)	25%	13%	39%	21%
% of hh having land certificates (agricultural land)	28%	24%	38%	27%
% agr land belonging to migrants/% migrant hh	1.21	1.05	0.84	1.09
% sawah land belonging to migrants/% migrant hh	0.73	0.84	0.78	0.79
% non-sawah land belonging to migrants/% migrant hh	1.42	1.06	0.89	1.18
Land distribution*	66.4	65.5	68.3	66.2
% of villages with land conflicts	86%	92%	67%	87%
% of villages with land conflicts in court	27%	32%	0%	26%

* land distribution index: 100 = completely equal distribution

Table 10: Land and labour Market in Different Types of Villages

	Native	Mixed	Migrant	Total
Land sales market				
% of hh sold land in past 5 years	6.22%	12.50%	4.15%	9.04%
% of hh sold all their land in past 5 years	0.85%	1.99%	0.72%	1.37%
Average land price for sawah (Million Rupiah/ha)	11.5	13.9	14.2	13.4
Land rental market				
% of village where fixed land rent occurs	64%	56%	67%	60%
% of village where share tenancy occurs	77%	76%	83%	77%
% of village where land sharing occurs	18%	36%	17%	26%
% of village where borrowing land occurs	64%	60%	67%	62%
% of farmers on own land	85%	84%	93%	85%
% of farmers on rented land	7%	7%	5%	7%
Labour market				
% of farmers wage labourer	8.6%	8.4%	2.0%	7.8%
% of farmers member of mapalus	17%	17%	23%	18%
agricultural wage (Rupiah/day)	10.795	11.000	10.500	10.858

The assets of migrants from South Sulawesi, who left their places of origin mainly due to land scarcity, enabled them to buy land in the study villages. The locals took advantage of this fact and sold land to the newcomers. The land that was sold is usually fallow land, which has been kept, e.g., as reserve for heritage. Soon, however, locals recognize their mistake to sell land for fast cash. After there is no more free land available, the locals face the problem that they do not have enough land for heritage. One consequence is that people enter the National Park and open new land there, which they claim as inherited land of their ancestors. One exception is the village Sintuwu (Palolo valley). There, nobody uses the term “tanah adat”, the ancestor’s land, even not the founders of the village who originate from Palolo valley. In contrast to other villages, these first settlers declared the necessity of protecting the National Park and complain the deforestation of that protected forest by immigrants.

Besides legal land transactions, land of locals was also sold by some village heads. The borderless authority of the village head during the Soeharto era allowed them to use this power for private enrichment at the expense of the villagers. The repressive New Order system prevented protests or even legal action against such an abuse of the administrative position.

The maximum amount of money that a household can borrow is an indication of the access that a household has to financial markets. Table 11 shows that the amount of money that migrants can borrow is higher than the amount that was borrowed by non-migrants or local migrants. An explanation for the fact that migrants have more access to credit is the fact that, generally speaking, they have more land and can use that land as collateral. Migrants also have a better access to infrastructure such as roads, compared to the other groups. The average distance between the migrants' houses and the road is 0.5 hours. Better access to infrastructure has further implications and will give the migrants a comparative advantage when considering the input and output markets. With regard to demographic aspects, we found no differences between the groups when considering the number of adults or children per household. Using the percent of adults that completed at least SMA as an indicator of the education level, this percentage was slightly lower among the non-migrants. However, the difference was not statistically significant.

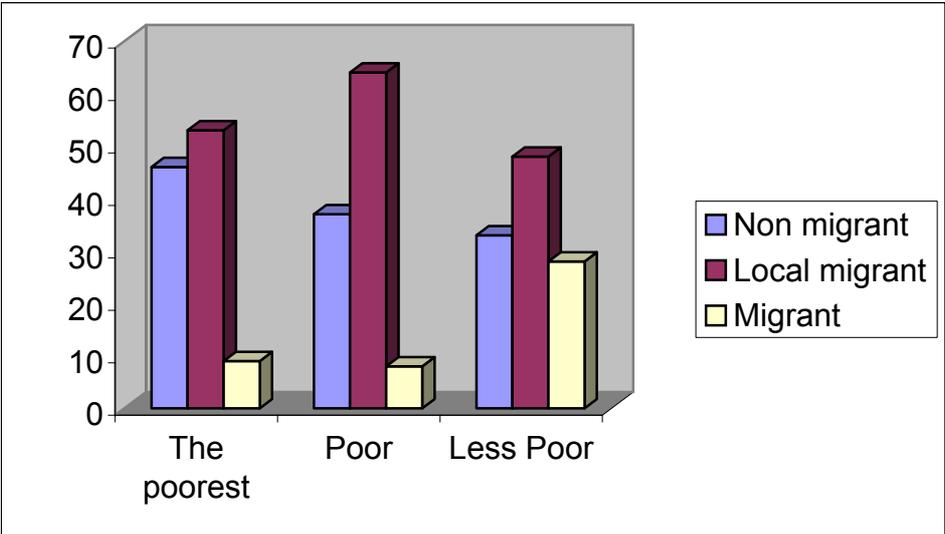
Table 11: Socio-economic indicators in the research area

	Non Migrant	Local Migrant	Migrant	Sig Level
Max amount of money household can borrow (IDR)	583,044.25	587,275.86	1,252,571	0.071
Distance house to road	1.4	0.6	0.5	0.001
Number of adults per household	4	4	4	
Number of children per household	2	2	2	
% of adults completed at least SMA	11	16	16	

Source: Survey data of project A4 of STORMA, 2000/01

Using a methodology developed by Henry et al. (2001), the survey households were divided into three groups, namely poorest, poor and less poor (Abu Shaban, 2001). When looking at the percentage of migrants in the different groups, we can see that their share in the Less Poor Group is the largest (Figure 4).

Figure 4: Comparing welfare status of different types of migrants in the forest margins of the Lore Lindu National Park.



Source: Survey data of sub-project A4 of STORMA, 2000 / 01.

In conclusion, migration has had an impact on land use in several different ways, and this became clear soon after the newcomers settled as well at a later stage (Table 12).

Table 12: Short term and long term impacts of migration due to changes in land use

Short term impacts:	
Land clearing	Land was cleared, especially in areas covered with primary forests, for the cultivation of cocoa
Land use	In many villages cocoa was introduced as well as new? other? the respective? production technologies
Technical change	Both short term and long term impacts could be observed
Long term impacts:	
Market changes	Migration enforced the role of the market, both for the factors of production land and labour
Social changes	Within the population migration also caused changes in welfare.

6. Discussion of impacts and effects, conclusions and perspectives

6.1 Regional impacts of migration

Our findings on the motivations and destinations of migrants in our research area suggest to distinguish between local migration and migration from other regions. With regard to the migrants from outside the province, the argumentation underlying the migration theories reviewed in Section 2.1, which focuses on disparities in economic opportunities as driving factors of migration, constitute an appropriate explanation of our findings. The research region we studied presents superior economic opportunities for self-employment in terms of availability of land favoring cacao production which the migrants did have in their more densely populated area of origin. Conditions favoring in-migration such as an established road network and marketing facilities were also available. Other authors have emphasized the suitable economic conditions for migration into our research area and they related them to the concept of a “smallholder cacao boom” (Ruf 1997; Li, 2002).

Our findings highlight that while economic factors can be considered as the driving forces of migration to our research area, socio-economic and political and institutional factors play an important role for the choice of destination within the research area. The findings show that there is considerable variation between villages with regard to their local policies towards receiving migrants, depending on the local institutions and on the political leadership. The findings underline the first hypothesis that the motives and destinations of migrants are highly different in between the region around the Lore Lindu National Park.

As our case study evidence shows, villages can well regulate the stream of incoming migrants. Thus, our findings show that the local population should not be considered as a passive object of the in-migration process. While the current political reformation has certainly increased the scope for villagers’ participation in local decision-making with regard to migrants, it is an area for further research to identify the factors that influence these decisions concerning in-migration at the village level and their outcome with regard to economic, social and ecological objectives.

Concerning local migration, our findings show that land availability and job opportunities are also the dominant reasons for migration, which indicates that the differentiation concerning these factors plays a role not only between provinces, but also on a smaller scale, in explaining the migration to and within our research area. Expectedly, marriage plays an important role as a cause of local migration next to the economic factors. Since migration related to marriage appears to follow rather fixed socio-economic and socio-cultural rules, such as that the husband moves to the wife's place, the possibilities for regulating local migration by village-level regulations appear to be more limited than in case of migration from more distant areas.

6.2 Impacts on forest cover

Our second hypothesis presented in Section 2.3 holds that migration leads to deforestation by expanding the area of agricultural land. As an earlier study based on our data, quoted in Section 5.1 has shown, an increase in the population in our research area by 1 % leads to an expansion of the cultivated agricultural area for almost 1 %, too. This is a rather high value compared to the values reported in the literature for other regions (see Maertens et al., 2002). The household survey and the village-level survey provide mixed evidence on the question as to which extent migration is responsible for the expansion of agricultural land:

On the one hand, according to the household-level survey, the total area cultivated by non-local migrant households in our research area was by more than 35 % higher than that of the indigenous households or local migrants, and this difference was highly significant. The average area of converted from primary forests for agricultural land was almost double as high in non-local migrant households than in indigenous and local migrant households. This difference was, however, not statistically significant. According to the village-level data, mixed villages and migrant villages in plain and valley/hilly are characterized by a larger percentage of households that have cleared forest during the past five years and a higher area of cleared forest. There was also evidence that land clearing inside the National Park is at least equally likely to occur in mixed and migrant villages than in indigenous villages. On the other hand, according to the village survey, the average total agricultural area per household was almost the same in native and mixed villages. In migrant villages, the average total agricultural area per household was even lower than in the other village types.

While these results appear contradictory at first sight, they indicate that in mixed villages, the pressure on the land resources caused by migration is proportional to the number of migrants, while in migrant villages, the pressure on the land resources increases less than proportional to the number of migrants. Since the migrants, by definition, came to the area comparatively recently, it should not be surprising that their share of the land that is converted from primary forest is higher. On the average, the total area they end up to cultivate is, according to the village-level survey, not higher.

The impact of migration on the forest cover can be expected to be related to the technologies and innovations that migrants introduce to the area. Cacao itself, certainly, the single most important innovation in the agriculture system of the research area, was introduced by migrants. The qualitative case study evidence shows that the migrants are, to some extent, influential in improving the techniques of cacao production of the local population. However, this is not a general effect. In the case of Sintuwu, for example, the cacao fields of locals and migrants can be clearly distinguished. On migrants' fields the ground under the trees is cleared to avoid infestations. The ground of locals' fields is usually covered by foliage. The degree of adoption of this technique differs between the villages.

In principle, the impact of introducing cacao on the rainforest margin is ambiguous. On the one hand, cacao allows farmers to achieve a higher income per area than other crops, thus reducing the area needed to achieve a certain income. On the other hand, the income possibilities of cacao provide an incentive for converting forest land into agricultural land.

The village-level survey data do not provide evidence that innovations allowing farmers to use their land more intensively, such as irrigation, improved seeds, fertilizer and pesticides are more widely used in mixed or migrant villages than in native villages. However, the household-level data show that migrant household use significantly higher amounts of fertilizer and fertilize a significantly larger area. They also have considerably higher expenditures for pesticides, even though this difference was not significant. In principle, these types of innovations can have a stabilizing effect on the rainforest margin areas, but the average figures on land expansion in relation to population growth derived from the village survey indicate that such a land-saving effect may only occur in the villages classified as migrant, but not in mixed villages.

Innovations that are labor-saving instead of land saving, such as hand tractors may lead to increased deforestation (Maertens et al., 2002). Mixed and migrant villages located in the valley/hilly and in mountainous area are characterized by a considerably higher number of hand tractors both in relation to households and cultivated paddy area. These findings suggest that migration brings in innovations and promotes their adoption, but this does not necessarily have a positive impact on the rainforest margin. The findings with regard to conservation techniques, such as barriers and terraces, are, however, different. These innovations, which can have a positive impact on the rainforest margin, are more frequently adopted in mixed and migrant villages than in indigenous villages.

6.3 Socio-economic impacts

The hypothesis “migration leads to disruption of the socio-economic system” requires to assess the impacts of migration both with regard to social and to economic aspects. With regard to social change, our data do not allow us to reject this hypothesis. We found that there are significantly more conflicts about land in villages with a higher share of migrants. Likewise, the number of social organizations in the village, as an indicator of social capital, is negatively correlated with the share of migrants in the village. Land titles, which could provide a basis for reducing conflicts about land, were less frequently found in mixed villages than in indigenous villages. Moreover, according to the household survey, migrant households cultivated areas that were by more than one third larger than those of local households. Other indicators derived from the household survey, such as poverty status, access to credit and labor relations clearly point to an inequality between the indigenous population and the migrants, who tend to be better off. These findings point to a disruption in the social system caused by migration. Li (2002), who studied the impact of migration in our research area with regard to the cacao “boom”, came to a similar conclusion.

However, the indicator of the land distribution calculated according to the village survey was comparatively high (between 65 and 68 on a scale where 100 indicates completely equal distribution) in all villages and did not differ significantly between native, mixed and migrant villages. This indicates that, on the average, there is no evidence that migration leads to a more unequal land distribution. Even though we used cross-sectional data here and cannot actually distinguish before and after migration situations, this finding suggests that land distribution was already unequal before the migrants arrived.

As discussed in the theoretical framework, migration does not necessarily lead to negative impacts on the social system. It may also bring positive effects of modernization and socio-economic infrastructure to the village. However, the village-level data do not indicate that native, mixed and migrant village differ with regard to the availability of shops, village markets, kiosks, vehicles, electricity, TV and children's' education. The qualitative research, however, showed that migrants play a crucial role in starting to open shops and kiosks. In all nine qualitative research villages, including even a very remote village (Lawe), the shops are owned by migrants. While a shop can be considered as progress in a socio-economic sense, the fact that the shops are mostly owned by migrants increases the inequality between locals and migrants and may lead to social tensions. The generally comparatively high level of education (low adult illiteracy rates) in our research area is probably due to the prevalence of Christian missionary schools, and not influenced by migration.

While our data allowed us to assess this impact on the social system, the general impact of migration on the economic system is more difficult to assess, since we did not conduct studies of regional factor and product markets. But it is evident that migrants brought the cacao to the region and migration induced an increasing diversity of crops like cacao and vegetables, like green onions and cauliflower. These newly introduced crops are cultivated on large fields, for example in Watumaeta. Furthermore land transactions have been mainly initiated through in-migration and that process led to land scarcity for the local population. Thus it happened that some former land owners altered to wage-laborers on the fields of the in-migrants. Another phenomenon is the fact that in some cases in-migrants have become creditors for locals.

6.4 Conclusions

On balance, our empirical findings justify the conclusion that spontaneous migration, which is driven by economic push and pull factors and modified by socio-economic, political and institutional factors, can have problematic effects with regard to the environment, the social system and the economic system.

While our findings show a tendency that migration has problematic effects, the results have to be interpreted with caution. We can draw on a rich empirical data set, but our quantitative data refer to average results for groups of households and villages. We controlled for environmental conditions by the way in which we grouped the villages, but other factors may have an influence on the group averages, too, and multiple regression techniques would be required to disentangle the effects of migration from other effects. As the qualitative case study findings suggest, there is considerable variation within the groups, for example with regard to the way in which village-level policies can influence migration. Further research on these issues is not only of scientific interest, but also of considerable policy relevance, because this local political decision-making can be expected to be an important instrument of regulating migration in such a way that negative socio-economic or environmental impacts can be avoided. This is especially relevant as socio-economic factors migrants tend to settle where there is already a community to whom they have social relations, so that decisions made in early phases of in-migration may induce path-dependent effects.

Our study also pointed to difficulties in disentangling the effects of migration from the effects of technological innovation, our case, cacao, which the migrants introduce, but which might also have been introduced otherwise. This can also be considered as an area that deserves further research. Long-term economic effects have to be taken into account, because in cases

such as cacao, positive economic effects may arise only for a limited time period, due to a “boom” effect (Ruf and Yoddang, 1999; Li, 2002). However, as has been shown for other booms (compare Wittmer, 2002, for the case of an oil boom), whether such negative boom effects indeed occur depends to a large extent on the flexibility in which farmers can adopt to changing circumstances.

Last, but not least, it is also necessary to take a wider view and assess not only on the effects of migration in the areas that receive migrants, but also on the areas where the migrants come from. While this topic was beyond the scope of our study, evaluating migration effects on a wider scale is essential for policy-making in a country like Indonesia, where considerable regional differences in economic opportunities will remain to be driving forces of migration for decades to come.

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Dr. Regina Birner (Supervisor of STORMA sub-project A3 and co-author)
Institute of Rural Development
University of Goettingen
Waldweg 26
D-37073 Goettingen
Germany
E-mail: rbirner@gwdg.de

Dr. Heiko Faust (Supervisor of STORMA sub-project A1, principal author and corresponding author)
Department of Geography
Division of Cultural and Social Geography
University of Göttingen
Goldschmidtstr. 5
37077 Göttingen
Germany
Email: hfaust@gwdg.de

Miet Maertens (Doctoral Candidate of STORMA sub-project A3 and co-author)
Institute of Rural Development
University of Goettingen
Waldweg 26
D-37073 Goettingen
Germany
Email: mmaerte@gwdg.de

Nunung Nuryartono (Doctoral Candidate of STORMA sub-project A4 and co-author)
Institute of Rural Development
University of Goettingen
Waldweg 26
D-37073 Goettingen
Germany
Email: nnuryar@gwdg.de

Dr. Teunis van Rheenen (Postdoc of STORMA sub-project A4 and co-author)
Institute of Rural Development
University of Goettingen
Waldweg 26
D-37073 Goettingen
Germany
Email: vanrheenen@hotmail.com

Dipl.-Geogr. Robert Weber (Doctoral Candidate of STORMA sub-project A1 and co-author)
Department of Geography
Division of Cultural and Social Geography
University of Göttingen
Germany
Email: rweber@gwdg.de