Agrarian Change and Alang-Alang in a Rain Forest Margin Community: A Case Study from Central Sulawesi

Günter Burkard

STORMA Discussion Paper Series

Sub-program A on

Social and Economic Dynamics in Rain Forest Margins

No. 15(May 2005)

Research Project on Stability of Rain Forest Margins (STORMA)

Funded by the Deutsche Forschungsgemeinschaft under SFB 552

Participating institutions:

Institut Pertanian Bogor

Universitas Tadulako

University of Göttingen

University of Kassel

Table of Contents

Summary

Imperata cyclindrica, or *alang-alang* as it is often referred to in writings on SE-Asia, is one of the most intensively studied weeds of the world. In investigating *alang-alang* related problems in a small holder community in the vicinity of the Lore Lindu National Park on the island of Sulawesi, Indonesia, this paper challenges some common claims about the origins, attached values and future perspectives of *alang-alang*. The sources of imperata infusion in the research area are neither linked to population pressure nor to inadequate cropping techniques in dry land cultivation. Rather, *alang-alang* expanded as a reaction to the development of the wet rice sector which absorbs most of the time and labour of the farmers. Often being forced to abandon their rain-fed plots in order to manage their wet rice fields, farmers create ideal conditions for the grass to expand. However, whereas on the one hand *alang-alang* represents a major element of “criticality”, the *alang-alang* plot as such offers important opportunities provided by other plants growing naturally in imperata sites. A culturally defined preference for rice subsistence as well as an orientation aimed at securing survival rather than enhancing profitability make an effective control of the weed difficult.

Keywords: Indonesia, rain forest margin, socio-economic security, weed control, wet rice

1 Introduction

This article discusses the socio-cultural and institutional implications of “*alang-alang*” (*imperata cyclindrica*) infestation in the vicinity of the Lore Lindu National Park (LLNP), Central Sulawesi, Indonesia. The research site is the village of *Rompo*, located in the Besoa valley, some 130 km to the south of the provincial capital Palu.[1] After the islands of Sulawesi experienced an unprecedented “cocoa boom” in the late 90ties, the fertile forest border zones of the Lore Lindu area became one of the major “cocoa frontiers” in the region. Since then, competition for agricultural land among local and migrant smallholders has resulted in a large scale conversion of secondary forests, often involving encroachment into the protected zones of the National Park (Burkard 2002). However, the intensity of this far-reaching process is not at all uniform: while in the northern (Palolo), western (Kulawi) and eastern (Napu) valleys around LLNP perennial grooves are taking over the formerly forested landscape, the Besoa valley in the South has been largely spared by this development. Its agricultural system is still

[1] The survey was integrated into a number of research activities under sub-project A2: "Social Organization and Processes of Ecological Stabilization and Destabilization” of the STORMA Research Program, a collaborative research program of the German Universities of Göttingen and Kassel and the Indonesian Universities "Institute for Agriculture" (IPB) in Bogor and Tadulako University in Palu, Central Sulawesi. Fieldwork was conducted from March 2001 until April 2002 and from September 2003 until April 2004.

dominated by a mix of wet rice (*sawah*) and dry land fallow cultivation in which perennial export crops play only a secondary role. Typical for the situation are “open gaps” in the forest canopy which offer suitable conditions for “light loving” weed-grasses of which *imperata cyclindrica* (called “*alang-alang*” in Indonesia) is the most dominant. Whereas *alang-alang* is not a major problem in the research villages located in other parts of LLNP, it represents the major element of “criticality” in Rompo.[2]

In general, there are four inter-related characteristics of imperata which count for its high regenerative capacity and its potential to dominate the soil cover over wide areas: (1) its seeds can keep in the air for at least 16 months and are spread easily by natural processes, (2) it produces toxic (so-called “allelophatic”) substances that may inhibit the growth of other species at the same time its dense web of underground rhizomes may crowd out competitors, (3) its capability to survive fire (it builds up new shoots even if the biomass above the ground is burned) contributes to the removal of shrub reserves and crop plants and (4) by producing only little organic litter it does effectively undermine the restoration of soil fertility. Equipped with such “infamous” qualities one should not wonder that until the end of the 70ties researchers showed little esteem for the “noxorious weed”. Landscapes dominated by imperata were considered simply as “wasteland” or “green deserts” (i.e. Gourou 1953, Geertz 1963, Geddes 1974, Soerjani 1980). This however changed significantly in the 80ties which showed a remarked “re-evaluation” of the grass and its agricultural perspectives. Scientists from various disciplines emphasised its function as a custodian against soil erosion (Soerjatna and McIntosh 1980), its role in the local economy (Eijkmans 1995), its potential as fodder in animal husbandry (Soewardi and Sastradipradja 1980), the qualities of its rhizomes as fertiliser (Sherman 1980, Pranowo 1987) and its role in the local ecology in general (Dove 1987). In short: what once dominated the literature as a “problem”, had now become if not a

[2] The research villages covered by sub-project A2 are Sintuwu and Berdikari in Palolo; Watumaeta and Wuasa in Napu, Bolapapu and Toro in Kulawi and Rompo in Besoa.

"solution", so at least an "opportunity".[3] On the other hand, important presumptions persist in regard to the origins of *alang-alang* grasslands, at least as far as the role of human activity in the creation of this landscapes is concerned. Most studies on *alang-alang* perceive its appearance as a negative side effect of too intensive agricultural cultivation (i.e. Eijkmans 1995), or in other words of too long cropping periods combined with too short fallow periods (Freeman 1970, Geddes 1970, Mischung 1984). In other words: in one or the other way the phenomenon is linked to the *internal constraints* of tropical dry land systems themselves and their limited "carrying capacity" in sustaining larger populations. Factors *external* to the dry land sector are consequently overlooked by those studies. Little attention has been paid to the socio-cultural preferences in agriculture and the inter-relationships between different resource types (i.e. how *alang-alang* infestation is related to intensification in irrigated rice production) as well as to the role of the institutional environment (i.e. development programs or state policies) in areas where *alang-alang* infestation occurs. It is hoped that this article can contribute to widen our knowledge about the socio-cultural and institutional conditions of imperata expansion and point to some possible directions of its control.

This article is organised as follows: after an analysis of the inter-relationships of *alang-alang* with technological devices and modes of production in section 2, section 3 investigates the characteristics of *alang-alang* plots and analyses the imperata infestation in relation to clearing practices and peasant decision making. Further it highlights the indigenous perceptions (or the "local knowledge") on *alang-alang* held by the local population, before section 4 discusses the agricultural perspectives of imperata sites and points to the "*alang-alang* dilemma" as a part of a larger "development dilemma" in the research region.

[3] Alang-alang was even propagated as the preferred location for state sponsored transmigration sites (see Burbridge et al 1981, Kumolo 1987).

2 Rice Subsistence First: Time Allocation and the Sawah-Alang-Alang-Complex

The village leaders of Rompo estimate that ca. 60% of the village territory is covered by *alang-alang* with most of the affected area being located on the numerous slopes surrounding the settlement. This figure relates to the whole *alang-alang* cover including plots abandoned since a long time and which are under the jurisdiction of the village administration. Imperata sites claimed as private property make up 31,3% of all plots *owned* by local families. *Alang-alang* has not been created on purpose in Rompo, neither at present nor in the past. There are no hints for a consciously improvement of imperata plots for cattle crazing as has been reported from other parts in Indonesia (Seavoy 1975: 49, Brookfield et al 1995: 183).

Shifting cultivation – practised at least until the mid 80ties – may be a causal factor for imperata emergence, but it was for sure not the decisive one for the present imperata expansion. The notion of improper shifting practices is too simplistic to explain the situation. Rompo farmers belonged to the *established* swidden farming type and practised a rather stable rotation system on secondary forest. Usually, one crop of local rice (*kamba*) preceded two seasons of secondary food crops (*palawija*), before the plot lay fallow (*bero*) for four years.[4] Following our informants, the creation of forest isles and intensive weeding effectively inhibited large scale imperata disturbance in the past. This opinion however is not shared by the Indonesian government whose negative attitudes towards shifting cultivation are well documented in the literature (see Dove 1983). To government officials shifting cultivation is seen as the main cause for deforestation and perceived as the one and only reason for *alang-alang* spread (Eijkmans 1995: 21, Zerner 1992: 14). The pressure to stop the "bad habits" of shifting cultivation became increasingly felt in the mid 90ties when local politics encouraged the villagers to expand wet rice (*sawah*) cultivation and when swidden agriculture was forbidden after the establishment of LLNP in 1993[5] and after the ministries of agriculture,

[4] As Murray Li (2002: 420) points out, relatively intensive swidden cycles are long established in Central Sulawesi and did not develop as a reaction against "degeneration" or "crisis".
[5] Wet rice fields are known in Rompo at least since the 40ties; but occurred only rarely before the mid-eighties.

home affairs and transmigration issued a joint decree (SKB “480-Kpts II/1993”) in which shifting cultivators were officially blamed as “destroyers of the forest resource”.

The fact that subsistence (rice) and market production (*palawija*) which formerly were integrated into a single agricultural swidden system become now separated into an irrigated rice and a non-irrigated *palawija* sector under a system of sedentary agriculture had far-reaching consequences for the local ecology. *Sawah* cultivation in Rompo allows for two planting periods per year: from February until May and from August until December. Given the fact that the construction and maintenance of wet rice fields is extremely labour-intensive, farmers are often forced to abandon their annual dry land plots in order to take care for their *sawah*.[6] This tendency is intensified by the introduction of new rice hybrids that absorb significantly more working time than local varieties.[7] Harvest failures in rice cultivation are a serious problem in Rompo, due to birds, rats and pigs that have destroyed a considerable amount of rice harvests within the last years. The wet rice locations are often several km away from the village, which means that when the rice plants begin to ripen, farmers have to spend up to several weeks in temporary huts (*bambaru*) outside Rompo in order to safeguard their rice fields. Our survey revealed that farmers spend 25 - 60 days a year in the *bambaru* close to their *sawah*. It is during the peak times in *sawah* cultivation that most farmers give up substantial parts of their dry fields.[8]

Usually, those dry fields are used for the cultivation of the cash crop maize. Thus, whenever a household has too much pressing work to do, rice subsistence is given priority. During the time dry fields are not cultivated, *alang-alang* recovers at a very fast rate converting abandoned dry fields into *alang-alang* plots within one season.[9] As table 1 shows,

[6] Every season fields have to be ploughed and leveled, ditches have to be made anew, channels must be cleaned by digging before the work loaded transplanting of rice seedlings starts.
[7] Despite this disadvantage hybrids (or improved varieties?) are preferred because of their shorter period of ripening. The most common varieties are the “cimandi” and “superwin” hybrids.
[8] Rompo villagers who experienced a significant rate of out-migration within the last years face now even more serious problems in the maintenance of their sawah fields due to a serious lack of labour.
[9] On average, alang-alang already appeared after the plot was abandoned by the farmers for two weeks. Thus, during our 2nd survey in Rompo during mid December 2002, four households that had no *alang-alang* plots

imperata infestation (or problems with other weeds) and declining soil fertility are only minor factors for the abandonment of land. In general annual dry fields are abandoned either because farmers lack of capital and family labor (of course, both factors are empirically related).

Why plot abandoned?	**Wet Rice Farmer (n = 20)**	**Non-Wet Rice Farmer (n = 11)**	**Total**
Covered with weeds / alang-alang	3	2	5
Declining fertility	2	4	6
Distance / steepness	6	4	10
Destroyed by wild pigs	5	5	10
Lack of capital / labour*	17	9	26
Lack of time to cultivate	14	5	19
Management sawah plots	18	0	18

Table 1. Reasons for abandonment of dry fields. Source: primary data. Farmers could mention several reasons. *capital / labor as one factor because capital can substitute labor by mechanization and hired workers.

The number of farmers who had to abandoned at least one plot in 2003 is 45,4% among those who do not cultivate *sawah* and 83,9% among *sawah* cultivators. In statistical terms the relationship becomes even more obvious: the area of dry land covered by imperata rises is correlated with the area of *sawah* under cultivation (r = 0,48; statistically significant at 0,01).[10]

Thus our findings challenge the common claims about the sources of *alang-alang*. In contrast to the general notion that imperata develops as a side-effect of shortened fallow periods[11] (Mischung 1980, Dove 1983, Eijkmans 1995), the opposite seems to be the case in Rompo: When asked why there is so much *alang-alang*, 83,9% of the farmers stated that this is due to the fact that people often must abandon their land; only a minority of 16,1% believed that the infestation with imperata in their village is linked to the fact that plots have been under cultivation for too long without a fallow period. This is not to say that all problems related to imperata are caused by wet rice cultivation alone. Non-rice farmers experience problems of time allocation and imperata infestation as well, albeit on a smaller scale.

during the 1st survey two months before, reported having *alang-alang* fields now due to the abandoning of their fields after they had to prepare their sawah after the last maize harvest.

[10] Consequently, 93,5% of our respondents affirmed a positive relationship between imperata infestation and wet rice cultivation.

[11] In most studies “too-intensive cultivation” is used synonymous with “too-short fallow periods”.

However, the problems increased with the introduction of new rice hybrid varieties and the expansion of sawah fields that absorbed more working time than the “traditional” crop rotation consisting of upland rice and non-rice food crops and that segregated subsistence and market crops in two different types of resources: the *sawah* and the non-irrigated fields.

As I have pointed out in Burkard (2002: 24ff), *sawah* cultivation can reduce the pressure on the forest cover. Given the fact that in comparison to rainfed agriculture, wetland rice production is characterized by a higher absorption of work force and lower returns to labor, it provides less time and surplus that could otherwise be invested in new land clearings. Similarly, Martens et al (2004: 188) found that the “forest saving” effect of yield increasing technologies in the lowlands of the forest margin is stronger if new technologies are also labor intensive. However, one should remain careful with the long-term consequences of labor-intensive agrarian systems. As Pender (1999: 4) points out, resource degradation and resource improvement are “multi-dimensional” (and therefore “relative”) conceptions. Improvements in one type of resource or in one location (wet rice fields!) may well be associated with degradation of other resources or other locations (dry fields!). Further, our findings show not only that *alang-alang* can spread with the same intensity under the conditions of sedentary agriculture as it may spread under a shifting cultivation regime; on the contrary they point out that imperata expansion may even be accelerated by the introduction of new technologies in agriculture.[12]

3 Coping with Alang-Alang: Indigenous Imperata Management and its Limitations

The common pattern of forest-grassland distribution in Rompo is for patches of imperata to be scattered throughout areas of secondary forest or cultivated area. Among half of all *alang-alang* sites are fallow plots covered by different species of which *alang-alang* has become the dominant vegetation (51,6%), the other half are locations characterised by light secondary

[12] Thus farmers often argued that alang-alang has spread increasingly after the late-eighties, just at the time when sawah cultivation expanded and when shifting cultivation was replaced by permanent dry land agriculture!

forest where *alang-alang* entered through open gaps via natural processes (48,4%). Such a fragmentation suggests that this landscape was only recently created. Although *alang-alang* is quite extensive, there is almost no mono-growth of imperata (so-called "sheet *alang-alang*") which is normally believed to be symptomatic for longer-lasting disturbances. Two factors may explain the absence of "sheet *alang-alang*" mono-growth in Rompo: (1) The absence of a pronounced and long-lasting dry season (rainfalls may occur during most months of the year) will forestall that *alang-alang* reaches a full fire climax, at the same time it allows competing species to coexist with imperata.[13] (2) Until the present, only a part of the farmers prefers to clear grasslands exclusively by burning with the effect that shrub-reserves have only been partly removed by fire. Using a "cognitive anthropology" approach, thirty-three so-called "vernaculars" (plants distinguished by the indigenous people and their language) have been isolated as growing "naturally" in both site types.[14] As Table 2. shows, the predominant tree species found in secondary forests could survive in a significant part of alang-sites.

(Local name)	**(Scientific name)**	**Alang-alang plots in open landscape (Type 1)**	**Natural „gaps" in secondary forest with imperata growth (Type 2)**
Bentunu	*Sterculia oblongata*	10 (66,7)	11 (68,8)
Palili	*Lithocarpus celebicus*	8 (53,3)	10 (62,5)
Lewunu	-	7 (46,7)	9 (56,3)
Belante	*Homalanthus populneus*	6 (40,0)	9 (56,3)

Table 2. Occurrence of tree species in imperata sites (percentages in brackets). Source: Primary data.

The "traditional" practice of clearing an imperata site is to cut the grass (*baparas*), dig the sods with hoes (*cangkulan*) and – seldom - to break the rhizomes by hand.[15] In difference to

[13] As Shim (1993) has noted for Sarawak, under conditions of nearly year-round rains alang-alang "nearly always loses in competition with other weeds" (ibid: 23). "Losing" would be an exaggeration in our case, as all respondents complain about the expansion of the weed. However, the limiting role of rains in the development of alang-alang mono-growth is obvious.

[14] Besoa people divided them into 14 trees and shrubs, 16 grasses and three flowers. A presentation of all the species identified would be beyond the scope of this article which focuses on the socio-cultural and socio-economic aspects of imperata cyclindrica. A list of all vernaculars and their usage can be ordered from the author. Only 14 of them however, could be clearly identified and classified with their scientific names so far.

[15] Chemical clearing is only used by less than 10% of the farmers due to the lack of capital and access. More than 2/3 however believe that chemical clearing is the most effective means in rising the fertility of their imperata infested plots. The discrepancy between the preferred means of control and access to it is quite obvious.

the clearing of secondary forest (which always requires the use of fire) in the case of *alang-alang* it is not first of all the *burnt*, but the *decayed* wastes of the bio-mass which functions as fertiliser. The improvement of soil fertility provided by the decay of rhizomes is not only recognised by most of our respondents; it is also the main reason given for the persistence of this method.[16] However, this system is extremely labour-intense. Thus the often cited finding of Kumolo (1987: 54) that imperata is more easy to clear than secondary forest is too simplistic: (1) The average number of total days our respondents needed to clear and prepare an *alang-alang* plot of 1 ha until the first seedlings could be planted was 22 as compared to 24 days in the case of clearing secondary forest; (2) the mean expenditures for plot conversion are Rp. 250.000 for 1 ha *alang-alang* and Rp. 300.000 for 1 ha of secondary forest. The savings of a modest two working days and Rp. 50.000 per ha however, do not compensate for the fact that plots "cleaned" (*dibersihkan*) from imperata are perceived as being less fertile than soils where secondary forest was removed.

Following our key-informants, *alang-alang* plots develop an acceptable fertility only after they have been planted with seasonal crops for at least three successive seasons without interruption. Then the "light-loving" weed has been stopped by a natural process of "shading-out". On the other hand, if the plot is used for only one season and shading out is not maintained, imperata growth will recover even faster and stronger! The reality however is, that most often lack of time and capital do not allow for three consecutive cropping seasons (especially when households own wet rice fields). Some 65% of our respondents perceive the conversion of *alang-alang* as not worthwhile, compared to the investment of time and labour and the rather poor harvests. Besides the fact that people do not use fertiliser in enhancing soil quality, the major "contextual" problem is that they do not use the converted plots for *periods long enough to make their investment worthwhile*! The most serious implication of the

[16] This may be the reason why more than 90% of the farmers interviewed approved the statement that soil fertility under alang-alang can still be improved.

dilemma is that neither investments to increase productivity, nor to enhance the sustainability of the dry-land production in general are made.

Despite the problems *alang-alang* poses for the villagers, the fact that 93% of our respondents have at least once converted *alang-alang* into agricultural land shows that imperata sites are actually not land without agrarian perspective. An important question related to the willingness to convert imperata is therefore in how far *alang-alang* is perceived as a valuable resource by its users and on which basis people make decisions about plot conversion. Both questions are empirically related. For example, in deciding if a certain imperata plot should be converted or not, the *slope* was much more often mentioned as a decisive factor among wet rice (*sawah*) than among pure dry-land farmers. This is because *sawah*-cultivators valued the grass-cover on slopes close to their wet rice fields for the protective function it plays in safeguarding the wet rice fields against soil erosion.[17]

Besides "slope", there are another two major variables perceived as relevant in conversion: The first one, *reliability of ownership* is interesting, because one of the major findings of our broader research is that security of land tenure is quite strong in the whole LLNP area (Burkard 2002: 14). With grasslands however it is a different matter. In principle, ownership rights belonged to the first clearer of primary forest. The "contracting" waves of out-migration and in-migration which Rompo experienced within the last decades had a two-fold consequence: First, rights of a first clearer may "lapse" because the vegetation which defines such rights is lost by deforestation or because the original clearer already left the village. Second, in difference to secondary forests, most imperata plots are now under the jurisdiction of the village administration which claims the solemn right of "grassland disposal" by virtue

[17] Suryatna & McIntosh (1980: 137) have pointed out that imperata plays an important role as a fast growing ground cover after deforestation not only in preventing soil erosion, but also in leaching. Similarly, Geddes (1970: 11) has concluded that "land which is under grass is as effective at preventing erosion as it was under light forest" and Sherman (1980:129) believes that erosion under imperata is even less than under secondary forest. Given the fact that 61% of all plots in the sample are on slopes, the role of alang-alang as a custodian against soil erosion should indeed not be underestimated. Whereas most wet rice farmers acknowledged the protective function the grass fulfils on slopes; the idea that imperata should be more effective in preventing erosion than secondary forest however was rejected emphatically!

of the new village regulations drafted in 2001. Thus, overlapping claims may always impede the conversion of a plot.

The most decisive characteristic however, which make a plot "valued" as an agricultural resource is the presence of certain *indicator plants* which are mixed within *alang-alang*. To our own surprise, it is not (as one would expect) "intensity of imperata", "soil colour", the presence of certain tree species or the last harvest result, but the existence of four other competing weedy grasses which informs the farmer about the quality of an imperata infested plot. Following "local knowledge", as long as either *"vuvule"* (*axonopus compresus L*), *"tonipo"* (*crassocephalum crepidioides*), *"karokahi"* (*bidens pilosa L*) or *"tile"* (*themeda sp*) can be detected in the plot, *alang-alang* has not yet reached its climax and the plot is still fertile enough to be converted. Of these four weeds, *tonipo* (the "Japanese weed") is probably the most interesting. Local history tells that during the Japanese occupation the colonial power spread the seeds of the grass with aeroplanes in order to destroy the agricultural base of the Besoa people. The ultimate aim of the Japanese however was not achieved, because the weed turned out to be an excellent fodder for pigs.[18] Meanwhile *tonipo* has lost out significantly in competition with imperata.

The quality of *alang-alang* as fodder however is low. It is nutritious only for six weeks, after that its carrying capacity drops to 2,2 animal units per ha (Suwardi & Sastradipraja 1980: 168). The average number of cattle per household in Rompo is 0,3. This figure points out that the carrying capacity of imperata sites as a fodder reservoir may in most cases be sufficient. Most owners of cattle and pigs however, use imperata only as a supplement. Besides its relative value as fodder, *alang-alang* is used by over 81% for construction, especially for the erection of houses and temporary huts (*bambaru*) close to their *sawah*. The well known use of imperata as a soil cover under perennial trees in order to control soil moisture under the crops

---

[18] According to Dove (1984, cited in Brookfield et al 1995: 193) the „Japanese weed" is also known in Kalimantan where it is identified with *chromolaena odorata* and surrounded by myths as well. Brookfield et al (ibid.) believe that the grass indeed expanded due to the fact that during the war the Dutch restrictions on burning were not applied.

is not widespread due to the fact that perennial cultivation is still at an early developmental stage in Rompo. In his study on land use among the Toba Batak in northern Sumatra, Eijkmans (1995) notes that "peasants who cultivate a substantial part of their area with perennials show slightly more appreciation of *alang-alang* fields. The more annual crops are planted, especially wetland rice, the more this appreciation decreases"(ibid: 142). Because the economic role of perennial trees is still minimal and because the usage of *alang-alang* is mainly confined to the construction and repair of the *bambaru*-sheds, the opposite is the case in Rompo where a higher percentage of wet rice cultivators could name useful advantages of imperata (83%) as compared to non-wet rice farmers (53%). All in all one must state that the degree of utilisation and economic value of *alang-alang* is far less than could be expected on the basis of the existing literature. However, what holds true for *alang-alang* as a "plant" does not necessarily hold true for the *alang-alang* plot as an "ecosystem". Whereas the value attributed to imperata itself may be low, the value of all the plants growing together with imperata on the same plot may be quite high. Of the 33 different vernaculars which grow in *alang-alang* plots, 27 are actively used by our respondents in their everyday life. The utilisation of these plants covers fertiliser, construction material, traditional medicine, fodder, firewood etc. Table 3 gives an impression of the diversified utilisation of these plants.

Local name	**Indonesian name**	**Scientific name**	**Utilisation**
Jambu Hutan	Jambu	Syzygium malaccensis	Medicine (stomach)
Vuvule	-	Axonopus compresus L.	Medicine (stomach)
Tile	-	Themeda sp.	Roof thatch
Rumput nipon	tonipo	Chromolaena odorata	Fodder
Enau / Aren	Aren	Arenga pinnata	Drink, Sugar
Danna	Alang-alang	Imperata cyclindrica	House construction
Rengko rengko	Rumput kacang	Crotalaria anagyroides	Fertiliser, „alang-Killer“
Palili	-	Lithocarpus celebicus	Fire wood
Delupa	Bunga putih	Urena labota	Medicine (stomach)
Putisese	-	Ageratum conyzoides L	Medicine (desinfection)
Silaguri	-	Sida rumbifolia L	Medicine (stops bleeding)
Bure bure	-	Glochidion sp.	Rope

Table 3. Examples for utilisation of vernaculars occurring naturally in alang-alang plots. Source: primary data.

Therefore it is misleading to conclude that a low level of *alang-alang* utilisation automatically implies that imperata *sites* are perceived as land without economic value which everyone is willing to convert. For instance, the reason given by some of our respondents for the non-use of fire in clearing imperata was that only if plots are kept safe from fire will the replenishment of valuable plants in their *alang-alang* plots be sustained! The situation in Rompo does neither fit the image of imperata as an opportunity as it is portrayed by some "*alang-alang* enthusiasts", nor does it fit the stereotype of the "infamous weed". Rather, *alang-alang* plots should be understood contextually:, as an ecosystem which may pose a problem in some locations (*palawija* cultivation), but at the same time it may offer opportunities in other areas (i. e. traditional medicine provided by "collateral" plants which grow within imperata sites). The related population views *alang-alang* as a "problem" in the sense that too much plots are infested which makes dry land agriculture increasingly difficult; but this does not mean that they want to relinquish the *alang-alang-plot* as an ecosystem in general. In regard to the first aspect, the role of perennials in eradicating *alang-alang* becomes increasingly important. As will be seen in the last section, from a "biological" point of view, perennials can be a way of overcoming the dilemma; the abandoning of land and the spread of *alang-alang* in agricultural plots. In socio-cultural terms however, they are not a "cure-all-remedy" for all the problems involved.

4 Perennial Expansion and the Agricultural Perspectives of Alang-Alang

For the Indonesian government, *alang-alang* plots are land lying idle, land which is not used effectively, and land which impedes the nations development (Dove 1983, Eijkmans 1995). Driven by the fear that non-compliance with state policies could lead to a withdrawal of government subsidies[19], in April 2001 the village administration issued several regulations in regard to natural resource use. The most important rules are that (1) all plots must be cultivated permanently, (2) land not used effectively (= *alang-alang*!) can be withdrawn by

[19] This was the painful experience of the neighbouring village of Katu which still practices traditional shifting cultivation inside LLNP and which was punished with a stop of all government programs and subsidies.

the village authorities and (3) allowances to open forest are only issued when the applicant has converted all his imperata plots before. Given the socio-economic circumstances and constraints outlined above, it is clear that these "rules" are rather meant to please higher authorities than that they represent institutional arrangements which are really monitored and enforced. However, they point to the future direction the dry land sector is expected to develop. As the previous sections showed, local people perceive *alang-alang*-plots neither exclusively in terms of a "problem", nor exclusively in terms of an "opportunity"; but they would appreciate if the number of imperata infested plots would be reduced. Although imperata is intolerable to shade and active cultivation may suppress its growth, the major problem Rompo villagers face is that this effort must be constantly maintained. In the recent past however, a growing number of farmers have started to plant perennials in part of their *alang-alang* fields. For instance, within the last three years 22,5% of our respondents planted *"kemiri"* (*aleurites moluccana*) and 35,4% planted cocoa inside of *alang-alang* plots. Considering the high vulnerability of *alang-alang* to shade, at first glance the trend of planting perennials seems to be promising. The general opinion is that more than cocoa itself, it is the cocoa-bound shadow tree *"gamal"* (*gliricidia sepium*)[20] which contributes most to the shading out of *alang-alang*. Once established, by absorbing less labour than annual plots, perennial crops may reduce the time pressure for the farmers and may suffer less degradation when temporarily abandoned. It is these characteristics which make cocoa the ideal remedy against land degradation in the eyes of regional policy makers and local NGO´s.[21]

In general, perennial expansion in the research area occurs within an evolutionary process, in which the area for perennial crops is first extended with annual crops being inter-planted. With the course of time perennials dominate more and more the mixed cropping stands and inter-cropping decreases. In the LLNP area, cover crops within the mixed system consist mainly of maize, peanuts and red beans. After the village head conducted a successful trial

[20] "Gamal" is actually an abbreviation for "ganyang mati alang-alang"; literally the "alang-alang-ko-killer".
[21] 40% of the villagers received either government or non-government subsidies in form of cocoa seedlings.

series in his private “experimental plot”, sweet potatoes (*convolvulaceae*) became the most popular cover crop in Rompo. The fact that over 80% of our informants have plans to plant perennial crops in imperata sites should not lead us to the fallacy that in the foreseeable future Rompo will become an export village, dominated by cocoa estates and free of *alang-alang* infestation. One aspect of the local imperata dilemma is for sure that under the given circumstances (low capitalisation, missing access to credits, frequent harvest failures) household decision making will always be governed by the “security first” principle. Thus it will always prioritise subsistence concerns over market production (“*sawah* first!”). In case a farmer has money to afford fertiliser, the general pattern is to use it for wetland rice first. Only when a “rest” is left, it will be used for market crops. Cocoa has only recently entered the Besoa area and is planted in Rompo since less than four years. Given limited knowledge and limited resources among the farmers, starting cocoa cultivation for the first time may be a very risk-loaded exercise. The life cycle of perennial crops involves that during the first three years (as long as the trees do not bear fruits) investment costs may exceed the benefits of the first harvests. Therefore, in terms of security fast yielding annuals are vital to overcome the first unproductive years of perennials. It is indicative for the situation, that the introduction of the export crop cocoa was supplemented by the introduction of a typical subsistence cover crop of almost no local market value: sweet potato!

In the Lore Lindu region, the arrival of cocoa is intrinsically linked to the Buginese migrants from South Sulawesi. Transferring a plant from one location to another (i.e. from South to Central Sulawesi) however is more than a matter of locality, but involves the transfer of a certain security conception which surrounds this specific plant. In the research region, security is obtained by a strategy of mixed cropping which is aimed at providing a high variety of cultivated plants in order to secure at least one crop in case of harvest failures. The predominant characteristic of this strategy is “diversification”. Among the Buginese on the other hand, security is derived from the “intensification” of one product of high economic value which is usually cocoa (Burkard 2002: 18ff). Whereas the local security system aims at "survival in bad years", the perennial system aims at "maximum production in average years" (Eijkmans 1995). One cannot expect that local communities adapt to such a fundamental change of their security conception within a short period of time. Consequently, the average area farmers are willing to plant with cocoa is 0,4 ha, which make up 1/3 of the average imperata area. In the neighbouring Napu valley we found that after cocoa trees in mixed stands reached the point where their increasing shade did not anymore allow for annual cover crops, people encroached into the National Park in order to plant diverse annual (*palawija*) food crops because they perceived the reliance on a single export product (cocoa) as a threat for their existence (ibid: 21). If one is allowed to speculate about a similar development in the Besoa valley, the opening of new plots for annuals would then again provide new "gaps" for imperata to invade. Thus perennials could set in motion a process they once were introduced to combat. Therefore, the need to intensify *alang-alang* fields cannot be solved in a sustainable manner by the spread of perennials and their biological advantages alone without taking deep rooted convictions and mechanisms of risk control into account.[22] Neither in developing the wet rice sector (the source of *alang-alang* infestation), nor in expanding perennial cultivation (the proposed remedy for *alang-alang* infestation) did the state take notice of the local conception of socio-economic security and of the role imperata plays in the wider cultural ecology of the Besoa people.

References

BROOKFIELD, H., POTTER, L. and Y. BYRON; In Place of the Forest: Environmental and Socio-economic Transformation in Borneo and the Malay Peninsula. New York 1995.

BURKARD, G. ; Stability or Sustainability? Dimensions of socio-economic Security in a Rain Forest Margin; Storma Discussion Paper Series No. 7, Bogor; 2002.

BURBRIDGE, P., DIXON; A. and SOEWARDI.; Forestry and Agriculture: Options for Ressource Allocation in Choosing Lands for Transmigration. *Applied Geography,*1: 237-258.

DOVE, M.; Manusia dan Alang-Alang di Indonesia; Gadjah Mada Press; Yogyakarta; 1987.

[22] To put it more concretely: as long as national health services are not improved and alang-alang fields produce the bulk of the locally used medicines, high cocoa prices will not be able to close the gap between potential and actual use of imperata plots.

EIJKMANS, H. J.; Profitability or Security. Decision Making on Land Use among Toba Batak Peasants in North Sumatra, Indonesia. Nijmegen Studies in Development and Cultural Change; 1995.

FREEMAN, J. D.; Report on the Iban. Monographs on Social Anthropology No. 41. New York 1970.

GEDDES, W. R.; Opium and the Miao: A Study in Ecological Adjustment; *Oceania* 1: 1-11; 1970.

GEERTZ, C.; Agricultural Involution. Processes of Ecological Change in Indonesia; Berkeley; 1963.

GOUROU, P.; The Tropical World. Its Social and Economic Conditions. London 1953.

KUMOLO, I.; Peranan Alang-Alang di Proyek Transmigrasi Baturaja. In: Dove, M.; Manusia dan Alang-Alang di Indonesia; 43-66. Gadja Mada Press; Yogyakarta; 1987.

MARTENS, M., ZELLER, M. and R. BIRNER; Does Technical Progress in Agriculture have a Forest Saving Effect? Evidence from Central Sulawesi. In: Gerold, G., Fremerey, M. and E. Guhardja; Land Use, Nature Conservation and the Stability of Rain Forest Margins in SE-Asia; Berlin 2004.

MISCHUNG, R. Sesshaftigkeit und Intensivierung beim Brandrodungsfeldbau. Eine Fallstudie aus Nordwest-Thailand; *Paideuma* 30: 241-25; 1984.

MURRAY LI, T.; Local Histories and Global Markets: Cocoa and Class in Upland Sulawesi. *Development and Change* 33: 415-437. Oxford; 2002.

PENDER, J.; Rural Population Growth, Agricultural Change and Natural Resource Management in Developing Countries: A Review of Hypotheses and some Evidence from Honduras; *TPTD Discussion Paper Series* 48; Washington; 1999.

PRANOWO, H. A.; Eksploitasi Alang-Alang di Hutan Lindung di Lereng Gunung Merapi. In: Dove, M.; Manusia dan Alang-Alang di Indonesia; 133-166. Gadja Mada Press; Yogyakarta; 1987.

SEAVOY, R. E.; The Origin of Tropical Grasslands in Kalimantan, Indonesia. *Journal of Tropical Geography* 40: 48-52; 1975.

SHERMAN, G.; What Green Desert? The Ecology of Batak Grassland Farming. *Indonesia* 29: 113-149; 1980.

SHIM, P. S.; Imperata Cyclindrica Grasslands in Malaysia. In: R. J. Vandenbeldt; Imperata Grasslands in SE-Asia: Summary Report from Indonesia, Malaysia and the Philippines. Bangkok; 1993.

SOERJANI, M.; Symposium on the Prevention and Rehabilitation of Critical Land in an Area Development. *Proceedings of Biotrop Workshop on Alang-Alang* No. 5; Bogor; 1980.

SOERJTNA, E. S. and McIntosh, J. L.; Food Crops Production and Control of Imperata Cyclindrica on Small Farms. *Proceedings of Biotrop Workshop on Alang-Alang* No. 5; Bogor; 1980.

SOEWARDI, B. and SASTTADIPRAJA, D.; Alang-Alang an Animal Husbandry. *Proceedings of Biotrop Workshop on Alang-Alang* No. 5; Bogor; 1980.