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Past, Present and Future – Perspectives of Balinese Rice Farming

Dr. I Wyn Alit Artha W, MSi, Balai Pengkajian Teknologi Pertanian, Bali,

Rachel P. Lorenzen, MSc(Agr) and Stephan Lorenzen, MA(Anthr), Australian National University, Canberra, Australia (PhD Candidates, currently doing field research in Bali)

Contact person: Rachel P. Lorenzen: rachel.p.lorenzen@anu.edu.au, HP: 081 338592269

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Abstract:

Balinese rice cultivation is famed all over the world for their efficient use of irrigation water. The fertile volcanic soils and abundant water are but one of the factors that enable high and stable yields. An existential part of irrigation management are the socio-religious organisations called *subak* which are the backbone of Balinese rice cultivation. The *subak* is a mixture of different units: It is a technological unit containing a dam and collectively owned irrigation canals. It is a physical unit containing all rice terraces within clearly defined *subak* boundaries. It is a social unit consisting of all farmers who cultivate land within the *subak* boundaries and receive water from the *subak* irrigation infrastructure. It is a religious unit consisting of rituals on the individual level, the *subak* level, and the inter-*subak* level. And last but not least it is a legal unit, with a clearly defined set of rules that regulates the rights and duties of its members.

The *subak* system and with it the rice cultivation is confronted with serious external pressures. The steady growth of the main tourist areas and increasing urbanisation creates many new income sources for the Balinese population. The possibilities to work in the building or tourist industry combined with the high land prices tempt more and more farmers to sell their rice fields and work in other professions. Low income and the stigma of the dirty uneducated farmer keep a whole generation of young Balinese away from rice cultivation. Moreover, highly productive arable land gets lost at an accelerated rate due to excessive building activities.

This paper discusses effects of increasing off-farm employment and conversion of agricultural land. The focus will be on one *subak* in central south Bali. This area achieves one of the highest yields of Indonesia, but is also facing a constant withdrawal of irrigated rice fields. Are farmers willing to continue rice farming and what are opportunities for Balinese rice cultivation to overcome present difficulties?

Introduction

Bali is famed all over the world for its beautiful rice terraces which have been cultivated for more than thousand years. The maintenance of this exceptional landscape would not have been possible without the organisation *subak*. The *subak* deals with matters related to the irrigation and cultivation of rice. It has been described by several authors and is recognised as autonomous socio-religious association¹. The *subak* system, evolved over such a long time, is consequently strongly interlinked with Bali's natural, social, cultural and religious environment.

The picturesque sights of the many rice terraces are also a main attraction for the many tourists that visit Bali every year. In fact, tourism has developed fast in the late 1960s'. In the following years arrivals at the international airport increased almost exponentially from 5000 tourists *per year* in 1968 to 3900 *per day* in 2001 (Wall, 1996, BPS, 2004). In the early stages, tourism centres concentrated in the south of Bali around Kuta, Sanur and Nusa Dua. With the constant arrival of more tourists every year, tourism can now be found all over Bali.

The many income possibilities directly created in tourism or indirectly in industries which produce goods for the tourist industry were one of the prime reasons for Bali's rapid economic development. 51 percent of people's income and 38 percent of Bali's employment opportunities are directly linked with the tourist industry (Pitana, 2003). The higher living standards and a growing population have promoted the expansion of urban areas. Every year, up to 1000ha of rice fields are converted into housing estates, roads, hotels, shopping areas, show rooms and other facilities.

Yet, agriculture, livestock, forestry and fishery still makes up 20 percent of the Gross Regional Domestic product compared to the trade, hotel and gastronomic industry with 32 percent². Rice yields harvested on 85'128ha irrigated fields are the highest in the Indonesian Archipelago with more than 5.3 t/ha (BPS, 2003).

However, rising land prices, better paid off-farm employment and increasing living costs are some of the factors that influence the incentives of farmers to seek alternatives to rice cultivation. Further, employment in the services sector is attached to higher status, regular working hours, and income security. Especially the younger generation are not willing to put up with the low income and status attached to rice farming.

These developments put a strain on remaining rural-agricultural communities. This paper discusses the difficulties and challenges *subak* face nowadays by means of a *subak* case study.

Subak T is a large *subak* with 183 ha of irrigated rice fields. The *subak* is divided into fourteen sub-groups (*munduk*) with an average of 13ha irrigated land. The *subak* counts 840 members. The farmers who have rice fields in Subak T mostly live in four nearby villages. These villages are again divided into 26 hamlets (*banjar*). The tourist areas Kuta and Legian as well as the capital city Denpasar are only thirty minutes away by car. As a consequence, a large percentage of the village communities in this area work part-time or full-time off-farm. The main road from Denpasar to Surabaya (East Java) passes through *subak* terrain. And another road is currently under construction. For over a decade, various enterprises have already set up their businesses along the main road. The land along the new road is just being sold for potential development. More water shortages and increased waste in the canals is expected as urbanisation is creeping further into the rice fields.

¹ See also Geertz (1972), Lansing (1991), Pitana (1993), Dinas PU (1997) and Sutawan (2000)

² GRDP is the Gross Regional Domestic Product. Source: BPS Statistics of Bali Province, 2001.

In a first section of this paper, the main characteristics of the traditional *subak* are summarised. The following passage discusses experiences the *subak* has made when external top-down management models were introduced in the past. In a third section a case study is used to present the challenges to one *subak*. Farmers' responses are analysed by focussing on urbanisation and off-farm employment. In the final section, some ideas for the future of the *subak* are presented.

Defining the subak

Archaeological evidence indicates that the *subak* system has been in place for more than a thousand years. It is one of the three public corporations of a traditional Balinese village (*desa adat*) along with the hamlet (*banjar*) and the temple congregation (*pemaksan*) dealing with the cultivation and irrigation of rice (Geertz, 1980 and Warren, 1993)³. These three overlapping but separate local organisations are fundamental in maintaining the balance between the creator, women, and the nature⁴.

The *subak* is a mixture of different units:

It is a ***technological unit*** including a main water inlet and a complex system of collectively owned irrigation canals which secure equal access to irrigation water to all the *subak* members⁵.

It is a ***physical unit***. The boundaries of a *subak* are defined by all the rice fields which receive water from the *subak* irrigation infrastructure.

It is a ***social unit*** comprising all farmers who cultivate land within the *subak* boundaries and receive water from the *subak* irrigation infrastructure.

It is a ***legal unit*** given the status of customary law societies with clearly defined rules and regulations written down in a law book called "awig-awig" (Dinas PU, 1997)⁶. This set of laws regulates rights and duties among the members. It includes public obligations, regulations concerning land and water use, legal transactions of land transfers, and collective religious ceremonies.

Subak internal matters are handled by the *pekaseh* the *subak* head and several assistants who are democratically elected by all members of the *subak*. The *pekaseh* is responsible to overlook the irrigation management within the *subak* area, to schedule cultivation cycles and to organise *subak* ceremonies⁷.

It is a ***religious unit*** including ceremonies on the individual level, the *subak* level, and the inter-*subak* level. The ceremonies vary in scale, involvement and duration. The most elaborated ones involve all *subak* who receive water from the same crater lake. Ceremonies on the individual level mark each rice growing stage asking protection for the rice crop

³ The *banjar* is responsible for regulating community life. The *pemaksan* organises and coordinates the vast religious rituals related to a *desa adat*, which comprises several *banjar*.

⁴ To achieve stability and harmony Balinese have to seek the balance between the divine world and the human beings, between the human beings themselves, and between the human beings and their natural environment.

⁵ The principle of equitable water sharing is put into action by fixed proportional flow division structures.

⁶ The *subak* are formally recognised by the Bali Provincial regulation No. 02/PD/DPRD/1972: "Subak are customary law societies with socio-agrarian-religious nature which were established a long time ago and evolved continuously as landholding organisations which distribute water in a defined irrigation area."

⁷ By coordinating the planting cycle all *subak* members plant rice at the same time. This synchronisation over large areas minimises growth and dispersal of pests and makes pest control more effective (Lansing and Kremer, 1993, Aryawan et al. 1993)

against pests and diseases, and to guarantee a good harvest. The ceremonies are linked to a hierarchical order of water temples which play an important role in the coordination of irrigation water and pest management. They are strategically located at every branch of the irrigation system from the crater lake down to the sea (Lansing, 1991; Pitana, 1993; Sutawan, 2000).

The general Balinese philosophy “Tri Hita Karana” guides the *subak* system and the farmers. To keep the harmony between God, the people and nature, farmers hold the several ceremonies and should adhere to fundamental principles for good irrigation management such as cooperation, mutual help and solidarity. These are some of the factors which are responsible for the long sustainability of the *subak* system. Only in the recent past has the *subak* system been subject to modification.

Past

The Dutch were the first to modify the *subak* system for their purposes. They used its organisational structure to collect taxes from 1906 until the Second World War (Lansing, 1991). After independence, the Indonesian government took over the Dutch tax collection system without making major changes. In the early 1970s, new policies were introduced to boost rice production for the increasing population, converting rice from a subsistence crop to a cash crop. One of the most profound impacts on the *subak* system was the introduction of new high yielding varieties (HYV) depending on chemical fertiliser and pesticide. The new varieties came with large investments to improve the irrigation infrastructure⁸.

Farmers were encouraged to plant rice as much as possible, without considering traditional irrigation schedules and rotational cropping patterns. Irrigation systems were improved and operation and maintenance costs reduced. However, the over-emphasis on technology did not take the already existing *subak* system into account. The result was disastrous. Although yields were substantially increased, water shortages and unprecedented outbreaks of rice pests and disease reduced the immediate gains⁹. Inter-*subak* conflicts about water rights broke out and the trust in modern agricultural technology was undermined.

The top-down management models conflicted with the traditional *subak* system which builds upon democratic values. The fact that the *subak* system is part of a complex socio-ecological system intimately interwoven with Balinese culture and society was at first ignored.

Fascinating is that even though *subak* capabilities for operation and maintenance were substantially weakened due to these events, the *subak* system recovered and adapted to the changes. With the revelation of the functioning and importance of the water temples, farmers were allowed to return to the traditional *subak* rice farming system (Lansing, 1991). Likewise, the introduction of *subak* federations provided a new coordination and communication structure on the inter-*subak* level (Sutawan, 2000). This allowed the *subak* to renegotiate water rights and strengthen the system.

⁸ The Bali Irrigation Project (BIP) financed by the Asian Development Bank, focused on the rehabilitation and expansion of irrigation facilities. It was launched in 1979, physically integrating smaller irrigation infrastructures into large systems sharing a common permanent weir.

⁹ See also Lansing (1991), Drysdale and Zimmerman (1995), Sutawan (2000) and Pringle (2004)

Present

In the past the subak system was subject to changes to increase agricultural production. The present challenges to the subak system are more indirect. As we will see, rice cultivation lost importance in the village economy. The vicinity of the study site to urban areas and main tourist centre creates many new jobs in various industries. The expansion of these areas also demands land, mostly taken from the surrounding *subak*.

In a first part of this paper the focus will be on the effects on the *subak* if farmers increasingly concentrate on off-farm employment. The second part concentrates on the effects of conversion of agricultural land and with it gradual urbanisation.

Concentration on off-farm employment

In the past, before the implementation of HYVs as cash crop rice was cultivated once a year for subsistence purposes. In the case study, the ploughing of the fields was done with cows by farmers themselves. The transplanting and weeding was organised in family groups. The harvesting was organised by the *banjar*. Every family which belonged to the *banjar* had to help harvesting the fields of all *banjar* members. A clearly defined amount of rice, depending on field size and distance of field to the village, had to be paid to the *banjar*. This rice was stored in the rice storing hut (*lumbung*) of the *banjar*. In times of food shortage the rice then was handed out to all families of the *banjar* in equal shares. Values such as solidarity and cooperation were carried from the *banjar* into the rice fields.

Nowadays, there is a visible shift from on-farm activities as main income source towards planting rice as a side business. As a result, farmers spend less time in the rice fields and more time off-farm, mainly as casual workers in construction. With an average size of 0.35 hectares the workload on the rice field is manageable and allows spending time in other occupations. The day-to-day routine visits to the rice fields to check the waterflow is either managed by the older members or the women of the households. The ploughing, transplanting, weeding and harvesting is outsourced. The ploughing is done by hired workers with tractors. The farmers prepare the fields for the tractor and do the levelling after the ploughing. For the transplanting and the weeding female work teams of three to six women are hired. They are usually from the same *banjar* as the farmer who cultivates the rice field. The rice is sold to a trader before the harvest. He brings in his harvesting team for harvesting, threshing and transporting the rice to the mill. The harvesting is mostly done by Javanese seasonal workers. The traders either have their own mill or sell it to a mill.^{10,11}

In chart 1 (see Appendix) labour input divided into farm labour and outsourced labour is depicted for the last wet season rice cultivation for 0.2ha. As the chart clearly illustrates, all labour intensive activities are outsourced. It also shows that most of the work in the first three months can be done in half a day or even less. This leaves time open for working off-farm.

Work which used to be built upon mutual help and solidarity is replaced by fixed prices for hired labour. The contractual system increases individual costs for farmers but it also reduces the community duties towards the other farmers of the *banjar*. Mutual help is replaced by financial means. This gives the farmers a greater independence as they do not rely on the community help anymore.

¹⁰ The traders work regionally and are linked through a loose network. The Javanese harvesting teams travel from trader to trader, following the harvesting areas.

¹¹ See also Patrick, ed (2004) *Contracting in Bali in: Contract farming in Indonesia: Smallholders and agribusiness working together*, ACIAR Technical Reports No.54

Another issue are the young generation who are not interested in working in the rice fields anymore. As Pitana (2005) puts it: "...The willingness of the younger generation to become a farmer has been drastically turned down. Becoming a farmer is the last choice – when other sectors are already locked because of the lack of skill and knowledge." Most of the farmers we met on the rice fields in this *subak* are over 50 years old. They say their sons are *malu* (ashamed) or *malas* (lazy) and therefore do not want to come and help. In fact, it is the image attached to being a farmer which keeps the next generation out of the rice fields. None of the young people want to be seen as dirty, uneducated, and poor farmers who doesn't have any other option than working in the mud. Parents would also like to see their sons and daughters leaving the rice fields and doing "important" work. It is seen as an economic and social progress, even if the income is not necessarily higher.

Asked about whether they think that their sons would return to working in the rice field after their retirement from another job, farmers don't consider this as a good option. Rice cultivation, so they say, is very complex and cannot be learned at an age of 40 or 45 years old. If the young generation doesn't follow the parents into the rice fields anymore, a considerable knowledge system will be lost, including the performance of ceremonies. Even, if they supposedly return after their retirement, it is unlikely that all the traditional knowledge related to the rice cultivation will be preserved.

Shifting rights - Do all farmers have the same rights?

The move away from agriculture as main income has certain implications concerning the equal distribution of water between the farmers within a *subak*. Traditionally, the water share received by each member determines his rights and duties within the *subak* and it reflects the equity concept that has evolved over a long time and is mutually agreed on by all members (Sutawan, 2000). Naturally this is the ideal form of water allocation. In reality farmers take greater shares if needed. Though, there is a socially regulated strict distinction between water stealing and water "borrowing". The manipulation of the water flow is labelled as "borrowing" as long as the farmer stays next to his water inlet and returns the flow to normal before going home. Otherwise, a farmer will be accused of stealing water. Although „borrowing“ is against *subak* law it is socially accepted to do so.

Full-time farmers can spend more time in the rice fields and consequently have more time to manipulate the water flow than farmers who are busy off-farm. They feel entitled to a greater share of irrigation water because their income solely relies on a good harvest. Although full-time farmers take a greater share of water and thus break *subak* law, the farmers who work off-farm accept this. It is not the "borrowing" farmers who is ashamed of manipulating the system. It is the farmer who works off-farm who is ashamed because he neglects his rice fields.

Conversion of agricultural land / urbanisation

A threat to the Balinese rice culture is the rapid conversion from rice fields to non-agricultural land. Following the main road from Denpasar to Tabanan (towards West Bali) one can hardly see any rice fields anymore. Various businesses, such as restaurants, local stores, car workshops, food stalls and other businesses have set up their commercial enterprises along the road.

Table 1 includes data on the conversion of land from six *subak* in the past seven years (1995 and 2002), including the case study *subak*. They are all in the vicinity to the main road.

Table 1: Loss of irrigated land¹²

Subak	Size (ha) 1995	Size (ha) 2002	Loss of land
1. Subak T	192	183	4.7 %
2. Subak D	129	122	5.4 %
3. Subak S	73	71	2.7 %
4. Subak P	60	41	31.7 %
5. Subak B	173	171	1.2 %
6. Subak A	173	150	13.3 %
Total	800	738	7.8 %

In all the *subak* the irrigated areas have decreased with an average loss of 7.8%. In Subak T there has been 4.7% of irrigated land lost. These numbers correspond well with the loss of irrigated land all over Bali (average of 1.1% per year).

The territory of Subak T extends to the north and the south of the main road. There are two *munduk* (sub-*subak* groups) to the south of the road. They are at the tail end of the *subak* irrigation system and have to manage with little irrigation water. In addition, the waste which is produced from the enterprises and housings along the road clogs the canals constantly. The maintenance of the canals within *munduk* boundaries is the responsibility of the farmers. Due to the waste the work load has increased immensely. More work for the same low income does not make sense for many farmers. They are more and more tempted to give up rice cultivation. This creates a vicious cycle: The more farmers give up farming the fewer farmers have to perform the collective labour of the *munduk*.

Right now, there is another road under construction, connecting two of the four villages that surround Subak T. This road will divide the *subak* further. Land prices for agricultural land in this area were around 30-35 Mio Rupiah (3'000-3'500 US\$) per are (0.1ha). Over the last view months, since the start of the project, prices for land adjacent to the road have gone up to 60-75 Mio Rupiah (6'000-7'500 US\$) per are. Most of it has already been bought by persons who will open a business along this road. This corresponds to almost 2 ha of irrigated rice fields that has been sold.

The landowners emphasise the positive effect of the road, arguing that the new road shortens the travel time to the market in the west. Also, farmers who cultivate rice along the road will be able to sell their rice for a higher price. This is because the traders don't have to pay their harvesting teams an extra amount to carry the freshly harvested rice to the road. In summary, the increased monetary value of the land is still the main argument for landowners to sell the land. This argument loses its emphasis the further one moves away from the road. Fear from the unknown development, waste and pollution become the main topic. The *pekaseh* sees increasing problems with the maintenance and operation of the canals. Also, he is concerned that the road splits the *subak* into three divisions. Farmers who sell their land close to the road will not have to take part in *subak* maintenance work anymore.

¹² Source: Laporan Hasil Pelaksanaan Proyek Pendataan Obyek Pelaksanaan Dan Sosialisasi IPAIR di Kecamatan M, 1995/1996, Pemerintha Kabupaten Badung, Dinas Pendapatan Daerah / Pasedahan Agung, Bunga Rampai Persubakan di Kabupaten Badung (2004)

Summary

As the above examples show off-farm work and land conversion are having a considerable impact on farmers' every day decision making and on the running of the *subak* system.

The literature on the *subak* systems emphasises values such as trust, cooperation, and mutual help among members as main features of *subak* organisation (Sutawan, 2000, Groenfeldt, 2003). These features which still exist today are socially monitored and sanctioned directly by farmers on the fields. However, the decreasing farming community and increasing pressure on land and water resources might change the integrity of the *subak* system and its social framework. The modern *subak* is not an association of mainly subsistence farmers relying on mutual help and solidarity. It consists of farmers with different off-farm opportunities and different incentives. Rice cultivation is still practiced but for many farmers the harvest does not determine if the family has to starve or can eat rice. The distinctions of rural and urban are not clear anymore. Households shift back and forth between agricultural and non-agricultural economic activities. They adjust to the employment possibilities constantly trying to increase their income and status. This requires a re-thinking of the rural economy and rural life (Barkern & Molle, 2002).

Future

The continuous shift to off-farm employment will be an ongoing process, especially in areas close to urban centres. The question is not how to stop this movement. It is normal and necessary that farmers try to improve their living standard. The question is how to strengthen the *subak* system within these developments. How can incentives for the Balinese population be created so that agriculture is not abandoned completely, but is integrated into their modern life style?

The Bali bomb has put an abrupt pause to the constant growth of the tourism industry. However, these days tourists are back with numbers as high as before the bomb. Large development projects along the coast and between Denpasar and the main tourist areas show that investors are optimistic that the tourist industry will further increase. Nonetheless, parallel to this development Bali has to do more for the agricultural sector. Not only to sustain agricultural productivity, but also to honour the link between Bali as a holiday destination and the beautiful landscape.

The multi-functionality of rice farming

There is a paradigm change in process concerning the role of agriculture and the farmer within society. It is called multi-functionality. Briefly stated, the concept of multi-functionality recognises important potential benefits of agriculture in addition to food production such as rural livelihoods and regional economic vitality, stable households and communities, cultural heritage and identity, and religious, spiritual, and aesthetic values (Groenfeldt, 2005).

The *subak* plays a fundamental role in recognising the multi-functionality of the rice farming. Its functions can be summarised as follows:

- ♦ **Environmental function:** Balinese rice cultivation is built upon an engineered landscape. It has evolved over thousand years and has become a part of the natural environment. Water is diverted from the rivers through the *subak* systems. Most of the water is returned

to the river and used by the downstream *subak* again. The complex system of canals and weirs contributes to flood control, groundwater recharge, flood prevention, and prevention of soil erosion and landslides. (Groenfeld, 2005; Sutawan, 2004)

Further, the rice fields are the wetland habitat for a vast amount of animals. It is breeding ground for birds and insects, in some areas even for fish and crabs. The rice fields do not only feed the Balinese society, they also strengthen the ecosystem and sustain biodiversity.

- ♦ **Social, cultural and religious function:** Balinese rice growing is intimately interwoven into Balinese society and culture. The *subak* plays a central role. On the one hand it is a religious and social community. It is responsible for the rice rituals and it sets the institutional framework in which the farmers coordinate and cooperate. On the other hand it is a productive unit providing the staple food for Balinese society (Sutawan 2002).

The *subak* is often described as the „wet community“ concerned with agricultural matters only¹³. Nevertheless, it has a strong influence on the *banjar*, the „dry village. Values such as cooperation, solidarity, harmony and a strong sense for community are fundamental for a well functioning irrigation system. The farmers are constantly reminded that rice cultivation demands these values. The basic philosophy „Tri Hita Karana“ is put into action on the rice field. A relationship between the Creator and the people is honoured by the many religious rice ceremonies. The relationship among the people is manifested in the equal distribution of irrigation water and the maintenance work which is done together. The relationship between the people and the natural environment is fundamental to keep yields high.

By acknowledging and promoting the multiple functions of rice cultivation the *subak* system can survive amidst modern lifestyles and changing habits. This acknowledgement and promotion will help to re-evaluate the farmer's role and status. A change from being the uneducated, unskilled, poor and dirty farmer towards an image of being a landscape designer with skills in natural and cultural conservation on the one hand, and a food provider on the other hand would do more justice.

Land and water use planning focussing on agricultural sustainability

Honouring the importance of the farmer for the Balinese culture, and for the economic and natural environment means respecting the geographical space rice cultivation needs. Minimising rice field conversion, especially in the fertile southern lowlands, can be achieved through careful spatial planning. Strict law enforcement would be needed to implement such planning.

Impacts of urbanisation can be planned, regulated and controlled. Bali has laws and regulations in relation to environmental management. However, it is the control mechanisms which remain weak. New estates and road construction sites in the middle of the Balinese green belt suggest that political and economic interests are prioritised above environmental or social concerns.

The integration of social aspects of irrigation into new land use planning is necessary to avoid creating conflict within the *subak*. Water is still the main variable of the *subak* system. Farmers make daily decisions in water management relying on face-to-face interactions. They fine-tune the irrigation and thus stabilise the whole system. Converting irrigated land at the wrong place can have the consequence that water negotiations among the surrounding farmers

¹³ See for instance Geertz (1980) *Negara – The Theatre State in Nineteenth-Century Bali*, Princeton University Press, Princeton, New Jersey

are seriously disturbed. Consequently, the arising difficulties can create incentives to give up rice farming and look for alternative occupations.

Organic agriculture

Conversion to organic rice production can be a valuable alternative for Balinese *subak*. Markets for organic products are growing with exponential numbers especially in Europe. There is a global move towards healthy food. Bali as a small island can use the already well established tourism industry as a stepping stone. The organic rice could be sold directly to hotels and restaurants to an increased price. Eco-tourism is another growing dimension within tourism and Bali is an optimal destination. This would strengthen the link between the primary and tertiary sector in Bali. It would allow the farming community to profit directly from the tourism industry. Tourism could directly profit from the promotion of Bali “going organic” as a role model how agriculture and tourism can profit from each other without damaging the social, cultural and natural environment.

Finally organic agriculture fits perfectly into the already existing concept “Tri Hita Karana” which promotes harmony between God, the people and the natural environment. Organic agriculture would strengthen the Balinese rice cultivation by promoting all around the world of having one of the best farmer based irrigation systems AND the healthiest rice.

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Appendix - Chart 1 - farm labour and outsourced labour

