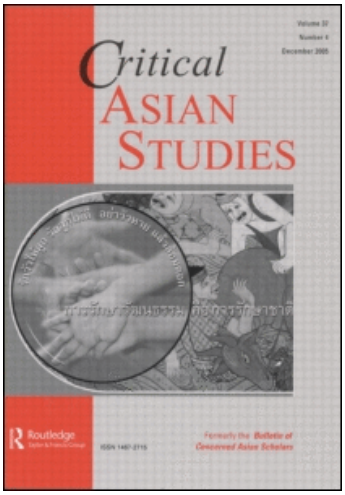

Critical Asian Studies
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713695955

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Online publication date: 13 April 2011

To cite this Article MacRae, Graeme(2011) 'RICE FARMING IN BALI', Critical Asian Studies, 43: 1, 69 — 92
To link to this Article: DOI: 10.1080/14672715.2011.537852
URL: http://dx.doi.org/10.1080/14672715.2011.537852

Critical Asian Studies
43:1 (2011), 69–92
Routledge
Taylor & Francis Group

RICE FARMING IN BALI

Organic Production and Marketing Challenges

Graeme MacRae

ABSTRACT: All is not well with agriculture in Southeast Asia. The productivity gains of the Green Revolution have slowed and even reversed and environmental problems and shortages of water and land are evident. At the same time changing world markets are shifting the dynamics of national agricultural economies. But from the point of view of farmers themselves, it is their season-to-season economic survival that is at stake. Bali is in some ways typical of other agricultural areas in the region, but it is also a special case because of its distinctive economic and cultural environment dominated by tourism. In this environment, farmers are doubly marginalized. At the same time the island offers them unique market opportunities for premium and organic produce. This article examines the ways in which these opportunities have been approached and describes their varying degrees of success. It focuses especially on one project that has been successful in reducing production costs by conversion to organic production, but less so in marketing its produce. It argues finally for the need for integrated studies of the entire rice production/marketing complex, especially from the bottom-up point of view of farmers.

The agriculture sector in Indonesia, and indeed most of Southeast Asia, has since about 1990 been in a state often described in terms such as "decline," "marginalization," and even "crisis." The most obvious manifestations of this are the steady shrinking of the agricultural component of national economic indicators and progressive transfers of land, labor, and capital from agriculture to other sectors. The causes are multiple, complex, and well-documented; they include declining productivity, increasing input costs, and static produce prices, as well as environmental factors such as water shortages and soil degradation.[1]

ISSN 1467-2715 print/1472-6033 online / 01 / 000069–24 ©2011 BCAS, Inc. DOI:10.1080/14672715.2011.537852

"Few young people in Bali, at least in the more affluent and touristed areas, choose to become farmers. So unattractive has farming become that farmers routinely advise their children against following in their footsteps." (Credit: Mudassir)

The Indonesian island of Bali is broadly typical of this pattern, but is in certain respects a special case because of its relative affluence and the dominant role of tourism in its economy. Farmers are on one hand doubly marginalized by the growing prosperity around them and by the alternative income opportunities in the tourism sector. On the other hand, tourism and the associated expatriate community and export sector offer significant potential markets for premium, "heritage," and organic produce. The agriculture sector in Bali has for some years been poised at a crossroads between two broad paths for future development: one of integration into global agro-industry and agribusiness, the other, a still fragmented movement of small, local initiatives based on principles of local self-sufficiency and sustainability, involving various combinations of revival of traditional varieties, organic production, and more modern/global approaches to marketing.[2] The pros and cons of these approaches have been widely debated globally, but in Bali the distinctive local economic and cultural conditions lend an added logic to the latter approach.

The horticulture (sub-)sector, especially in the mountain areas, has proven relatively adept at exploiting opportunities for new products and markets. This is consistent with a long-established pattern across Indonesia of flexibility, com-

1. See, for example, Pingali, Hossain, and Gerpacio 1997; and Gerard and Ruf 2001.
2. MacRae 2005 (Growing).

mercial orientation, and innovation among upland horticulturalists.[3] The rice sector however has been much less inclined to change, let alone shown an interest in innovation or entrepreneurialism. This too is consistent with an Indonesia-wide pattern, rooted partly in material factors such as the collective decision-making and cropping schedules imposed by irrigation systems. The resistance to change has also been linked with what is said to be an inherent peasant conservatism, which in itself explains little. In Indonesia rice farmers, including Balinese ones, are mostly over fifty years of age and have spent most of their working lives under the top-down command regime of Suharto's New Order. They remember the time, prior to the Green Revolution of the New Order, when hunger and even starvation were real consequences of regular low productivity and occasional crop failure. Neither their age nor their experience inclines them to experimentation, innovation, or risk. Consequently, when I began researching this subject in 2003, new and alternative approaches had made very little headway. Since then, however, unprecedented and unexpected developments have taken place in the organic production of rice and, to a lesser extent, in innovative approaches to the marketing of such produce. These developments are the subject of this essay.

The Rice Farmer's Lament

Few young people in Bali, at least in the more affluent and touristed areas, choose to become farmers. So unattractive has farming become that farmers routinely advise their children against following in their footsteps. As a result the farming population is aging and this raises serious questions about generational succession. The reasons for this flight from the fields are many, but for the majority of farmers, farming is first and foremost a matter of livelihood. The fundamental problem lies at this level. Income from farming reflects a simple equation between production costs and income from sales of produce. In recent decades, the costs of production (primarily seed, fertilizer, and pesticides) have risen steadily, but the market price of rice has remained at best static.

This unfavorable equation is exacerbated by several factors. First, the basic necessities of life in a modernizing and affluent society have become less basic and more necessary; they now include items such as school fees, medical expenses, water and power bills, and goods such as motor vehicles and mobile phones. Second, especially in the more affluent areas, the general cost of even the most basic necessities has risen considerably. Third, old traditions of collective labor that once helped offset labor costs have been largely abandoned in favor of wage labor and contracting. All these expenses require cash, whereas many farmers grow only enough rice for family subsistence and need alternative sources of cash income. At the same time, alternative uses of land, such as sale or lease for residential or commercial building, have become both available and more lucrative than farming, as have nonfarm sources of wage labor and small businesses.

3. Hefner 2009, 337.

The declining economics of farming in Bali is the result of a complex interaction of factors, many of them common to Indonesia as a whole. The priorities of government agricultural policy since the 1960s have been national self-sufficiency first and, second, affordability of basic commodities, especially for the urban middle and poorer classes. The well-being of farmers and the sustainability of rural economies has not been entirely ignored but has tended to take third place to these other priorities.[4] The Green Revolution package of new higher-yielding seed varieties, driven by petrochemical fertilizers and pesticides and made affordable for farmers by subsidies and easy credit financed by growing oil revenues, was generally successful in raising production. National self-sufficiency was achieved, albeit briefly, in the mid 1980s. As a result rice prices stabilized at affordable levels for consumers, and the combination of increased production and subsidies resulted in comfortable incomes for farmers through the 1980s.[5]

Around 1990, this happy balance began to tip. The productivity gains of the Green Revolution slowed, halted, and in some cases reversed. The slump in oil prices in the late 1980s severely affected Indonesia's balance of payments and the government began reducing subsidies to farmers. Along with rising costs for fuel and general inflation, this meant increasing production costs. At the same time, the government agency managing the costs of basic commodities (Bulog) held the market price of rice down in favor of consumers.[6] By 1993, when I began my research in Bali, the economics of farming was already in serious decline in relation to the booming tourist economy.

Few farmers know or care much about this political-economic history; they see the problem in the simple economic terms outlined above. Nevertheless, the most concise and systematic version of the bottom-up view from the rice fields that I have heard was from an extraordinary farmer, Pak Sunari, in a village near Payangan in central-south Bali during the lull between harvest and planting times in mid 2009. Born in 1960 he remembers what older farmers told him about earlier times, but most of what he told me is based on his personal experiences and observations since the late 1970s.[7]

Prior to 1950 farmers grew local traditional rice followed by a rotation crop (*palawija*), usually soya beans, in the dry season. They used only natural fertilizers—green material and cattle and chicken manure—and pesticides made from ash and plants. Around 1950, they began replacing the rotation crop with a

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4. Piggot et al.1993, 82, 89.
5. Ibid., 86.
6. The reasons for this decline in productivity are in fact considerably more complex then this simplified sketch would suggest, but it is a sufficient generalization for our purposes here. For a more detailed analysis, see Dawe 2002; Fane and Warr 2008; Simatupang and Timmer 2008; Piggot et al. 1993; Damarjati et al. 1989. For accounts of the Green Revolution on the neighboring islands of Lombok and Java, see Cederroth and Gerdin 1986; and Cederroth 1995. On Bali, see Lansing 1991; and Poffenberger and Zurbachen 1980.
7. Sunari is a pseudonym and this account is an edited summary from my field notes based on two hearings of the story in May–June 2009. Pak Sunari also works in the local office of the Department of Agriculture and this may to some extent account for his uncommon ability to analyze his hands-on experience.

second crop of rice.[8] In 1968, the synthetic nitrogenous fertilizers, ammonium sulphate, and urea were introduced by the government. Farmers resisted the change, hiding the fertilizer or throwing it into their backyards or dry fields where there were only banana trees. But the banana trees thrived as never before so they started using it on their rice and it thrived too, and thus began a new era. In 1972, the government introduced new seed varieties with names such as IR5 and IR8[9] and also new pesticides—first Endrin, then Diasinon, Basasinon, and Sevin.[10] They sprayed these every two weeks and the diverse creatures of the rice fields—small eels, fish, frogs, snails, and insects—immediately disappeared and the soil hardened. Despite these side effects, farmers kept using the new system because the harvests were good and work was easier than before. But after a few harvests they found they had to increase the quantities of fertilizer to maintain production levels; this did not matter a great deal because fertilizers were cheap. In 1978 they were hit by the brown plant hopper (*wereng coklat, Nilaparvata lugens*). New, more resistant varieties of seeds were introduced—IR26 and IR36, among others—but the diseases kept erupting. Eventually farmers stopped using the pesticides and the pest problems decreased.[11]
In 1980 they started planting three crops per year, each with 50kg/ha (kilograms per hectare) of urea, but they found that each crop produced successively less and all they achieved was to maintain production levels but with 50 percent more work! So, in 1985, they reverted to two crops per year. By this time their urea usage had increased to 100kg/ha without any corresponding increase in production. This system continued until 2002, at a constant level of production but with a gradual increase of urea usage to 300kg/ha.

This story brings us to the point at which I became interested in the problems of rice farmers, and the economic logic of organic production. A number of people in Bali, most of them foreign expatriates, were thinking along similar lines: organic production seemed to have the potential to reduce input costs (fertilizer and pesticides) while producing a product with higher value in an existing market for premium and chemical-free produce. To this logic was added the celebrated stereotype of Balinese being great copiers of ideas that work.[12] Several of them developed themselves, or paid local farmers to develop, small organic trial plots, in the hope that their neighbors would become interested and if the crops succeeded, they would follow suit next season. In some cases the crops did succeed, but the farmers did not follow suit.

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8. He did not mention the reason for this change, but it may have had to do with a combination of increased demand and improved irrigation, both within a wider context of a national drive toward economic self-sufficiency.
9. The IR prefix is a standard terminology of the International Rice Research Institute (IRRI) in the Philippines, which with financial support from government, academic, and international organizations has led global rice research and development since the 1960s.
10. These pesticides are synthetic organic (i.e., carbon-based) chloride phosphate and carbamate compounds that multinational chemical companies developed in the 1950s. They were widely used through the 1970s, but are now banned in many countries because of their dangerous toxicity to non-target species, including humans.
11. This correlation between pesticide use and frequency of pests is consistent with reports from elsewhere in Indonesia. See Winarto 1999, 166.
12. Covarrubias 1994, 403.

Until about 1990, rice farmers in western Bali "had been able to live well by growing rice, but since 1990 production costs and the cost of living have risen steadily, while prices for their crops had not becoming less reliable." (Credit: author)

The expatriate exemplars were mystified and so was I. In 2005 I became involved in another initiative to assist a group of farmers in western Bali make the transition to organic production.[13] Their story was typical: until about 1990 they had been able to live well by growing rice, but since 1990 production costs and the cost of living have risen steadily, while prices for their crops had not. In addition their soil seemed to be suffering the effects of long-term chemical fertilizer use and their supply of irrigation water was becoming less reliable.[14]

Despite these problems, these farmers were well positioned to move to organic production. They were skilled, experienced, and dedicated full time to rice production. Some of them were still growing traditional local varieties that lend themselves to organic methods. They also had a strong functioning community and although many of their young people had moved away to work, the local economy was still essentially agriculture based. They could see their problems clearly but solutions less so. Some of them had already begun experimenting with alternative crops, such as cocoa, bananas, and vanilla, which did not require irrigation and could fetch better prices, but because of their distance from major markets and their lack of experience in marketing, they did not always realize the potential of this experiment.

13. The group included a Balinese agricultural scientist Dr. Alit Arthawiguna and some of his colleagues, Australian researchers Rachael and Stefan Lorenzen, an Israeli expatriate Oded Karmi and his Balinese partners Ni Nila and I Jabu, who produce and market organic vegetables and rice for sale through networks of local expatriate consumers.
14. This project is discussed in more detail in MacRae 2005 (Anthropologist).

Our group discussed their situation, made suggestions based on our experience, and agreed to assist and support them if they decided to change to organic production. The farmers expressed enthusiasm in principle but nothing happened. The reasons for this reluctance to take what appeared to us to be an obvious path are not entirely clear, but they include the factors discussed above, together with an oft-cited (but not always true) need for agreement of the entire *subak*[15] before any significant changes to cropping patterns, irrigation cycles, or even seed varieties could be made. In many other cases, broader structural factors also inhibit change, including these:

- In touristed and urban areas many farmers farm only part time, often just for enough rice to feed their families; they work the rest of the time in other sectors to earn much-needed cash. As a result they are disinclined to invest in any changes, especially if these appear to involve an extra commitment of time or energy. Likewise medium- or long-term development of agricultural systems is simply not their priority.
- Many farmers all over Bali are sharecroppers rather than owners, keeping only half or less of the harvest for themselves. They often have no responsibility for the entire management of soil, seed, fertilizer, and pesticides, let alone do they have long-term security on the land they work. This too is a disincentive to investment in longer-term investment.
- Landholdings tend to be small (less than half a hectare), especially in the urbanized areas, meaning they are often sufficient only to supply household consumption but not sales outside. This is another disincentive to investment or commercial ambitions.

This contradictory picture of economic unsustainability and awareness of a need for change combined with reluctance to change has been a repeated theme in my experience of rice farmers in south Bali.[16] Since 2005, however, promising developments have been seen, as this article will show. These developments illustrate how both the production and the marketing aspects of rice production in Bali have been systematically addressed.

Recent Initiatives

Government subsidies for seed, fertilizer, and pesticides were progressively reduced from the late 1980s and had all but ended by the end of the 1990s.[17] By this time, the authoritarian New Order regime had also ended, leaving the country in economic and political turmoil, but also creating room for new freedoms of choice and action, including for farmers. But, as mentioned above, most farmers were at least fifty years old by that point and had spent their entire work-

15. *Subak* is a traditional local organization concerned primarily with irrigation and the ritual aspects of rice production.
16. Many researchers have warned about the dangers of generalizations in Bali, but in this matter the pattern is almost universal, at least in my experience, which is largely in the southern half of the island. My generalizations also refer specifically to farmers of irrigated rice. Dry-field farmers, especially market gardeners in the mountains, have long shown themselves to be considerably more flexible and innovative. See MacRae 2005 (Growing).
17. Suparmoko 2002, 6.

ing lives under a regime of top-down commands and had little experience of making their own decisions. At the same time, the local knowledge that their fathers once had was now largely lost.[18] It was in this mixed climate of lost knowledge and new opportunity that a few experiments began.

In Ubud, a tourism center that is also home to a large expatriate community, several shops and restaurants provide organic food and a number of experiments with organic production have begun. A local nongovernmental organization, Indonesian Development of Education and Permaculture (IDEP),[19] has also been teaching permaculture and SRI (System of Rice Intensification) cultivation methods around Ubud. One former IDEP employee has formed his own organization, teaching these methods in a widening circle.[20] Through these initiatives, at least one government agricultural extension officer has also become involved in propagating SRI. As a result dozens of farmers have now adopted SRI with varying degrees of commitment and success and are moving simultaneously toward more organic methods.

The Indonesian government has also begun to embrace organic production, at least in theory. The Department of Agriculture has begun researching and conducting field trials of organic methods and in 2009 the governor of Bali announced funding of Rp 8 billion to "raise awareness" of organic methods.[21]

In 2003, Pak Sunari (referred to above) and a group of farmers decided to try something new in response to the increasingly obvious imbalance between inputs and outputs in rice production. About thirty farmers bought "organic" fertilizer,[22] made from cattle and chicken manure, from a commercial supplier[23] in East Java and tried it, at a rate of fifteen tons/ha on twelve hectares of their land. The experiment did not work well, but they tried again the next season, this time combining the fertilizer with fifty kilograms of urea per hectare. Production increased from 6.8 tons/ha to 7.2 tons/ha.[24]

In 2004 these same farmers began making their own compost from cow manure and applying it at a rate of eight tons/ha; in addition they reduced their application of urea (to forty kg/ha). Production rose again to 7.5 tons/ha. By 2009, they had reduced their compost to five tons/ha and urea to fifteen kg/ha; since then they have maintained yields of 7.5 tons/ha.

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18. For an example, in relation to pest management, see Winarto 1999, 174–75.
19. Available online at www.idepfoundation.org/ (accessed 21 April 2010). Permaculture is a generic term, but also a brand name, for a systematization of traditional techniques and philosophies of sustainable agriculture and human settlements, see www.permaculture.org/nm/index.php/site/index/ (accessed 11 May 2010). SRI (System of Rice Intensification) is likewise a brand name for a set of techniques for improving yields of modern rice varieties. See ciifad.cornell.edu/sri/ (accessed 13 June 2010). SRI leans toward, but is not totally dependent on organic practices.
20. See www.trihitakaranabali.com (accessed 9 December 2009).
21. See, for example, Dinas Pertanian 2004; and Erviani 2009.
22. The farmers later found out that their supposedly organic fertilizer contained large amount of nonorganic rubbish such as fragments of plastic packaging.
23. P.T. Sang Hyang Seri (named for the goddess who dwells in the rice plant) is a large (Java-wide) commercial supplier of seed and fertilizers. See www.shs-seed.com/index.php (accessed 13 June 2010).
24. All crop yields are expressed in metric tons and refer, unless otherwise noted, to *gabah kering panen,* i.e., the crop harvested, threshed, and dried, but not yet milled.

Table of fertilizer usage and yields

Year	Urea (kg/ha)	Compost (ton/ha)	Yield (ton/ha)
2002	300	00	6.8
2003	50	15	7.2
2004	40	8	7.5
2009	15	5	7.5

The farmers also stopped using petrochemical pesticides. The beneficial creatures that had disappeared from their fields gradually returned. Since then the farmers no longer have had any significant disease problems.[25] Even the rodent plagues that were decimating crops all over Bali in mid 2009 were no longer a significant problem because of the return of natural predators and their location adjacent to a significant area of natural forest in which the predators live.[26]

This case, rare as it is, demonstrates that organic methods are not only feasible, but that they can increase productivity at the same time as reducing inputs. The next case, discussed in more detail, provides similar evidence on a larger scale, but also addresses what for most farmers is the most intimidating problem of all—marketing their crops.

Wangaya Betan[27]

Around the same time as Pak Sunari and his colleagues began their experiment, a local agricultural scientist, W. Alit Arthawiguna, employed by the government agricultural research institute BPTB, was searching for opportunities to develop more sustainable approaches to farming.[28] In 2005 a group of farmers in Subak Wangaya Betan (SWB) in western Bali approached Arthawiguna for help in dealing with their growing waste problem due to rice milling, chicken raising, and cocoa and coffee production. Arthawiguna saw these "wastes" as raw materials for compost and in mid 2005, he initiated a project with the SWB farmers.[29]

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25. This was probably influenced by Integrated Pest Management (IPM) propagated by the government through the 1990s, largely in response to ongoing failures and emerging environment and health consequences of indiscriminate petrochemical pesticide use. See Winarto 1999, 163.
26. The main predators of rodents are snakes, owls, and cats, both domestic and wild, all of which are plentiful in residual forest areas.
27. My knowledge of this project comes largely from multiple annual visits, in May–June or July–August, and usually accompanying Alit Arthawiguna on working visits. While these have often involved lengthy meetings at Wangaya Betan, the visits have also offered opportunities for lengthy conversations en route. I am grateful to Alit, Nengah, and many the other people involved, both named and unnamed. For a more complete, but differently angled discussion of this project, see Arthawiguna and MacRae 2010.
28. BPTB (Balai Pengkajian Teknologi Pertanian) is a national government agricultural research institute with a local branch in Denpasar. The technical details of this research and its outcomes are documented in Arthawiguna 2007.
29. Subak Wangaya Betan is in a village of the same name, at the upper end of the Yeh Ho watershed in Tabanan district of western-south Bali. The project is reasonably well known in Bali

Compost shed in the fields. "In 2005 a group of farmers in Subak Wangaya Betan (SWB) in western Bali approached Arthawiguna for help in dealing with their growing waste problem due to rice milling, chicken raising, and cocoa and coffee production. Arthawiguna saw these 'wastes' as raw materials for compost and in mid 2005, he initiated a project with the SWB farmers. (Credit: Alit Arthawiguna)

In June 2005, a group led by Arthawiguna met with interested farmers at the premises of Nengah Arisa, a farmer who also owns chicken and rice-milling enterprises.[30] Arthawiguna outlined the benefits of organic production and his ideas for the project. As a result of this and subsequent meetings, a group of four farmers, with a total land area of two hectares, began to change their production methods. The key technical innovation was the production and use of composted cattle manure as fertilizer.

The farmers used a proprietary microbial product to assist in breaking down organic materials, including rice stalks (*jeramih*), chicken manure, rice mill waste (*sekam*), and cocoa and coffee wastes into a form digestible by cattle.[31] The resulting manure was composted to produce fertilizer. Cattle manure, which neighboring farmers were glad to be rid of, was collected to increase production. Farmers began substituting this compost for (their already low rates of) petrochemical fertilizer.[32] Their first crops were successful and productivity

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and beyond and has already been the subject of publication (e.g., MacRae and Arthawiguna 2010), so it and key people involved are identified by name.

30. I was a member of this group along with Australian researcher Rachel Lorenzen.
31. Starbio is one of a number of propriety products increasingly used in Indonesian agriculture. For activating compost and rendering coarse vegetable materials more digestible for livestock, see MacRae 2005 (Growing). They are based on ferments of sugar products and work as starters for fermentation of larger bodies of organic material. See www.lembahhijau.com/ product.htm (accessed 13 June 2010).
32. Farmers throughout Indonesia often use less than the recommended amounts of fertilizer, primarily as a cost-saving measure, a practice that began with the reduction of government

increased slightly. Other farmers began following their example. A year later, in mid 2006, the group had grown to thirty and another twenty were planning to join. After two crops, productivity had increased from around four to five tons/ha to five to eight tons/ha.

Cattle manure soon became scarce and farmers realized that they needed their own cattle. Some farmers had also bought their own cattle or obtained them on a calf-sharing basis through a government-sponsored program.[33] They had by this time also formed an organization, Kelompok Somya Pertiwi (KSP), for sharing technical expertise and collective marketing of their produce. As KSP developed a more systematic collective compost production system and as cattle numbers and compost production increased, they were also able to sell compost.

The method spread quickly to neighboring communities and soon there was interest from all over Bali and beyond. In 2006, the KSP obtained a grant from the Department of Agriculture to develop an on-site training center (Pusat Pelatihan Pertanian Pedesaan Swadaya [P4S]), complete with computer, library, facilities for teaching workshops, new cattle stalls, and a biogas (methane) system for cooking. At this stage, despite the success and rapid growth of the project, it still involved only a minority of the subak membership of around one hundred.

Another year on (mid 2007) productivity had increased by a minimum of 4 percent up to a maximum of nearly 14 percent.[34] The number of cattle had increased to three hundred, some of which were kept in a central stall combined with a shed for processing and packaging compost. Most farmers kept their cattle in small stalls adjacent to their fields where the compost would be used.

Like Pak Sunari's group, the KSP farmers began to notice a return of biodiversity to their fields. The shift from purchase of capital-intensive fertilizer to labor-intensive compost, as well as the processing and packing of compost for sale, had also begun to provide new employment opportunities for local people. Thirty farmers were well established in organic production and most of the remaining seventy had begun converting. The P4S was built and functioning as planned. There was talk of making organic production a formal requirement under the rules (*awig-awig*) of the subak.

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subsidies in 1987 and increased with their total withdrawal in 1998 (Arifin 2005, 8). In areas such as Wangaya Betan, where traditional rice varieties are still grown, the need for artificial fertilizers is less in the first place. Of the group of thirty individuals Arthawiguna surveyed in 2006, the average use of urea was 177.79 kg/ha, of KCl was 8.11 kg/ha, and of Sp36, 1.25 kg/ha, all well below government recommendations. In addition several farmers were already using significant amounts of organic fertilizer.

33. Such schemes are based on traditional methods of livestock resource sharing, known in at least some parts of Bali as *ngadai karang*, in which the person caring for a cow has first right to its offspring.
34. Arthawiguna 2006, 2. My knowledge of this project has come mostly though annual (mid-year) visits of a few weeks, hence the "one-year-on" format of this account.

Reasons for Success

Given the track record of organic initiatives in the rice sector, the significance of what had been achieved in Wangaya Betan at this stage is difficult to overstate.[35] The reasons for this success are multiple, ranging from obvious technical ones to less-obvious ones embedded in social and even personal processes. Most obvious are the primary ecological conditions: location at the head of a watershed that provides a pentiful supply of unpolluted water and abundant raw material for composting (despite not especially good soil conditions).[36] The existing system of production, using traditional varieties, low levels of synthetic fertilizer, and retaining some cattle in the rice field ecology provided another layer of favorable resources. Additionally, as Arthawiguna notes, the farmers are full-time, committed, and unafraid of hard work. These qualities are not uncommon in Bali, including in some locations where other attempts to initiate change have failed, so these are at best enabling rather than determining factors.

The critical factors in this case appear to be embedded in social relations, even in the personal qualities of key individuals. Every step in the process was discussed and decided upon by consensus in meetings open to the entire subak and often attended by interested outsiders, including foreign researchers. Nengah organized the gatherings at his rice mill, chicken and cattle complex. Arthawiguna led the meetings. In other words, while the process was a collective, democratic effort, two figures—Nengah and Arthawiguna—were the key initiating, motivating, and organizing forces. Nengah is a successful entrepreneur/farmer and probably the wealthiest man in the village. He is also a person of intelligence and integrity who has chosen to use his position and resources for the benefit of the whole community. He appears to have the trust and respect of other farmers. Arthawiguna, for his part, is an outsider, but a Balinese one, with specialist technical knowledge as well as access to resources beyond the community. Arthawiguna draws a civil servant's salary, but his work goes beyond his civil duties and, most importantly, KSP members regard him more as a trusted friend than a state representative. The project may thus be seen as a loose network of individuals with shared experience and interests, motivated and facilitated by the two key figures: Nengah within the farmers group and Arthawiguna outside it.

Both Nengah and Arthawiguna are critical to the project in complementary ways. Nengah is the insider with status, without whom Arthawiguna would have only limited access to and credibility with the farmers. Arthawiguna on the other hand has access to vital knowledge and resources from outside. He and Nengah have known each other for some time and have a relationship of mutual understanding, trust, and indeed friendship in the sense of having the interests of each other and the farmers and community at heart. It is the personal qualities

35. One exception is obviously Pak Sunari's project near Payangan. The only other one of which I am aware is just one valley away in Wangaya Gede, where a local (Gede Hanjaya) married to an expatriate has converted his own fields to organic production, largely to supply an international yoga center located on his property. See MacRae 2005 (Growing).
36. Arthawiguna 2006, 6.

of these two men, the relationship between them, and the resultant web of trust that lie at the heart of the project and that make it work. After several years of working together successfully, the trust the farmers have in Nengah has extended to Arthawiguna, so he too has a direct store of credibility in their eyes.

There is a third leg to this tripod, which was less visible to me at the start because I came to the project via Arthawiguna and Nengah. Pak Nyoman is one of four farmers who initially embraced organic production and has remained the one most committed to the project. Nengah and Arthawiguna refer to him constantly for evidence from the rice fields or affirmation of their thoughts. By 2009 Nyoman had converted fully to organic production while most others were still supplementing their compost with small amounts of urea. His productivity is at the top end of the scale at around eight tons/ha. Consequently, my initial dual model of key insider and outsider, now seems better understood as a triangle with Arthawiguna bringing outside expertise, Nyoman the inside expert, and Nengah as the link between these fields of knowledge.

Beyond these key factors are less obvious ones: those factors that have not prevented the project from working. First, the scale of the project is not too big: it started very small, grew incrementally in response to individual decisions, and even now is located primarily within a circumscribed local ecosystem and community. This grounding in local landscape and face-to-face community interactions provides intelligibility and a sense of ownership that would be less easy to achieve in larger-scale projects. Second, the project is not mediated by a complex system of intermediary outsiders let alone an anonymous bureaucracy: it is simply the farmers linked to the outside world of knowledge and resources by the visible, known, and trusted persons of Nengah and Arthawiguna.

This article is not the place to explore these factors in detail, but the small scale and the absence of intermediate bureaucracy are the corollary of the face-to-face relationships that make this project work.

What Was *Not* Achieved?

While Arthawiguna's vision of this project is driven partly by environmental concerns, the primary day-to-day concern of the farmers themselves is balancing or preferably reversing the unequal equation between production costs and a profitable return for their harvest. Prior to 2007 the project focused largely on the production side of this equation, and the farmers were able to lower production costs by substituting inputs of local labor (in the form of compost production) for cash ones (commercial fertilizer). The project had not yet addressed the other side of the equation, however: marketing their produce for a better return. Addressing this side of the equation meant that farmers had to confront the forbidding mysteries of the market—a system that has long been dominated by traders and middlemen who have tended to take advantage of farmers' lack of market knowledge and their need for ready cash and often credit as well.

In particular, farmers had not explored, let alone realized, the potential for exploiting the unique Balinese market for boutique and organic produce. They

sold some of their rice to this market at premium prices, via KSP, to the Bali Organic Association (BOA) and to an expatriate restaurateur in Ubud, but the major portion of their harvest was still sold on the local market at a small margin above the price for ordinary rice. Consequently while the economic situation of KSP farmers had improved, they were still far from prosperous and there was still room for improvement. This, and other unrealized potentials, became the focus of the next stage of the project.

Addressing the Marketing Challenge

In July 2007, a new player with a new agenda entered the project. At a meeting in the P4S meeting room, Hendra, a representative of an organization called PT Desa Bali (Balinese Village, Ltd., hereafter PTDB), presented a slick PowerPoint display outlining the aims of PTDB and what it had to offer KSP. Despite its form as a limited liability company, the avowed aims of PTDB were those more commonly embodied in development NGOs, namely, to assist in improving village livelihoods and standards of living, especially through agricultural development. Its means, however, were not those of charity or aid, but of a business partnership in which PTDB would provide capital and expertise to assist the local community to improve its productivity and profitability and eventually to become an independent business, over a period of ten years.[37]

PTDB's analysis of the problems facing farmers was insightful and comprehensive and their proposed solution likewise addressed every aspect of the situation in an integrated way. The core of their proposal was for farmers to hand over most of their crop for marketing by PTDB in exchange for a guaranteed monthly income and other benefits. The farmers would retain one-sixth of their crop for themselves. PTDB would provide the initial capital for seed and other production costs, and it would invest development funds in technical improvements to boost productivity and quality.

Farmers' incomes were to be calculated according to the area of land owned or worked by the farmer involved. Returns would be used to pay off the initial investment and then to support efforts to boost productivity, to provide insurance against crop failures, and to underwrite benefits such as health and retirement. Eventually earnings would be used to build up a stock of capital for the transition to an independent business, to be known as PT Subak Wangaya Betan (PTSWB).

PTDB's approach was two-pronged, addressing both the input and output sides of the equation. It believed that production could be increased to nine or more tons per hectare by use of the latest seed, planting, and post-harvest technologies while retaining the existing benefits of organic production. PTDB also recommended expanding the existing organic production to a neighboring subak to achieve economies of scale. But PTDB's main thrust was on the marketing side: they aimed to increase income by bypassing the middlemen and selling

37. Hendra is a pseudonym, as are the names of most other members of PTDB, but PTDB (and its offshoot companies) are not, because they are publicly listed company whose activities have also been reported in the public media.

(l-r): Nengah Arisa, Alit Arthawiguna, and G.N.A. Sumaru. (Courtesy: Alit Arthawiguna)

high-quality organic rice in premium markets, initially local ones, but ultimately nationally and internationally as well. PTDB's financial projections showed increases in profitability sufficient to pay for all the proposed benefits on top of running and overhead costs.

PTDB was a registered company with three directors, Hendra, Jro Gede Karang Tangkid Suarshana, and Pak Karto. Hendra is an Indonesian who spent most of his working life in the IT industry in the Netherlands, much of it at a management level. Returning to Bali to live and work, he became involved with sustainable agriculture and has developed a good working knowledge of the issues farmers face as well as how the rice market functions. He was the working partner, the front man, and to some extent the driving force of PTDB. Jro Gede Karang is a Balinese businessman, one of the most successful of the first generation of tourism entrepreneurs in Bali. He has now stepped back somewhat from his business interests in order to devote himself to agricultural development. At the time of PTDB's first visit to KSP, Jro Gede Karang had just announced his entry into politics, possibly even as a candidate for the governorship of Bali.[38] Karto, another Javanese businessman also with connections to the Netherlands, has had IT interests in Bali at least as far back as the mid 1990s. Through their networks the three directors claimed to have access to the capital needed to finance the proposed developments. Arthawiguna was appointed operations manager of the proposed PTSWB and G.N.A. Sumaru, an academic economist, was named director of finances for the parent company and main director of the local company.

38. Jro Gede Karang's presence, and the content of his speech, was an undoubted boost to the prestige of the project, but may also be read as an early step toward establishing his political legitimacy among farmers. This introduces yet another layer of motivation and interests into the project, but this is another story.

Neither Karang nor Karto appeared to need more income, least of all from a project oriented more to long-term local development than short-term profit. According to Karang, the aim of the project was to provide farmers with access to "the benefits of the global market, but with protection from the risks." Hendra eventually become a salaried employee of PTDB. In the proposed contracts with the local companies they would spawn, PTDB proposed to take what appeared to be reasonable fees to cover their costs as well as a 20 percent share in the local companies. The remaining 80 percent was to be divided among the local members as shares, based on their landholdings.

At the time there seemed little reason for concern about the motivation of PTDB and the transparency and fairness of their proposals. However, the idea was new and radically beyond the experience of the farmers. From the start they all faced challenges in mutual understanding and communication. The knowledge, experience, and worldviews of PTDB and the farmers were worlds apart and differences in outlook and priorities soon became apparent. The farmers were enthusiastic in principle, but they had many questions about pragmatic details. Many of these questions reflected the real concerns of ordinary farmers: crop failures, differentials of land ownership, utilization and productivity, and such technically and politically tricky issues as the inequality between owners and sharecroppers.[39]

At the second meeting with PTDB, representatives from a neighboring subak participated. This subak, which is even larger than Wangaya Betan (having over 300 hectares and more than 600 members), was one of several—inspired by Wangaya Betan's success—converting to organic production. The same issues and differences of outlook surfaced in this and subsequent meetings.

For PTDB time was of the essence (presumably because of the investment costs involved) so its leaders wanted to enter into contracts before the new planting season (August–September 2007). But as the complexity of the issues became increasingly apparent, they realized that this timetable was not feasible. As they analyzed the data collected from farmers, it also became clear that the smaller holdings, especially those worked by sharecroppers, would not produce sufficient income to be economically viable. Their proposed solution was to consolidate holdings, partly by retiring older farmers or relocating them to lighter duties in compost production. Changes of this order needed time for negotiation and implementation. Thus, they developed a three-step process toward the final ten-year contracts. By the end of August 2007, more than thirty farmers had taken the first step, an agreement that PTDB would meet their production costs and buy their crop at slightly above normal market price, with mild sanctions for underproduction and bonuses for excess production. This was an attractive low-risk initial step for farmers prior to the deeper commitment that would follow.

39. Issues of tenure are, as Nitish Jha has reminded me, always important in Balinese agriculture, and are one of several missing links in this story. This calls for more detailed ethnographic research.

Progress and Problems

By the middle of 2008, significant progress had been made, but problems had also arisen (some of them predictable). All but a couple of notoriously stubborn members of Subak WB had begun converting to organic production. In total the members now had 400 cattle, more than they needed at a rate of two per hectare. The P4S was thriving, providing training to a steady stream of visitors from as far away as West Papua. Another new development was the establishment, with government funding, of a Bali Cattle Breeding Center (Pusat Pembibitan Sapi Bali), which aimed to improve the quality of stock by breeding and raising cattle to supply to other farmers. The ultimate goal was to restock Bali with its own cattle and reintroduce them into the rice field ecosystem.[40]

On the commercial side, two new companies had been formed, PT Management Subak Bali (PTMSB) and PT Subak Wangaya Betan (PTSWB). The former grew out of PT Desa Bali as the central (parent) company providing capital, management, and marketing. Its directors (*komisaris*) were Hendra, Karto, and his brother Pringo, as well as Alit Arthawiguna and G.N.A. Sumaru. (Jro Gede Karang had by this time resigned.) PTSWB was the local offspring company ultimately to be 80 percent owned by local farmers, but at this stage all shares remained in the hands of the parent company.

The market for organic rice had proved less strong than anticipated, as the vast majority of Indonesians place a higher value on taste and an appearance of "whiteness" rather than on subtleties of provenance, but buyers had been found in Surabaya and Jakarta. Orders were also coming in from Europe, but servicing these involved obtaining special export permits.[41] Some eighty farmers, about half of them from the WB area, had contracts of various kinds with PTMSB. Negotiations were under way to bring in more farmers because of the need for a larger quantity of rice to ensure a reliable supply and sufficient varieties to meet buyers' demands and to achieve economies of scale. This progress was frustratingly slow for PTMSB, but despite this and ongoing problems of communication, the parent company had pushed ahead boldly with a major capital investment in a new rice mill.

The new mill was not simply an improved version of the local mills that dot the landscape all over Bali, but a large modern building housing a modern state-of-the-art rice milling system, with machinery imported from China. The mill deals with the entire process from cleaning the raw harvested rice to the packing of selected premium grain into pre-labeled packages of various sizes. Its power requirements far exceed the entire capacity of the local grid supply so the mill has its own diesel-powered generator. By this stage the company had in-

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40. Bali cattle are a small subspecies distinctive to Bali. They were traditionally used for ploughing and fertilizing rice fields, but since the Green Revolution, they have (for a number of reasons) progressively disappeared from the agricultural landscape and by the early twenty-first century, appeared destined to die out.
41. Export of rice is illegal in Indonesia, reflecting the priority of national self-sufficiency, but there is now provision for exceptions in the case of special premium products.

vested a total of Rp 7.5 milyar, mostly in the factory.[42] This large investment, which was way beyond anything dreamt of in Wangaya Betan, betokened a company vision and agenda larger than one village.

PTMSB was in fact buying rice from farmers elsewhere in Bali in order to meet demand from their buyers, especially for *ciherang*, a new and popular variety.[43] The first priority for the factory was to increase turnover from the present two to three tons/day to at least five tons/day. For this quantity a cropping area of fifty to eighty hectares was needed. The break-even point, in terms of operational costs alone, would require about ten tons/day; the maximum capacity of the plant is between forty to sixty tons/day (requiring 500 to 800 hectares). This level of investment meant at least a fourfold increase in input of harvested grain in order to break even.

At first local people were simply bemused by the scale of the factory, but as time went on they became uneasy about new developments such as the company bringing in skilled outside labor to operate the mill. Because the mill is highly automated, the numbers were small, but the issue for locals was one of local control and development. Farmers were also unhappy about aspects of their contractual arrangements with the company, including a 10 percent management "fee" deducted from the payments they received for their crops. Their chief concern, however, seemed to be as much about matters of principle and their lack of voice in the process as about the money itself.

On 26 July 2008 a meeting was convened to address these concerns, which had by this time become apparent to management. About twenty-five farmers attended. Aided by a formidable PowerPoint display of Excel spreadsheets, Hendra tried to clarify and explain what they were doing by reference to its financial basis. The formulae were complex and difficult for the farmers to understand. As the meeting progressed the deeper underlying dissatisfactions surfaced. These were expressed most clearly by farmers who had sold their crop to the company but now wanted part of it back for household food or ritual purposes and found that their only option was to buy it at market prices. While this was clearly stipulated in their contracts, for the farmers the breach was not of a contract but of what they understood to be a mutual moral commitment to each other's welfare. This illustrated a gulf between the two economic understandings that the parties brought to their relationship: one, embedded in a wider capitalist economy, the other, in a local/moral economy. Hendra's brave attempts to explain the financial and moral bases of the contracts came to little in the face of this misunderstanding. The PTMSB directors present were shocked and upset as they began to grasp the loss of trust that had occurred and vowed to make amends.

This misunderstanding was mirrored within the management of the company itself. Arthawiguna's relationship with WB, which long predated the

42. Approximately US$750,000.
43. Ciherang, which was developed from the previously standard IR64 and released onto the market in 2000, is widely preferred because of its superior taste. It has since become the new standard variety in much of Bali.

involvement of PTSMB, was based on a gradual building of the economic base of farmers by improvements in productivity and sustainability, underpinned by shared understandings of the culture and moral economy of rice production. He felt that the company did not understand these matters, let alone know how to communicate with farmers, and that it was moving too fast, driven by purely financial considerations. This in turn was placing strains on Arthawiguna's own relationship with the community, on which the whole project had been based from the start. He resigned from the company early in 2008.

By this stage it was clear that the differences of understanding, evident in the initial meetings a year earlier, were indeed becoming serious obstacles and also that the company was making little progress in adjusting its approach to deal with them. Whatever their original motivations may have been (e.g., assisting local development), the financial imperatives built into the company model were clearly driving the project and making it harder for company officials to hear let alone accommodate the farmers' point of view. The stage seemed set for further problems unless a way of bridging this gap could be found.

Unfortunately a way was not found and the project unraveled over the following months. With Arthawiguna gone, Hendra found himself in much the same situation as Arthawiguna had been in: advocating for the farmers' concerns against the increasingly inflexible commercial priorities of his fellow directors. Presumably because of the mounting losses—due largely to the

The two projects described and analyzed in this article provide evidence of "the technical and economic viability of organic rice production in Bali and, by extension, in other wet-rice environments in monsoon Asia." (Credit: author)

underutilized mill—the directors bankrolling the project decided that "helping the farmers" (their aim at the start) was no longer affordable: they needed a larger financial return. In effect this meant no more compromises.

Hendra left in early 2009 and a few months later the company pulled out of Wangaya Betan altogether. The new factory was abandoned. The company was planning to dismantle the mill and move it to a location that promised a better return, but there was also talk among farmers that the mill belonged to the community and they might prevent it from being removed.[44]

When I next met Hendra a few months later he was still licking his wounds and busy rebuilding his own business: being a "friendly *tengkulak*" to what remained of the network of farmers with whom he had so laboriously built up relationships and trying to get them a fair price for their organic rice. Arthawiguna was still working with the WB farmers to improve their production projects. Most farmers had more manure than they could use and Nengah had developed yet another business marketing this new surplus. He had renovated and upgraded his own mill and was now able to process larger quantities into a higher quality product more suitable for premium markets.

Despite the demise of the company and the burnt fingers all round, the idea of marketing seems to have caught on and in 2009 KSP entered a new government-supported program designed to help local farmers' groups become marketing bodies (Lembaga Distribusi Pangan Masyarakat Indonesia, or LDPMI). The government advances capital for the group to buy farmers' produce (at prices negotiated in open meetings). In Wangaya Betan the process goes through Nengah, who mills and markets rice supplied by other farmers.

The P4P continues as a separate entity, concerned with human resource development, training, and outreach all over Indonesia. KSP is seeking funding for a Village Energy Self-Sufficiency (Desa Mandiri Energi) project based on biogas (methane), which they are producing from the wet slurry from their central cattle stalls. They now talk of their future development in terms of a new slogan: F4 (food, feed, fertilizer, and fuel).

What began as a waste management project became a composting one, an organic rice production one (the focus of this essay), an educational one, a marketing one, and in the end, perhaps, a local energy one. It has been argued that "the real failing of the Green Revolution was ideological" (rather than technical)—the "immorality of its ecology."[45] While the farmers understand their problems primarily in economic terms, the more reflective among them see them also in moral terms. Both the successes and the failures of this project may likewise be seen in terms of the morality and otherwise of relationships with interested outsiders. So, what we may be seeing in Bali is the beginning of the re-embedment of rice production in its local moral/ecological context.

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44. My knowledge of these events comes largely from conversations with my friends Alit and Hendra. I am grateful to them both for their open and honest sharing of information as well as their own perceptions and feelings. I record also my respect for the (typically Indonesian) dignity and resigned good humor with which they accepted unhappy outcomes and declined to lay blame for the problems.
45. Dove and Kammen 1997, 96.

Conclusions

The two main issues that have emerged from this updated overview of rice agriculture in Bali are the unanticipated breakthroughs in organic production and the marketing challenges that farmers have to confront.[46]

We have examined two projects (there are more no doubt) of successful conversion to the organic production of rice. Significantly, and unlike earlier attempts, both have been initiated and managed primarily by groups of local farmers rather than by government or foreign aid/development agencies. In both cases individuals of exceptional skill and commitment played key roles in the projects. Both are Balinese and are to varying degrees insiders in the communities involved. Other noteworthy features are these:

- Both projects began by analyzing the fundamental problem of economic sustainability resulting from static prices for produce and rising costs and by linking the parallel technical and economic dimensions of this equation.
- Both projects identified the techno-economic advantages of substituting locally produced compost for petrochemical fertilizers and have also virtually eliminated petrochemical pesticide use with successful results and beneficial side effects.
- In addition to lowering production costs, both projects produced surprising and apparently sustainable increases in productivity.

These two projects provide evidence of the technical and economic viability of organic rice production in Bali and, by extension, in other wet-rice environments in monsoon Asia.

In addition to these projects, there are other more modest examples of individuals and groups of farmers moving independently toward organic production, in many cases by way of SRI. These efforts all signal a weakening of once-unquestioned conventional practices and a growing awareness of and willingness to experiment with alternatives. The fact that some of these other projects are in urban, touristed, and affluent areas, where farmers work less than full time, indicates a broader-based movement that could take root in a variety of social and economic environments.

Progress on the marketing side has clearly been slower and more difficult than on the production side. This remains a significant challenge. The boutique market in Bali for premium and organic rice is strong and supports high prices, but it is small and would be unlikely to absorb a large increase in organic production in the foreseeable future. Selling organic produce on the ordinary local market is possible, as some producers have shown, but such sales are unlikely to bring higher prices, at least in the short term. This is the problem PTDB was addressing by seeking out premium markets farther a field and by replacing the middlemen.

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46. Some of the conclusions that can be drawn from this story have been discussed elsewhere; others will be described and analyzed in future publications. One, Arthawiguna and MacRae, 2010, concerns the role of the subak in this process. The other, MacRae forthcoming, concerns the factors that enable successful development projects.

There was no problem with the logic of PTDB's plans and their aims were worthy, but their dramatic and costly (for the directors if not for the farmers) failure points to the inherent difficulties in achieving these aims in practice and, more importantly, the failure of PTDB to engage with the farmers in a way that built the mutual understanding and trust necessary for success. The contrast between this failure and the equally clear success of the production project, suggests that a model of key relationships and communication more like that which enabled the production project is likely to be a more productive approach. The new government-sponsored but locally controlled marketing initiative is a promising step in this direction.

Further Questions

While the obvious conclusions to be drawn from this story concern organic production and marketing, it also reveals the complexity and interrelatedness of what might be called a "rice production and marketing complex." This complex involves multiple elements and steps, from management of primary ecological resources, through seed and fertilizer procurement to harvesting, processing, and marketing of final products. It also engages local economies with regional and global supply chains and market forces. Although these are in a sense separate elements, often performed by different parties, they are integrally related and not easily separated, as PTMSB found to its cost. While the focus of this essay has been on the fertilizing, production, and marketing stages, it has also revealed significant gaps in understanding of the interrelatedness of this complex.

PTDB's unsuccessful foray into the harvest, milling, and marketing end of the process shows, apart from the key failure to engage successfully with producers, how complex and little understood the rice market in Bali (and indeed Indonesia) is, even by its participants. Top-down macro-studies by economists are plentiful, but local-level studies—especially ones that reflect the points of view of the small players (farmers, harvesters, millers, buyers, and sellers) are rare.[47]

Another area of change, signaled in PTDB's unrealized plans for increased productivity, is the development of new technologies for raising yields even further. Looming largest among these is the use of hybrid seed and planting systems, developed and widely used in China as well as in Vietnam, India, the United States, and to a lesser extent the Philippines. Marketing of these systems

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47. Such studies were relatively common until the 1980s (for a recent review, see White 2000), but since then they have been all but abandoned. Among the rare exceptions are Ellis 1993 and Bourgeois and Gouyon 2001, but even these are based on research a decade or more ago in parts of the country where economic conditions were, even then, rather different from Bali. The work of Stefan and Rachel Lorenzen (2008) is one exception that is both recent and related to Bali.
48. "RI–China Kerjasama Benih Padi Hibrida," *Antara News,* 6 December 2007; Sumarno 2006; Virmani et al., n.d.; Simatupang and Timmer 2008, 67. It is perhaps significant that the countries most involved in hybrid varieties are also the largest exporters of rice.
49. See Mathews and Wassman 2003.
50. A similar point has also been made recently by Hart and Peluso 2005, 182.

has begun in Indonesia, and has official government interest, but to date they have attracted little interest among farmers, certainly in Bali. While this new technology is being promoted by the International Rice Research Institute and governments, as well as by commercial interests, its effects on local farming practices and economics are not yet well understood.[48]

Finally, global concerns, policies, and emerging practices to do with climate change will inevitably begin to affect rice cultivation in the years to come. On one hand, wet-rice fields are a well-known source of the powerful greenhouse gas methane and, on the other, it is also well-known that relatively small changes in temperature and rainfall can have significant effects on crop productivity and diseases. The new methane-based energy project at Wangaya Betan begins to address one side of this issue, but it is reasonable to anticipate an increase in the influence of these factors.[49]

Taken together these emerging issues reinforce the need for more systematic commitment to understanding the dynamics of the entire rice production complex. While this system is a global one, and analysis at this level is essential, the evidence presented here shows that useful lessons can be learnt in relatively small, peripheral, and atypical corners of the rice world such as Bali. It also reminds us once again, given the preponderance of top-down, quantitative, macroeconomic studies, that local-level ethnographic studies are much needed in order to reflect the often-overlooked perspectives of farmers in the fields and in the communities in which they live.[50]

ACKNOWLEDGMENTS: This article is based on regular research in Bali since 1993, with a specific focus on agriculture since 2003. Research was facilitated initially by the Indonesian Institute of Sciences (LIPI) and Udayana University and has been assisted financially by Auckland and Massey Universities. I am grateful to all the friends and colleagues mentioned here (especially Alit Arthawiguna), to countless anonymous farmers, to Stephan Lorenzen for insightful feedback on a draft of this article, and to *CAS* editor Tom Fenton for editorial rigor beyond the call of duty.

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