Labour, mechanization, market integration, and government policy: Agrarian change and lowland rice cultivation in northeastern Thailand and southern Laos

Ian G. Baird1 | Kanokwan Manorom2 | Santi Piyadeth3 | Sirasak Gaja-Svasti2 | Chanthavisouk Ninchaluene3

1Department of Geography, University of Wisconsin-Madison, Madison, Wisconsin, USA
2Faculty of Liberal Arts, Ubon Ratchathani University, Ubon Ratchathani, Thailand
3Savannakhet University, Savannakhet, Lao PDR

Correspondence
Ian G. Baird, Department of Geography, University of Wisconsin-Madison, Madison, WI, USA.
Email: ibaird@wisc.edu

Funding information
NASA Land Cover and Land Use Program, Grant/Award Number: 80NSSC18K0287

Abstract
Over the last two decades, significant changes in lowland rice cultivation practices have occurred in mainland Southeast Asia. Here, we compare lowland rice farming in six provinces in northeastern Thailand and four districts in Savannakhet Province in southern Laos and consider the ways that agrarian change, including the deepening of capitalist relations, is occurring. Some of the most important changes taking place relate to increasing mechanization, remittances, changing bases of labour's simple reproduction, and the increased importance of international markets, especially for organic rice. These changes and associated government policies are having a considerable influence on agricultural practices. The Chinese market for organic rice from Laos is reducing pesticide and herbicides use and prolonging hand-transplanting of paddy, while encouraging farmers to use uniform sized high-yielding rice varieties, and abandoning local seeds. Rice exports from Laos are having both positive and negative environmental effects, indicating the nuanced influences of particular international markets and government policies.

Keywords
agriculture, Laos, organic, rice, Thailand
INTRODUCTION

Over the last few decades, lowland wet rice cultivation practices have changed in northeastern Thailand and in southern Laos, especially in relation to mechanization, relations in the countryside, changing dynamics of accumulation and changing bases of labour’s simple reproduction factors, and the influence of export markets and government policies, as discussed below. However, rice is being cultivated differently in both regions, despite environmental conditions being generally similar, and the people living in northeastern Thailand and southern Laos having closely related languages and cultures.

We are particularly interested in engaging with what Akram-Lodhi and Kay (2010a, 2010b) refer to as “ecological agrarian questions.” They suggest that “the political ecology of struggle and agrarian change shapes and is shaped by biophysical contradictions in capitalism that are integral to any understanding of the agrarian question” (Akram-Lodhi & Kay, 2010b, p. 270). Indeed, various scholars have carefully considered the environmental implications of particular types of agricultural development (Foster, 2009; Taylor & Bhasme, 2019; Watts, 2009; Weis, 2007).

Following Byres (1991, p. 10), we are concerned with “the extent to which capitalism has developed in the countryside, the forms that it takes and the barriers which may impede it,” including how agrarian change is variously occurring (Bernstein, 1981; Bernstein, 1996/1997; Friedmann, 1987; Watts, 1983). In addition, we are interested in the uneven incorporation of different modes of capitalist reproduction, especially mechanization, and the degrees to which agrarian change is path-dependent and hence inevitable (Akram-Lodhi & Kay, 2010b, pp. 266–267), including the ways that rural capitalism is highly contingent and context-specific (Akram-Lodhi & Kay, 2010b, p. 269; Bernstein, 1981; Watts, 1983).

We are especially interested in how small-scale farmers are being affected by international export markets (Akram-Lodhi & Kay, 2010b, p. 273; Friedmann, 1987), including those related to China, the European Union, and other rice importing countries, such as Japan and South Korea, which are becoming increasingly oriented to organic rice. Illustrative of how markets can influence peasant societies, Bernstein (1981, pp. 11–13) discussed what he called “the simple reproduction squeeze,” which occurs when the costs of production increase for small farmers, while returns on labour simultaneously decline, often due to global market factors. Guthman (2004) has also made it clear how markets have greatly affected the structure of organic farming. Here too, we are interested in how markets, especially international rice markets, and associated government policies, are influencing the political economy of agrarian change (Akram-Lodhi & Kay, 2010b, p. 278; Bramall, 2009), particularly in relation to low chemical-use or organic rice. In response, some farmers have switched to organic methods, so as to avoid these sorts of pitfall (see Broad & Cavanagh, 2012).

In both northeastern Thailand and southern Laos, Cold War geopolitics and associated integration with the international political economy of capitalism resulted in the Green Revolution developing at different times. Thailand, for example, became a close ally of the United States, which promoted increased capitalist penetration into rural areas, while war in Laos, and the subsequent takeover of the country by the Pathet Lao communists led to a much slower adoption of capitalism (Evans, 1990; Hansson et al., 2020). This partially explains why for decades Thailand has been one of the top exporters of rice internationally, while until recently the focus of Laos was on feeding the country’s population. However, recently, rice production has increased in Laos, resulting in more rice exports.

To a certain extent, the trajectory of rice cultivation practices in northeastern Thailand and southern Laos is similar. Whereas 20 years ago most farmers in northeastern Thailand were mainly using hand-held tractors to till their fields, in southern Laos, water buffaloes were still mainly ploughing the fields. Now, almost all the small-scale farmers in southern Laos use hand-held tractors for ploughing, while the majority of farmers in northeastern Thailand rely on larger tractors for ploughing. So, is rice cultivation and associated changes in social relations destined for the same
We adopt an agrarian change approach for comparing how lowland rice cultivation and associated social relations in six provinces in northeastern Thailand and in four districts in Savannakhet Province, southern Laos, have changed over the last 20 years, between 2000 and 2018. We consider the trajectory of rice cultivation in both regions and examine factors that are influencing changes in rice cultivation practices, particularly labour demographics, remittance incomes, international markets, and government policies. We focus on the influence of markets, especially exports to China, and the role of large rice Dutch milling operations in influencing rice cultivation and international marketing in Laos. Our central argument is that patterns of agrarian change in northeastern Thailand and southern Laos are variously shaped by labour factors, mechanization, national policy regimes, and increasing integration into international markets. In relation to organic rice, we present the different organic pathways in northeastern Thailand and southern Laos and demonstrate how mechanization, labour, market factors, and government policies associated with low chemical inputs are increasingly affecting agricultural practices. We are particularly interested in capital penetration, ecology, and unevenness, topics that have also long been of interest to scholars of agrarian change, including Philip McMichael (2013) and Henry Bernstein (1996/1997, 2006).

In the next section, we provide important information related to the present rice cultivation circumstances in Thailand and Laos, before outlining our research methods. We then present the findings of a household farmer survey conducted in northeastern Thailand and southern Laos in 2019. Finally, we reflect on how labour, remittances, markets, and government policies are influencing rice cultivation change and capitalist relations in both regions.

1.1 Agrarian change in Thailand and Laos

The literature on agrarian change in Thailand has documented important changes in rural livelihoods, including the adoption of different agricultural technologies. Andrew Turton’s work is particularly relevant, as it focused on core lowland rice growing areas, as does this article. It was also focused on the Green Revolution and accompanying technological and social changes. Turton considered the increasing levels of inequality in rural societies and between rural and urban dwellers (Ganjanapan & Hirsc, 2010; Hart et al., 1989). More recently, Jonathan Rigg and others have built on this work, particularly emphasizing how farmers in northeastern Thailand have become increasingly reliant on non-agricultural work of various kinds to support their livelihoods (Rambo, 2017; Rigg et al., 2018; Rigg & Salamanca, 2011). Technical changes are closely interconnected to migration, an issue considered below.

In Laos, Grant Evans’ research stands out (Cole & Rigg, 2019), particularly his classical book Lao Peasants Under Socialism (1990), in which Evans examined the circumstances associated with a move away from collectivization in the 1980s, after the country became a communist country in 1975 and started experimenting with radical agrarian change. However, since then much of the literature associated with agrarian change in Laos has focused on the uplands, especially efforts by the government to end swidden cultivation, and relocate shifting cultivators to the lowlands and near major roads (Baird & Shoemaker, 2007; Evrard & Goudineau, 2004). More recently, the focus has been on upland agrarian transformation associated with giving out large-scale land concessions for developing plantations in the 2000s and 2010s (Baird, 2020; Kenney-Lazar, 2012). There has also been an emphasis on cross-border migration to support livelihoods (Barney, 2012; Cole & Rigg, 2019; Rigg, 2005, 2007), although there has recently been some research conducted on changes in lowland rice farming in Laos (Baird et al., 2021; Cramb, 2020; Manivong et al., 2014).

Household labour and migration are critically important factors when it comes to agrarian change, including increased mechanization, which are affecting lowland rice cultivation practices in both northeastern Thailand and southern Laos (Rigg, 2005; Rigg et al., 2012, 2018), albeit in different ways. The demographic differences between northeastern Thailand and southern Laos are important. Indeed, farmers interviewed in northeastern Thailand are older than those in Savannakhet Province, averaging 58 years old in the first, as compared with 54 years old in the
latter. In addition, there are considerably more people living in Savannakhet farming households compared with households in northeastern Thailand. In northeastern Thailand, the average number of people recorded per household was 3.85, which is considerably less than the 5.39 people per household in Savannakhet. The number of children under 16 is also higher in Savannakhet. These statistics show that there is considerably more labour available for farming in Savannakhet, and this difference is likely to persist, although there is consensus amongst demographers that birth rates will continue to decline in both regions.

The demographic situation in Thailand and Laos is important for understanding agrarian change. Between 1960 and 1965, the total fertility rate in Thailand as a whole was 6.13 children per woman, whereas between 2010 and 2015, it declined to just 1.53, well below the population replacement rate (Teerawichitchainan et al., 2019). However, infant mortality in Thailand is now only 7.3 deaths per 1000 births (Macrotrends, 2020), and life expectancy in Thailand has increased to 77 years (World Bank, 2020). It is expected that the overall population in Thailand will decline from 71 million in 2017 to just 35 million in 2100 (Science News, 2020), although this does not take into account migration from neighbouring countries, such as Laos, Cambodia, and Myanmar.

The situation in Laos is different, although the trajectory of change is similar. Whereas between 1960 and 1965, the total fertility rate in Laos was 5.97 children per woman, between 2005 and 2010 the rate declined, but just to 3.02 (United Nations, 2010), above the population replacement rate, and double the birth rate of Thailand. Laos’ population is still growing, and life expectancy has increased to 68 years, which is still 9 years less than in Thailand (World Bank, 2020). In addition, infant mortality in Laos remains high, at 37.6 deaths per 1000 births as of 2018, although it has declined from 56.1 deaths per 1000 births in 2008 (Plecher, 2020), and seems likely to continue to decrease.

Population mobility is an important factor when it comes to agrarian change and capitalist relations. We found that there are 1.49 people per household in rural northeastern Thailand working in a different province in the country, but that in Savannakhet, only 0.59 people per household are working in another province within the country. However, the tables are turned when it comes to working in a different country, with 0.88 people per household in Savannakhet working outside of Laos (the vast majority to neighbouring Thailand), while only 0.05 people per household in northeastern Thailand are working in a foreign country. Thus, in both northeastern Thailand and Savannakhet, there is considerable outward migration for work, as has been pointed out by various authors writing about the livelihoods in both southern Laos (Barney, 2012; Rigg, 2005) and northeastern Thailand (Rigg et al., 2012, 2018). As Park and White (2017) have pointed out, generational differences in agricultural families are crucial, in relation to education levels and aspirations to continue farming, although they have often been neglected in the literature. In both northeastern Thailand and Savannakhet, the tendency is for older adults to stay on the farm and younger people to migrate and then to send remittances home. This results in the average age of farmers being higher than the overall population structure. This is part of what Friedmann (1987) refers to as simple commodity production and is part of deepening capitalist relations that link family farms, outside wage labour, and markets for family farm produced food.

Crucially, lowland rice cultivation is becoming increasingly mechanized in northeastern Thailand due to a shortage of labour, and economies in northeastern Thailand are becoming increasingly diverse, and embedded in a variety of capitalist relations. Labour migration and remittances are important, but not so much specifically for paying for expenses associated with rice cultivation. In Savannakhet, mechanization is also occurring, but differently. For example, there has been a switch from using water buffaloes to till the land to mainly using hand-held tractors, but Savannakhet is still less mechanization than in northeastern Thailand. There is less diversity in occupations in Savannakhet, but more available farm labour. The increased need for fertilizers and machinery to cultivate rice is making labour migration more important, since remittances are often used specifically to pay for expenses associated with lowland rice cultivation. Thus, as is shown in the results section, households in both northeastern Thailand and Savannakhet are becoming increasingly dependent on wage-labour and markets, albeit for different reasons. In addition, the role of the government in Thailand with regard to providing subsidies to farmers that affect agrarian change is important, as the Thai government has more resources to support farmers compared with Laos.
International markets and associated government policies, combined with labour and other factors, are greatly affecting how lowland rice is being cultivated, and thus how capitalist relations are deepening. Therefore, the move to using less or no chemicals for rice farming is making it possible for small-scale farmers to increasingly access international markets.

1.2 | Thailand

In Thailand, the government is promoting the production of organic rice like never before, so as to penetrate the growing international market for organic rice (Ministry of Agriculture and Cooperatives, 2019). Indeed, government policies are being greatly influenced by market factors, as are the efforts of non-government organizations (NGOs), such as Green Net, which are promoting and certifying organic rice production in Thailand (Vandergeest, 2009). However, it is not only about going organic, as marketing also relies heavily on cultivating high quality rice varieties, such as jasmine fragrant rice, which is highly desirable for direct consumption throughout Thailand and also for international markets.

The government of Thailand is particularly concerned about the country’s competitiveness in international rice markets, since many Asian countries have the potential to produce better quality rice at lower costs than Thailand. Therefore, the Thai government is interested in accessing specialized niche markets, including for organic rice and other high quality products. Part of this effort is also related to the awareness that both consumers and farmers in Thailand are increasingly concerned about environmental protection, farmer health, and consumer health. In particular, and as explained earlier, Thailand is becoming an aging society, which is in itself influencing consumer choices. In addition, consumers abroad are increasingly demanding high quality and safe food. This has resulted in the government of Thailand launching the National Organic Agriculture Development Strategy (2017–2021). This scheme comes under the government’s National Agricultural Development Plan (2017–2021), which is in line with Thailand’s 20-year National Agriculture Strategy (2018–2037) (Ministry of Agriculture and Cooperatives, 2017).

The main goal of the National Organic Agriculture Development Plan is to increase the income of farmers to at least US$13,000 per year (approximately 416,000 baht per year) (World Bank, 2016) by the Rice Department providing support to farmers to convert to organic rice. The initial goal was to reach 1,000,000 rai (approximately 160,000 ha) or around 3.3% of the domestic rice consumption by 2021 to become organic. Technical support, organic certification, and financial support have been offered to farmers in support of this effort. Part of the reason that organic farming is gaining increased support in northeastern Thailand is because the soils there are not particularly good and therefore are somewhat vulnerable to environmental degradation (Limpinuntana, 2001), thus indicating the partial agency of the environment in affecting government policies regarding farming.

To join the program, at least five farmers whose paddy areas are adjacent to each other and cover at least 16 ha (100 rai) in total must join together to apply for government support. Their farmland needs to be close to water sources, and must have legal land titles, and must not be close to heavily polluted areas. Then, to qualify for support, each farmer group is required to register with the Rice Research Center (RRC) in their respective province.

The Department of Agricultural Extension (DoAE) works closely with the RRCs to provide various trainings about organic rice and seeds. Indeed, agricultural extension is important for bringing about agrarian change, including reducing agrochemical dependency (Nelles & Visetnoi, 2016). Agricultural extension provides farmers with technical information, but also helps to generally change farmer perceptions. Conversion to organic rice typically takes 3 years. Registered organic rice farmers are, therefore, subsidized to grow up to 2.4 ha (15 rai) of organic rice for 3 years, so that they do not face serious losses during the transition period. Farmers receive 2000, 3000, and 4000 Baht per rai for the first, second, and third years. By the end of 2021, the program expects to have promoted the production of 400,000 tonnes of organic rice per year. The total budget for this program in 2018 was 777,697,200 Thai baht, which is close to US$25 million (Rice Department, 2018). The Office of Agricultural Economics, which monitors the program, has reported that from 2017 to 2019 there were 107,354 farmers in the program. Organic paddy
reportedly covers 962,570 rai or 154,000 ha (Office of Agricultural Economics, 2020), which represents a substantial increase in organic rice production. However, the long-term implications of this program are still uncertain, and there have been reports that organic certification standards associated specifically with this program are not sufficient for the organic rice market in Europe.3

Rice farmers in Thailand are increasingly adopting a new method for eliminating the use of herbicides when using broadcasting to seed rice. Whereas in the past herbicides were used to eliminate grasses that grew up in fields together with rice, now more farmers are using weed-eaters to cut down both grasses and rice stalks when they grow up together and are about a 20–30 cm high. Then farmers flood their fields, and the grasses die out while the rice grows up. Yields are often good, and farmers often express confidence and satisfaction in this innovation. Government agriculture extension agents have not been systematically promoting this method, but many farmers have learned about it from other farmers and are also gaining knowledge about the method through television, radio programs, and social media. However, this method is only viable when farmers can control the water in their fields, and when only a single rice crop is grown in a year, since this method tends to lengthen the growing season to some extent.

The government program to promote organic rice, combined with farmer innovation, has garnered some success. While the area cultivated with organic rice only covers a relatively small percentage of all the rice farmland in Thailand, the initiative is crucial because the government is openly encouraging organic farming, thus extending organic practices to the public as a viable mainstream government-endorsed and subsidized option. This is influencing how farmers perceive organic rice. During fieldwork, we observed that a number of farmers had received various levels of government encouragement and material support, although they were not beneficiaries of the particular program designed to convert to organic rice production, since they had already gone organic before the program began. Still, government policies and the growing market for organic rice associated with the changes that are occurring have been important to them.

In northeastern Thailand, however, Chinese Thais mainly own the large rice mills, and none are devoted to processing organic rice, something that is the case in southern Laos. In northeastern Thailand, organic rice must still be milled by smaller mills owned by small groups of organic rice farmers, so as to avoid contamination by chemicals used to grow other rice, and it must be marketed through farmer networks, which is challenging. Thus, it is more difficult to get organic rice milled and marketed in northeastern Thailand as compared with in Savannakhet, as explained below.

1.3 Laos

In Laos, various factors have led the government to promote low chemical or organic rice production, although the government does not have Thailand’s budget to subsidize such changes. However, one crucial factor has been commitments from China to import rice from Laos, although insisting that the rice they purchase meets quality standards set by China (Vientiane Times, 2016, 2017, 2018). For example, in January 2017, the Vientiane Times reported that China planned to import 20,000 tonnes of rice from Laos, but all of the rice had to be organic. The Prime Minister at the time, Thongloun Sisoulith, emphasized that, “The shipment must not contain nonorganic rice” (Vientiane Times, 2017). Foreign rice exports are certainly crucial when it comes to how rice is produced. They are also resulting in Laos becoming recognized as a legitimate source of organic rice (see Prudham & MacDonald, 2020). This also reinforces the long-standing reputation of Laos as a place that produces high quality rice (Schiller et al., 2006). More recently, China has increased the amount of rice it is importing from Laos, which is expected to be 50,000 tonnes of polished rice in 2021 (Vientiane Times, 2021).

While China’s import policies and practices have recently caused negative environmental impacts in relation to some commodified crops, most notably bananas, which are being exported from Laos to China (Bartlett, 2016; Phnom Penh Post, 2020), the situation with regard to rice represents a much more positive influence when it comes to environmental impacts. Thus, this article adds a new element to the variant of the agrarian question relating to the role of Chinese markets in affecting agricultural practices (see Akram-Lodhi & Kay, 2010b; Bramall, 2009; Green, 2021; McMichael, 2020) and also to thinking about the influences that new organic markets have on the environment.

One of the indirect results of market influence has been that the Lao government is now promoting improved quality of rice production by encouraging foreign investors to build large rice mills in Laos. The Indochina Development Partners Lao Ltd (IDP) first started operating in Savannakhet Province in 2016, with a Dutch investor owning 100% of the shares in the company. The Lao government has facilitated this development by allowing IDP to purchase the land where they have built their large rice mills. Between 2016 and 2018, IDP in Savannakhet purchased about 110,000 tons of rice a year, and between 2019 and 2021, the company expanded its operations and is now expecting to purchase 150,000 tons of rice per year. IDP is different from other smaller rice mills, as apart from simply buying rice to mill and market, the company also has extension workers who have encouraged the establishment of farmer groups, to which they have provided agricultural advice and rice seeds. These extension workers cooperate closely with Lao government officials, following a Memorandum of Understanding (MoU) that they have with the Lao PDR government.

IDP has four rice mills in Laos, all of which are in the south, including two in Savannakhet Province. IDP, in response to market export demand, has been promoting “clean” rice (khao sa-at in Lao), which is not technically fully organic, but is rice that is grown with minimal chemical use, and can presumably be exported to China, the European Union, and elsewhere as organic. “Clean” rice production is a level below “organic,” where rice is grown with a small amount of chemical fertilizer, or none at all, and no herbicides or insecticides. Thus, “clean” rice is not exactly organic, but it is close to it (Baird et al., 2021). They are mainly producing glutinous rice using high-yielding non-photosensitive varieties, particularly Thadokkham 8 (TGK-8) (Baird et al. 2021, p. 41). The director of the Savannakhet Province Commerce Office described the rice produced in the area we worked in as “clean and chemical-free” (DAWN, 2013). This has allowed for the production of rice that meets the increasingly strict requirements of export markets, including China (Vientiane Times, 2017, 2018). Since IDP is now estimated to be purchasing 70% of all the rice grown in Savannakhet, their promotion of clean rice for export is affecting agricultural practices (DAWN, 2013; Vientiane Times, 2016), and the trajectory of agrarian change, especially since more farmers are selling more rice than ever before. This is providing a particular niche market reputation to Laos that has already led to farmer changes in behaviour to meet market demands for organic or clean rice (Baird et al., 2021).

According to an employee of IDP, the guaranteed minimum price that IDP pays for rice is 2200 kip/kg (US $0.24/kg). However, in reality, in 2019–2020, they were paying much higher prices (see Table 1), which makes it desirable for peasant farmers to sell their rice to IDP.

IDP extension workers monitor rice farming in Savannakhet and arrange to buy rice. There are three ways that IDP purchases rice: (1) directly from farmers, (2) from intermediaries who buy the rice from farmers, and (3) from farmers who they supply with rice seed, as those farmers are contractually obliged to sell their rice to IDP. Thus, they

<table>
<thead>
<tr>
<th>Moisture of rice</th>
<th>Price paid</th>
</tr>
</thead>
<tbody>
<tr>
<td>14–16%</td>
<td>4050 kip/kg</td>
</tr>
<tr>
<td>17–21%</td>
<td>4000 kip/kg</td>
</tr>
<tr>
<td>22% or more</td>
<td>3950 kip/kg</td>
</tr>
<tr>
<td>25% or more</td>
<td>3900 kip/kg</td>
</tr>
</tbody>
</table>
are able to access rice through various channels, allowing them to become the dominant purchaser of rice in the province.

Rice quality is crucial, and there are standards for different grades of rice, with IDP following the International Seed Testing Association (2013) guidelines for monitoring and testing rice. 5A quality rice is the highest quality of organic rice and is exported to Europe, where demand for organic food has been expanding (Gibbon, 2008). 4A rice is also good quality rice and is exported to China. 3A1 and 3A2 quality rice are exported to Japan, South Korea, and China and are marketed internally in Laos as high quality rice (see Table 2).

To ensure that the chemical content of exported rice meets market demand, the rice is tested before being exported. Levels of chemical fertilizers, shellfish and crab pesticides, and herbicides are tested. If higher than allowable levels of chemicals are found, IDP conducts an investigation to determine where the rice was grown, and rice from that village will not be approved for export and will not be further purchased by IDP during that growing season. The next season, IDP checks the chemical levels of rice in previously violating villages. If levels do not exceed standards, IDP may agree to purchase rice from the village, but at a price that is 500 kip (over US$0.05) less per kilogram than what is normally paid, as a penalty for violating chemical use policies during the previous season. The third author heard of this happening, both from villagers and from IDP employees.

Rice production in Laos has been increasing in recent years, and the government hopes to further increase production (Cramb, 2020; Manivong et al., 2014; Ministry of Agriculture and Forestry, 2010), in order to support export markets and gain more foreign exchange revenue (Vientiane Times, 2018). Crucially, however, accessing international rice markets is reliant on meeting importer quality demands, and since 2015, Laos has been exporting organic rice to China (Manivong & Cramb, 2020), and as already mentioned, exports are increasing each year (Vientiane Times, 2021). This has influenced the Lao government to become increasingly supportive of low-chemical rice production, as the government now realizes the necessity of doing so to meet market demand (Baird et al., 2021; Ministry of Agriculture and Forestry, 2010). Moreover, farmer perceptions of the risk of chemicals on the environment and farmer health is being reinforced by market factors and government policy shifts (Baird, 2020; Baird et al., 2021).

However, while in northeastern Thailand farmers often rely on government subsidies, as well as new innovative use of weed-eaters to respond to international market demand for organic rice, in southern Laos the greater supply of farm labour and the critical role of IDP in purchasing rice, has led farmers to meet market demand by continuing with or reverting to the hand transplanting of rice. This is allowing the critical social relations associated with peasant farming practices to somewhat persist in Laos, even if increased use of small amounts of chemical fertilizers and mechanization has also occurred, making farming households in Savannakhet more dependent on remittances from younger family members, especially those working in Thailand.

### Table 2  IDP indicators of different grades of rice

<table>
<thead>
<tr>
<th>Grade</th>
<th>5A</th>
<th>4A</th>
<th>3A1</th>
<th>3A2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broken (smaller than % while grain)</td>
<td>&lt;3%</td>
<td>&lt;5%</td>
<td>&lt;5%</td>
<td>&lt;5%</td>
</tr>
<tr>
<td>Moisture</td>
<td>&lt;13%</td>
<td>&lt;14%</td>
<td>&lt;14%</td>
<td>&lt;14%</td>
</tr>
<tr>
<td>Yellow</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1.5%</td>
<td>&lt;2.5%</td>
</tr>
<tr>
<td>Back spot and red stripe</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Transparent</td>
<td>&lt;3%</td>
<td>&lt;3%</td>
<td>&lt;3.5%</td>
<td>&lt;3%</td>
</tr>
<tr>
<td>Paddy grains per kg</td>
<td>&lt;2</td>
<td>&lt;2</td>
<td>&lt;2</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Foreign matter</td>
<td>&lt;0.5%</td>
<td>&lt;0.5%</td>
<td>&lt;0.5%</td>
<td>&lt;0.5%</td>
</tr>
<tr>
<td>Crop</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Whiteness index</td>
<td>≥57.5</td>
<td>≥57.5</td>
<td>≥55.0</td>
<td>≥55.0</td>
</tr>
<tr>
<td>Milling degree</td>
<td>Well milled</td>
<td>Well milled</td>
<td>Well milled</td>
<td>Well milled</td>
</tr>
</tbody>
</table>
The increased influence of market penetration and the deepening capitalist relations is affecting the trajectory of agrarian change for small farmer production systems in Savannakhet (Akram-Lodhi & Kay, 2010b; Bernstein, 1981; McMichael, 2020; Watts, 1983). However, in this particular case, these influences are actually resulting in farmers adopting more low-chemical or organic farming practices, which is, ironically, partially helping to sustain rural social relations, although farmers are also increasingly relying on remittances to pay for expenses, thus leading to changes in family structures, with uncertain implications into the future.

2 | METHODS

Fieldwork began with preliminary investigations about changes in lowland rice farming, which were conducted by the authors in both northeastern Thailand and southern Laos. In 2018, we interviewed farmers in 12 villages in six provinces (Udon Thani, Sakon Nakorn, Kalasin, Roi Et, Amnat Charoen, and Ubon Ratchathani) in northeastern Thailand and 12 villages (three villages per district) in four districts (Xaybouly, Outhoumphone, Atsaphone, and Song Khone) in Savannakhet Province, southern Lao People’s Democratic Republic (Lao PDR or Laos). These areas were chosen because they are both important lowland rice growing areas in the region. Villages in these areas were randomly selected.

In June 2019, a detailed survey was designed, tested, and revised in Ubon Ratchathani, Thailand. The survey was then implemented between June and August 2019 by the authors and student research assistants in northeastern Thailand and southern Laos. The locations of villages where farmers were interviewed are included in Figures 1 and 2. In northeastern Thailand, 240 lowland rice farmers (one representing each household) were randomly selected without any stratification in 12 villages in six provinces (20 households per village). In Savannakhet Province, southern Laos, a similar methodology but a different scale of analysis was adopted. The 12 villages were located in four districts. Therefore, three villages, or 60 households, were surveyed for each district. Each village included between 100 and 200 households, although the villages in Laos were a little smaller than those in Thailand. There were not major differences between the villages surveyed in either country, since all were located in lowland areas with similar levels of precipitation and altitudes, and all are located on the Khorat Plateau. Lowland rice farmland-holdings in Savannakhet are 2.52 ha per household as compared with 1.78 ha in northeastern Thailand. Although we conducted the survey in 2019, we asked about changes between the previous year (2018) and 20 years before 2019 (from 2000). We recognize that our survey questions about rice growing practices 20 years ago are limited by farmer memory and that is one of the reasons we did not ask about period prior to 2000. However, most farmers were able to clearly articulate differences between 20 years ago and the present.

We compared the circumstances between northeastern Thailand and southern Laos because people on both sides of the border have historically engaged in similar lowland rice-based agriculture. That is, planting of the main rainfed crop generally begins at the beginning of the monsoon season, in May or June, and harvesting occurs after the end of the rainy season, generally in around November or December. However, the political and development history and present-day circumstances in each country have been considerably different, thus making comparing the two useful.

3 | FINDINGS

3.1 | Survey results in northeastern Thailand and southern Laos

The survey results suggest that family structures in northeastern Thailand and Savannakhet are somewhat similar, although with more skipped generational households (grandparents raising grandchildren in the absence of the in-between generation) and especially more single-parent households in northeastern Thailand as compared with
Savannakhet, while there is a higher proportion of coupled households and multigenerational households in Savannakhet. Combining demographic and mobility factors, families in Savannakhet have more people available as farm labour compared with northeastern Thailand (2.07 in northeastern Thailand compared with 3.12 in Savannakhet). We will return to this crucial issue later.

Another difference between northeastern Thailand and Savannakhet relates to the relative importance of rice farming for rural households. Whereas 62% of rice farmers in northeastern Thailand reported that in 2000, rice cultivation was their main source of livelihood and that they consumed much of the rice they cultivated. By 2018, however, that number had dropped to 53%, indicating what has already been widely reported, that rural people in northeastern Thailand are increasingly diversifying their occupations (Rambo, 2017; Rigg et al., 2016, 2018), although not necessarily the crops they cultivate. However, in Savannakhet, 92% of farmers surveyed reported that cultivating lowland rice was their main source of income in 2000, and 91% reported this to be the case in 2019.

*During the survey, farmers were asked to assess the amount of income generated from selling rice combined with the monetary value of rice not sold but consumed in the household. We were aware that farmers sometimes exaggerate the importance of rice cultivation, and so during the surveys we emphasized not overestimating the importance of rice farming.*
These statistics reflect the greater importance of rice cultivation in the lowland plains of Savannakhet as compared with northeastern Thailand.

With regard to remittances from migratory household labour, a higher percentage of interviewees in northeastern Thailand reported receiving remittances from family members compared with those interviewed in Savannakhet. However, those in Savannakhet were much more likely to use remittance income for paying for expenses associated with rice cultivation (Table 3). Those in Savannakhet told us that remittances were crucial for supporting rice cultivation, something that people in northeastern Thailand were much less likely to articulate, since remittances in Thailand are often used for purchasing food and consumer items. This may be because rice cultivation is a much more important component of local livelihoods in Savannakhet as compared with northeastern Thailand.

Land ownership is often crucial for understanding agrarian change, so it is notable that farmer land ownership is high in both northeastern Thailand and Savannakhet. As in other parts of Asia (Dawe, 2015), there is little evidence in either northeastern Thailand or Savannakhet that farms are being consolidated and that individual farm sizes are increasing rapidly. Some have advocated for the adoption of policies that would promote such consolidation (Otsuka et al., 2016), but others point out that small farms are often still quite viable (Wiggins et al., 2010). Farmers in northeastern Thailand actually have a somewhat higher percentage of farm ownership compared with Savannakhet (97% to 92%). Finally, 29% of farmers in northeastern Thailand reported using some type of irrigation system, either weirs or pumping, while only 17% of farmers in Savannakhet reported having access to irrigation.
Lowland rice planting and field ploughing in northeastern Thailand and in Savannakhet Province differ. In northeastern Thailand, only 32% of farmers still hand-transplant rice seedlings, which compares to 84% in Savannakhet. Moreover, 59% of households now broadcast seeds in northeastern Thailand, which is related to outmigration and reduced labour availability, while just 14% broadcast rice in Savannakhet, where there is more available labour. In 2000, 87% of farmers in northeastern Thailand hand-transplanted seedlings, compared with 95% in Savannakhet. These findings are noteworthy, as they are heavily related to labour availability, herbicide usage, and market demand, issues that we will return to later in the article. Moreover, while men and women both transplant rice, women do so more than men.

Harvesting also experienced major changes in northeastern Thailand and Savannakhet between 2000 and 2018. In northeastern Thailand, only 29% of farmers reported hand harvesting in 2000, while 68% utilized a combine—often rented from others—to do so in 2018. In Savannakhet, however, 85% of farmers still mainly harvest rice by hand, with 13% using mechanical harvesters, and only 2% utilizing combines. This compares to 2000 when over 95% of farmers in both northeastern Thailand and Savannakhet reported harvesting by hand. The reduced amount of labour availability and the higher cost of labour in northeastern Thailand have been especially important for driving the move to greater mechanization.

In 2019, only 30% of rice farmers in northeastern Thailand reported growing at least some organic rice, as opposed to 40% in 2000. However, these statistics are somewhat deceiving, as in the past most organic rice was cultivated due to past familiarity with not using chemical fertilizers, and the lack of capital to purchase them, whereas nowadays more farmers are purposefully turning to organic farming, which the Thai government and market are increasingly promoting (Poapongsakorn, 2019). A few decades ago, the goal was mainly to produce as much rice as possible, without much consideration of the impacts of increased chemical use on the environment (Siamwalla, 1975). This view is changing, both among farmers and within the government, thus leading to increased interest in organic rice farming, sometime already outlined earlier (Ministry of Agriculture and Cooperatives, 2019). However, there are certainly obstacles to organic rice farming in northeastern Thailand, including past dependence on chemical-intensive farming, high debt, and perceptions that chemicals are necessary for high yields (Setboonsang et al., 2006; Taotawin, 2011). Meanwhile, in 2019, 77% of the farmers in Savannakhet claimed that they were growing some organic rice, as compared with 80% in 2000. The market and government policy are heavily influencing the circumstances.

The vast majority of lowland rice farmers in northeastern Thailand (99%) and Savannakhet Province (93%) are using improved or high-yielding rice seed varieties, which are mainly being produced at rice research stations in each country. In 2000, 75% of surveyed households in northeastern Thailand were using improved or high-yielding seeds, as compared with 25% in Savannakhet. The use of local varieties of rice has declined dramatically to 11% in northeastern Thailand and 10% in Savannakhet, respectively. This compares to 45% and 72% respectively in 2000 (Table 4). Indeed, much of the rice diversity in northeastern Thailand and southern Laos (Appa Rao et al., 2006; Inthapanya et al., 2006; Siamwalla, 1975) has been lost in recent decades. Although Taylor (2020) reported that Indian farmers have been hesitant to adopt high yielding varieties of rice, farmers in northeastern Thailand and Savannakhet have largely been receptive to improved and high-yielding varieties of rice seeds. Somewhat surprisingly, when we asked farmers about this, they generally did not exhibit much concern. In Savannakhet, farmers often reported that they were obliged to adopt these high-yielding seed varieties because the large IDP rice mill that

<table>
<thead>
<tr>
<th>Rice seed usage</th>
<th>% NE Thailand</th>
<th>% Savannakhet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved/high-yielding seeds (yes)</td>
<td>99</td>
<td>93</td>
</tr>
<tr>
<td>Improved/high-yielding seeds in 2000 (yes)</td>
<td>75</td>
<td>25</td>
</tr>
<tr>
<td>Use local seeds (yes)</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Use local seeds in 2000 (yes)</td>
<td>45</td>
<td>72</td>
</tr>
</tbody>
</table>
purchases their rice demands uniformity in the rice it purchases. In northeastern Thailand, rice mills are also reportedly refusing to buy rice seeds that are not the standard size.

Chemical inputs for lowland rice farming do occur in both northeastern Thailand and Savannakhet. As presented in Table 5, 85% of northeast Thailand farmers reported presently using chemical fertilizers, whereas in Savannakhet, the rate is 94%. This compares to 72% usage in northeastern Thailand, and 26% use in Savannakhet in 2000. However, even though a higher percentage of farmers use chemical fertilizers in Savannakhet, farmers they use less chemical fertilizers per area. In addition, the “clean” rice category in Laos allows for a small amount of chemical fertilizer, whereas in Thailand, certified organic rice does not allow any chemical fertilizers. In any case, rice production has, nevertheless, increased substantially in Savannakhet, and this is partially due to increased chemical fertilizer use (Kousonsavath & Sacklokhom, 2020; Sacklokhom et al., 2020). Using chemical fertilizer early in the growing season apparently cannot be found when rice is tested.

While many northeastern Thailand farmers reported using organic fertilizers, mainly manure and rice husk, less do so compared with in the past, and smaller quantities of organic fertilizer are being used. In Savannakhet, however, somewhat fewer farmers are using organic fertilizers, but over half of those who still use them reported using larger quantities than previously (Table 5). They attributed this change to having tractors and wagons to haul organic fertilizer to their fields, which they previously did not have (Baird et al., 2021).

As for herbicide use, a crucial environmental and health issue linked to changing agricultural practices, 24% of farmers in northeastern Thailand reported using herbicides on their rice fields, compared with just 5% in Savannakhet. Pesticide use is more prevalent in northeastern Thailand as compared with southern Laos (17% versus 6%). However, about a quarter of farmers in both northeastern Thailand and southern Laos reported cultivating at least part of their rice fields without using any chemical inputs (Table 5). As will be discussed below, markets and government policies are crucially influencing these patterns.

### 3.2 Government policy and support

Lowland rice farmers in northeastern Thailand are much more likely to be members of cooperatives or farmers’ groups than farmers in Savannakhet (77% compared 14%), receive government agricultural training (73% compared to 7%)

<table>
<thead>
<tr>
<th>Inputs</th>
<th>% NE Thailand</th>
<th>% Savannakhet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use chemical fertilizers (yes)</td>
<td>85</td>
<td>94</td>
</tr>
<tr>
<td>Use chemical fertilizers in 2000 (yes)</td>
<td>72</td>
<td>26</td>
</tr>
<tr>
<td>Increased chemical fertilizer use (2018 vs. 2000)</td>
<td>60</td>
<td>84</td>
</tr>
<tr>
<td>Use organic fertilizers (yes)</td>
<td>68</td>
<td>77</td>
</tr>
<tr>
<td>Use organic fertilizers in 2000 (yes)</td>
<td>91</td>
<td>82</td>
</tr>
<tr>
<td>Increased organic fertilizer use (2018 vs. 2000) (more)</td>
<td>30</td>
<td>56</td>
</tr>
<tr>
<td>Use herbicide (yes)</td>
<td>24</td>
<td>5</td>
</tr>
<tr>
<td>Use herbicide in 2000 (yes)</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Increased herbicide use (2018 vs. 2000) (more)</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Use pesticides (yes)</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Use pesticides in 2000 (yes)</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Increased pesticide use (2018 vs. 2000)</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Lowland rice where you do not use chemicals (yes)</td>
<td>25</td>
<td>27</td>
</tr>
</tbody>
</table>
with 30%), and receive government subsidies for rice farming (92% compared with 12%). This indicates the importance of government policies on rice farming in northeastern Thailand, whereas government policies are having different kinds of impacts in Savannakhet, as discussed earlier.

3.3 Are northeastern Thailand and Savannakhet destined for the same trajectory?

Particular parallel trajectories can be identified in northeastern Thailand and Savannakhet. For example, in 2000, most of the farmers in Savannakhet were tilling their fields with water buffaloes, while those in northeastern Thailand were mainly using hand-held tractors. Twenty years later, the farmers in Savannakhet have moved from water buffaloes to mainly using hand-held tractors, which their northeastern Thai counterparts previously used. Most farmers in Savannakhet believe that hand-held tractors have more than paid for themselves. Once farmers gained accessibility to the tractors, they have been able to complete ploughing and thus more effectively take advantage of the arrival of monsoon rains by planting earlier in the growing season than in the past (Baird et al., 2021). This increases the likelihood that an early end to the rains would not negatively affect rice yields. In slightly higher elevation areas vulnerable to drought, the crop has more of a chance to grow before the rains end. In lower areas vulnerable to flooding, the rice has time to grow taller before flooding, thus reducing the likelihood of flood damage.

Farmers in northeastern Thailand, however, have mainly switched from using hand-held tractors to large tractors. Similarly, there has been a move from hand harvesting rice, to increasingly adopting mechanical harvesting in Savannakhet, while in northeastern Thailand over half of the farmers are now using combines to harvest and thresh their rice. A long period of economic and political insecurity in Savannakhet, due to anti-Lao PDR government insurgent activities between 1975 and the late 1980s, is an important attributing factor to why technical advancements have occurred more rapidly in northeastern Thailand as compared with Savannakhet. The Thai government also provides much more support in relation to training, subsidies, and marketing, as compared with the Lao government, which has more financial and human resources constraints.

In relation to rice seed varieties, improved seed varieties have become dominant in northeastern Thailand, while high-yielding varieties have become dominant in Savannakhet, Laos. High-yielding hybrids also dominate the Mekong Delta in Vietnam and the Central plains of Thailand.

There is a considerable amount of cross-border learning going on, with Lao farmers typically learning from Thai farmers, something that is facilitated because the people on both sides of the border speak mutually intelligible dialects of Lao. Many on the Lao side also watch Thai television, and have relatives in adjacent parts of Thailand, and some work there. In addition, there is also material cross-border transfer, with many Lao farmers using chemical fertilizers imported from Thailand, and hand-held tractors are also being imported from Thailand. In the past, Lao farmers also imported some rice seeds from Thailand, but nowadays, most high-yielding varieties of rice are sourced from inside Laos.

Should we expect farmers in Savannakhet to follow the same sort of lowland rice farming changes that farmers in northeastern Thailand have already experienced, or are presently experiencing? Can farmers in northeastern Thailand be expected to follow the same trajectory of agrarian change compared with what has been experienced up to now? Our assessment is that it seems likely that lowland rice farmers in Savannakhet will continue to adopt some of the lowland rice-cultivation practices presently being adopted in northeastern Thailand, and farmers in northeastern Thailand can be expected to continue adopting labour-saving measures due to labour shortages and labour cost increases. However, we contend that the influences of markets and government policies are having important impacts on how agrarian change is occurring, such as increased mechanization, somewhat in line with what would be expected based on recent agrarian change literature (see Akram-Lodhi & Kay, 2010b) and deepening capitalist relations and changing consumer preferences.

There are important structural and practical reasons why certain types of agricultural changes are occurring. As already mentioned, labour availability or lack of it is an important factor. While labour exchange between
families in villages was once common for transplanting and harvesting, this is becoming increasingly uncommon, as labour becomes more commodified. A good example of how labour affects farmers relates to the decisions that farmers in Savannakhet are increasingly making, as to whether they should take up broadcasting or continue with hand transplanting. The decreasing availability of family labour and high labour costs are often major factors encouraging farmers to adopt broadcasting (Konchan & Kono, 1996; Kumar & Ladha, 2011). One of the key advantages of broadcasting is that it requires much less manual labour than hand-transplanting, since labour has become scarce in households in northeastern Thailand, and increasingly costly to hire (at least 300 baht/day, approximately US$10). However, a limitation of broadcasting is that it does not eliminate grasses in the way that transplanting does. Therefore, the increased use of herbicides is often directly associated with the shift to broadcasting. Many northeastern Thai farmers are not keen to use herbicides either, but due to labour shortages, they often feel obliged, fearing rice-crop yield declines due to grasses overwhelming the rice. Moreover, most farmers in northeastern Thailand, both larger scale and smaller scale, have considerable debt with the Bank for Agriculture and Agriculture Cooperatives and elsewhere, and this debt puts additional pressure on farmers to reduce costs and maintain high yields. Indeed, for small-scale farmers, debt generally reduces options (Green, 2020). Some farmers have become trapped in the “simple reproduction squeeze” (Bernstein 1981, pp. 11–13) as their costs increase, including due to increased debt, and return on labour subsequently declines, leading to economic hardship.

In Savannakhet, however, farmers are largely still hand transplanting, and most farmers claim that they limit the use of chemical inputs, especially herbicides and insecticides. There are still groups of farmers, often groups of women, who are willing to hire out their labour when they are not farming their own land.

Because farmers in northeastern Thailand have a longer history of chemical-intensive rice farming, they are often somewhat less inclined to stop using those chemicals than farmers in Savannakhet. In addition, farmers in Savannakhet generally have much less debt compared with farmers in Thailand, since the Agriculture Promotion Bank in Laos does not typically give out short-term loans to small-scale farmers for rice cultivation. Crucially, in Savannakhet farmers are partially sticking with hand transplanting because they would rather not use herbicides, due to environmental and health risks (Baird et al., 2021), but market factors are also influencing them in important ways, as explained earlier. In addition, it is crucial that a higher proportion of the farming families in Savannakhet have enough household labour to hand transplant without hiring much or any outside labour. Labour is hired for various reasons, including not having enough household labour, having larger land holdings, and having other sources of income to pay to hire labour.

One of the key findings of this article is that while under particular conditions certain changes in agricultural practices can be expected to mirror changes in nearby regions, the influence of markets and government policies associated with low chemical inputs are becoming increasingly important and are greatly affecting the trajectory of change, especially in Savannakhet. Indeed, we contend that they are having a considerable and increasing influence on farmer decisions, in potentially both negative and positive ways. While it is well-known that market factors often affect land-use practices and agrarian change (Friedmann, 1987; Ruaysoongnern & Suphanchaimart, 2001; Watts, 2009; Weis, 2007), the specific role of organic markets on small-scale lowland rice cultivation and associated social relations in mainland Southeast Asia deserves more attention. In addition, market changes almost never occur in a political vacuum, and that government policies and particular political alliances that affect markets are crucial for understanding how agricultural change and associated capitalist relations are changing.

4 | CONCLUSION

Lowland rice farming in northeastern Thailand and Savannakhet Province has experienced many but differing changes over the last couple of decades. While a certain degree of path-dependency can be expected, with farmers in southern Laos making some of the same sorts of changes that farmers in northeastern Thailand made many years
ago, this study indicates that we should be cautious about predicting linear agrarian change, or that deepening capitalist relations will always lead to greater chemical dependent agriculture. While this finding is not new, what is interesting here is the specific pathways that are emerging in northeastern Thailand and Savannakhet, and how they are being affected by labour and remittances, and particularly markets and associated government policies, which are intertwined in particular ways.

This article has been particularly focused on the different ways that "clean" and organic rice is being developed in northeastern Thailand and Savannakhet. However, in both cases, deepening capitalist relations are impacting the ways that agrarian change is occurring. In northeastern Thailand, only a small percentage of farmers are receiving support to go organic, but this support has potentially important implications, not only because of the subsidies that farmers are receiving to convert to growing organic rice, but also by legitimizing and mainstreaming organic rice cultivation. There has been some localized efforts, including those promoted by NGOs, to certify and market organic rice, but these efforts have not affected the vast majority of farmers. However, government support for going organic has much more of a potential to influence mainstream rice cultivation practices amongst a much larger number of farmers. Moreover, government support for organic rice cultivation is being heavily influenced by export markets, which are increasingly demanding organic rice. For low-lying areas, some broadcasting without using herbicides is possible, through using weed-eaters to cut down young rice and grasses and then releasing water into the fields, but this method is not effective in drier areas without irrigation (Baird et al., 2021), thus indicating the importance of environmental factors in mitigating certain market influences in relation to rice cultivation practices.

In Savannakhet, IDP's promotion of "clean" rice is having an even greater impact on agricultural practices than in northeastern Thailand, since the IDP mills support extension and monitoring to ensure that standards are maintained, IDP dominates rice milling and marketing in the province, and that those using more chemicals than allowed are penalized. In particular, IDP's policies and practices, which are supported by the Lao government and the market, are greatly influencing farmers, and causing them to not switch from hand transplanting to broadcasting, despite some labour constraints, as broadcasting without using herbicides typically results in dramatic declines in yields. Therefore, market demand is acting as a strong incentive for continuing with hand-transplanting, at least for the time-being. Elsewhere, Roesch et al. (2009) have found that rice mills have been able to gain considerable control over small-holder farming practices, something that is also beginning to happen in Savannakhet, and deserves much more attention moving forward.

These circumstances partially resonate with Guthman's (2004) argument about the structures of organic agriculture in California and relate to "clean" rice in Laos taking on similar forms to more conventional large-scale food commodity chains, although without pushing small-scale farmers out of the industry (see Pratt, 2009). However, a key difference is that rice farming land in both northeastern Thailand and Savannakhet has not experienced much commercialization, since most land in both locations is inherited by farmers, or is cultivated by relatives, with some of the harvest being given to the land owners as compensation for being able to cultivate their land.

Thus, while we can expect farmers in Savannakhet to follow some of the innovations and changes already adopted in northeastern Thailand, having more agricultural household labour in Savannakhet compared with farming households in northeastern Thailand is affecting the trajectory of agricultural practices. In addition, the market and Thai government policies are influencing agricultural practices in northeastern Thailand, albeit through different mechanisms than in Laos, especially government subsidies and other promotional efforts, combined with the increased interest of farmers in reducing chemical use combined with new knowledge of how to use weed-eaters instead of herbicides. Finally, remittances sent from elsewhere are affecting agricultural practices in northeastern Thailand but especially in Savannakhet. All these factors are undoubtedly part of the reason why there is much less herbicide use in Savannakhet and northeastern Thailand compared with neighbouring Cambodia (24% of farmers in northeastern Thailand and 5% in Savannakhet as opposed to 92% in Battambang Province, northwestern Cambodia), where markets and government policies are not influencing the switch to organic rice in the same ways as in Thailand or Laos.
For now, the farmers in Savannakhet mainly have the labour to continue hand transplanting, but if there is less labour in the future, will farmers still be able to continue growing clean rice? Indeed, an exodus of peasant farm workers from northeastern Thailand to work in other jobs has already been occurring for decades (Funahashi, 1996; Isvilanonda & Hussein, 1998), with important implications for agrarian change (Rigg et al., 2018). Moreover, how will the market and government policies, along with farmer perceptions, impact future farming practices in northeastern Thailand? While we cannot predict the exact trajectory moving forward, past environmental degradation due to the overuse of agricultural chemicals in parts of northeastern Thailand can be expected to encourage farmers to make changes, especially since the government is directly subsidizing small-scale farmers to transition to organic farming.

What we can assert is that rapid agrarian change is occurring and that capitalist relations are deepening. However, as we have demonstrated here, the movement to organic or “clean” rice is resulting in somewhat surprising changes, and while some, such as the loss of local seeds and associated agrodiversity, are quite concerning, others related to limiting or stopping the use of herbicides and insecticides are environmentally and socially beneficial. Thus, international markets can have negative, positive or in this case, mixed results.

ACKNOWLEDGEMENTS
This research was funded by the NASA Land Cover and Land Use Program, grant number 80NSSC18K0287. The authors would like to thank all participating rice farmers and government officials for their cooperation and support. The authors also would like to thank to students from Ubon Ratchathani University and Savannakhet University. Anna Kato, from the East West Center in Honolulu, Hawai’i, helped produce Figure 1, and Christopher Archuleta from the Cartography Lab at the Department of Geography, University of Wisconsin-Madison, helped produce Figure 2. Thanks to W. Nathan Green for comments on an earlier draft and to the Associate Editor and two anonymous reviewers for providing useful comments on earlier versions of this article.

DATA AVAILABILITY STATEMENT
Please contact the authors in relation to data collected for this research project.

ORCID
Ian G. Baird https://orcid.org/0000-0001-7747-2485

REFERENCES


Office of Agricultural Economics. (2020). Bright future of three years of organic rice production and good price [Song Serm Kan Palid Khao Inchee 3 Pee Nea Nom Sod Sai Raka Dee],[In Thai]. https://www.kaset1009.com/th/articles/186862-%E0%B8%A


