# The Complexity of a Supply Chain:

## Political ecology of corn production in Nan province, Thailand

Thitirat Kittiwiwat

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Department of Sociology

University of Essex

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## Abstract

The study of environmental degradation and corn production in Nan province, Thailand cannot be explained merely by the farmer's activities without taking into consideration the complex interaction among humans, society, and nature. This thesis has argued that social and nature cannot be separated when considering environmental issues. As far as this study case is concerned, the social-political context, including the growth of agricultural capitalism, has to be taken into account as a major factor of environmental degradation. This study has used the sociogenesis of natural resource management and capitalocene approaches in order to clarify this complex matter by examining the historical context in the mid19$^{th}$ century of the establishment of state bureaucracy, such as land and forest administrations, to control natural resources in Thailand.

This research aims to understand the political ecology of corn production in Nan province by unravelling the complex stratification of the food supply chain, which is considered to be an exploitation of human labour and the environment. Qualitative research is applied to analyse the relationship among different actors within corn production and the supply chain by using obtrusive methods such as interviews and participatory observation and unobtrusive methods such as observation and documentary analysis of public reports, including office documents published by state agencies and private companies. This study has tried to identify the actors in the supply chain and conducted semi-structured interviews with 47 interviewees: from corn farmers to agro-business and chicken farm owners, including government officers. Thus, the corn supply chain investigated in this research presents the voice of farmers and other related actors. This information echos the inequality among those parties which has resulted from the centralisation of state power over natural resource management. This is a significant obstacle to sustainable development. The environmental crisis in Nan is a major part of the complex relationship among those actors in the supply chain.

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**List of Acronyms**

| | |
|---|---|
| ALRO | Agricultural Land Reform Office |
| ADB | Asian Development Bank |
| ARD | Accelerated Rural Development |
| BAAC | Bank for Agriculture and Agricultural Cooperatives |
| BOI | Board of Investment |
| BIOTHAI | Biodiversity and Food Sovereignty Action Thailand |
| CCGC | Commodity Chains and Global Capitalism |
| CME | Chicago Merchandise Exchange |
| CP | Charoen Pokphand |
| CPF | Charoen Pokphand Foods Public Company |
| CPT | Communist Party of Thailand |
| CSR | Corporate Social Responsibility |
| DNP | Department of National Parks, Wildlife and Plant Conservation |
| EGAT | Electricity Generating Authority of Thailand |
| FR | Food Regimes approach |
| FTA | Free Trade Area |
| GATT | General Agreement on Tariffs and Trade |
| GCC | Global Commodity Chain |
| GDP | Gross Domestic Product |
| GM | Genetically Modified |
| IBRD | International Bank for Reconstruction and Development |
| ISO | International Organisation for Standardisation |
| MOAC | Ministry of Agriculture and Cooperatives |
| MFLF | Mutual Fund Liquidity Facility |

| | |
|---|---|
| NAFTA | North American Free Trade Agreement |
| NCPO | National Council for Peace and Order |
| NESDB | National Economic and Social Development Board |
| NTC | National Land Policy Council |
| OECF | Overseas Economic Cooperation Fund of Japan (), and the |
| PNCSRC | Public National Corn and Sorghum Research Centre |
| USAID | United States Agency for International Development |
| RFD | Royal Forestry Department |
| RID | Royal Irrigation Development Ministry of Agriculture on Cooperative |
| SEA | South East Asia |
| SEATO | Southeast Asia Treaty Organization |
| TBPEA | Thai Broiler Processing Exporters Association |
| TFMA | The Thai Feed Mill Association |
| WB | World Bank |
| WTO | World Trade Organization |

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# Chapter 1 - Introduction



**The objective of the chapter:**

This introduction chapter aims to present the background of the dissertation and the importance of research for agriculture and the environmental crisis in Thailand, especially corn farming in the north of Thailand. To describe the difference in corn production in other countries and Thailand. To discuss the theoretical framework and make the dissertation clear by presenting the structure of the thesis.

**1.1 Background:**

In 2011 Thailand had a devastating flood that brought about public concerns about climate change and environmental degradation. This was the first time that corn farms in Nan Province was present in the mass media as if the farms were a causal part of this disaster. Hence, this is the beginning of this dissertation, which aims to explore the complexity of corn production and environmental degradation in Nan from a sociological point of view.

The flood was the worst in Thailand since 1942. Although many Southeast Asian countries saw exceptionally severe rains during the 2011 monsoon season, Thailand was the hardest hit, with major portions of the Thai capital, Bangkok, submerged. The floods in Thailand began in northern Thailand in July and August 2011. The central plains of Thailand were among the first locations to be flooded in August and September, inundating 9.1% of the country's total land area and affecting over 13 million people, resulting in 680 deaths and causing total damage and loss of USD 46.5 billion. Damaged areas were found in 69 provinces across the country (World Bank, 2012; Poaponsakorw and Meethom, 2013).

After the flood, the issue of disaster and deforestation began to be of interest to Thai society in all sectors, including the government, academics, industry, and the media. From the 24th to the 26th of June, 2011, Tropical Storm Haima[1] (HAIMA 1104) moved into Nan Province and causing heavy to very heavy rain and resulting in flash floods and landslides in the north area, including six provinces: Phrae, Chiang Rai, Phayao, Nan, Tak, Sukhothai. (Climatological Center, 2511).

Pictures of corn farms among dry mountains in Nan province were presented in the mass media and linked to the issue of highland agriculture as part of the causes of the big flood. In the summer of 2013, the second time that I went to Nan was different from the first in 2007.

[1] Haima is the name of a storm originating from the People's Republic of China, meaning seahorse (Climatological Center, 2511).

The view of cornfields in many areas of the province confirmed what the media had presented, with areas now being mostly cultivated and covered with corn and noticeably increased. The increase in corn production occurred alongside chicken production, which had been increasing as well (Office of Agricultural Economics, 2013; Office of Agricultural Economics 2014; Office of Agricultural Economics,2015; Research Kungsri, 2021).

In addition, the issue of corn farming in Nan is interesting because most of the area is forest belonging to the state. Approximately 85% of the area is classified as conservation forests and 17% as national forest reserves, represented by watershed forest areas. While corn farming is scattered all over the area, Nan has the highest corn production in the north and second in the country. Although the right of land ownership is a major issue for the farmer, at least two generations of corn farmers are allowed to work on state land with no land ownership certificate.

With regard to the situation above, the present dissertation critically analyses the connections between corn production and the supply chain in relation to the environmental problems of contemporary Thailand. These implications have been related to agricultural development, which has been discussed as a major cause of environmental problems linked to climate change (Crutzen and Stoermer, 2000; Tilman et al., 2011, Foley et al., 2011; Tilman et al., 2002). The dissertation considers the situation by applying the perspective of the sociology of development, political economy, and political ecology by considering the agricultural growth and the environmental issues related to political development and state power. For example, the case of corn farming in Thailand needs to consider the historical development of the country. Furthermore, the environmental problems discussed are part of the national resource management of the country and the access to resources that have been controlled by the state (Vandergeest and Peluso, 1995). Hence, the study concerns other conditions of actors—capital and the state, which are key actors in relation to environmental issues (O'Connor, 1997).

Moreover, the case study of corn farming in Thailand reflects the power of the Thai state, which has a monopoly on natural resource management. These are linked to environmental problems and inequality in the corn supply chain.

In order to understand corn farming and the environmental problems in Thailand, the dissertation investigates the debate about the causes of environmental degradation and climate change by referring to the name of the geologic time scale in which humans have had an enormous impact on the environment. This geologic time is called the Anthropocene to refer to the epoch in which human activity has significantly affected climate change (Crutzen and Stoermer, 2000; Tilman et al., 2011; Foley et al., 2011; Tilman et al., 2002). The main cause of climate change has been human activities, especially agriculture, where forests have been cleared and turned into agricultural land treated with chemical fertilisers and releasing air pollution and greenhouse gases, contributing to the climate change crisis. Moore (2016) argues for an alternative term, capitalocene, which regards environmental crises as caused by the exploitation of capitalism. Although human activities are the causes of environmental degradation, the capitalist production process is the major condition that exploits nature. The dissertation supports the proposal of Moore as well as pays attention to the state's role and other actors in the supply chain. In terms of studying Thailand's corn production, the dissertation also applies the concept of sociogenesis in order to investigate Thailand's social and political context, which involves complicated issues. Harvey (2016) examines the historical context in different countries as part of the causes of climate change, which are different in various countries. Societies that have created crises have to be politically involved in addressing the crises. Foley et al., (2011) also point out the impact of human activities in general and Moore (2016) also mentions capitalism as a causes of the problem; both focus on a wide view and structural approach that are useful for framing further analysis. Although this dissertation focuses on corn production in a small province for analysing the complicated environmental

problems in developing countries like Thailand, corn production has to be understood as part of wider consumption systems and Thailand is one of the countries to supply chickens for consumption in other countries. Hence, corn production and environmental degradation issues need to be linked to the supply chain concept. In order to analyse the complexity of the environmental degradation and the growth of the agriculture section in a developing country, needs more than one concept.

**The meaning of corn in different areas**

There have been some studies of corn or maize in different countries and different areas of study that have explained the meaning of the history, culture, and increase of corn production as related to urbanization and changes in consumption (Pollan, 2006). This dissertation found that corn has a significant function in society and politics and that the expansion of corn farming and the environmental impact that it has are not different from other countries in which corn is the major crop (Ackerman et al., 2003; Nadal and Wise, 2004). This section discusses and makes comparisons about corn production and environmental impacts between Thailand and other countries where corn has a significant role in the economy and culture. During the 1990s one explanation of agricultural production was based on the food regime concept, which can be applied to the analysis of the food system. This concept was developed in order to explain the strategic importance of agriculture and food in the expansion of the global capitalist economy (McMichael, 2009). Although the concept is useful for presenting the notion of exploitation at the macro level as global and play an important on external power, this study argues that internal factors such as the state and agribusiness are also important in terms of constituting the relevant operating organisations and creating regulations for the food system and supply chain.

Due to the fact that corn is a raw material that can supply other manufacturing sectors, especially food and meat products, this study about corn production has been linked to meat consumption and the trans-nationalisation of food regimes. Since the colonial and Cold War

periods (1945-1989) ‘food regimes’ have been a result of the growth of agriculture and the processing of agricultural products and trans-nationalisation (McMichale, 2013). As Pollan (2006) has observed, the growth of fast food in food chains represents a key part of such a food regime and these chains began with the significant increase in corn production, supplying the United States and Latin America, two global regions which use corn as a raw material for feeding cattle for meat in the fast-food industry (Pollan, 2006). Corn agribusinesses have been transformed into transnational enterprises, which concentrate on managing labour and land use (Goodman and Watts, 1997). These are crucial points of the food regime, which are open to transnational enterprises to use and take benefit from in the form of labour, land, and the national resources of source countries. Although the food regimes (FR) approach can play an important role in the analysis of the state in the global politics of food (Prichard et al., 2016), it has received less attention at the local level, which serves as the unit of production. The increasing demand for corn as raw material affects expansion and intensive farming. Elsewhere, the farming process of corn has led to environmental degradation in Mexico and the United States (Ackerman et al., 2003; Nadal and Wise, 2004) and the same occurs with Thailand's corn farming—but the solution is different. Nadal and Wise (2004) pointed out that the environmental issues in Mexico and the United States have been influenced by the North American Free Trade Agreement (NAFTA). These studies pay attention to the following effects of trade on the environment. The United States increased corn exports to Mexico due to trade liberalisation which affects environmental impacts. These impacts are considerable and include high chemical use, water pollution due to runoffs, unsustainable use of water for irrigation, the expansion of genetically modified corn, soil erosion, and loss of biodiversity (Ackerman et al., 2003; Nadal and Wise, 2004; Walters, 2010). Moreover, in the case of Mexico, NAFTA influenced a fundamental agricultural restructuring with wide-ranging social, economic and environmental consequences. The restructuring of the corn sector had contributed to the trend

of accelerating soil erosion through both specialisation and monoculture, coupled with the increased use of fertilisers (as observed in cases of more competitive producers) and more intensive use of soil, including the extension of the agricultural frontier into marginal land by traditional producers. Thus, corn producers in Mexico have had a direct and significant impact on the natural resource base, especially in terms of soil conservation, aquifer use and chemical inputs (Nadal, 2000). In the case of Mexico and the U.S. it is clear that intensive corn farming, which falls within the agreements of international trade organisations such as NAFTA, has been affected by environmental problems and corn diversity (Nadal and Wise, 2004).

The social contexts of corn in other countries are different, including Thailand, and therefore considering corn in different social and political contexts is important. The history of corn in each country is related to the changes in society and culture. The meaning and practices of corn are not only that it is a crop that feeds society in modern life and causes environmental problems. In Mexico and the U.S., corn is used for animal consumption and in the industrial sector, while in Thailand corn is a more recently cultivated crop that has been supported by the state and promoted as a cash crop since 1960, mostly used for animal feed, especially for chickens. Thus, Thailand has given priority to corn and at the same time supported chicken production. Hence, the meaning of the corn supply chain in this dissertation must include the related growth of the chicken industry. In Thailand corn is not a native or indigenous crop as it is in Mexico and the U.S.; most corn in Thailand is sent to chicken farms, which is a source of high protein for the food chain. Significantly, it can be said that corn farming and related specialist farming knowledge are a legacy of the Cold War and a policy aimed at poverty alleviation in the rural areas. James C. Scott's study *The Art of Not Being Governed* (2009) mentions that in Southeast Asia, hill dwellers (who are targeted by the state as a minority group that are a threat to the security of the state) adapted by taking advantage of new crops such as sweet potatoes and corn, which came from the Americas, if these made it easier to avoid the

clutches of the state (Scott, 2009). Accepting the new crop was thus a strategy to keep their independence while making it more difficult for the state to exert control over them. In the beginning, corn farms were developed under the political conditions of the region and the issues of social and economic development. The corn seed introduced into Thailand was developed in a cooperative project involving the Rockefeller Foundation and USAID, and led to the foundation and establishment of the headquarters of the Inter-Asian Corn Program in 1966, which has been successful in researching, breeding and developing new seeds under state policy (Sriwatanapongse et al., 1993). The corn initiative was developed during the Cold War period as an alternative crop because the Thai state aimed to increase income for the people and the minorities that lived in rural areas where state security was at risk, e.g. from the external threat of communism. This interesting point—that corn farming in Southeast Asia and Thailand has been influenced by the United States for political and economic reasons—is discussed in Chapter 2.

However, the fundamental issue of corn farming and capitalism is the expansion of a monoculture that has transformed agricultural practice at the smallholder level around the world. The new agribusiness sector has a significant role in this and also has supported and played an important role in corn production and in the supply chain since the 1970s. Since then, Thailand's corn production policy has been controlled by the state, which focuses on economic growth.

Although Mexico, the U.S. and Thailand have different social contexts with regard to the history of the development of corn production, they face the same problems, such as environmental degradation, soil conservation, aquifer use and chemical inputs. Moreover, deforestation and air pollution are also serious problems in Thailand. Despite this, studies of corn farming in Thailand and neighbouring countries mostly focus on supply chains and the relationship between farmers and middlemen (La-orngplew, 2012; Chiangtong, 2013;

Achavanuntak, 2014; Wood, 2015; Panyagaew et al., 2016), while environmental issues have received less attention, especially from sociologists in Thailand.

Corn growing in other countries presents different social histories and backgrounds. It is useful to consider corn cultivation practices in other countries in order to position the situation of corn in Thailand, although intensive corn farming creates environmental degradation in the same way. Blake's Maize for Gods (2015) points out that central Mexico is the origin of teosinte and the first domesticated corn. This book provides an archaeological understanding of the development of corn and the advancement of scientific research, as well as remarkable insights into the relationship between humans and plants. Warman (2003) discusses the history of corn in America and the way that it was used to feed people in Africa before they became slaves so that they could be taken as slaves. Corn then journeyed to Europe, China and the rest of the world. In England, corn was introduced after World War II as a lowly grain fed only to livestock. However, besides the corn used in the livestock and chicken industry, there is another crop—soybean—which supplies the food industry and is linked to environmental problems such as deforestation in the developing world. The export of soybean from less to more developed nations is a specific form of ecologically unequal exchange which has increased forest degradation in the less developed nations (Austin, 2010). Therefore, the environmental degradation that results from increasing international soybean exports must be seen as a form of dependency. Both agricultural products (corn and soybean) are part of international trade and both world-systems theory and dependency theory have been used to understand the association between soybean exports and deforestation in less developed nations on a macro level (Austin, 2010). Ideally, it is necessary to consider both corn and soybean consumption and production in order to assess global patterns of deforestation. While Austin (2010) analyses deforestation in less developed countries caused by the exportation of soybean to more developed countries, corn production in Thailand is complex, as it is also part of poultry production and exports to

Japan, the US, China, and European countries, which are the major markets for chicken from Thailand. In 2020, Thailand's chicken exports grew by 10% compared to the previous year (Bangkok Post, 2020). Therefore, it is necessary to focus on a critical analysis of the connections between corn and chicken production related to domestic chicken consumption and exports because these are the most important factors in causing environmental problems. Studies about corn or soybean need to analyse and present the system of exploitation within and between countries at the macro level in terms of the international supply chain by using the concept of the food regime or dependency, which are very important; but it is also necessary to consider the main actors within a country and their interaction in the supply chain, which reflects the exploitation process involving both humans and nonhumans.

In addition, in the case of Thailand, the state has shaped demand and promoted daily consumption of chicken and eggs since 1939 by linking this to nation building and the construction of citizenship. In the past, Thai people focused on rice as a staple food, while other protein food was less consumed, which affected nutrition. The state leaders propagated the idea that a healthy and strong people are fundamental for developing the country, and the military state at that time therefore promoted protein consumption from World War II onward, with later corn and chicken being given specific importance during the Cold War. The U.S. has had a good relationship with the Thai state and played a significant role in Southeast Asia during the Cold War periods and this influenced a developmental policy related to the promotion of corn production (Kawinvaweekun, 2002). Corn was first planted around 1950 and used only for household animal feed, but since 1961, when Thailand launched the first National Economic and Social Plan, corn has become a cash crop alongside cassava and sugarcane (Ekasingh et al., 2004). In addition, corn is increasingly in demand as a component of animal feed due to growing chicken consumption in Thailand and other countries. Thus, the government has promoted corn as a cash crop in order to raise household income and support the chicken industry. The growth

of corn and chicken production in Thailand has been part of the success of the agribusiness sector, which has been supported by the state for more than fifty years (since 1961). The intensive planting of corn for feed has often involved transnational corporations that have conducted experimental research on seed development and introduced contract farming to farmers with the cooperation of the state (Napasintuwong, 2015). Despite its fast cash turnover, there have been great concerns about the effects that intensive farming has upon the environment, e.g., deforestation and air pollution from land clearing and burning, the degeneration of soil from intensive use of fertilisers and herbicides, and the deteriorating health of farmers caused by the use of chemicals, as noted since 2011.

This dissertation investigates corn farming and environmental issues in Thailand, which is a different social context from Mexico and America, the largest corn producers and exporters in the world. Corn production in Mexico and the U.S. has been connected to the culture of consuming corn as food, as well as the use of corn in other industries (Nadal and Wise, 2004). Basically, corn is not a staple food in Thailand, unlike Mexico and other countries in South and Central America. In Thailand and other Southeast Asian countries, rice is a staple food while corn is an economic crop that has become more important since 1960. Most corn production in Thailand is produced for animal feed, which is directly related to increasing household incomes, but the most important aim for the agribusiness and the state is to support the chicken industry rather than household consumption.

The dissertation places importance on the hierarchy and social inequality in the corn supply chain as exemplified by state support and agribusiness regulations. The study reveals the interaction between the social structure (referring to the policy and political-economic approach) and actors connected to corn and chicken production, including farmers and entrepreneurs, with regard to environmental issues. Thus, the dissertation discusses five important issues that differ from previous studies:

(1) Previous studies (Warman, 2003; Blake, 2015) have paid attention to the history, origin, and expansion of corn. This dissertation investigates the history of natural resource management and corn production and the supply chain in Thailand. These are the fundamental causes of deforestation and other environmental issues in Thailand.

(2) Although it is important to discuss the structure of corn production with regard to state policy, it is also necessary to pay attention to the level of household production and the interaction between the actors in local villages.

(3) Corn production has been growing in Thailand due to its use in animal industries, particularly chicken. Therefore, while previous studies have had other foci, this dissertation links corn production to the growth of the chicken production and export industry; the growth of the chicken industry affects the increasing demand for corn. It also links the environmental degradation in Nan to international consumption.

(4) Previous studies have investigated corn production under the conditions of international trade organisations, while in the case of Thailand the state and agribusiness play a very important role in corn production and environmental rehabilitation policies.

(5) In Thailand, corn production and environmental issues have been paid less attention by sociology. At present, corn farming has expanded from Thailand into neighbouring countries such as Laos and Burma and has caused land grabbing and environmental problems (Woods, 2015; Chiangtong, 2013).

Thus, the dissertation focuses on the five issues above in order to fill the gaps in the sociology of agriculture and environmental issues in Thailand and Southeast Asia by discussing the question of the complexity in the supply chain in agricultural products and environmental degradation.

## 1.2 Theoretical framework

In order to analyse the case study of corn farming and its supply chain, which are linked to the environmental problems in Nan province, the dissertation develops a set of the concepts in three dimensions.

(1) The macro view considers the causes of the environmental problems based on a discussion among scholars from the natural and social sciences. They propose two different concepts: the anthropocene and capitalocene. This applies to the analysis of the issue of agricultural activities and its effect on the environment. (2) This dimension analyses the case study as informed by the concept of sociogenesis and an eco-Marxist perspective—the section is important for the analysis of the problems in Nan. Both concepts help to understand the problems at the state level as well as the interactions among the actors in corn farming. (3) The supply chain is considered in terms of the concept of Commodity Chains and Global Capitalism (CCGC), which is employed with regard to the whole corn supply chain in order to explore the accumulation of capital, which is the major cause of the environmental crisis in Thailand. Although the concept of CCGC highlights trade and economic views, it was developed from dependency theory. Therefore, the dissertation uses the CCGC concept in order to reveal the multilayered exploitation in different sectors of the corn supply chain, including human labour and natural resources. This exploitation is related to the concepts of Eco-Marxism and capitalocene. The dissertation argues that the environmental problems related to the corn farms in Nan Province in Thailand are part of political economy and world trade, and it is necessary to connect the local issues in the villages to chicken consumption and exportation in order to understand this. A single perspective or approach is not sufficient.

### 1.2.1 Anthropocene or capitalocene: the causes of environmental crisis

In order to analyse these complicated issues and to understand the causes of the environmental problems, the dissertation was developed from the debate between the macro approach of two

groups of scholars. The first group explains that the causes of environmental degradation and climate change comes from human activities. The concept of Anthropocene refers to the era in which humans have faced serious environmental problems, which have followed from human activities since the industrial revolution, followed by improving the agricultural system by use of agricultural machinery and the use of fertilizers with intensive chemicals in order to increase production (Tilman et al., 2011; Foley et al., 2011). Jason W. Moore on the other hand has developed from an eco-Marxist position the capitaltalocene concept in order to argue that the crisis that humans face today needs to be understood more in terms of the driver of capitalism, which is co-produced by humans and the rest of nature (Moore, 2016). Moore (2017) highlights that the world ecological crisis was caused by historical turning points such as the agricultural revolution, which enclosed the process that transferred land to be merchandise, and the philosophical revolution, in the dualism of Cartesianism. It is the fundamental idealism that categories of nature and society could be described as a society without nature and nature without humans and develop to anthropocentrism approach. These conditions lead to the utilization of natural resources as a cheap product to increase profits. Hence, the proposal of the concept challenges the Anthropocene approach, which has been a powerful and influential concept in environmental studies over the last ten years. The dissertation supports the proposal of Moore by considering the social and political context in Thailand.

Both words, anthropocene and capitalocene, are informal names for the geological time scales that scholars have used to describe the current epoch in which humans have been facing environmental degradation. Anthropocene is proposed by scientists (Crutzen and Eugene Stoermer in 2000) as an epoch in which humans face environmental crises caused by human activities. Although agriculture has had a global environmental impact since antiquity, the major turning point was the industrial revolution. The change has significantly affected improvements in the agricultural system through machinery and intensive chemical fertilisers

that increase production. At the same time, modern agriculture, agricultural expansion and intensification are also causes of climate change (Crutzen and Stoermer, 2000). In the modern world, some environmental problems have been caused by agricultural activities such as land clearing, which have resulted in around one quarter of global greenhouse gas emissions, while crop production and fertilisation harm marine and freshwater ecosystems; thus, the fragmentation of habitats can threaten biodiversity (Tilman, 2002; Tilman et al., 2011). A study by Foley and colleagues (2011) also highlights the fact that agriculture is a major factor pushing the environment beyond the planet's limits. Contemporary agriculture is confronted with the huge challenges of agricultural practice itself, which is behind many environmental threats, including climate change, biodiversity loss, and degradation of land and freshwater. Moreover, this study highlights the issues of global crop use and allocation: only 62% of crop production is used as human food, while around 35% is for animal feed (indirectly producing human food in the form of meat and dairy products) and 3% is for bioenergy, including seed and other industrial products (Foley et al., 2011). Furthermore, during this time of concern about environmental sustainability there are three challenges for feeding a growing world in which land and other resources are being sacrificed for animal-based agriculture: finding around 350 million hectares of cropland for animal feed, 3.38 billion hectares for pasture, and 3.73 billion hectares for raising animals. Foley et al. (2011) also mention that in the future the world's supply of meat and dairy products will be in high demand, while pastureland is inadequate for the production of other food. However, mixed crop-livestock systems can add calories and protein to the world. This could be created by improving economic conditions and food security in many regions. A study of Foley et al. shows that agricultural greenhouse gas emissions are at around 30-35% of global greenhouse gas emissions, largely from tropical deforestation, methane emissions from livestock and rice cultivation, and nitrous oxide emissions from fertilisers (Foley et al., 2011). Although environmental degradation began in the past, since the

twentieth century the rate of change has been faster than it was 200 years ago. This is due to the development of technology to produce and transport agricultural products, as well as agricultural and food industries in response to the growth of cities, populations, and their consumption. Although the agricultural production process comes from human activities, the mechanisms of production control are based on state regulations and the maximisation of profit for capital. Hence, if one focuses only on human activity, the production process that exploits human labour and natural resources is therefore neglected and made invisible. This study argues that the major cause of environmental degradation in the agricultural sector is the production mechanisms that pay attention to reducing costs and making high profits as well as excessive consumption. Therefore, analysing the conditions of production and the interaction among actors is important for understanding the problems of the corn supply chain and the environmental degradation in Thailand.

Hartley (2016) mentions the limitations of the Anthropocene concept as being apolitical and narrowly technological, and as a consequence of only focusing on the modern period, as it ignores the complex historical processes that are a major part of the capitalist world ecology (Hartley, 2016). In addition, Moore (2016:2) critiques using the Anthropocene concept by asking fundamental questions such as: How do humans fit within the web of life? How have various human organisations and processes—state and empires, world markets, urbanisation and much beyond—reshaped planetary life? These challenges and questions are linked to the condition of food production and the organizations that organise this around the world. It is important to link the corn supply chain, which is the case study, to questions about the relationship among the corn production process, regulations, the main organisations involved, and the power of management. In addition, Moore (2016) addresses the fact that dualism is part of the problem, especially the categories of ‘nature’ and ‘society’, as shown in the concept of the Anthropocene, which can be described as a society without nature and nature without

humans, including the binaries of intellectual/political or capitalism/nature. All of these binaries seem to be a root of the environmental crisis in modern times. Similarly, he has suggested the word *oikeios* and stated that previous vocabulary/concepts have been influenced by dualism. What is needed is to offer new words and to 'crack' this dualism. O*ikeios* refers to 'reative, generative and multi-layer relations of species and environment' or the relationship of life-making that contributes to the rise of multiple ecosystems, that meant human belongs to them (Moore, 2016, p.287).

This dissertation supports the argument that the binary views related to resource management are the major cause of the problem, but, as the social and political contexts also need to be considered, the concept of the capitalocene needs to be proven by case studies. The capitalocene approach used in this dissertation places importance on history and a spatially specific case study of the corn supply chain and chicken production that relates to the environmental problems in Nan, Thailand.

### 1.2.2 The sociogenesis of environmental degradation in Thailand

The dissertation prefers to analyse the environmental problems in Nan through the use of the concept of the capitalocene, which was developed from Eco-Marxism. The interaction of local actors needs to be considered, as actors under the structure (referring to the people that have been controlled by market forces and state policies) are accused of causing environmental degradation in Nan Province, while the state, capital and social movements are seen as actively trying to solve the problem.

In order to provide a clear understanding of the sociogenesis of environmental degradation (such as deforestation, air pollution, and soil degradation in Thailand, which are part of the political economy of the corn supply chain and chicken production), the sociogenesis concept will be used to explain the complicated social structure linked to the political economy of changing land use, state policy regarding corn production and trade, changes in domestic

consumption patterns, and the role of the state in environmental issues. The concept of sociogenesis refers to change and is used to explain change within a particular society, community, or social unit. It is used to understand climate change, food consumption, and food production with regard to the social context linked to the issue of the political economy. This concept highlights the interaction among the political economy, environment and climate in different areas of food production related to the different trajectories of climate change (Harvey, 2016).

In addition, chapters 4,5, and 6 of the dissertation use Eco-Marxism to explain the interaction among different actors at different levels. Connor (1997) explains that intense competition in a capitalist world drives environmental destruction and extensive social community. Both nature and human labor are heavily exploited, both locally and globally.

Basically, Eco-Marxist theory has focused on the conditions and relationships of capitalist production, or 'capitalist relations and the forces of social reproduction', arguing that there can be a transition from economic crisis to socialism. According to Marx, three kinds of production conditions can be defined. The first, the external physical conditions, can be considered in terms of the viability of ecosystems, including the sufficiency of the atmospheric ozone, the consistency of watersheds and coastlines, and soil, air and water quality. The second condition is the physical and mental well-being of workers, and the last is a 'communal condition' that refers to social capital infrastructure (O'Connor, 1997).

However, from the conditions above, the agricultural sector can be considered one of the sectors that uses a huge amount of natural resources (forest, water and soil) over a long period of time (Ruddiman et al., 2015), and it cannot be neglected as a driver of capitalism because it is a catalyst for the environmental degradation of this modern era (Johl, 2006). O'Connor (1997) points out that there is a theoretical lacuna that needs to be considered and suggests adding the main actors—capital, the state, and social movements—to these

conditions. The role of the capitalist state in the conditions of production is also emphasized, although three main transitions are seen to affect environmental governance in globalisation; the development of supranational environmental institutions, increased use of market-based regulatory instruments, and the rise of global civil society involvement (Sonnenfeld and Mil, 2002). However, in the case study, the state is seen to play an important role in the regulation of the conditions of production, for instance, access to land, raw materials, labour and other markets for fictitious commodities. This theory is used to understand the interaction among the main actors in the case of the corn supply chain.

### 1.2.3 Why the concept of the food supply chain is used in this thesis

In recent years, there has been a surge in food-related research in the social sciences (Jackson et al., 2005). Agro-food studies have drawn upon different disciplinary and sub-disciplinary traditions; for example, geographers and sociologists have worked on the critical political economy of Europe, North America and other countries, and rural sociology has been paying attention to food production (Goodman, 2002; Lockie, 2002). There has been increasing interest in alternative food initiatives and localising food systems in Europe and North America (Allen et al., 2003; Renting et al., 2003; Winter, 2003). While in Thailand the study of agro-food and consumption have been less interesting for sociologists, agrarian issues, the food supply chain, and consumption have been of interest to other disciplines such as economics, agricultural economics, and social development (Surathamchanya,2001; Taloengsri and Pongkitworasin, 2012; Achvanuntakulet al, 2013; Chiengthong, 2013; Napasintuwong, 2015; Wood,2015). However, as this dissertation focuses on corn farms and environmental problems related to chicken consumption, it is very important to rethink terms such as food systems, food networks, and chains and webs. Moreover, globalisation is the major change that links the agricultural production of local farms to consumers in different countries. Although they do not cover the environmental issues and exploitation that this dissertation places importance upon, there are at

least four sets of explanations for agro-food networks: 1) explanations relating to increasing consumption, which focus on the concept of 'systems of provision'; 2) explanations connected to the concept of the 'cultural turn', which propose that production and consumption are related to meanings and narratives around food and that most food is sold with a story; 3) explanations associated with the development of alternative agro-food networks in which food is related to the quality of production; 4) explanations connecting food and production to the food supply chain, which influences economic development and the food industry. The first three explanations can be found in the fields of sociology and geography, while the last has often been used in business and management studies (Jackson et al., 2005). However, the concepts of food networks and commodity chains used in agro-food studies and economic geography have been developed from two other important concepts, 'world-systems theory' and the 'new political economy' of food and agriculture, both of which began in the 1970s. The first was proposed by Wallerstein in 1974 and explains the commodity chain as a 'network of labour and production processes whose result is a finished commodity' (Wallerstein, 1986: 159). This explanation has influenced the concept of the 'global commodity chain' (GCC), which focuses on 'a nuanced analysis of world economic spatial inequalities in terms of differential access to markets and resources' (Gereffi et al., 1994: 2). The second is related to the sociology of agriculture and the comparative analysis of production systems, focusing on an inquiry into technological changes in agriculture and the farm labourers that have become victims of these changes, as well as exploring corporate power within the agricultural production system (Jackson et al., 2005).

This dissertation investigates the corn supply chain as related to chicken production, both for domestic consumption and export, and then employs the important concept of Commodity Chains and Global Capitalism to explore the whole chain and the exploitation of world capitalism. The CCGC approach includes a set of inter-organisational networks clustered

around ‘one commodity or product, linking households, enterprises, and states to one another within the world-economy’ (Gereffi et al., 1994: 2). The specific situation is one of the qualities of the networks and, along with other characteristics, such as the fact that they are socially constructed and locally integrated, underscores the social embeddedness of economic organisation. Moreover, the analysis of commodity chains shows that social relations and organisations shape the processes of production, distribution, and consumption in society. The dissertation emphasises the important role of the state action in particular—the policies that influence the development and growing integration of the commodity chain network (Gereffi et al., 1994). However, although the study (Gereffi et al., 1994) seems to focus on management and uses purely economic terms, the categories of the governance of global value chains are useful for understanding the corn supply chain in relation to state policy, which has an effect on the development of the achievements of the chain. Moreover, Jackson and Ward (2010) argue that studies of supply chains need to employ a life history approach and also analyse the personal testimony of the key players that are involved in them. Therefore, their study was designed to analyse the data with regard to three discursive spaces: commodity spaces, commercial spaces, and the spaces of consumption.

The concept of CCGC, focusing on management and economic terms, is used to analyse the corn supply chain and chicken production in the thesis. The concept is applied by placing importance on the role of the state and agribusiness, and the interaction among other actors such as corn and chicken farmers. The aim is to review the exploitative process of the corn supply chain in relation to environmental problems. Moreover, the dissertation agrees with CCGC theory, that social relations and organisations shape the process of production, distribution, and consumption. These will be discussed in Chapter 6.

**The argument and research questions**

The main argument of the dissertation has been developed from the debate between the concepts of the anthropocene and the capitalocene, and the dissertation itself fills the gaps in these concepts by applying them to a case study.

Corn production and environmental degradation in Nan province Thailand have been part of the complexity and stratification of the supply chain that exploits both small farmers and the environment. In addition, the state power over natural resource management is the fundamental cause of the problem and it relates to the development of capitalism in Thailand.

The situation has been part of the history of state-building and the political economy of development. Corn production and the supply chain have been controlled by the corporate power of the state and the agribusiness sector, which have influenced corn and forest restoration policies. From this argument, the dissertation is going to answer four main questions.

**Research questions**

(1) How are the political issues in Southeast Asia during and after the Cold War related to agricultural development, the history of land use, forest management, and corn production in Thailand?

(2) What are the major cause of the multilayered exploitation in the corn supply chain and chicken production, and how have these been maintained? In order to understand this, the study focuses on the level of household production and the interaction among actors. Moreover, it links corn production to the growth of chicken production and the role of the state.

(3) What are the environmental problems that are relate to corn farming, and how are they connected to the accumulation of capital?

(4) What are the responses of the different actors in the corn supply chain to the environmental crisis in Thailand, and what interactions take place among them?

### 1.3 Dissertation structure

This dissertation is composed of seven chapters, including the introduction, which answer these questions. The introduction provides an overview of the entire dissertation, beginning with previous studies of corn farming in different areas and their lacunae. The dissertation investigates five issues related to corn and the environmental problems in Thailand that differ from previous studies. The introduction then discusses the main concepts that the dissertation will employ and the gaps that it will address.

Chapter 2, the sociogenesis of natural resource management and its historical background, is the most important chapter, and investigates the historical background of agriculture and natural resource management in Thailand. This chapter discusses the history of Thailand in terms of resource management and the influence of foreign countries, from the colonial period to the Cold War. It is clear that although Thailand was never directly colonised, it experienced 'semi-coloniality' (Jackson, 2004); Thailand has not been isolated from other countries. Moreover, Thailand has tried very hard to adjust to the superpowers in different ways. This will be proved by the natural resource management policies and agricultural adjustments presented in Chapter 2. Another aim is to argue that the concept of the Anthropocene is ahistorical and apolitical by showing that environmental issues and agricultural land use conflicts are a product of state policies regarding nation building, social and economic development, and national resource management. Chapter 2 places importance on the historical context of the Thai state in relation to nation building during and after the Cold War. The situation at that time is important for understanding the rise of new cash crops and corn farms in relation to international politics and development policies. This chapter explores the history of resource management and social and economic development in relation to the rise of corn farms in northern Thailand and the issue of deforestation. Therefore, the study analyses the data by placing importance on the history of development as it relates to political economy.

Chapter 3 is a methodological chapter that demonstrates how qualitative data are important for the dissertation in addition to the historical approach presented in Chapter 2. As discussed in Chapter 3, *Methodology*, interviewing and observation are the main methods. The voice of the actors in the supply chain makes the chain 'come alive' while the supply chain concept focuses on the macro level. In addition, the dissertation uses a multi-level analysis of the supply chain; hence key information comes from different organisations. In addition, it focuses on fieldwork and the collection of data in different areas and with different actors. This chapter explains the means of accessing the key informants in each group. The researcher spent four months collecting data in Thailand, conducting interviews with key informants in different organizations along the chain, such as corn and chicken farmers, local merchants, local state officials in various departments, and feed mill firms. Furthermore, the chapter also explains the limitations of the study and provides reflections on the fieldwork. These are very important for further studies.

Chapter 4, the voice of the voiceless (the corn farmers and the middlemen) *in the villages and local market*, presents a discussion of corn in everyday life: the negotiation and resistance among corn farmers, capital and the state. This chapter aims to fill a gap in the concept of sociogenesis by focusing on the social structure of the political economy and the historical context. The chapter provides ethnographic data in order to explore the different actors in corn production and the supply chain. In addition, although the state plays an important role in the regulation of the conditions of corn production, the other main actors—capital, social movements, and corn farmers—also need to be considered with regard to the production conditions. Therefore, the chapter emphasises the interactions among them as they try to negotiate, resist or surrender in the different situations that are very difficult for corn farmers. The whole corn supply chain is controlled by agribusiness and facilitated by the state, while the corn farmers are powerless because they cannot access the corn market by themselves and local

merchants take advantage of this. Corn farmers that cannot adjust to the new crop suffer most from the environmental crisis in Nan Province, whereas the farmers that have secured land ownership have been supported by the state. The argument in the chapter is that the small corn farmers that have no resources, such as land or cash, are the vulnerable farmers; they have been affected by the policies of forest rehabilitation and corn promotional farming.

Chapter 5, the political ecology in the supply chain, discusses corn production as both a cause and effect of environmental degradation among the interaction of the main actors. This chapter focuses on modern agriculture, supervised by multinational agribusinesses and supported by the capitalist state as the main factor of environmental exploitation. Besides environmental degradation, the chapter also echoes the political ecology of the problem. The environmental problems in Thailand—such as deforestation, air pollution and soil degradation caused by the corn farms—are another part of the economic growth that has been supported by the Thai state since the Cold War. Moreover, the acceleration of environmental degradation is directly related to state regulation and the growth of Thai agribusiness.

Chapter 6, stratification and survival in the supply chain, analyses the whole chain with the argument that stratification and survival in the supply chain have significantly affected sustainability and it reproduces the exploitation process in human labour and the environment. The chapter investigates the global consumption of protein from chicken supplied by developing countries such as Thailand, which is the major cause of the crisis. The fundamental issue of these problems is that agribusiness seeks to benefit from cheap labour and the environments of developing countries in order to support capital and human consumption. The corn supply chain and chicken production in Thailand are part of the cycle of exploitation.
This chapter presents a discussion of the corn supply chain; at the beginning of the chain are the seed and chemical input companies, followed by the corn farms, feed mills, chick farms, chicken farms, chicken factories, and retail and exports. It can be seen that the supply chain

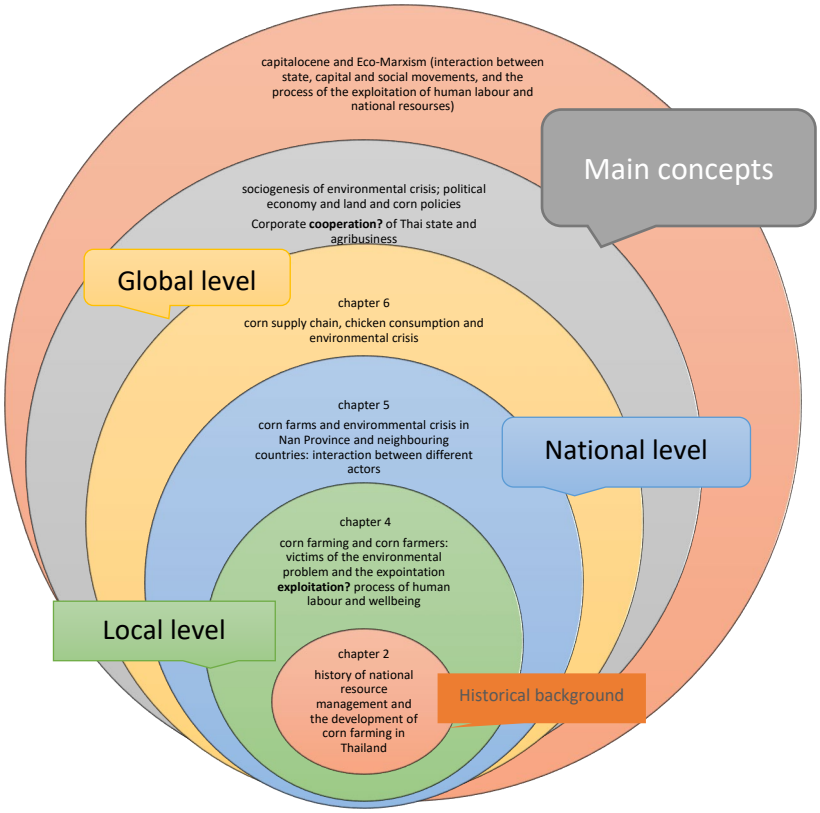
includes different actors, but that only corn farms have been the victims of environmental degradation. The process of exploitation is supported by state regulation. The chapter discusses the power structure within the food supply chain, from the corn farms in Nan Province to the feed mills and chicken farms in central Thailand, by focusing on the role of the agricultural businesses that control the entire chain.

Chapter 7 is the conclusion, the final chapter, which exposes the complex situation in intensive corn farming and the environmental impacts of deforestation, chemical use and burning by answering the four main research questions that connect to the main agreement of the study. It discusses the findings and concepts that are applied as the framework and their limitations.

**1.4 Conclusion**

The two diagrams below show the scope of this thesis. The first diagram (Figure 1.1) presents the research structure, which includes the background of the study and the analytical chapters that demonstrate the exploitation at three levels—local, national, and global. The story consists of the corn supply chain, and chicken consumption as it related relating to environmental deterioration, which will be discussed with the main concepts specified in the two largest cycles.

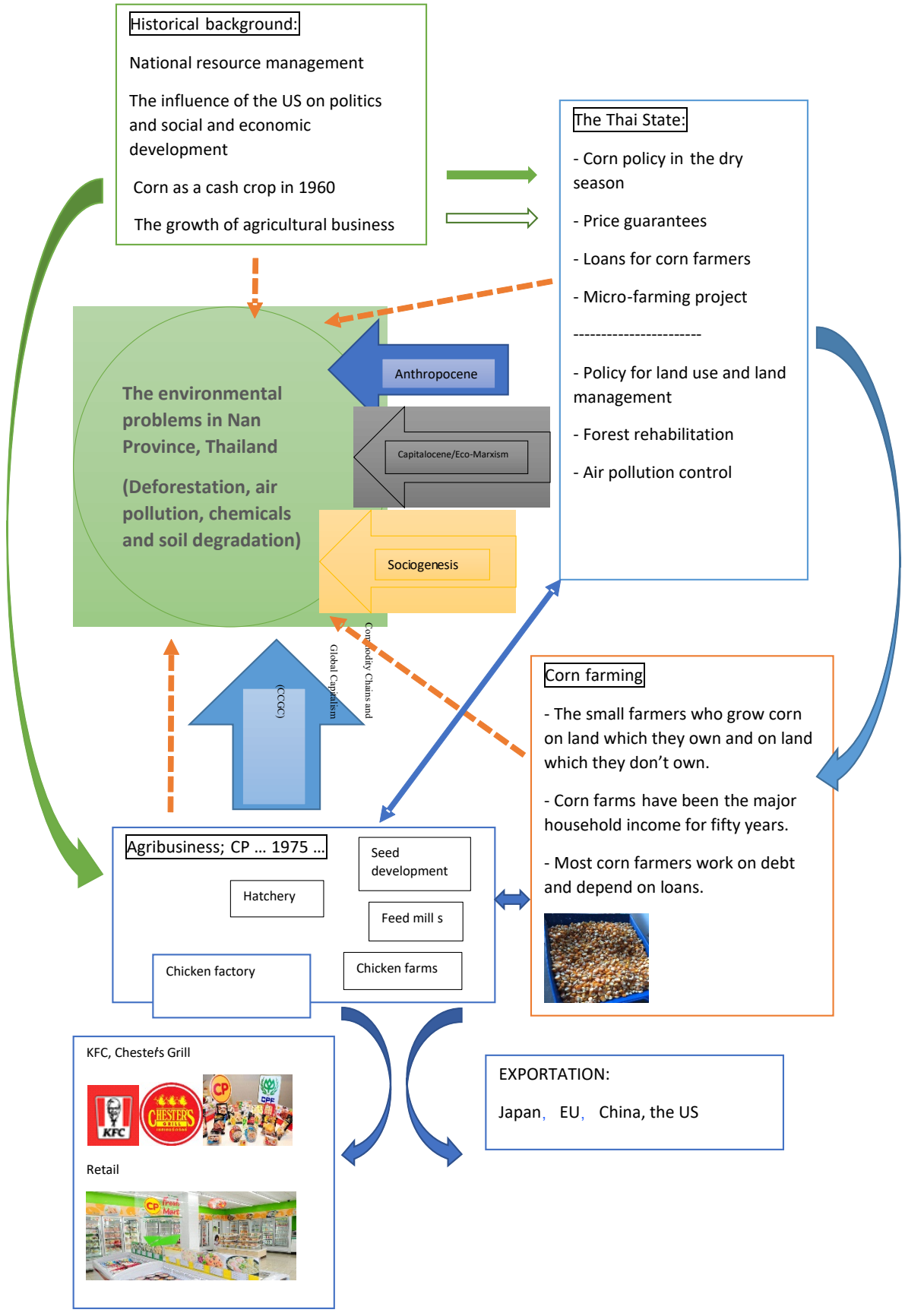
*Figure 1.1 Three levels of exploitation in the corn supply chain and chicken production in Thailand*




The second diagram (Figure 1.2) shows the theoretical framework and empirical data. This diagram focuses on the green cycle of the environmental problems in Nan Province. It is the main issue that requires four concepts to demonstrate it, as shown in the four different colors of arrows. The debate between Crutzen and Stoermer (2000) and Moore (2013) about the cause of the environmental crisis in the modern era under names of the geological eras—anthropocene and capitalocene—is the beginning of the study to address the issue of agricultural and environmental problems. Although the sociogenesis concept has produced an important social perspective on Thailand historically and on natural resource management, the environmental problems require further clarification in the context of political and social development. Political ecology will present the interaction among the actors in the corn and chicken supply chain, which will demonstrate the exploitation in this food industry. The last concept of CCGC

is to connect the local corn farmers and environmental issues to chicken consumption. Then the four squares are the historical background and the empirical data. The orange arrows with an unsolid line pointed outward from the squares to the green cycle show the cause of the environmental problems in Nan, and the other arrows signify the interaction among the sections. This research attempts to understand this complicated situation by way of addressing problems raised in the research questions referred to above. The next chapter explains the development of natural resource management and the historical background of the origin of corn farmers and the Thai state's role and related policies.

*Figure 1.2 Theoretical framework and empirical data*



# Chapter 2 - The Sociogenesis of Natural Resource Management and Historical Context



**The objective of the chapter**

This chapter uses a historical approach in order to focus on nation-building and the growth of the political economy of development, which are fundamental to the environmental degradation in Nan. It argues that the cause of climate change comes only from human activity, especially agricultural practices. The chapter focuses on the power of the state over natural resource management and how it was influenced by colonialism and the Cold War. In addition to the historical approach, the role of the state in controlling and managing natural resources is analysed. It examines the territorialisation and deterritorialisation of the Thai state with regards to land use and land control in different periods.

## 2.1 Introduction

This thesis discusses corn farming and related environmental problems in Nan Province, Thailand. This second chapter focuses on the history of agricultural development, especially concerning the rise in the numbers of small farmers and the development of land and natural resource management. It aims to provide a better understanding of the complex role that corn farming plays in the Thai economy and the complex relationship among corn farming, forest clearance, and environmental problems. The major discussion of this chapter concerns the state's role in land and forest management that relate to the use of land to achieve high profits under idealistic notions of civilisation and development. Territorialisation and deterritorialisation are strategies that the state has applied since the beginning of the 19$^{th}$ century.

This chapter argues that studying and understanding more about corn production and deforestation in Nan require learning about the development of resource management as well as the history of the small farmers and agribusiness since the beginning of the colonial period. The colonial period and the Cold War are fundamental to the complex problems of natural resource management and corn production. The chapter focuses on the social context of Thailand that is affecting the environment in Nan province at present. However, it can be seen that the environmental problems in the present are partly the result of political issues and state intervention that occurred in the past, over a number of years. Consequently, it is necessary to discuss how the history of natural resource management and social and economic development has been reflected in the territorialisation of the Thai state (Buch-hansen, 2003).

The chapter has been divided into four sections. The first is an outline of the social structure and administration of Thailand before the Second World War. This period falls between 1853 and 1939, the time of the influence of colonialism in Southeast Asia. The monarch of Thailand, under the system of absolute monarchy, had to carry out administrative

reforms in order to resist colonisation as well as to show a level of civilization similar to that of the western countries (colonists). During the colonial period, Siam as it was called was in the position of a buffer zone between the British and the French. The country was surrounded by the vessels, and tried very hard to avoid being colonised by both countries (British and the French). As a result, (modern) bureaucracy was first established as the means of administration of the country (Mead, 2000), including the western forms of natural resource management.

This period is the time when the ideas of natural resource management in Thailand emerged and resulted in land conflicts and deforestation issues that have continued until the present. The second period is Thailand after the World War II (1939-1944), focusing on the nation-building policy which promoted the idea of a healthy body: 'The Promotion of National Food Project' of 1938 was run by the state to encourage people to have better eating habits by consuming healthy and varied food. This is the changing point in domestic food consumption among the Thai people, especially in relation to protein. The third section is the period during and after the Cold War, involving cooperation between the U.S. and Thailand between 1945 and the 1980s. This section discusses the process of development in Thailand and the role of the United States in Southeast Asia and its influence on Thai economic development plans, particularly in the fields of forestry management and the emphasis on cash crops, both of which have affected agricultural land use (Rigg, 1993; Cropper el at.,1999; Delans, 2011; Delang, 2005). This section also includes discussion about the encouragement by the U.S. of corn cultivation and the origin of the agribusiness sector that led to the expansion of corn farming and the chicken industry. The final section focuses on the growth of the agribusiness in Thailand that influenced changes in agricultural development and how this became institutionalised. It is important to understand the success of the corn and chicken agribusiness interests and the power of the firms involved as they control the supply chain. It is the increase in chicken consumption

that is considered a key factor in leading to the increase in corn farming, which has been the direct cause of environmental degradation in the north of Thailand and Nan Province.

## 2.2 Thailand before the World War II: the period of administrative reform (between 1853 and 1939)

This section focuses on the reforms that marked the beginning of the state, placing importance on natural resource management (land and forest) as state property and demonstrating state power**.** These reforms were influenced by trade between Siam and foreign countries at that time. The first section explains the influence of trading and the increase in land use and land management. The second expounds on the rise of forest management which was influenced by British colonialism elsewhere. Siam[2] was the previous name of the country that was used by past monarchs when dealing with foreign trade and communicating with foreigners. The name Siam represents the multiethnic composition of the kingdom; special importance was given to the creation of a society that could bring together different ethnic groups in peace as the nation-state emerged. During the colonial period, Siam struggled to resist colonisation in different ways. By learning from European countries, administrative reform was seen as important to show that Siam could become a modern state that was neither barbaric nor uncivilized. However, the name of Siam was changed to Thailand in 1939[3].

### 2.2.1 The Influence of Trading and Land Management

In 1855 Siam and the British signed the Bowring Treaty, which had a significant impact on changes in internal and external trade (Ingram, 1971), including the supervision of later land use. For example, the agreement incentivised the export of good quality rice, which is mainly grown in the central plain, to external markets. Rice quickly became the major export product,

[2] The name Siam means dark or brown in reference to the skin color of the native people and represented the fact that the country has a multiethnic identity, and the kingdom consists of many ethnic groups such as Tai, Laos, Vietnamese (Yuan), Cambodian (Kamer), Chinese, and Malay (Malayu) (Hulme, 2018; Wangpanya, 2018).

[3]After the Siam revolution in 1932, the government aimed to construct a nation state that was purely based on Thai ethnic identity (Wangpanya, 2018). On June 24, 1939, the name of country changed from Siam to Thailand with an announcement from the Prime Minister's Office.

although teak and tin were also significant (Ingram, 1971). Rice exports led to the state encouraging the reclamation of land for further rice cultivation and export in order to increase financial income (Ingram, 1971). Alongside this, King Chulalongkorn (King Rama V) announced the initiative to 'abolish slavery', a longstanding practice, on 22 July, 1917, which had consequences for the provision and management of agricultural labour. The process of the abolition was gradual and continuous, taking around 31 years, during which period the ruling elites created a substitute labour management system by monetizing serf obligation in many areas. This was the beginning of the expansion of agricultural areas and the increase in the number of small farmers in the central region (Ingram, 1971; Pongpijet and Baker, 2003).

The expansion of rice farms added more value to land as an economic resource to be controlled by the state through reforms to the land system (Vandergeest and Peluso, 1995), with the "first land code … enacted in 1901 and then the Civil and Commercial Code … in 1936" for the purpose of establishing simple qualifications for the people who own the land (Vandergeest and Peluso, 1995:402). This would both protect the property rights of citizens and allow the state to maintain a record of landowners. However, the process was slow because of lack of expertise and after 1909 there were still very few title deeds recorded outside the area of the central plain. The process of providing title deeds continued until the 1940s but faced functional problems, mainly related to a lack of knowledge of using Western land measurement techniques and the land registry model (Feeny,1982).

By 1954 farmers were required to report occupancy and then receive a certificate called S.K1. which was a temporary document. The S.K1. document gave them rights with respect to the use or sale of land (Vandergeest and Peluso, 1995). At the same time, there were three types of documents issued by the Land Department: a 'Pre-emption Certificate', a 'Certificate of Use' and a 'Land Title deed'. The difference between them is that the latter two documents gave the right to *transfer* land ownership to others, whereas the first did not (Vandergeest and

Peluso, 1995). Based on the land document(s), the boundary status between the state and private land became blurred because although most people declared the land they occupied in 1954, many people in remote areas and those engaged in shifting and rotational agricultural work did not (Kemp, 1991). At the same time, the state itself has pursued an inconsistent policy and practice regarding forest land. This has caused more problems for development planning since the 1960s (Vandergeest and Peluso, 1995).

### 2.2.2 The rise of forest management

During the colonial period, Siam was pressured and pushed to identify the location of its borders and to change its internal administration from the traditional system to the British system, especially in relation to resource and land management. For example, in 1840, the British requested Siamese agreement regarding the demarcation of boundaries with Burma—then a British colony, now Myanmar, although this then required the assistance of the British because Siam did not have expertise in modern map making. By the 1860s the demarcation of borders could be discussed with the new king, who by then had learned about the "modern" conception of space, which was different from local customs. The map of Siam in the pre-twentieth century was oriented by rivers and coasts, together with military and trading routes, and did not use abstract terms of latitude and longitude as in modern map making (Winichakul, 1997).

In 1896 the Royal Forestry Department (RFD) was established under the recommendation of the British with the main purpose of collecting income derived from the teak concessions in the north, which was held by the local lords (Mekvichai, 1988). H. A. Slade was the first director, from the establishment of the Department until 1901, and was succeeded by W. F. Lloyd, the next director, until 1923. Both were English and for around 27 years the department was directed by the British under a model of administration influenced by British rule in India and Burma (Vandergeest and Peluso, 1995).

The first period of operation of the RFD (1896-1953) focused on developing forest management systems and forest industry, when forestland was managed primarily for commercial timber extraction to meet both domestic and foreign consumption. During this time, population densities were still low and forest and agricultural lands were abundant; about 60% of the total land area was still forested until 1953 (Pragtong and Thomas, 1990). The forest was transformed to produce goods such as timber and wood under a new institution of forest management as a public forest enterprise; the Forest Industry Organization (FIO) was established in 1947 and the Thai Plywood Company was established in 1952 to promote in-country wood processing (Pragtong and Thomas, 1990).

Forest management has been controlled by the state since this period. Some areas that were forested in the past are now defined by the RFD as 'denuded forest' and the state has allowed local people to work on the land until now; however, this permission does not give the right of land ownership. Currently, these agreements cause problems for farmers because they work on state property which they can be asked to relinquish at any point.

This period marked the foundation of a national management system in Siam, controlled by the King and noblemen. Land and forests were in the hands of the wealthy rather than ordinary citizens. To begin with, the aim of control and management of national resources was to protect the country from colonial exploitation through mapping and defining territories, leading to land and forest management. However, this also had the effect of handing control and power over national resources to the state. Therefore, during this period, the power of Siam came from its authority over national resources by following the methods of external colonial powers, such as the British.

## 2.3 Thailand after the World War II: nation-building policy and the promotion of the healthy body project (1938-1944)

> "The foundation of the prosperity of the nation lies in people and manpower. Although the education is good, transportation is convenient, the industry is progressive, unfortunately, if the citizen is lethargic, weak, sickly, unable to work hard, and short-lived, we could not reach prosperity. Scientists confirm these defects can be solved by food. At this time, we are now in the middle of a revolutionary period, therefore time to ask for the nutrient revolution. We revolutionise nutrition"
>
> (Chutima, 1964:37).

The statement above is part of the state policy to change Thai eating habits and is the first state-led step to promote protein consumption in Thailand. The policy was fundamental to changes in food consumption and the agricultural sector, both of which played a part in nation building and the health improvement policy (improving the physique of Thai citizens). A later section of this thesis points out that it was the policy to promote meat consumption that resulted in the increase in the number of corn farms. After this period both sectors were influenced by the growing interest of the U.S. in developing countries, including Thailand.

After the Second World War, nutrition was directly related to nation building and citizenship in Thailand, and this had a significant impact on Thai eating habits (Kawinvaweekun, 2002). It made nutrition an important area for state intervention. In 1938 the National Food Promotion Project was established as part of the national development policy. The aim of the project was the promotion of health, sanitation and a protein-based diet, and in order to improve the physical health and strength of the population, and to solve the dearth of protein by encouraging households to keep kitchen gardens and farms. During this period, state advertisements promoted the benefits of protein, which was considered to play a role in the physical improvement of Thai citizens and was linked to the idea of a superpower. Therefore, promoting food consumption and changing food habits from an eating culture based on carbohydrates (rice) to increasing the intake of protein and other nutrients were related to improving the quality of the lives and health of citizens. The policy provided plans to promote

new habits of food consumption in various ways, including: 1) setting up a food promotion division; 2) creating a textbook for citizens, students, and official staff; 3) advertising through movies, stills, and posters at science and health centre locations and other public places; 4) creating a plan to focus on local disease and to suppress epidemics; 5) carrying out local surveys on food, life and health, especially in the rural areas; 6) encouraging the people in rural areas to accept and change to better eating standards by using official staff to perform as role models; 7) cooperation between state organizations to campaign for changes in eating habits; 8) official staff to be trained in food subjects; 9) protecting people from dishonest food vendors by legislation; 10) promoting education in the economy and the industrialisation of food for example regarding production, food processing, and transportation (Kawinvaweekun, 2002, Muksong, 2013).

However, the most interesting development was to enact as law the 'Gardening and Animal Farming Act for the Benefit of the Household' in 1939. This Act obligated the state to promote kitchen gardens and raising animals to benefit household consumption (Kawinvaweekun, 2002). The state encouraged people by asking government officers to create gardens and raise chickens, with the Prime Minister, Plaek Phibunsongkhram,[4] suggesting that chicken and eggs form part of a nutritious diet and that their daily consumption indicates a good quality of life (Kawinvaweekun, 2002). In 1940, the Department of Public Welfare campaigned for people to eat eggs as they provide a high source of protein, vitamins, minerals at a cheap price and are easily accessible. It was promoted as an excellent and healthy food source suitable for improving health and contributing to nation building. The state created a slogan, "Thai people should eat two eggs per day for health purposes" (Muksong, 2013; Puaksom 2018).

[4] Phibun was ousted as Prime Minister by the National Assembly in 1944 and replaced by members of the Free Thai Movement until he returned to power in the Siamese coup d'état of 1947 led by the Coup Group. Phibun aligned Thailand with anti-communism in the Cold War, entered the Korean War under the United Nations Command, and abandoned fascism for a façade of democracy.

Moreover, the state established state slaughterhouses in every district to service and support household farms as well as to increase meat consumption in the countryside (Kawinvaweekun, 2002).

A rise in chicken consumption in other countries at this time was associated with luxury and healthy eating. For example, as Jackson and Russell (2010) mention in their study in England, in the post-war period chicken was regarded as a luxury foodstuff, although the consumption of chicken meat as a staple source of protein was more common and popular from the 1960s, partly as a result of the increase in raising chickens for egg production. Egg production increased to over one million in terms of domestic consumption during the Second World War, and egg rationing of domestic poultry keepers accounted for 30% of the national laying stock (Holroyd 1986). The first U.K. broiler shed was built by Antony Fisher in 1953, who was influenced by the American broiler industry. He followed the U.S. poultry production processes that were the beginning of the intensive broiler industry in the U.K. (Holroyd, 1986). Between 1960 and 1980, the number of broiler farms expanded as well as the average person's weekly consumption of poultry, which more than trebled. With the expansion in the number of broiler farms, the price of poultry fell while consumption increased (MAFF, 1991).

During a period of about fifty years, U.K. chicken production transformed from being a localised cottage industry to being a highly concentrated and industrialised sector. There were a small number of economic factors involved in and dominating the process of production and distribution (Yakovleva and Flynn, 2004). This process is also happening in present-day Thailand where broiler farms are acting within an oligopoly, which can be understood as an imperfectly competitive market in the area of economics or marketing. This is causing problems in achieving a fair market for corn and chicken producers in Thailand. The situation in Thailand can be compared with the situation in Australia where in 1788 87 chickens arrived with the First Fleet of British colonisers along with various other animals; only poultry and pigs did well

(Wood, 1977 cited in Dixon 2002). Much later in the early 1950s, hatching and the chicken meat industry expanded, and it is now one of the major protein food sources for the Australian population. Moreover, it is a significant success story of the development of a primary industry in Australia (Bell ,1990 cited in Dixon, 2002). In addition, since the Second World War, most of the chicken and egg production has operated at a local level serving the domestic market, with only a few exceptions involving the international market (Dixon, 2002). This differs from the situation in Thailand, where domestic consumption included that of American soldiers who stayed in the U.S. military base in Thailand (approximately 45,000 soldiers), some of whom settled there (Muksong, 2013). Therefore, the increase in chicken consumption in Thailand can be attributed to the influence of the U.S. on Thailand, not only on production but also consumption.

However, a policy factor relating to the nutritional transition of the country has played a part in the growth of the agribusiness, reflecting a state campaign to increase the consumption of animal protein, and fresh fruit and vegetables. Changes in the consumption of these foods have provided opportunities for the expansion of domestic food companies in various countries. Brazil and Argentina together with Thailand have become major suppliers of animal feed and meat. In all of these countries the changes in consumption gave rise to domestic agribusiness firms, particularly in the white meat sector (poultry and pigs), such as Sadia and Perdingao in Brazil and the Charoen Pokphand Group in Thailand (Wilkinson, 2009).

**2.4 The Cold War and the cooperation between the U.S. and Thailand (1945-1980s)**

This period saw significant changes that are linked to the rise of corn farming and the chicken industry in Thailand. Both sectors have been influenced by the U.S. and the growth of the agribusiness. The major change in the period is the rise of development plans and the promotion of cash crops.

After the Cold War, chicken (eggs and meat) became a high protein food that many countries began to develop in their own agricultural sectors. The United States had been successfully leading in the development of the chicken industry since the late 19th century, and then grew rapidly in the early 20th century (Potts, 2012). The chicken farming industry has also expanded in other countries around the world, especially in European countries that experienced food shortages after the war. Plans to build a poultry industry were initiated in several countries with U.S. backing through the Marshall Plan in the 1960s-1970s. Denmark and Holland achieved great success in European poultry production and as the U.K. began to develop a U.S.-style chicken industry in the 1950s, the share of consumption of chicken meat started at 1% of the total meat consumed in Britain and increased to 25% in 1980 while overall meat consumption remained stagnant (Godley and Williams, 2009). In Asia, the chicken industry began growing fast in Japan and the Philippines, both of which were allied with and supported by the U.S.A. However, Thailand has been influenced directly as an ally of the U.S. (Muksong, 2013). Although in the beginning the Thai government supported chicken and egg consumption and raising chickens in reference to nation building, after that, the plan was to develop the economy by supporting the chicken industry, corn farming, and linking it to the feed production process. All of these areas of production can today be considered as successful agribusinesses (Muksong, 2013).

This section expounds on the development process of the economic plan and the rise of corn farms which began in the northeast of the country, and then moved across to the north. This involved the role of the U.S. in Thailand during and after the Cold War. Four points are discussed, the first of which is the political cooperation between Thailand and the U.S. during the Cold War. It marks the beginning of the relationship which developed to other forms of cooperation later. The second point concerns national economic and social development plans with U.S. cooperation; the third relates to the development and success of hybrid corn in

Thailand, and the fourth is the background of forest management, land rights and farmland issues. This section aims to understand the development of corn and chicken farming in Thailand as part of the National Economic and Social Development Plans.

### 2.4.1 Political cooperation between Thailand and the U.S.

The objective of the United States in expanding its role in Southeast Asia and Thailand was to oppose the expansion of communism with military force and liberal economic development. At that time, the Thai political structure was a military dictatorship and the response to U.S. policy was quick and profound. The motive behind U.S. interests in Thailand was fear of the 'domino effect' and the creeping influence of communism. The good relationship that existed between the military Thai government and the U.S. related to other political and development projects. However, the geographical area where this research study was carried out has significance in that it was the base camp of the communist party in Thailand, which challenged the state and its power.

The U.S. implemented three measures in Southeast Asia. The first was sending the Griffin Mission to propose liberal economic development policy, focusing on foreign investment. The government of Field Marshal Pibulsongkram received the proposal by making economic agreements on 19 September, 1950, and then adopted it as a guideline for national economic development. In addition, the U.S. government also made two other agreements with the government in order to oppose the expansion of communism and to develop a liberal economy: the Fulbright Foundation Agreement and the Military Cooperation Agreement on 1 October, 1950. After the coup on 16 September, 1957, Field Marshal Sarit Thanarat (1959-1963) and later, Field Marshal Thanom Kittikachon (1959-1973), continued relations with the U.S. government under the three successive governments of Presidents Dwight D. Eisenhower, John F. Kennedy, and Lyndon B. Johnson. In the meantime, there were three important changes in Thailand: 1) the change from the nationalist economy to an economic policy promoting

private investment both inside and outside the country; 2) the First National Economic and Social Development Plan initiated by focusing on economic liberalization; 3) the establishment of the National Economic and Social Development Board (NESDB) and Board of Investment (BOI) (Pattamanan, 2000).

Thailand became an important and energetic ally of the United States, joining the United States in the Korean War in 1950. Thailand later made a multilateral commitment to the United States, the Philippines, Pakistan, Australia, New Zealand, the U.K. and France, namely the Southeast Asia Collective Defense Treaty of 1954, also called the Manila Pact. Thailand requested the Southeast Asia Treaty Organization SEATO to intervene when the civil war in Laos intensified between 1960 and 1962, but this was opposed by the U.K. and France. The United States became concerned about the progress of communism in Laos and the panic of the Thai leaders, and in March of 1962 the Rusk-Thanat Communique was signed by the two countries, with the U.S. proposing to fully support Thailand against communism from inside and outside (Euarukskul, 2019). For example, the cooperation between the C.I.A. and the Thai state shows how in the early 1950s, the United States C.I.A. supported the Forestry Department to enforce territorial control by setting up a paramilitary police unit and Border Patrol Police as a non-military counter-insurgency force. This cooperation, which was supported by the C.I.A., effectively gave the Thai state more power (Vandergeest and Peluso, 1995).

However, Thailand also supported the U.S. by sending troops to the Vietnam War (1955-1975), as well as by allowing the United States to set up military bases in Thailand, which held 50,000 soldiers and more than 600 aircraft. In return, the U.S. has provided assistance to Thailand that has covered almost every area, from the development of the army, National Economic and Social Development Plans, to the suppression of internal terrorism intended to destabilise the Thai state. Throughout the 1960s U.S. aid was higher than 50% of the national defense budget of Thailand. In addition, the Thai army developed a structure based on the

assistance provided by the U.S. Army in planning and development training that included sending soldiers to study and practice in the United States (Euarukskul, 2019).

However, as well as external developments, the internal political context of Thailand was another important factor in choosing an American partner. From the World War II until the events of October 14, 1973, Thailand was governed by a military dictatorship. The alliance was therefore determined by military leadership (Euarukskul, 2019). Field Marshal Sarit Thanarat, the Prime Minister, staged a coup on 16 September, 1957. The Social and Development Plan began in this period with support from the U.S., and the first plan began in 1957 under the military government because they believed this would improve the quality of life in the rural areas and provide a bulwark against communism.

An important fact concerning internal politics—and for this thesis—is that Nan Province was the location of the Communist Party of Thailand (CPT) headquarters in 1967 (Sae-Teio, 2008). Nan Province is interesting because the CPT was founded in 1942, and in 1962 some activists moved to rural and forest areas because of the suppression by the military government. Between 1965 and 1977 more than 40 provinces were communist areas, especially rural and distant villages. In 1963 the CPT sent members to disseminate communist ideology among the Hmong, Khamu, and Mal hill tribes. Their work in the villages was successful, and in 1967 the centre of the CPT moved from the northeast to the north. In the same year, an attempt to overthrow the Thai government was suppressed. Most of the survivors were university students that escaped to the CPT headquarters in Nan. Hence, Nan was a stronghold to which the military government gave priority as a sensitive area of stability within the Thai state. In their study of the history of deforestation in northern Thailand, Ganjanapan and Kaosa-ard (1995) point out that between 1973 and 1976 there was a high level of deforestation in the north: around 4.65 million rai (Thai Units)[5]. Nan and Chain Rai Province were the worst cases

[5] 1 rai = 0.16 hectares = 1,600 square meters

due to the combat between the Thai military government and the CPT, as well as immigration from Laos and other neighbouring countries (Ganjanapan and Kaosa-ard, 1995). Bo Gua (1975) noted that some of the hill tribes, the majority of them being the Hmong people who mainly grew opium, moved from China to northern Thailand. Bo Gua's study describes the two important transitional periods of opium cultivation: the first being the period after World War II, when the United States and France secretly supported the Hmong in the growing of opium as a cash crop, most of which was sent to the United States. The second was when government policies sought the suspension of opium cultivation, the preservation of forest areas, and national development. After that, various projects were implemented in the northern region by the government, the Thai royal family foundation, and international organizations. Most of these projects supported the cultivation of plants such as teak and fruit trees to address the issue of deforestation in the north. The government reported that the practice of swidden and the growing of opium were the causes of the problem, and thus the Hmong and their farming practices were the major cause. The government did not give them the right to own land but allowed them to use the land to grow other plants such as coffee, fruit trees, and some kinds of vegetables. Another problem was that these farmers could not access the market (Ganjanapan and Kaosa-ard, 1995). It can be seen that the major problems of the farmers that work in the highlands have been those of land ownership and deforestation over the past fifty years. Although the social context is different, the corn farmers have faced the same problems that the Hmong faced in the past.

In terms of academic research, it is interesting that the study of Thai culture and society by American anthropologists began after the Cold War, around 1964. The reason for this was not only to understand more about people in rural areas but also to provide analysis that could help prevent communist expansion and also encourage state-building. The anthropologists that worked on this project used an American military map, L708, to access faraway villages. There

were other maps for Lao, Vietnam, and Cambodia (L709, L710, and L7011), all of which showed politically sensitive areas about which the U.S. was concerned (Kittirianglab, 2019). The information from these studies was applied in the preparation of the National Economic and Social Development Plan, especially in rural development.

The cooperation between the military government and the U.S. is fundamental to the changes in the rural areas, not only in terms of the landscape but also in economic and social aspects. This demonstrates a process of s*tate power* being supported by a s*uperpower*. This 'top-down' dimension of development is led by the state and has affected national resource management linked to land use issues and deforestation.

### 2.4.2 Economic cooperation: The National Economic and Social Development Plans with U.S. cooperation

This section presents how the role of the U.S. and international organisations has influenced development policy in Thailand, especially in relation to corn farming. Corn has been one of the cash crops that has been underpinning the development of the rural economy. The Thai government implemented the First National Economic Plan between 1961 and 1966, which focused on expanding agricultural areas and constructing infrastructure that included electricity, dams, irrigation systems, and especially a road network to connect rural areas and villages to towns and cities. International loans were a very important means for developing the country of Thailand, and at least four international financial institutions were significant for its economic development: the International Bank for Reconstruction and Development (IBRD), the Overseas Economic Cooperation Fund of Japan (OECF), and the Asian Development Bank (ADB); the World Bank (WB) was the main supporter of development and sent specialists to survey and study the social and economic context of Thailand in order to help create the Economic Development Plan, which was suggested by the WB between 1957 and 1958. At this time, Thailand has received a loan from the WB of around eight billion American dollars, as

well as a ninety-million-dollar grant. All of the loans were invested in 130 infrastructure projects, such as dams and road construction (Siriwansan, n.d. cited in Kannuch, 2010).

The National Development Plans and many projects in the rural areas began around 1957. The projects linked the villagers to markets, giving them access to trading opportunities, and the developmental projects were implemented during the following National Economic and Social Development Plan (1967-1971). For example, the Accelerated Rural Development (ARD) scheme was a rural development program supported by the U.S. Agency for International Development funds. In the beginning, the project focused on the needy provinces where border areas were a risk to the security of the state. According to Muscat (1990), the significant primary project of the ARD scheme was road building, and from 1947 many new roads were constructed using the United States' grant (Phongpaichit and Baker, 2003). The political purpose was to oppose the expansion of communism from Vietnam and these new roads were to be a catalyst for opening up new land to grow field crops other than rice, thereby supporting economic improvement and ensuring that communism did not seem an attractive alternative.

The turning point, between 1960 and 1980, saw the total road network treble in Thailand, the improved infrastructure being used for many different purposes. The first was the military purpose; it provided easier access for troops, movement of supplies, and surveillance. The second concerned the logging industry, as roads were also the main components of logging operations and forest conversion. The last was to facilitate the migration of those that had no land to open up areas of new farmland to grow both subsistence and cash crops such as corn, cassava, and sugar cane (Uhlig 1984; Hirch 1990). Ganjanapan (2011) observed that the roads brought capitalism to the village by the farmers being able to sell their products such as rice and corn through being able to connect to the market.

However, it was national development policies under state control characterised by a top-down developmental approach that were the main factors that connected the farmers to capitalism. The National Development Plans benefited Thailand and SEA in terms of economic development, and the country followed plans that were designed by experts and international financial institutions. These seemed to follow a neo-colonial format in that Thailand was being directed by the U.S. and supranational organisations. There were many development projects for national and economic security that were offered to rural areas and these programs of rural reform aimed to stabilise the countryside as part of the plan to stop the spread of communism (McMichael, 1997). The complex issue of agricultural development in local areas relates to regional politics, including Nan Province, especially the border areas.

### 2.4.3 The development and success of hybrid corn in Thailand

The National Economic and Social Development Plans, which were supported by the government and international experts, encouraged farmers to change from cultivating local crops to cash crops. Although all corn farmers have engaged in global capitalism since the 1970s, the project of developing corn seed as supported by the state and international investment has been an important part of this story (Napasintuwong, 2014).

In the 1950s the government, with researchers from Cornell University, launched the Thai Usom Crop Development Project to develop new varieties. In 1966 there was a cooperative project between three sectors—the Rockefeller Foundation, Kasetsart University, and the Department of Agricultural Extension—the aim of which was to develop a Thai variety of corn (Napasintuwong, 2014).

In 1974 Thai researchers, in cooperation with the Rockefeller research team, successfully developed the first Thai corn variety, ‘Suwan 1’, after long experimentation with 36 corn varieties from different countries: 16 from the Caribbean, 6 from Mexico, 5 from South America, 5 from India, and 4 from other places (including the U.S.). The first hybrid corn was

an open variety that helped the development of other corn varieties. In 1975, the Public National Corn and Sorghum Research Centre (PNCSRC) was established, which researched and developed this variety in cooperation with the Rockefeller Foundation. Corn farming began in the northeast under the support of the PNCSRC. It later moved across to the north due to political issues and internal migration from the northeast. After the achievement of the PNCSRC with Suwan 1, the centre encouraged private companies to join the project and develop their own varieties. Charoen Pokphand (CP) was the first private company to play an important role in hybrid corn seed, and around 1990 the company established a successful corn and chicken business. There are at least five corn varieties under the CP brand: CPS1, CP301, CP508, CP808, and CP888 (Napasintuwong, 2014; Vijitsrikamol K et al, 2015). At present, 5 multinational companies have stakes in the corn seed industry in Thailand: Monsanto, Charoen Pokphand, Pacific Seeds, Pioneer Hi-Bred, and Syngenta (Napasintuwong, 2014; interview with the director of the National Research Centre of Millet and Corn, 2017).

Moreover, the demand for corn products is still increasing, according to information from the Thai Feed Producers Association (2018b), which predicted the amount of feed demand per year during the years 2007 to 2017. It was found that demand was to increase from 12.9 million tons in 2007 to 19.6 million tons in 2017, an increase of 4.7% per year due to the increase in the export of chicken and livestock products. However, intensive corn farming has gone hand in hand with environmental degradation in the last decade, and corn farming has become recognised as highly damaging to the environment, especially through deforestation, air pollution, and soil degradation. The state has been trying to solve this problem by cooperating with the operators of the major feed mills in order to control the corn farms in Nan and to promote cultivation in other provinces.

The development of new varieties of corn that resulted from the cooperation between Thai and U.S. researchers marks the beginning of the story of the corn supply chain in Thailand.

More precisely, this took off when the Thai variety named ‘Suwan 1’ was developed resulting in agribusiness firms developing it for commercial proposes. Since then, the corn supply chain has been controlled by these firms with state support. However, during the 1980s three notable trends developed in the global agricultural context. First was developments in wealthy nations that led to a rapid decline in the numbers of family farms. Second, new commodities and foodstuffs were increasingly traded internationally. Third was the breakdown of the national regulation of trade with the inclusion of agriculture in GATT policies in 1986, and the increasing importance of new players within the food sector (for example, supermarkets, consumer advocates, biotechnology companies, transnational food companies)—all signaling reconfigurations in the organisation of agriculture (Goss, 2002). For McMichael (2009), this marks the beginning of the ‘third food regime’[6] within the period of neoliberal globalisation (Goss,2002; Bernstein,2015). This coincided with widespread changes in agriculture in Thailand, with the emergence of agribusiness taking an important role in the agricultural sector.

### 2.4.3 The background of forest management, land rights and farmland issues

Vendergeest and Peluso (1995) have criticised forest management in the Thai state. The system originated with the establishment of the Royal Forest Department in 1896, although this did not lead to a specific form of forest management. In the beginning, the department borrowed a model of territorial forest control from the British colonies in the region. Today, the resource protection policies are based on the American model involving national parks, wildlife sanctuaries, and land-use zoning. These management policies now relate to the current issues

[6] The first food regime (1870-1930s) linked colonial tropical imports to Europe with basic cereals and cattle imports from settler colonies, supplying expanding European industrial classes and supporting Britain's 'global workshop.’ The second food regime, which lasted from the 1950s through the 1970s, redirected (surplus) food flows from the United Governments to its informal empire of postcolonial states on Cold War strategic outskirts. A third, possibly emergent, regime (late 1980s-) has accelerated this process by incorporating new regions into animal protein chains (e.g., China and Brazil), consolidating differentiated supply chains (e.g., a "supermarket revolution" (Reardon et al. 2003) for privileged consumers of fresh fruits and vegetables, and fish), and displacing slum-dwellers as small farmers abandon the land (McMichael 2009).

of landholding, land ownership and deforestation, and have led to conflicts over resource management between farmers and state officers (Laungaramsri, 2005).

In the case of Thailand, although the agricultural sector has been the key element of social and economic development, the villagers and the government are in constant dispute over environmental degradation, particularly in the north where the political conflict between them has been a major issue for a long time. The causes of this conflict relate to land ownership, deforestation, and air pollution from the burning of land. For example, the farmers that work on a plateau burn their land to prepare for a new crop because tractors cannot be used on the highland and also most corn farmers cannot afford to buy them. This is therefore the traditional way of cultivation in the area. Since the start of 2017, the government has initiated a campaign to stop burning land because of air pollution in Nan and the North, although the practice is not entirely banned; the farmers are allowed to prepare their farms by burning from May to January, but it is not allowed from February to April (see further discussion in Chapter 5).

This situation illustrates the contradictions among development, the agricultural sector, environmental concerns, and national resource conservation. For instance, in the past, the growing of opium in the highlands was related to deforestation and also to political issues (as mentioned above). A higher quality of opium was produced when it was grown in primary rather than secondary forest, and therefore the tribesmen (Hmong and Lisu) moved to different areas of forest to open up new land. This was the situation before 1975, but from 1975 to the present the major cause of deforestation has been the increase of cash crop cultivation, especially corn for feed. Corn farms were established extensively in the north from 1970 to 1975, and the area of corn farm cultivation increased from 149,960 to 379,923 rai at that time, and then to 854,382 rai in 1980 because global prices for agricultural products increased. The three provinces with the greatest extent of corn farming were Chiang Rai (250,389 rai), Nan (207,303 rai) and Phayao (117,549 rai), and between 1973 and 1976 the area of forest loss was

around 4.5 million rai. Between 1980 and 1988, corn farming increased by more than one million rai (Ganjanapan and Kaosa-ard, 1995). Moreover, the farmers in the north began to grow corn as a cash crop around 1975. Although some of the farmers used land on which rice had previously been grown, most of them opened up new land that had been forested in the past. The reason for the increase in corn production was that it had government support. For example, the government invested more in rural areas by making new roads to connect villages in forest areas to towns. Another plan was the policy of increasing agricultural credit. In 1975 the cabinet voted to allow villagers to farm in national forests, although this was canceled in 1976. In 1975 the cabinet also voted for the Royal Forest Department to offer a document to farmers that farmed an area of less than 15 rai per household in the national parks, although this did not mean that the farmers had a right to ownership. Most of the corn farmers in Nan Province have this document (Ganjanapan and Kaosa-ard, 1995).

In 1975, the Agricultural Land Reform Office (ALRO) was established with the aim of distributing land to landless farmers and also supporting agriculture. At the same time, as mentioned above, corn farming was booming in the north, with an expansion of cash crops, and new land being used by farmers for growing corn. This opening of new land for new crops was connected to internal migration from the northeastern part of Thailand with incomers buying the land from a local farmer that had the documents of land possession for tax purposes, although these documents did not show actual land *ownership* or the right to land. The trade of land between the buyer and seller was informal, and the conditions of trading were accepted by the communities (Ganjanapan and Kaosa-ard, 1995) and apparently were unaffected by a flexible state development plan that supported cash crop cultivation and did not strictly specify land use. For example, the end of the Second Section of The National Economic and Social Development Plan (1967-1971) indicated that the state would expand the corn market through annual corn contracts with Japan and Taiwan (Office National Economic and Social

Development, 1967). However, taxpayer documents (P.B.T5)[7] which have been used to claim the right to access farmland have caused problems for the corn farmers in Nan because they do not actually bestow ownership.

In addition, vague and imprecise documentation concerning land use, deforestation, and the knowledge of forest management cause further problems. Although Thailand was never colonised, as noted above, its forest management system was influenced by the British and it was controlled by British directors for 27 years. The main purpose of the establishment of the Royal Forest Department was for the government to control natural resources. Since the founding of the department, the aim of forest management has moved, as in Western countries, from a focus on the economic benefits of timber to recognising the importance of conservation and aesthetics (Laungaramsri, 2005). Vendergeest and Peluso (1995) argue that "during the 1980s, the Forestry Department increased surveillance of areas classified as inappropriate for agriculture, with particular focus on national parks, wildlife sanctuaries, and sensitive watershed areas. It also set up the program for moving people out of these areas, with the help of the military" (p.393). Around 20-30 % of all farmers worked land that was mapped as a reserve forest with different reasons for occupation. The demarcation system included many prior occupants of the forest. For example, the policies encouraged upland settlement and agricultural and logging concessions. It is likely that by now less than half the reserve forest is actually covered with enough wooded vegetation to be identified as a biological forest. Then in 1985 the Royal Forestry Department was directed by a new National Forest policy to reclassify the forest reserves; they were now classified into two categories, as 'conservation forest' and 'commercial forest'. The sensitive watersheds, wildlife sanctuaries, and national parks were allocated as areas of conservation forest, whereas the degraded forest was defined as

[7]Por. Bor. Tor 5 (P.B.T5): This document is not in any way a title deed. It is just a document that shows that the holder pays the local maintenance tax. It does not show who the owner of the land is. However, most of the land is possessed by the government, which people are allowed to use temporarily. In the case study in Nan province, the farmers mainly referred to this document when they were asked about what type of title deed they possessed.

commercial forest. After that, the Royal Forestry Department was directed to award Sor Por Kor land titles (SPK 4-01)[8] certificates to the farmers that occupied commercial forest land which was classified as suitable for agriculture. The SPK 4-01 certificates in the hands of the cultivators that work on the farms in the forest have been controlled by the Agricultural Land Reform Office, which gave out limited land rights, therefore preventing farmers from expanding their farmland (Vandergeest and Peluso, 1995). This policy to control land use by awarding SPK4-01 certificates to cultivators in degraded forest was partially funded by a World Bank loan, as part of the process of the internal territorialisation of the Thai state under aid provided by supranational organisations, in which the U.S. had an important role. The territorialisation has been carried out by the state with the aim to control the utilization of resources. It represents the state's power over natural resource management.

The main concern of this section has been to point out how the state supports farmers that work on state land while ignoring land rights. Since the corn market is increasing, the corn farmers can access the national resource of land to assist with the state promotion of increasing cash cropping. At the heart of this arrangement is a mechanism by which the state seeks to benefit from the vague definition of land rights in order to keep its power to control the land and forest while supporting the corn market.

**2.5 The growth of agribusiness in Thailand and the globalisation of the food system**

The major turning point in the growth of agricultural businesses came from agricultural development, which was intended to grow the economy and increase the income of local farmers. During and after the Cold War there was cooperation between the Thai state and international organisations, such as the World Bank (WB), the World Trade Organization

[8] Sor Por Kor land titles land is essential in the agricultural sector, usually found in the rural areas. It is an agrarian certificate that refers to government land that is transferred to a farmer only for agricultural purposes. The farmer that has Sor Por Kor land titles cannot sell the land, but it confers the right to occupy it and can only be transferred by inheritance.

(WTO), private foundations such as the Rockefeller Foundation, and American business companies. These played an important role in Thailand, especially in its socio-economic development. The American influence on the Thai economy was partly a result of the American policy to use economic development to curb the communist threat in Indochina. Furthermore, American companies could see opportunities in Thailand since the country had a strong agricultural base and was trying to develop that sector (Pananond and Zeithaml, 1998). At the same time, when the Board of Investment of Thailand (BOI), a state agency, was established in the 1960s with the aim of supporting international business, Thai companies were able to form joint ventures with foreign companies.

This new business sector was supported by state policy. Moreover, Thailand and the U.S.A established an alliance, cooperating on different military and development projects, and the agribusiness sector was one outcome of this cooperation. Since the 1960s, Thailand has applied the modernisation model to develop the country under an authoritarian regime (with top-drown development strategies). Agriculture and cash crops have been promoted and farmers have been supported by state loans. Agribusiness links small farmers to extensive markets of various crops, and most farmers work under formal and informal contracts with agribusiness firms. Consequently, the agribusiness sector has been growing successfully, as can be seen in the Fourth Plan (1977-81) of the National Economic and Social Development Board (NESDB). This and subsequent plans mentioned that the sector was important and supported by the state through, for example, the encouragement of high-value crop diversification and the decentralisation of agri-food processing facilities (NESDB Fourth Plan, 1977). In its Fifth Plan (1982-86) the NESDB accorded agribusiness high priority, and by the mid-1980s, when Thailand was experiencing the consequences of severely low commodity prices, the Sixth Plan (1987-91) supported a thoroughly intensive, commercial, agribusiness-led sector. The Seventh

Plan (1992-96) made explicit mention of contract farming and sought its widespread promotion and adoption (Goss and Burch, 2001).

However, globalisation has also been an important factor in the growth of agribusiness, especially after the 1990s, and has had a major impact on food systems around the world (Kennedy, Nantel and Shetty, 2004). The expansion of corn and chicken consumption in Thailand is indeed part of the growth of world food systems that have been linked by agribusiness.

Although the change in Thai meat consumption and the social and economic development under the National Economic and Social Development Plans are related to the rise of a new business sector, other global changes such as urbanisation, increasing income, market liberalisation, and foreign direct investment have also played a role. Consequently, the modes of production and consumption have changed. The sector has grown within the historical context of politics and development, and the globalisation of the food system currently provides opportunities and more power to agribusiness.

**The growth of the corn and chicken agribusiness sector**

In Thailand, the rise of the agribusiness sector has played a significant role in the development of corn farming and the chicken industry, especially corn for animal feed, and the expansion of livestock and chicken farming businesses. In addition, the new business sector has influenced the development of new cash crops and created new business groups. These play an important role in agricultural development, including agribusiness companies. The major player in Thai agribusiness, especially in the chicken and corn seed industry, is Dhanin Chearavanont, who owns 30,000 ha (hectares) and established the Charoen Pokphand Group (CP)[9]. He is the second generation of a Chinese family that opened a seed and agricultural input shop in Chinatown, Bangkok in 1921. The beginning of CP's modern expansion began in the 1960s, when he took

[9] 30,000 hectares (ha) = 300,000,000 square meters (m²)

over the business and moved into the production of animal feed (Goss, Burch and Rickson, 2000). The first two feed mills were in operation by the late 1960s. As it moved into the agribusiness, the company began arranging poultry production contracts through a vertical integration system in which the company eventually came to supply all of the inputs and processed and sold the goods. However, the success of the company was assisted by domestic political changes with the collapse of the military regime in 1973. This was the end of the military government's monopoly on livestock slaughtering (Suehiro, 1996). In the same year, CP went into partnership with the American company Arbor Acres (Thailand), establishing the Bangkok Farm Company to buy chicken breeds from the latter (Goss, Burch, and Rickson, 2000).

CP emerged as the largest of the Thai companies involved in the cultivation, processing, and sale of poultry, primarily because of the remarkably high efficiency within its production systems (Gronaki, 1994). With this foundation, CP moved into retail by purchasing the Kentucky Fried Chicken (KFC) Thailand franchise. At present, the CP Group is the biggest Thai agribusiness company with links to global commerce and operates agribusinesses in other countries. For example, by 1995 CP operated seventy-five feed mills in twenty-six of China's thirty provinces, and also controlled the KFC franchise rights for China, operating in thirteen cities (Bangkok Post, 1997). The company made investments in poultry operations in Turkey, Vietnam, Cambodia, Malaysia, Indonesia, and the U.S. (Goss, Burch and Rickson, 2000).

The CP Group is a multinational corporation, and one of the major producers of corn seed and chicken breeds. Charoen Pokphand Foods Public Company (CPF) is an associated company of the CP Group that manages agro-industrial and food conglomerates, including feed, farming, food, and retail businesses. Before the point of distribution to retail and food outlets, there are three main precursor businesses: the first is the production of animal feed; the second is breeding and animal farming and the third is the production of processed and ready-to-eat

food. The business covers almost the entire supply chain, acting almost as a monopoly. This results from the firm being the first private company to play a key role in hybrid corn seed, and there are at least five corn varieties under the CP brand: CPS1, CP301, CP508, CP808, and CP888 (Napasintuwong, 2014; Vijedsrikamon et al., 2015). At the feed mill stage, CPF firms prefer to purchase corn under the CP brand and to offer a high purchase price. In the poultry business, the firm has organised contract production of poultry through a system of vertical integration in which the firm provides all inputs (day-old chicks, animal feed, medicines, credit, and extension services) and processes and markets the outputs (Goss, Burch, and Rickson, 2000). It describes itself thus:

> Charoen Pokphand Foods Public Company Limited ("CPF") is one of the world's leading listed agro-industrial and food conglomerates that operates vertically integrated businesses. The Company operates in sixteen countries, exports products from Thailand to over thirty countries, covering over four billion population around the world. The Company operates both the livestock (swine, broilers, layers, and ducks) and aquaculture (shrimp and fish) businesses. The vertically integrated businesses incorporate the manufacturing of animal feed, animal breeding and animal farming; meat processing, the manufacturing of semi-cooked meat and fully-cooked meat; food products and ready meal products, as well as the meat and food retailer and restaurant businesses (CPF, 2019).

In addition to CP, the biggest and most powerful firm, other companies such as Betagro Group and Saha Farm play a key role in corn and poultry farming. Betagro Group is an agribusiness that was established in 1967. There are three main parts to this company: (1) agro-industry (e.g., agribusiness and animal health); (2) fresh food (chicken eggs, chicken meat and pork, ready-to-cook and ready-to-eat foods); and (3) pet care (pet food, supplements, and supplies) and other businesses (wholesale food business, retail food business, the Betagro science centre, and property development) (Betagro, 2019). Saha Farm was established in 1969 and is entirely dedicated to running a chicken business similar to CP and Betagro. This business includes grandparent stock farms, parent stock farms, hatcheries, broiler farms, silo and feed mills, processing plants, and the production of chicken (Saha Farm, 2019). Both Betagro and

Saha Farm are smaller than CP and their businesses do not cover the whole supply chain as CP does, that is, from the seed industry to retail, supermarket, and exportation.

Through their cooperative association, these companies and others have gained the power to negotiate with the state and to push for policies favorable to them. The Thai Feed Mill Association (TFMA) and the Thai Broiler Processing Exporters Association (TBPEA) play a significant role in the shaping of corn and broiler policies.[10] In a fieldwork interview, the Secretary-General of the TFMA mentioned that the association proposed a project for "*corn growing in the dry season after the rice harvest"* to solve the problem of deficient corn in the dry season (between January and April). The project comes under the policy that aims to bring stability for agricultural goods and income from corn for feed. A further project concerning plantation policy is *"to ban corn production from farms that have landowner issues."* Both plans are now in operation (interview, December 2017) and they benefit feed mill companies more than corn farmers. Both plans have been employed by the state for two reasons: first, to support feed mills and chicken farms, and second, to solve environmental issues resulting from the problem of deforestation in Nan Province. The aim is to do this by reducing the number of corn farms in Nan. These solutions to the depletion of corn and deforestation reflect the dominant interests in the capitalist state of Thailand. The Thai state has changed from its alliance with the U.S. to a new alliance with multinational agribusinesses since 1990, and both cooperate to create power over land and forest management. However, the cooperation between the state and multinational businesses is symbolic of the shift in state policy after the Cold War,

[10] TFMA was founded by a group of entrepreneurs who realised the importance of developing collaboration among the livestock sectors in Thailand. On 25 December 1978 the organisation was registered, under the Trade Association Act of 1966, as the Thai Feed Mill Association (TFMA). Its main objective is to assist members to solve problems that affect feed and livestock businesses. Altogether, TFMA had fifty-four members and sixteen directors in 2019 (TFMA website, 2020).

from nation building and development to engagement with globalisation. The aim has been to increase economic development and participation in the commodity chain by linking local farmers to the global market as the Thai economy has expanded. Agribusiness not only uses the constraints of contract farming to control farmers and products, but it has also captured and regulated the entire corn and chicken supply chain.

**2.6 Conclusion**

This chapter has discussed the territorialisation and deterritorialisation of the Thai state with regards to land and forest control in different periods. Siam in the modern state has exercised its powers through the allocation of land and forest use since the 19th century. The first part provided an account of Thailand before the World War II when it was known as Siam. Siam was affected by colonialism especially in the field of administrative reform for resource management. The two main issues were first, the Bowring Treaty which was signed in 1855 between Siam and Britain. The expansion of rice farming for trade affected land use and management because it increased the value of land. The state started to survey and measure the land using British means, but it did not succeed because most farmers did not understand the system. In 1896 the Royal Forestry Department was established under the recommendation of the British with the main purpose of collecting the income derived from teak concessions in the North. The first section presented initial key information about the influence of colonialism as it related to land and forest management. The second section referred to the situation of the international conflict during the Cold War which also affected Thailand, especially at the beginning of the National Economic Development Plan around 1960. The plan was supported by experts from the U.S. and WB. At that time, the Thai political structure was a military dictatorship and influenced by U.S. policy to prevent the spread of communism, and to develop the country by following the modernisation model. The two nations had a good relationship with the same purpose - to oppose the expansion of communism with military force and neo-

liberal economic development. As a result, many development projects were initiated such as road construction as well as corn farming. The first period and the beginning of the second period can be pointed out as the time of territorialisation of the Thai state in natural resource management. But the deterritorialisation started when Thailand undertook the First National Economic and Social Development Plan under an economic neo-liberalist policy in which the state supported the agribusiness companies. As a result, corn farms boomed from the 1970s and the farmers cleared new land for production. They had no conflict with the state officers at that time; corn farming has had state support since the beginning of the development plan. The final section discussed the developmental issues relating to corn farming. Although the feed mills and the multinational companies as buyers, are part of the problem, the farmers are the ones suffering from environmental problems. Moreover, the cooperation project between corn farmers, the state and the multinational companies cannot support all the corn farmers in Nan. The land use for corn farming in Nan has been controlled while growing corn in other provinces has been promoted. This is a return to the territorialsation of the state by cooperation with multinational companies. In the next chapter, I will discuss the methodology underpinning this study which places importance on the voice of the actors in the supply chain**.** Chapter 3 discusses the methodology that has been applied to collecting the data along the corn supply chain and affirms the importance of the fieldwork.

# Chapter 3 – Methodology



**Objective of the chapter**

This chapter discusses the instruments for carrying out the qualitative research that were suitable for the study, focusing on the relationships and interactions of the actors in the corn supply chain. Key information comes from different organisations involved in the chain and reflects the types of interactions of the actors. The study focuses on the complex relationship among the different actors and links this information to environmental degradation; thus, the analysis is not based on the findings from only three villages.

However, the rich data obtained from the corn farmers in the villages are fundamental to understanding the production process that connects the farmer to other organisations. In addition, documentary analysis, fieldwork study, interviews, participant observation, and nonparticipant observation were the methods used in the thesis to access the complexity of the corn production and supply chain. Moreover, the chapter discusses the reflections based on the fieldwork and limitations of the study. The data from these different methods can reflect the relationships among human behavior, social systems, regulations, and natural resource management. However, the voice of the corn farmers and other actors, as well as the atmosphere

of the villages, echoes the connection among the farmers, merchants, feed mills and the natural resources (land, air, and forest) under the capitalist mode of production. In addition, the study places importance on the “voice” of the voiceless and the social context that have less interest in the economics area in the study of the supply chain.

## 3.1 Introduction

This chapter aims to provide information about the set of qualitative research methods applied and justifies the reasons. It also highlights how I gained access to data sources and key information, and the process by which the data have been analysed and triangulated. Finally, there is a brief discussion of the research ethics and limitations of the study.

As described in the introduction, this research aims to understand the political ecology of corn production in Nan Province Thailand by unraveling the complex stratification of the food supply chain. It is considered that this chain demonstrates exploitation of both human labour and the environment. It attempts to offer an intelligible explanation of the complex issue of corn farming that is entangled with environmental degradation and the idealism of sustainability. I believe that qualitative research offers me a range of research techniques and methods to address each research question. The methodology is an important part of the thesis that is instrumental to accessing the data sources. For this study, even though corn farming relates to agricultural activity in the rural community, the unit of analysis is not limited to the villages. When considering corn production within the context of environmental problems, then the supply chain is the unit of analysis. Hence, interviews and participant observation, as well as nonparticipation, are applied to the research. In fact, the study of the supply chain is popular in economics and marketing, focusing the analysis on economic institutions within the economic framework. However, this study emphasises the voice of the actors and their social and economic interaction, which is the main sociological focus within political ecology and eco-Marxism.

## 3.2 Research questions

As discussed in the introductory chapter, the aim was to study corn production and environmental degradation. During the research design, I developed key research questions and identified appropriate methods that fit this study's objectives. Although the research problem

has remained unchanged since the design phase, I chose research methods that are justifiable in relation to the research questions. I aim to find the best possible answers within the research timeframe. Table 3.1—adapted from Mason (2002)—links the research questions to the methods chosen and their rationales.

*Table 3. 1 Research questions, methods, and justification*

| Research questions | Data source and methods | Justification |
|---|---|---|
| 1. How are political issues in Southeast Asia during and after the Cold War related to agricultural development, the history of land use, forest management, and corn farming in Thailand? | Research projects about the natural resource development and politics in Thailand and Southeast Asia<br><br>Analysis of social context and political issues in Southeast Asia during the colonial period and after the Cold War<br><br>In-depth interviews with forestry officers and the Director of the Natural Research Center of Millet and Corn | The socio-economic context, state regulations, and political analysis of the social and economic development that relate to natural resource management are the necessary first analytical steps to gain initial insight into corn farming and the environmental issues in Thailand. |
| 2. What are the major causes of the multilayered exploitation in the corn supply chain and poultry industry and how have these been maintained? | The interaction among different actors in the chain and focus on the type of negotiation and exploitation<br><br>In-depth semi-structured interviews with corn farmers, middlemen, state agencies and agribusiness cooperation, organisations, and the owners of chicken firms.<br>Participant observation and non-participant observation. | Approaches of the political economy of corn production<br><br>Interviews with different stakeholders, e.g., corn farmers, middlemen, the government, and international agribusiness corporations as well as expert practitioners, allow a clear understanding in which multilayered exploitation in the corn production and corn supply chain and poultry industry is interconnected. |
| 3. What are the environmental problems that are related to corn farming, and how are they connected to the accumulation of capital? | Secondary data (reports, research papers, newspapers, and TV programs), analysed by classifying the problems and linking them to the concept of political ecology and capitalocene | First of all, to understand that corn farming is an important link to environmental degradation. The farmers are the key actors. |

| Research questions | Data source and methods | Justification |
|---|---|---|
| | In-depth semi-structured interviews with corn farmers, middlemen, and government officials | Moreover, the regulations of the state and companies are the response to the problem. The interaction between them reflects the relationship among humans, nature, and society. These relationships bring about an understanding of the capitalist mode of production of corn.<br><br>The different views of natural resources affect different responses. |
| 4. What are the responses of the different actors in the corn supply chain to the environmental crisis in Thailand, and what interactions take place between them? | Secondary data (research, newspapers, and the TV programs)<br><br>In-depth semi-structured interviews with corn farmers, middlemen, and state officers (forestry officers) | To understand the relationship among human, social and natural resources<br><br>As corn farming is closely linked to environmental degradation, it relates to all actors in the chain.<br><br>Moreover, the regulations of the state and companies are the response to the problem. The interaction between them reflects the relationship among humans, nature, and society. These relationships bring about an understanding of the capitalist mode of production. |

### 3.3 Research methods

#### Documentary research

I began with documentary research in order to dive deeply into the emergence of corn farming in Thailand. I valued the importance of the historical analytical approach, which certainly helped me make the connections among the local, regional, and global demand-supply equation for corn and associated products, and its supply chain. The historical approach allows clarity in three crucial situations: the influence of the colonial period on natural resource management, state-building through citizenship after World War Two, and the state promotion of protein

consumption. This marks the turning point in food consumption. The last is the promotion of corn as a cash crop as a result of political and economic aims; Thailand was influenced by the U.S. during the Cold War. These are the main factors underlying deforestation and other environmental problems.

I employed a documentary research method in order to 'plug into' a historical analysis of corn farming in Thailand, making connections between the regional and global context of agricultural development. From the documentary research, I was able to make connections between corn farming as a cash crop, which is supported by the state within the capitalist mode of production, and which relies on human labour and the natural resource. Moreover, the state policies on natural resource management, and agricultural policy, support corn farming and the projects involved in addressing the environmental problems. These reflect the relationship among the state and the farmers and natural resources.

To sum up, documentary research was a very important method for the situational analysis of corn farming in order to complement the field research conducted.

*Table 3. 2 Data sources and information gathered*

| Data sources | Information gathered |
|---|---|
| Government | Policy and Legal Framework<br>National Development Plans and Strategies<br>Research reports conducted by key ministries (Ministry of Agriculture and Cooperatives, Royal Forest Department, Department of Internal Trade of Thailand, Department of Livestock Development)<br>Statistical data |
| Private sector | corporate policies<br>sustainability related report |
| International organizations and civil society organization and | project documents<br>research reports |
| Local and international media outlets | news<br>articles |
| Academia | books<br>articles |

**Field work**

Fieldwork is at the heart of this sociological/anthropological research for systematically examining social phenomena and people's lived experiences. The corn production and supply chain need to be made clearer by linking the political and economic factors to corn farming and the agricultural practices of the different actors in the chain. Participant observation and non-participant observation were applied to study the activities of corn farmers' interaction with state officials and the staff of the private companies by using observation and semi-structured interviews.

- Choosing the research sites

From the documentary research, it is clear that the corn supply chain is extremely broad and encompasses multiple players/actors and business sectors. The fieldwork was carried out in the three provinces along the corn supply chain: Nan, Lop Buri, and Sara Buri provinces, whereas the main offices of the companies and business organisations are located in Bangkok. The northern province of Nan is the largest producer of corn in the north, and the province has faced environmental problems. Lopburi Province, and Saraburi Province are in the central region and have a density of feed mills and poultry farms.

A range of research techniques were adopted for my field work, including the participatory observation of farmer's behaviours and key informant in-depth interviews, in an attempt to piece together 'The Complexity of the Supply Chain' and the 'Political Ecology of Corn Production in Nan Province, Thailand'.

- Access to the research sites and targets

> "One of greatest pitfalls in conducting research successfully is the inability to obtain access to the research field."
>
> (Johl and Renganathan, 2010: 41)

One of the most challenging issues during my field work was the problem of access. At first, given that I am Thai and therefore understand the Thai culture and language, I was confident

that I could gain easier access to all of the research sites chosen. I was totally wrong. This resulted in revisiting my research plan and schedules.

I recall that the different people I wished to contact exhibited different levels of difficulty in terms of gaining access to them. According to Laurila (1997), three types of access are highlighted in her study—formal, personal, and individual rapport. Formal access certainly requires the researcher to follow formal procedures in order to gain access when there is a need to work with gatekeepers (Laurila, 1997). For this thesis, all three types of access were applicable to the research targets.

Formal access: according to her, formal access requires the researcher to follow formal procedures in order to gain access when there is a need to work with gatekeepers (Laurila, 1997). For this research project, this type was used to access government agencies and companies (see the table below). Initially, I needed to follow the regulations of the organisation.

*Table 3.3 List of the key informants from government authorities and private corporations*

| Agency Name | The officer |
|---|---|
| 1. National Research Centre of Millet and Corn | a director |
| 2. The officer of the district agricultural office (Nan Provincial agricultural extension office) | a director and a staff member |
| 3. Nan Provincial Commercial Office | a director and a staff member |
| 4. Nan Officer of Provincial Cooperative | a director and a staff member |
| 5. District of agricultural extension office (Tha Wang Pha, Wang Sa, Na Noi) | 3 members of the staff |
| 6. Nan Provincial Forestry Office | a director |
| 7. Lopburi Provincial Livestock Office | a veterinary surgeon |
| 8. Saraburi Provincial Livestock Office | a veterinary surgeon |
| 9. Betagro | |
| 10. INTEQC FEED CO., LTD | |
| 11.Saha Farms | |
| 12 Thai Feed Mill Association | |
| 13.Thai Broiler Processing Exporters Association | |

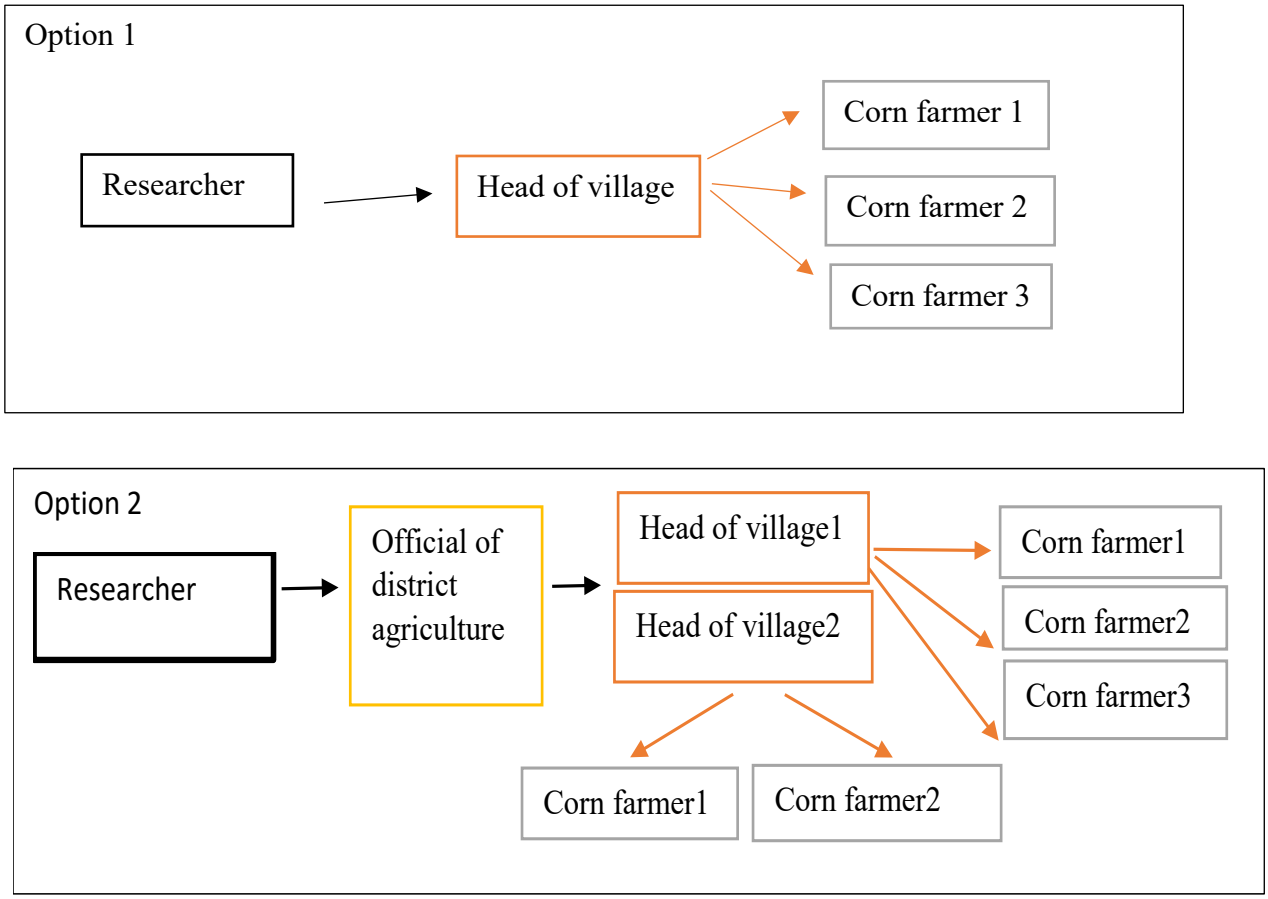
However, the concerning communication is still influential in Thailand. Access through personal contacts is the second type that is mentioned, and this was more effective in my case.

In my study social networking was very important and before I went to Thailand, I contacted my colleagues, friends and former students that had been working in places related to the area of corn farming. I found that it was very useful to find someone that you have known before as these people would function as gatekeepers to the next step.

The third type of access is fostering individual rapport. This type is also very important when applied to finding corn farmers to interview, although it was less of an issue for some villages that I had visited before. However, I encountered difficulty in gaining access to the villages that I had never visited before. In order to be able to access these villages, I first approached the head of the village by contacting the official of the district agriculture office. I then explained my purpose in going there, the subject of my research, and asked them if I could visit the villages and seek farmers to take part.

After this, I stayed in the villages, spent time with the villagers, and worked with them on their farms. This required considerable rapport, which was both challenging and took time to establish (Laurila,1997). The success of working closely with the farmers also improved the quality of the evidence gained through the interviews. For this, gaining access is a significant step. If the researcher can find someone to accept his or her presence, it will help to build a web of relationships. These relationships are important as the contacts function as gatekeepers to gain access to multiple informants (Feldman et al.,2003). However, in my case there was a limitation regarding timing, as only the head of the village could provide the farmers that were available to interview. Additionally, the range of interviewees may have been limited to a group of farmers that were familiar with the head of the village and therefore may not have been completely objective. I was concerned about this issue but because the questions were about basic agricultural practice, they did not relate to political issues. Having said that, the data provided could link to the key points raised by the greater network of sources. Further, data were collected from different villages, thus providing diversified data.

*Figure 3.1 Two access paths to the corn farmers*




**Sample**

As this research is purposive, convenient, representative and flexible (Bryman, 2016; Patton, 2002), I shaped the sample in order to: 1) gain valuable insights, aiming at selecting participants under specific criteria in relation to their mandates (government officials); 2) be strategic as the sample has been adjusted according to arguments emerging from the research; 3) be representative in order to match the characteristics of the population relevant to the study (that is, experts); and 4) be flexible in order to face potential challenges arising during the data collection.

I approached potential contacts for sampling and was able to engage 47 interviewees. I conducted 22 interviews with corn farmers, 2 local merchants, 13 government officers in state agencies, 6 in the business sector, and 4 chicken farmers.

1) Purposive sampling

I used a combination of snowballing and pure purposive sampling techniques. I believed the first participants to be 'strategically important contacts' (Henn et al., 2009:337). I spent the first few months contacting the key informants by phone, although I had sent an email to some in advance. I have come to realise that networking is the most functional way to make contact. I started to interview some of my colleagues and their suggested networks, which has proven to be very useful when looking for interviewees with specific expertise.

For purposive sampling, I began drafting a list of as many authorities with relevant mandates, responsibilities, and knowledge in the field (shown in Table 3.3) as I could. I called government authorities to schedule the first round of meetings in order to gain valuable insights (Bryman, 2016). Yet not all of the individuals were available to meet with me; some of them took more time than others to successfully arrange a meeting (on average it took me a few months to successfully schedule one). I finally was able to meet and interview 13 officials. Their responses can be divided into three approaches: 1) avoiding answering the main questions; they were pleased to present and show reports, papers, and other documents; 2) describing what the department does even if that it is not the question being asked, and explaining the cooperation with other agencies and recommending interviews with the relevant agencies; and 3) answering questions honestly and reflecting on the problems and limitations of the agency. Most of the responses were of the first and second type, and the last type was rarely found.

2) Convenience sampling

In this sample group, I chose 22 corn farmers and 2 local merchants. The corn farmers are at the top of the sample list as they are blamed for their involvement in environmental problems and deforestation; they are in the spotlight as being those that farm on the highlands. The most difficult part was how to find them and arrange interviews; once the schedule was arranged, I found the interviewing more relaxing than with the other sample groups. There are only three times when the farmers are usually available to talk: the early morning before going to the farm, at night after they finish the daily routine or, if lucky, they will allow you to go to the farm and do observations and interviews there. The conversation is informal and relaxed when the interviews take place in their homes or farms; however, there is a problem in that they are usually interrupted by family and neighbours. The interviews begin with questions concerning the background and process of corn farming, the issue of land ownership, other problems, and future plans for corn farming. The difficult questions for them are those concerning land use and the source of capital while environmental issues seem not to concern them. Moreover, the dialect also posed a problem for the researcher at the beginning (see Appendix 3 regarding information about the corn farmers).

- Local merchants

Arranging interviews with this group, the merchants, was rather more difficult than with the first and was very challenging because they are somewhat guarded. The researcher has to consider sensitive issues such as the buying and selling price, and business networking. The merchants are well-known as sellers, buyers, and some of them provide capital. The topic of the conversation concerned the process and conditions of selling and buying, with follow-up questions used to link to the higher market such as the feed mill companies. In the beginning, one merchant refused to talk to me and said he was very busy. However, later I had support

from the head of the village, who is his customer, and with his intervention he agreed to be interviewed.

The role of the local merchants is important to the study. They are the owners of mills and trucks and are vital to the small-scale corn farmers in Nan, whose only assets are their land and labour. The role of these actors is important in linking the farmers to the buyers and some of them also provide capital. The second group is people that run businesses related to agricultural products and are also buyers and sellers, as mentioned above. This is an influential group, and they are the most difficult to access. However, the researcher approached them using the same strategy as with the first group: contacting the officials of the provincial commercial office and the well-known corn farmers.

3) Representatives

*Feed mill operators*

I interviewed 6 representatives from 3 feed mill companies and 2 associations (see Table 3.3). The problem was how to deal with their attitude. They were friendly and collaborative but were worried about the consequences of this study, making it very difficult for me to gain information. I came to realise that when comparing the executive and operational staff, the manner of the operational staff is more relaxed when providing data and giving their opinions, while those in executive positions have more responsibility and therefore need to be careful. Another point to make is that when interviewing agencies such as the Thai Feed Mill and the Thai Broiler Processing Exporters Association, some benefits arose besides the specific information. The Association can provide links to the other feed mill firms for the researcher to carry out interviews and visit firms that are otherwise difficult to access. This enabled interviewing at the same time as observing. The letters and information sheets are important.

*Poultry farmers*

This is the final group, and they are the users of corn as chicken feed. Carrying out interviews with this group is similar to interviewing the corn farmers. The most difficult part is finding the farmers and arranging interviews. Once found, the farmers thoroughly explain the process of feeding the chickens until they are sent to the chicken processing factory, and they talk openly about the quality of the feed and the conditions of the contract.

These interviews are the most important for the study as the information obtained is the most meaningful when looked at from a sociological perspective. In order to give the interviewees their own voice, working with various groups requires different interview techniques for understanding their story. Although techniques are important, the reliability of the data obtained is also crucial.

**3.4 Data analysis**

Braun and Clarke (2006:87) listed the process of analysis as 'familiarizing yourself with your data; generating initial codes; searching for themes; reviewing themes; defining and naming themes; and producing the report.'In this particular research, I have applied these required stages to analyse my data. I transcribed my interviews, observation reports, and the other documents that I used for my research as the primary stage of familiarising myself with my data. Additionally, I read my transcripts and other sources several times in order to deeply understand my data. This also allowed me to find valuable information to create my themes and codes for the data analysis, which are the requirements of the second and third steps of the thematic analysis.

The data were organised into 10 themes: 1) the corn in everyday life; 2) the mode of production used by the small corn farmers in the slope areas; 3) the environmental degradation in Nan and the reaction of relevant actors; 4) the fundamental issue of land use on the highlands and the land conflicts in Nan; 5) the negotiation of corn farmers; 6) the cooperation between

state and agribusiness companies at different levels; 7) the role of the state in the environmental crisis with three key problems; 8) corn production and state power; 9) the exploitation process in the corn supply chain; and 10) the development of the chicken industry and corn farming. After creating these themes, I reviewed them to understand if there was sufficient evidence in my data to cover each theme or whether there was a need to create new ones or to change the thematic structure.

**3.5 Reflections on the fieldwork**

This section discusses the two important experiences that influence fieldwork and collecting data. Those are "seeking the gatekeeper" and "the power relations in the field"; both topics were written about in the fieldnotes. There is a difference in definition between reflection and *critical* reflection, but both support each other. The process of reflecting on an experience or a specific activity is known as reflection, whereas *critical* reflection is a more in-depth form of reflection in which researchers analyse the assumptions (beliefs, values, and ideas) that influence their behaviour (Brookfield, 1995; Fook & Gardner, 2007). Fieldnotes generally provide the material for this reflection.

- *Using social networks to search for gatekeepers*

I have learned from two successful aspects of my study. In the first case, my fieldwork in Nan Province went quite smoothly, especially the work with the government sector. Before I travelled to Nan, a friend introduced me to her colleague who has worked in the Nan Provincial Agricultural Extension Office. He was a good and very helpful gatekeeper, providing initial information on the corn situation in Nan province. He also contacted and gave me the phone numbers of other staff in different governmental sectors, such as the Nan Provincial Commercial Office, the Nan provincial agricultural cooperative, and the agricultural district in Amphoe Na Noi.

In the second case, a colleague introduced me to her teacher who was also the supervisor of someone that had worked as an assistant managing director in one of my case study companies. This made it easier to approach this company; it then gave me useful information and organised a trip to visit their feed mill in Lopburi Province, offering to answer further questions if needed. For the other companies, I normally contacted them by phone and emailed them, but this was very time-consuming and I failed to reach some of them. In this case, I asked them if they could answer my questions by mail and I have also drawn on data from their websites.

- *Asking the head of the community to be gatekeepers and peer interviewers*

For the second aspect of a reflection on the fieldwork, the credibility of the researcher and the gatekeepers is significant. Doing the research in Thailand, especially in the villages in rural areas, if the researcher can get along well with the heads of the community or village, it can be a useful way to access the villagers. The village heads play a significant role in the village as state representatives and also heads of the community. Hence the researcher needs to establish trust and faith in the relationships with these people in order to facilitate his/her access to the next step. Emmel et al. (2007) highlight the methods that the researcher can use to build trust with a community when coming from the position of an outsider. Because the researcher is an outsider, the study population views him/her as a stranger, and the degree of social separation between them is characterised by distrust. This happened to me at the beginning; all of the villagers, including the head, speak the local dialect, which immediately marked me as an outsider from my speech. However, applying the strategy of using a peer interviewer who lives in the same village helped in this case (Elliott et al., 2002).

In the beginning, the head of the village introduced me to the villagers as follows: "*There is a Ph.D. student who is doing research into corn farming and will be staying in our village between 5th and 15th of November 2017. She is living in my house. During this time,*

*she will come to your house to interview you about corn farming. Please give her your cooperation*." I also had peer interviewers as recommended by the head of the village. This was useful in the beginning, but in fact, I just wanted someone that could explain when I did not understand the local dialect. The researcher should be the main person running the interview by her/himself, especially with the semi-structured interview. However, the villagers came to know me as the student studying corn farming. I went to their houses in the evening after their return from the farm, at around 6-7 pm., and stayed until 9 or 10 pm. On my first day of interviewing I was accompanied by the wife of the community leader because they suggested that it would be difficult for me to find the interviewee's house. Also, as a female working alone I should be accompanied. I accepted their suggestion, but only on this first occasion.

**The power relations in the field**

This section comments on the power relations in the field, which the researcher had not considered before, and it related to the relationship between the researcher and participants.

- *Gender issues in the village*

During the period that I stayed in the village to conduct the interviews and to observe, it was difficult to find female participants since the society is highly patriarchal. When I asked women to participate in my research, some of them were hesitant to take part and I could not find many female participants. They asked me to collect data from their husbands because they told me that their husbands knew more. Interestingly, when I conducted interviews with the men, their wives were likely to be around during the interviews and would interrupt to make a contribution. In fact, the women would address my questions and provide more detailed answers despite their husband being the participant.

I found that the women provided information just as useful as that given by men. Working on the farms using their own labour, both men and women can explain all of the processes involved in farming, though their activities may differ. For example, most of the men

usually work with chemicals while the women's activity is cultivating and harvesting. However, this is not an absolute division and there is some flexibility. Probably because of their secondary position in the family women were sceptical about participating in the study and I think that this was a way of protecting themselves from any potential harm that may result from participating in my research. Their husband's participation made them more comfortable and together they would easily express their opinions. This highlights the need to be flexible when conducting research and to adapt to local customs.

Gender issues also affected me as a female researcher when staying alone in the village. A suitable time to interview was in the evening around 6 to 10 p.m. after the farmers had finished their work and were relaxing at home. In the village, the farmers' houses were not too far from each other, and I went to them to carry out the interviews. I conducted 1-3 interviews per evening, depending on the time that the farmers were available. One night I interviewed a fifty-eight-year-old farmer; we used the living room for the interview, which meant that it was not private, so anyone could come and join our conversation, and this had both positive and negative consequences. An advantage was that the interview was natural and informal. On the other hand, our conversation could be disturbed by anyone, members of the family or otherwise. In the village, everyone can come to visit their neighbours any time they like. This particular interview was disturbed by a man who was drunk, in fact the interviewee's son. He tried to stop our conversation and asked me to join his party. He told me that he could answer the questions and came to sit close to me. He touched my knee and tried to reach my hand. I felt so uncomfortable that I had to stop the interview. I told the interviewee that it was late and that I would return the next day and left. I walked alone to the house of the community leader, with whom I was staying. The leader was hosting a small banquet, which is quite common after a harvest; the farm owner prepares some food and drinks to serve his neighbours that assisted with the harvest. They asked me to join them, and I did so for a while but left after the drunk

followed me to join the party. He made inappropriate remarks and tried to touch my hand again. The wife of the community leader witnessed this and evicted him. The next day I went to finish the disrupted interview and finished the interviews with this community a day later. Owing to this experience, from then on I planned to stay in town and drive to carry out the interviews in the village, returning to town at night.

Staying in the community and conducting interviews in the interviewees' homes benefited the research in terms of observation but it also had some disadvantages for alone female researcher as well. Both sides should be considered.

### 3.6 Limitations

*Emic and etic in the fieldwork*

I am aware of the issues of being both an insider and an outsider (Morris et al., 1999), and I have been well prepared. However, this problem still affected me when I was working in the villages; I faced some difficulties in understanding the local language used in the villages where I collected my data. Even though the local people speak Thai, they have a specific accent and at the same time, use completely different words. At the initial stage of my fieldwork, I struggled to understand the corn farmers and local people, but after spending some time with them I became familiar with their accent. It was also somehow easier to communicate with young people in comparison to the older people because the official language is used more by young people. Older people have a strong accent and for some reason, I got the impression that they did not want to speak standard Thai because for their generation speaking it is difficult, while the younger generation learns Thai in school and has more chances to use it with outsiders. Hence, this made it difficult from time to time for me to understand the information that they provided. Fortunately, some of the villagers kindly offered language support, and I could seek their help when I met a language barrier. Sometimes, I had to repeat the questions and asked my participants to kindly repeat their answers when I had language issues and did

not have a local person to help me. It is important to mention that I did not face this problem throughout the fieldwork; it was mainly during the initial period. I began to understand their accent after I had spent some time in the villages.

This concerns me for two main reasons. Effective communication not only affects the quality of the data collection, but it also relates to developing a good relationship between the researcher and the villagers. However, as I spent more time with them, during fieldwork, and sitting at the grocery shops in the centre of the village, I realised that my listening skill was developing and I could better understand them.

*The time frames*

The period for collecting the data was planned to be four and a half months, between the middle of September 2017 to the end of January 2018. There were four main sectors of the corn supply chain that I needed to study: farmers and local merchants; state officials; the companies and the owners of chicken farms. However, it was difficult to access the target population during December due to the New Year's vacation and I struggled to collect data from the companies and governmental agencies. While the timing is suitable for other actors, especially for the activities in the corn farms, October and January is the harvest season.

## 3.7 Conclusion

The focus of the thesis is on corn production and the supply chain, which aims to analyse the socio-economic interaction between the main actor in the chain and connect it to the capitalist mode of production and environmental crisis. Therefore, the qualitative method was applied to accessing the data. Fieldwork with the semi-structured interviews, participation observations, and nonparticipation observation are the main methods. Documentary research and the historical approach are applied in order to gain greater understanding of the background of the natural resource management, the beginning of the corn farms, and the changes in the consumption of the Thai people for consuming more protein. The supply chain is the unit of

analysis, and the most important aspect is the voice of the actors, who are subordinate in the chain and can echo the different power relationships. However, emic and etic issues, and the suitable time frame, are the limitations of this study.

Chapter 4 discuss the voice of the corn farmers and other actors, as well as the social context and the farmers' everyday life.

# Chapter 4 - The Voice of the Voiceless from the Corn Farms: The Struggle of the Small Farmers



**The objective of the chapter**

This chapter aims to reveal the voice of the corn farmers and others within the social context of their everyday life. The difference between the farmers and their interaction with other actors, such as local merchants and state officers, will be examined. These interactions echo the connection between the farmers, the corn market, state regulations and the natural resources (land, air, and forest). Their interaction signified how human labour and nature are exploited intensively on a local and global scale. This kind of a capitalist world, with fierce rivalry, leads to environmental degradation (Connor, 1997).

## 4.1 Introduction

This chapter explores the social structure of corn farmers and their voices. Although corn farmers and agricultural practices are mentioned as being central to the issue of deforestation and other environmental degradation (Khempet and Jongkaewwattana, 2021; Telerngsri and Pongkijvorasin 2015), the social context also needs to be considered as a factor in corn production and the corn supply chain (Gereffi et al., 1994). Moreover, that the expansion of corn production has been successful in supporting the growth of the chicken industry since the 1970s is also key (Heft-Neal, et al., 2008). The story of corn production involves not only the corn farmers but also other actors that play significant roles in corn production. The voice of the corn farmers reflects the unequal relationships among the participants in production, involving, for example, farmers, local merchants, agricultural shops, and state officials and feed mill companies. In this context, the state, the large companies, and the local merchants have more economic power than the corn farmers, but it is the farmers that have often been blamed for deforestation causing serious environmental problems (Pongkijvorasin and Telerngsri,2015). For the corn farmers, the situation seems to have been compounded by uncertainty about the future of the corn market because of deforestation, and their powerlessness when trying to negotiate and sometimes resist state regulation. The interesting thing is that despite this, they do not give up; all of them try to find ways to survive through negotiation and resistance because they have been corn farmers since their parents' generation and receive their main income from the farms. Based on the above, the chapter has been divided into four parts: the first provides the social background of corn farming in Nan province; the second examines corn production, including farm management and the labour used; the third discusses the issues of land ownership of the corn farmers in Nan province and how it relates to deforestation; and the last section examines the response of the corn farmers to uncertainty. All of the sections consider the production conditions according to three aspects: the external

physical conditions, the physical and mental well-being of workers, and lastly the ‘communal condition’, which refers to social capital infrastructure (O’Connor, 1997). Moreover, these relationships involve the exploitation and negotiation among the actors and state regulators.

**4.2 Everyday life of the corn farmer**

Apart from explaining the corn farmer’s life, this section investigates the landscape of the study area, which is mostly highland and, in parts, mountainous. The change of land use in the province is similar to that of other countries in Southeast Asia. Formerly, many of the mountainous areas were covered by forests, but as a result of logging and the relocation of expanding human populations into land appropriate for farming, they are rapidly being turned into farmland. This is a result of the social and economic development plans that influence agricultural expansion in remote areas. The plans aimed to promote economic development as well as prevent the expansion of communism during the cold war (see Chapter two, page 45-47). The first plan was in 1961, which focused on developing infrastructure with the aim to link the remote villages to the central region and also to make it easy for the state to carry out inspections. Moreover, the infrastructure projects such as roads and dams relate to the loss of the forest area.

The majority of those places were forested, with small human populations that practised shifting cultivation. In many areas, commercial logging and colonisation initiatives changed the environment (Marten, 1990). Corn planting has been part of the historical development in the region, but farming has been significantly extended since the Cold War as a result of political and economic development (see Chapter Two, page 47-49). Moreover, the chapter describes the importance of the social life and social class of the corn farmers that have had a similar background for generations; however, they have become significantly different in terms of being a part of the capitalist mode of production (Milios et al., 2002). The demand for corn has been increasing, with the result that corn farming in the present generation needs more capital

in order to practise intensive farming compared with the previous generation, when the land was not restrictive and needed less capital.

As part of my fieldwork, I worked in the villages of Ban Huai Mong, Ban Chompuu and Ban Ai. Ban Huai Mong is my focus because of its location in the highland and it is where most corn farmers have a problem with land ownership. The dwellers in the highlands are marked as being the cause of deforestation. The other two villages are in the areas that have high corn production. Travelling to the village of Ban Huai Mong took around two and a half hours from the centre of Nan province, a distance of eighty kilometres. I drove on uphill roads, which were difficult for someone unfamiliar with the area like me; however, the view of corn fields along the road fired my curiosity.

Ban Huai Mong is a small village with 137 households. It is situated on a hill and houses have been built along both sides of the village road. The structure of the village is the same as the other villages in the north. The houses are separated from each other by vegetation or a simple wooden fence. The boundaries between the houses are not fixed; some neighbours have a shared space for vegetable gardens. There is a village temple situated in the area at the front of the village which has been renovated and looked better than it did the first time I visited 12 years ago (2009). The temple functions not only for Buddhist ceremonies but is used for other activities as a community centre. The head of the village[1] explained, "we have received donations from villagers who work in Bangkok. It is typical for village temples in rural areas to be supported by the villagers. Besides, young people who work outside the village will send money to support their family and farms, and they also support the temple." Next to the temple is the residential area with most of the houses scattered in the middle, whereas the farmland is far away on the hillside. Because the landscape of the village and agricultural areas is on the

[1] The head of the village acts as a representative of the government, elected by the villagers. At present, the head is changed every five years whereas in the past they held the position for life.

hillside, a motorcycle is important for households. The farmers go to their farms by motorcycle, which has to be maneuvered by the rear wheel for riding uphill. The motorcycle is part of the farmer's life; each household owns one, and some have more than one. Some households buy them on instalment because they do not have enough cash. There are three grocery stores in the village and each of them has regular customers. One of the advantages of being a regular customer is that one may buy goods and pay later. Some of the products are more expensive than at the supermarket in the town due to the owners adding transport costs, and the villagers pay with credit (buy goods and pay later). Most of them are small farmers whose main income comes from farming corn, other crops, and wages for their hired labour. They use credit rather than cash. Sitting in a village shop, I sometimes heard people gossiping about a villager who had not paid for goods bought on credit but had chosen to go to another shop. I overheard other stories about their lives and problems. At the end of the village, there is a river tributary which some villagers use for washing. The pictures below show the village scenery.

*Picture 4.1 Landscape of the village*

Most villagers are members of two families, with the names, 'Thammasiri' and 'Tanakuang.' It means that they are closely related, and some people have relatives in

neighbouring villages. Such relationships relate to the labour exchange system. All of the villagers in Ban Huai Maung are farmers and have worked their farms since their parents' generation. The majority of the farmers are 'traditional farmers'; their age is around 50 to 70 years, whereas 'newcomers' are younger, aged between 30-40 years. One of the newcomer farmers told me about her agricultural life, which she had resumed after she had abandoned it for 10 years—so I could not always categorise them precisely.

The farming households manage their food and income from the land. The households do not spend much money on food; they have a simple meal composed of ingredients that can found on their farms and in their gardens: rice, vegetables and chilli sauce are the main components of every meal and they rarely consume meat. Meat dishes are mostly prepared for guests or for a specific party. For example, during harvest time the farm owner cooks for the neighbours that are working on his farm. Most houses in the village have enough space for growing vegetables. Some farmers also keep animals such as chickens, pigs, and cows, which they use for household consumption and sale. The villagers also grow rice for household consumption and earn a living by growing corn. Thus, households have sufficient food to supply their family. During the time I spent time with them doing fieldwork, I noticed that the three meals (breakfast, lunch, and dinner) are the same—sticky rice, vegetables, spicy sauce, and chicken or sometimes fish soup—they rarely ate red meat. The food is simple when compared with the food of middle-class people in town. The money is used for other household expenses such as groceries, travelling, medicines and children's education.

In general, all of the farmers have debts because of the need to invest in corn, other crops, and also household expenses. Although the main income comes from agriculture, especially corn and other fruit trees, most of them have borrowed money from more than one source and cannot pay back the money, while some people are the exceptions. For example, all of the farmers are members of the Bank for Agriculture and Agricultural Cooperatives

(BAAC)[2] ,which is a state bank providing credit to the farmers that have to prove land ownership to guarantee the loan. In practice, however, even the farmers that have no certificate of land ownership can be a member and get agricultural input support by asking for five guarantors. Moreover, most of the farmers also obtain loans from the local merchants, agricultural shops and also other developmental funds provided by the government. All of the corn farmers said that corn production is the main income for the household and that corn is a cash crop that has received support from the state. The farmers receive less benefit in comparison with the other actors (the merchants and feed mill companies) in the chain and are nearly all living with debt.

Most studies about the farmers in Thailand focus on rice farmers, who are the majority. However, they have faced a situation similar to that of the corn farmers in being exploited by the capitalist mode of production. This thesis argues that the farmers' struggle is a part of the adjustment process of capitalism, while their struggles and indebtedness signify the exploitation process. In Thailand, the growth of agricultural capitalism has developed from sources including profits from accumulated rent, profits from the sale of agricultural inputs, interests on loans, land rent, and profit from the underpricing of agricultural products (Taotawin, 2008). In the case of corn farmers, even if they survive, they are exploited by the need to pay rents and the need to provide intensive labour under the capitalist system.

Although most of the farmers in the village are similar in that they are struggling and have trouble working on the corn farms, they are different in terms of access to and possession of the land and capital. The farmers that are in the three villages can be categorised into three groups according to their sources of income, their capacity to manage credit, and their access to the market. While the study of Ganjanapan (2001) argued that land ownership is the main

[2] The Bank for Agriculture and Agricultural Cooperatives (BAAC) was established in 1966. The objective is to provide financial assistance to farmers, farmer groups and agricultural cooperatives.

factor for identifying a farmer's class, the issue of land ownership reflects the relation among humans, the environment, and social regulation. Although most corn farmers face the same problems relating to the right to land ownership, it is their capital and ability to grow several types of commercial crops that are the factors that categorise them as corn farmers. Therefore, diverse sources of income and the ability to adapt and survive can be used to classify the groups of farmers.

(1) *The first category comprises those that can cope economically in order to survive*; they grow diverse types of crops to supplement their income—additional to corn—enabling them to manage their debts and therefore they do not have to work as labourers in other people's fields. The labour exchange between relatives and neighbours has been a necessity. For example, Soi is a newcomer farmer worked in Bangkok before returning to farming again in 2015. She is the owner of a grocery shop but also a farmer that grows corn, rubber trees, and mango trees. Soi told me about her routine. Every day she wakes up at around 3 a.m., and then goes to the market in Tha Wang Pha district to buy fresh food (vegetables, meat, and other fresh food). Her shop opens at around 5 to 8 a.m. and closes after 9 a.m. She and her husband may have to work occasionally for their neighbour in return for the labour provided by them to her previously.

In Tha is a successful farmer who also has a loan from the state bank (BAAC) and the development fund that is similar to other farmers in the village. He is the head of the Ban Huey Muang village and is a traditional farmer, whereas Soi and some other villagers had just decided to return to farming after 10-15 years. In Tha has been a farmer since he finished secondary school when he was 17 years old and now he is fifty. Currently he lives with his wife. He has two sons, both of whom completed a bachelor's degree and now work in Bangkok. His family is successful compared to others because he was able to support his sons to study in higher education, which is rarely the case. His large two-storey house looks modern compared to

others. He told me that he built his house by himself more than 10 years ago with the money from corn farming and did not need to pay for hired help: “I built up a fortune through corn farming”. At present, he owns around 60 rai in various places and grows diverse types of plants such as corn, rambutan, mango, glutinous rice, and tobacco. Although he has a pickup truck, he usually uses his motorcycle to travel to the farm with his wife. Every morning he wakes up at around 5 a.m. and then goes to the farm before 9 a.m. and comes back at around 5-6 p.m. He does not work as an exchange labourer on the neighbouring farms. If his family has to work as a return, his wife will go. He said one person is enough and he has to work on his own farm. He works every day, including the weekend if the village does not have any events on. He told me about the land he works; he received a part of the land from his parents—around 15 rai—and he has more than 60 rai in total. Some land has title deeds, and some does not.

(2) The majority of the villagers fall into *the second category, living on corn farms and at the same time, working as labourers for other farmers*. Although they are able to pay off their debts, they have suffered from being exploited (Chiangtong,2013; Achavanuntak et al., 2014; Teerasuwannajak and Pongkijvorasin, 2015). The farmers in this group work just to repay their debts; they do not have enough money to cover household expenses and to invest in the next crop. Most of them borrow from the local merchant and agricultural shop because they do not have enough legally-owned land to guarantee the credit of the state bank (BAAC). Some farmers lose their credit because they cannot return the loan.

Por Sui represents the second group of corn farmers in the village. He is a corn farmer aged 62 years and he has stayed in the village since he was born. When he was young, at around 20 to 30 years of age, he worked as a paid labourer after the harvest season because his income from the agricultural sector was not enough, especially when a family has to pay for its children's education. Por Sui is different from Soi and In Tha; for him, corn farming is the main

income. He grows glutinous rice for domestic consumption, the same as with other householders. He inherited around ten rai of land from his father with a certificate of ownership and also acquired land with no certificate from his father (right to possess by custom). At the beginning of his working life, he worked on a swidden field (shifting cultivation). At present, he is the same as other villagers that have worked on lands with a certificate and without. The land management system between the villagers is quite flexible. He grows corn covering an area of around 15 rai. He said that sometimes he grows corn on the neighbours' or relatives' land without paying rent. The other villagers also do the same thing in cases where the owner leaves the land empty in that year. Interestingly, before the issue of deforestation, the state was not strict on land use; the land was viewed as a free resource that was easily accessible and people reaped the benefits (Moore, 2016). In addition, he said that he has grown corn for more than 20 years because the market demand has gradually increased, but nowadays, he needs to pay for seed, fertiliser, and pesticides so the investment is higher than in the past. Moreover, accessing the land is more difficult than in previous times.

The life of the villagers echoes the ecology of highland villages wherein human life, nature, and society are interconnected. It is not true to say that environmental changes are caused only by the farmers. The two groups of farmers discussed above reflect a complex relationship between human activity working under the regulations of the state, and capitalism, which links them to the use of natural resources for agricultural activities and living.

(3) The last group consists of farmers that have *become labourers because they do not have sufficient funds or credit to live despite owning farmland*. The major problem for the farmers is that they cannot repay their loans.

Parnee is a female labourer who was a corn farmer but is currently working as a labourer. Although her status concerning the certificate of land ownership is similar to that of other farmers that have been working on both kinds of land, she has debts and cannot pay them off.

She lives with her second husband, who lost his leg in an accident while working on the farm. She told me that she needs to take care of him, and she does not have the money to invest in corn farming. She is also indebted from different sources. Currently, she works as a labourer on her neighbours' farms at a rate of 175-200 THB, around 3.94-4.50 GBP per day. Parnee represents the third group of corn farmers that face a more difficult life than the other groups. In this case, corn farming under capitalism cannot support farmers such as Parnee, especially when she faces family crises such as losing labour. This is a form of labour exploitation which forsakes the small farmer that is left behind despite an increase in the demand for corn.

These are the backgrounds of the corn farmers showing that some of them (Soi and In Tha) are successful because they grow corn and other crops in different areas. In particular, Soi is the owner of a grocery store as well, but both of these individuals represent a minority of the corn farmers; most corn farmers are in the second group, like Pro Sui, who has been trying to find a way to survive under the limitations of ambiguous landholding rights. Meanwhile, Parnee cannot survive by corn farming at this time and working as a labourer is the only choice for her. Though corn farming still forms the main income of the farmer's household, the increasing production costs, the problem of the rights of land ownership, and deforestation issues are factors in the insecurity of corn farmers. With the growth of the chicken industry and the high demand for corn as feed, the farmers in Nan have to cope with these problems. On the other hand, the growth of corn production has led to the accumulation of rent, transportation, agricultural input, and management. Hence, the benefits are shared between the local merchants and local companies.

There is a significant connection among the products from the small farmers in the rural areas that feed the people in the city and thereby drive urban life. This issue has been discussed in the area of agrarian capitalism and is widely debated in the areas of the 'food regime', the 'capital lens' and the 'agrarian crisis' (McMichael, 2014). The story of the small corn farmers

above is the other side of agrarian capitalism, with the crisis in their lives set against the backdrop of environmental degradation. The present situation in the villages needs to be better understood by the production institutions, which are far away but which influence the corn production in the villages. The agricultural mode of production is linked to the important issues concerning massive displacement caused by 'free trade' as defined by the World Trade Organization (WTO), overlaid with fresh displacements caused by fiat, force, and finance as land grabs in various forms continue apace. It can be said that the situation in the villages above is part of the institutional management of agricultural production in the wider market that controls human and non-human life in the web of life (Moore, 2013; McMichael, 2014). Instead, the state must acknowledge that farmers need to be integrated into bigger commodity networks (Challies, 2008) and the complicated chains in feeding the world's population. This requires the backing of the state as well as social movements for achieving food sovereign alternatives (Jansen, 2015; Amin, 2012). In this way the insecure lives of the corn farmers are part of the same complicated story of world consumption and environmental degradation, which state regulations have neglected to deal with since the 1970s.

**4.3 Mode of corn production in Nan Province**

This section discusses the interaction among the farmer (labourer), knowledge of farm management, the market system, and state regulations and natural resources, which are the factors of corn production. It focuses on the corn farmers' mode of production in Nan and labour management issues. Although some of the farmers can survive, most of them are suffering and all of them are exploited by the higher levels of agricultural capitalism. This section examines the activity of production and the business context; it includes the relationship among farmers, village merchants, and middlemen. This first part, at the market level, involves the activity of corn farmers in the local market before the corn is transferred to the feed mill factory.

**Corn farming and the network of corn production**

The focus of this section is the everyday life of the corn farmers and their activities on the farms. The farmers are the beginning of the corn supply chain, working in an occupation inherited from their parents. Most received the land as an inheritance from their parents and the area has expanded in this generation. It is only with the last two generations that growing corn as a cash crop has developed in Nan, with corn farmers engaging in intensive capitalism.

Although the study began with corn farmers in the small villages, the production cycle involves different groups of people that play different roles in the process. Thus, when corn production is mentioned, it means that the corn farmers are not the only ones involved in the whole story, but they are in the spotlight. During the time spent in the villages I interviewed farmers, village merchants, and middlemen, and the corn farmers vividly explained the 'biography' of corn to me. This study will now address the relationship among corn farmers and other agencies—in which at least three actors relate to the corn production process in a capitalist system.

- *The daily life of corn farmers and their sources of capital*

Most of the corn production in Nan comes from small farmers that have insecure land use claims and a difficult life. The corn farms in Nan are run by small farmers with between 10-100 rai (1.6-16 hectares) per household; most of the farms are on sloping terrain. The corn production per rai is around 400 -1,200 kilograms, depending on quality of the soil and seed. The farmers do not use machinery because the sloping terrain makes this difficult; it also means investing more capital (Pongkidwarasin, 2015). Some farmers in the lowland areas can use machinery but cannot afford it. Therefore, in both areas, human labour is still very important. The most crucial factor in corn farming is the need for capital and this involves the farmers in the exploitation process. Most of them have been dependent on outside sources of capital and affected by land use policies that are controlled by the state from the centre.

I stayed in a village in November, the time between the end of the rainy season and the beginning of winter. The weather in the villages in the north is cooler than in the central region, especially on the hillsides. The temperature is between 10 and 20 degrees Celsius, but the sunshine is very strong on the farms. In general, most of the farmers in Ban Huai Moung still grow corn at this time of year but some of them stopped during this time because of deforestation issues and the uncertainty of the market price. The harvest season is in October extending to January (see Table 4.1).

Every morning in the village, life begins with the morning crow of the cockerel around 4 to 5 a.m. When I was there, I slept on the second floor and was woken up by the continuous crowing and the sound of the villagers' conversations. The houses in the village are close to one another with a simple fence between them. After waking up, the men and elderly people would go outside the house and have a chat whilst the women worked in the kitchen; then they took the children to school. Some of the children live with their grandparents as their parents have gone away to work in Bangkok[3]. After 8 a.m. the village is usually quiet but would come alive again at around 5-6 p.m. The farmlands are far away from the village, and therefore a motorcycle is a necessity.

Table 4.1 Four-stage process of corn farming

| Step | Month | Activities | Price per unit (THB) | Hire/Cost (THB) |
|---|---|---|---|---|
| 1 | March, April | To cultivate the land, prepare it for cultivation | | Tractor = 350 per rai |
| 2 | May | To seed | - real (high quality) seed = 1700-1800<br>- local seed = 400 -500 | Machine = 600 per 1 bag (10 kg) |
| 3 | June – July | Apply herbicide Glyphosate Isopropyl ammonium[4] | | Labour = 300 baht per day |

[3] Bangkok is the capital of Thailand.
[4] Glyphosate Isopropylammonium is the trade name of a herbicide which was mentioned by most of the farmers interviewed.

| Step | Month | Activities | Price per unit (THB) | Hire/Cost (THB) |
|---|---|---|---|---|
| | | (200-litre water per 1 litre of Glyphosate)<br>Paraquat[5]<br>Apply fertiliser<br>Urea<br>Organic fertiliser | - chemical fertiliser (Urea) = 700<br>- organic fertiliser 400 - 500 | |
| 4 | October-January | Harvest and sale of the product | | 200 baht per day |

According to table 4.1, in general there are 4 steps in the corn process: (1) preparing the land and soil; (2) sowing; (3) applying herbicide and fertiliser; and (4) harvesting and selling the corn product. The table also shows the cost of agricultural input, for example for corn seeds, fertiliser, and herbicide. The farming costs vary according to the farm management and the location. For example, Pu Yai Jaloon explains the differences in the quality of seed and corn production and his management in the following:

> I usually use real seed[6] so the cost is higher than the counterfeit seed[7]. But the selling price is higher than the local seed as well. I used Pioneer 46 11 80; actually, I change the brand of seed every 2 or 3 years because if the same brand has been used repeatedly, the product would not be good, and it also damages the soil. This year the price of seed has increased to 1,800-baht per1 bag, whereas last year it was around 1,600 baht. For sowing seed, I used the machine and paid 600 baht per 10 kilos of seed. Production costs increased from last year. I do not know why the price is increasing every year, while the land use and farm have been controlled.

The points mentioned above and Jaloon's explanation confirm that farmers are strongly engaged with the other actors in the corn market and need to follow the market regulations and prices. In addition, in cases where the price of agricultural input increases, it means that the farmers need to reduce the other costs, such as labour. In conversations I had with the corn farmers, considerable time was spent discussing agricultural inputs and the market for selling corn. My attention was brought to the source of capital. Corn farmers are not isolated; on the

[5] Paraquat is the trade name of a herbicide.
[6] Real seed refers to the high quality of seed that is bred and sold by the big seed companies such as Pioneer, CP Monsanto, Syngenta, and Pacific.
[7] Counterfeit seed refers to the low-quality seed that comes from a local merchant, where the price is around 500-700 baht per bag.

contrary, the mode of production in a capitalist system involves them in an unequal relationship with the middleman and local merchants. A local staff member of the Nan Commercial Office mentioned the following in this regard:

> The problem of corn production in Nan is that corn farmers have been exploited by the whole system, especially by the merchants (middlemen) who take advantage of them.

This initial information accords with the previous studies of Changtong (2012) and Telerngsri and Pongkijvorasin (2012), who found that local merchants play a key role in the corn production process and receive benefit from the process. They offer credit to those farmers that do not have enough capital with the condition that after the harvest, the farmers have to sell the corn to them. Consequently, the merchant gains double profit from selling the agricultural input at a high price rate and selling the corn product to a larger merchant or the feed company. The corn farmers receive less money compared to them and suffer from the further disadvantage of corn farming on sloping terrain (Telerngsri and Pongkijvorasin 2012). They are caught in a vicious circle of working under the conditions of debt: some farmers get credit from the merchants and most of them have debts with The Bank for Agricultural and Agricultural Cooperatives [8].

In general, there are three sources of agricultural input or credit that the corn farmer can access: state sources, local merchants, and agricultural stores, which act as brokers for the sale of agricultural input and the purchase of corn. The last one is the most powerful.

(1) *The state sources*, Bank for Agricultural and Agricultural Cooperatives is the major source that provides credit to the farmers, but the farmer must guarantee repayment on the basis of land ownership. Most of the corn farmers are members; the bank provides a fixed budget of around 50,000 baht or 1,250 pounds per year (according to

[8]The Bank for Agriculture and Agricultural Cooperatives was established in 1966; the bank is a government (state) enterprise.

interviewees in 2017). The farmers use a debit card to buy agricultural products from the agricultural stores in a joint project with the bank or buy the products directly from the bank. Moreover, the state sources include a development fund that is called the 'village fund'. This has been extended to corn farms in the highland areas since 1997 because the fund aims to support the community to grow crops in potential new areas, and at that time corn production is booming (Nunsong, 2014). Both loans are managed by a state agency.

(2) *The local merchants* linked with the small corn farmers that do not have a pickup and have limited capital (money and land). The farmers that use this source buy all of their agricultural input at a higher rate than the market price (it may even be higher than the first and last source). In this case, the farmers have no need to use cash but after the harvest they have to sell the corn to the same merchant. Then, the merchant pays them after recouping the debt and the farmer has less power to negotiate. The local merchants in turn sell the corn to the large stores (the third source) or other feed mills.

Siripron is a female corn farmer in Ban Hai Nan village that received credit because she did not have capital and therefore no choice. Her case is similar to that of most farmers.

> I received seeds, fertiliser, and other agricultural input from a local merchant in advance. I do not have to pay for it until the farms are harvested and the corn is sold. I do not have more money for investment. I got all my agricultural supplies from the local merchant "Khung Tawat," even though the price is higher than at "Withawat." But I have no choice because I do not have enough cash.

Many farmers have the same experience as that of Siripron; they received the money after recoupment by the merchants. In Ban Huai Muang village, 3 merchants have offered agricultural supplies to the farmers that do have not have enough capital or suitable transportation.

Although Por Sui has credit from the BAAC because he has land to guarantee the loan, the local merchant is the main source of credit because he does not have a pickup truck. He

explained more about this, saying that ordering agricultural products from the local merchants is more convenient than from the BAAC because he can order any product brands. The merchant transfers all of the goods to the house or farm, although the price is higher than what the BAAC charges—but he will pay for them after the harvest.

> I have no choice because we do not have a car (pick-up) and capital so, we have to get the agricultural supplies from the merchant, but we know the price is higher than the shop in town, we have to sell the corn to him, and the buying price is controlled by him.

The worst case happened in Ban Huai Muang; this story was mentioned by the head of the village:

> On one occasion, three farmers sold their corn to a merchant who offered credit. But the three farmers did not receive the money because the merchant said he did not have the money to pay them. Now these three farmers cannot do anything because the agreement was made verbally. They are powerless and have no capital. Now, they work as labourers even though they have their land with certificates. They are looking for that merchant to pay them so they can grow corn again.

(3) *The agricultural stores* that sell agricultural products such as seed, fertiliser, insecticide, herbicide, and other chemicals are the last source of credit. They also buy the produced corn. In Nan province, two large stores run the business of buying and selling corn products and transfer the high-quality corn to large feed companies. The farmers with connections to these stores are somewhat secure in their farms. PuYai Muean is a farmer that can buy agricultural products and sell his corn to one of these stores. The farmers that can access the large buyers must have a high level of capital, such as a certificate of land ownership or other financial assets. The farmers that sell their corn to these buyers/stores have to show the certificate in order to prove that the corn comes from the legally owned land (right of ownership). They also need to use high-quality corn seed, which is more expensive than the seed generally used. Similar to another farmer, PuYai Jaloon stated the following:

> I farmed 40 rai of corn this year. I paid for harvesting and after that, I paid for labour. I also hired a lorry with the machine for milling, then the lorry transferred the corn to the buyer or a larger merchant. I have made an agreement with the merchant named “Widtawat” to whom I showed the title deed (certificated guarantee land

> ownership), and he also offered me a decent price. However, the price depends on the quality of corn. It should be solid, dry, less moist and have no mould. I used high-quality seeds and that is why the merchant gave me a good price. But some farmers used the cheaper seeds; therefore, they will produce a low-quality product and also receive a low price. In the past, the farmers needed to expand the farm in order to get more money instead of buying high-quality seed but now they are restricted from doing so… I paid for transportation and milling at the same time, the rate is around 350 baht per one hundred kilos of corn. I think the corn will be sent to CP (Charoen Pokphad)[9] in Ayutthaya province.

The term 'store' includes large stores that run their business by buying and selling—they are merchants and also brokers that are linked to large feed mills. A second-generation owner explained the way in which corn is traded and stated that his family had run the business since 1990. He explained how the cooperation among the merchants and farmers benefits the company because the farmers provide high quality corn, which the merchant sells on to the big feed companies to make a profit. This has been the process of corn production for around 30 years. The merchant explains the purchase conditions and transfer in the following:

> There are two types of trading: (1) buying through an order, and (2) buying in general (with no order). We then split corn into two groups. The superior quality corn sold to the feed mill is corn No. 2 with a moisture content of less than 30. The low-quality corn is exported.
> The good grade of corn (corn No. 2) that was ordered by the large feed mill is delivered to CP and Betagro at a rate of 7 to 8 baht per kilo. Corn grade No. 3 (lower quality) is bought by Saha Farm. Actually, the corn will be sent to CP first. There are three feed mill companies in different places: Phitsanulok, Lopburi, and Ayutthaya. If the corn is not accepted by CP, then it will be sent to Betagro which has two companies in Lopbuli and Samut Prakan. Selling the corn to these two companies is not easy because they need 100% of the corn from land with a certificate of land ownership and we have to show them this to prove it. If both companies refuse to buy corn then it will be sent to Saha farm in Lopburi province and exported elsewhere.
>
> (Chaimitkit Agriculture Company)

In addition, complicated relationships exist among the corn farmers that can access the larger merchants and receive a decent price, and with the larger merchants and the multinational companies that can specify the source of the corn. Pu Yai Jaloon, head of the Ban Chom Puu village, explained that he sold his corn to a merchant that offers him a high rate because he grows corn on his own land; he presented the merchant with the certificate of land ownership.

[9] The largest multinational agricultural company in Thailand.

He said that the merchant will get a high rate from the feed mill, which boycotts corn products being purchased from land with no land ownership certificate. This resulted from the feed companies wanting to avoid being part of the deforestation. Pu Yai Jaloon received 60 baht per rai when he showed his title deed. The overarching feed mill aimed to demonstrate that the company does not support corn farming in reserved areas, as Pu Yai Jaloon demonstrates. Moreover, the merchant offers good terms, paying extra money for corn from the legitimate farms because the corn from these farms is in high demand.

> I normally sell my crops to the merchant where I have been a member. The condition is if the farmers want to sell their product to him, they have to show a title deed of their land and register with them. After that, the merchant will give the farmers sixty baht per rai. He does not want to buy the corn grown in the areas of conserved forest. This is because of the policy where large companies ban corn farming on land which has no certificate of land ownership.

In another case, I worked with Pu Yai Muen on his corn farms during harvest time. After the corn was milled, all of the corn production was transported to "Chaimitk," a large purchasing company in Wang Sa district in Nan. I noticed that the purchase price that was shown on the board was higher than the rate that the merchant paid to Pu Yai Muen. He said, "it is common; nobody has been offered that price, but I am fine with the rate." This example shows that the corn farmers are the subordinate agency. However, a son of the owner of Chaimitk company told me the following:

> The superior quality corn such as that from Po Yai Muen's farm will be sent to CP[10] whereas the low quality will be sent to other feed mills. Selling corn to the large companies such as CP and Betagro requires proof of the source of the corn to guarantee that the product comes from legally owned land. It not, it needs to be sold to other companies.

It can be seen that in the relationship among them, the merchant has more power than the farmers in terms of the conditions of trading. Although some farmers said that they can sometimes try to bargain over prices, the final decision depends on the merchant. The corn

[10] Charoen Pokphand (CP) is a multinational feed corporation based in Thailand. The company is one of the major producers of corn seed and chicken. Charoen Pokphand Foods Public Company (CPF) is a trading agro-industrial and food conglomerate.

farmers are therefore the subordinate agency in this relationship. The merchants control the purchase prices and other conditions of corn production.

The corn farmers are strongly tied to the corn market, as they depend greatly on the sources of capital that control the costs of agricultural input and the purchase price for corn. At the same time, their land rights are controlled by state agencies. The corn farmers work for little income. Even though farmers have debt problems, these financial institutions are always ready to facilitate funding (loans) for farmers in time for the next planting season. If the farmers provide a reason for borrowing as the need to invest the money in growing corn, they receive the money even though the original debt is overdue. At the same time, farmers have no better choice because this is the only way for them to get the funds to manage their living expenses (Greennew, 2021). This situation reflects the exploitation of small, powerless farmers. It is also the case with the other small farmers in the countryside because the state pays more attention to economic growth and the gross domestic product (GDP) than the life of ordinary farmers (Santasombat, 1996).

- *Labour Management in Corn Farming*

For the small farmers that farm in the highlands, human labour is the most important factor. The study found that the labour on corn farms comes from the households, neighbours, and hired labour. These are the three main sources of labour in Nan. Labour is key, as access to machinery is limited by the conditions of the location of the farms and the cost. However, the labour management on each farm depends on the amount of corn production each year and also on the harvest time. If most farms in the same village set the harvest during the same period, hired labour from outside is important because all of the farms need to harvest at the same time. More labour is needed in the harvest season than at other times because the duration of the harvest affects the quality of the corn, which in turn affects the purchase price. If possible, the process of harvesting and selling would be finished in one or two days. The farmers that have

more capital will pay for the labour, whereas the small farmers have to wait for their neighbours, making the process longer and affecting the quality of the product.

Human labour has been an important factor in corn farming in Nan province. Because they have to pay high prices for agricultural input, some farmers have to employ labour from their own household and use the exchange labour system, which saves money. However, some farmers pay for a neighbour's labour and also hire labourers from outside the villages, for example from the neighbouring countries of Laos PDA. In Tha commented, and other farmers concurred with, the following:

> We work on our farms every day, there are no weekends for a farmer. If our village has a festival or religious ceremony maybe we would not go to it or would go later. The farmers have no weekend or vacation.

Soi spoke about the labourers that work on her farms:

> This year I have 20 rai of corn and I have used both labour from my neighbours and paid for labourers. I paid 170 baht per day for labourers from the village but for the ones from outside I had to pay more. Some farmers, especially those who received credit from the merchant in getting corn seeds, fertiliser, and herbicide in advance for their farming, would have to pay a higher price than buying directly from the shop. If they then have to pay for farm labour, then they will earn nothing. Actually, we harvest by using our household labour. We exchange labour with our neighbours and also pay for people to work on the farm.

Her case is the same as that of other farmers in this village. Por Sui, who has spent his whole life in corn farming, explained more about the system of labour exchange:

> I sometimes ask other farmers to help us, and we have to help them with farm work in return. It is an informal agreement under a system of labour exchange among the villagers. If I cannot get help from this type of labour exchange, then I have to pay for 2 or 3 workers to work on the farm. Normally I pay two hundred baht per person for harvesting but if I want them to help to take farm produce to other areas then I have to pay three hundred baht.

Naree used both types of labour:

> I paid for planting and also harvesting. For the harvest, I paid around 175 baht for around fifteen workers per day. It normally takes 2 days to finish. In cases when I cannot find the labour in our village, I have to pay more. I had to use paid labourers in every process except applying fertiliser, which I did with my husband. When we can exchange labour for the harvest, it takes around a week to finish.

The situation above is not representative of most of the corn farmers in Nan; Ban Huai Muang is a small village where the villagers still use household labour and labour exchange

between their social contacts in order to reduce costs. It can be said that both types of labour are left over from the past, still functioning at this time. However, generally, the farmers need to harvest and sell the corn at the same time and consequently need to pay for the labour immediately. The characteristics of how labour operates in the village, including the farmers working without weekend breaks, the use of household labour, and the labour exchange system, all reflect the exploitation of labour, which is the fundamental underpinning of unchecked capitalism The corn farmers are forced to be part of the capitalist system because of their underlying insecurity with reference to land ownership rights and because the income related to the corn market is controlled by the local merchants and the higher-level buyers, such as the feed mill companies.

**4.4 Corn farming and the problem of land ownership**

The major problem for corn production in Nan is that most of the land which is farmed is state property and the farmers have no right of ownership. The state allows the farmers to use the land in some areas on a temporary basis, while some farmers farm on wasteland. However, both types of land belong to the state. Even though Nan province is the second-highest corn producer in Thailand and the first in the north, most farmers are suffering from the issue of the right to land ownership. This means that more than half of the corn used for animal feed from Nan comes from farms with issues of land ownership.

First of all, it is necessary to clarify the matters of geography and land use in the province because they are related to the corn farming and deforestation issues. Around 80% of the land is highland; only some areas are allowed to be farmed, but the land belongs to the state. The total amount of land utilisation is approximately 7,170, 045 rai: forest land is at 4,654,853 rai, and agricultural land use is at 1,414,516 rai. From this it can be seen that around 65% of the total area is identified as forest land and comes under the responsibility of three state

organisations: the Royal Forest Department, the Department of National Parks, Wildlife and Plant Conservation and the Agricultural Land Reform Office (Royal Forest Department, 2016). Most farmers use the land to grow rice for domestic consumption while at the same time the state started promoting corn as a cash crop to relieve poverty. Corn farming has increased, and since 1960, it seems that corn is the door that led the local people into interaction with financial institutions, local merchants, and the corn market. However, the situation of deforestation in Nan became a public issue concern around 2011. The multinational feed company Charoen Pokphand (CP) and the corn farmers were mentioned as the cause of the problem. The large purchasing companies, such as CP and Betagro, announced the policy to ban the purchase of corn from farms that have no certificate of land ownership or cannot identify the source of the corn production. This went together with a state-issued policy that aimed to return forest land to government control in order to solve the problem of damaging encroachment on forests and to increase forest areas by at least 40% in 10 years from 2014 to 2024 (The Momentum, 2018). However, it appears that the corn farmers in Nan have been marginalised from the conversation and instead only suffer the consequences of these policies.

This section examines and aims to understand the situation above, and then focuses on the issue of the corn farmers' landholding issues; it seems that the main issue relates to deforestation. The argument in this section is that the deforestation issue together with trespassing by corn farmers are a part of the deterritorialisation of the Thai state. This is seen in the context of the antipoverty policy and ensuring state stability in border areas through the growth of commercial crops. Corn is the most important crop because it is linked to the chicken industry, which is a successful business. Therefore, in the beginning, there was ambiguity regarding land use and forest management as part of the state policy of deterritorialisation.

However, the following conversation with the corn farmer Chana reflects the feeling of the corn farmers about the situation of land use and the deforestation issue in Nan:

> I received land from my parents. My farms are both in the highland and lowland. None of the land has a title deed or other form of land certificate. I have been growing corn and sticky rice since I first started as a farmer. Most of the area for farming in Nan carries no title deed but the farmers have worked the land for years. The issue of deforestation in Nan is unfair to us because we were working on these lands before it was changed to a watershed area [11]which is just 10 percent. People who blame the corn growers should come to Nan and ask us instead of believing what was said in the news.

The conversation I had with Chana was informal. I met him at Bank for Agriculture and Agricultural Cooperatives in Wang Sa district in the morning for an initial observation. He came with a truck driver to sell corn produced on his farm. We had a conversation about corn farming, and he made the points that all of the corn farmers in Nan wanted to make. Even if the information about the watershed area was incorrect, the interesting point he made to me, as a stranger, was the following: “My farms are both on the highland and lowland. None of them have a title deed.” It seems that in this area land ownership had not been a problem before the number of corn farms increased and been claimed to be the major cause of the deforestation issue.

However, the number of corn farms in Nan and other provinces in Thailand is increasing and they are successful due to the high demand for corn related to the growth of the chicken industry. This seems to be a state achievement and consequently, the free expansion of farms without state control was permitted until deforestation and other environmental problems were raised. At this point the corn farmers became victims of the issue.

### 4.4.1 What is the problem of land use in corn farming?

According to the information that the corn farmer mentioned above, the problem concerns landholding and forest management; both have been a problem for some time but it is more complicated with the farmlands in the highlands today. As the information shows, the total agricultural area in Thailand is over 149.24 million rai. Of this, 77.64 million rai or 52% is rented land and 71.59 million rai or 48% is owned by the farmers themselves; however, of this

[11] The high area where rain is collected, some of which flows down to supply rivers and lakes at a lower level.

amount, 29.72 million rai is mortgaged. Moreover, the problem of the encroachment on land belonging to the state is not only caused by poverty. Land shortages due to pressure from the market system, which directly affects the inequality of private land ownership for the poor, ethnic, tribal, and marginal people (Land Watch Thai, 2019). The most affected are the corn farmers, most of whom are small farmers, tribal, and also the marginal people that face an insecure life. They are subordinate in the supply chain as well as being accused of causing environmental problems. The documentation of the Nan Royal Forest Department (2016) showed that 375 villages are settled and living in the forestry preservation area, or around 42.13% all communities. Although the study area is included, the situation was not as remarkable as in other areas. This is because the villages had been settled before the area was categorised as preserved forest and the farmers were forbidden to cultivate the preserved areas. Hence, while working in the villages, the conflict between the farmers and state officials did not take place and simultaneously, the farmers avoided mentioning it. They just repeated: “We cannot open up the new land as in the past.”

As mentioned in the first section, the corn farmers have been farming land with and without title deeds since their parents’ time. Currently, they still work in both types of areas, but they cannot open any new farmland or do swidden farming as in the past. Swidden is classified as the cultivation carried out by ethnic minorities within nation-states and involves dividing the terrain into forest and permanent agricultural land uses (which includes the expansion of use by the forest department). Moreover, the demise of swidden has now been replaced by “the rise of conservation, resettlement, privatisation, and commoditisation of land and land-based production, the expansion of market infrastructure and the promotion of industrial agriculture” (Fox and Fujita et al., 2009; 305). Although swidden is claimed as the traditional method of cultivation that benefits the environment, corn farming as a cash crop consumes the natural resources of the soil through intensive cultivation and therefore it needs

to be regulated and controlled by showing concern for the corn farmers' livelihood as well as the agricultural business. The corn farmers have been learning that they cannot return to the methods of the past. The head of the village mentioned how the land was used in the past:

> In the past, our family reclaimed and opened up the forest for growing rice, corn, and other types of plants. We didn't have title deeds or any documents from the government to claim our rights over the land, but the villagers knew who owned the land. We also had more than one area for using in different years. However, at present, we cannot do the same as our ancestors.

The issue of land ownership is a major problem for both the corn farmers and the feed mill companies, so there is a need to be concerned about the problems of land management. Even though, in general, there are two types of land ownership—state property and private property—the landholding rights of corn farmers are complicated. For the corn farmers there are at least three types of landholdings: Chanote is the only one that represents private rights and this type of title deed is difficult to find with the corn farmers. Two other types of documents are more common in Nan: Sor. Por. Gor 4-01 (SPG4-01) and Por. Bor. Tor 5 (PBT5)—and hence need to be considered.

The Sor. Por. Gor 4.01 (SPG4-01) is an essential document solely for agricultural land use, usually found in rural areas. This is an agricultural certificate stating that the farmers can use the land for farming. Although the land belongs to the government, it can be transferred to other farmers only for agricultural purposes. The farmer that holds this document cannot sell it. It confers the right to occupy the land only, and can be transferred only by inheritance (Thailandlawonline, 2021). The SPG4-01 certificate can be used to guarantee land ownership and the large purchasing companies accept this right. On the other hand, the document called 'Por. Bor. Tor 5' (PBT5) is only used to show that the holder pays the local maintenance tax; it does not show any type of ownership. The land is possessed by the government, and it allows people to use it on a temporary basis (Thailandlawonline, 2021). This latter type of document is not accepted by the large buyers, but the corn farmers can sell their corn to others at a lower

price. In many of the case study villages, the farmers referred to both documents (PBT5 and SPG4-01) when they were asked about the type of land certificate they held. The problem is that more than half the corn farms are cultivating land with a PBT5 document.

From the fieldwork, it was found that only one farmer has a Chanote. Jaroon, a 57-year-old farmer, is the only one who has it, and he also works on other land with SPG4-01 and PBT5 documentation. All of the farmers said the same—that the PBT5 means nothing because the government can take the land back at any time. Sometimes the farmers mentioned land with no title deed—which refers to the land with a PBT5—or that the land use was illegal. There is a blurred line when they mentioned both types of land used (PBT5 and illegal land use). A comparison can be made with an interesting study in Africa by Damnyag et al. (2012), which points out similar deforestation issues in Africa caused by the insecurity of tenure. They mentioned that the rules governing landholding are the main part of the problem that creates adverse effects. For example, Wiang Sa Agriculture Office arranges farm management for sharecropping and lease-holdings, but these do not persuade the farmers to change to tree planting, which is a long-term investment. In addition, it is necessary to deal with the deforestation problem caused by the local tenure system. The study states that the solution to the problem is policy reform, which should target benefits not only for landowners but include future benefits such as payment for environmental services as well. Ghana is mentioned, stating that the primary causes of deforestation are the land tenure arrangements (Antwi-Agyei et al., 2015). In Thailand, the primary cause of the problem of land management in the highlands is that it has been centralised by the Thai state since the establishment of the Royal Forest Department in 1896 in order to grant forest concessions. Since then, this system has continued to the present day by creating various versions of government acts and cabinet resolutions related to the forest. These give more power of resource management to the state while

neglecting the local people. Meanwhile, there has been the expansion of corn farming to the north since 1997 (Mongkolijarernsakul, 2015; Laungaramsri, 2005).

Jaroon has been working on more than one hundred rai of farmland with different landholding documents, half of which is SPG4-01 and the rest is PBT5 and Chanote, or private land rights. The land used for corn farming is around 40-50 rai and the rest is used for other plants such as tamarind, glutinous rice, mango, orange, lychee, lime, and the tree such as bamboo shoots. He does not have any problem with the land used for corn. He said that he has a lot of land and cannot work on all of it, but he did not mention what types of land certificates he has. This year he has offered it to his relatives and neighbours to use for free. For example, his neighbour used his land of around twenty rai to grow corn without paying for the rent. On the opposite side, the other corn farmers face the problem with the corn produced from land with no land certificate or a PBT5. This corn is banned by the larger purchasing companies. During the fieldwork, most of the corn farmers that were interviewees did not mention that they had a conflict with the government or large companies. However, some of them mentioned that the government had confiscated the land from them and thereby reduced the number of corn farms. However, some farmers reduced their area for corn farming because they said that growing corn at this time requires a high level of investment and it is too much of a risk to be able to cover the expenses after selling the produce. For instance, Siriporn, a 40-year-old female corn farmer, is a newcomer that began growing corn in 2009 because of the high demand at that time. She stated that her one hundred rai of corn land had been reduced to 45 rai in 2017. This was because at this time, more money was needed to invest in growing corn to purchase the agricultural input. The purchaser will only pay a high rate if the corn is grown on land with a certificate of land ownership, like the Chanote or SPG4-01, and the farmer needs to use high quality seed that is more expensive than the general seed. Most of the corn farmers mentioned the same things, that they are reducing the area of their corn farming because the capital outlay

is higher than in the past, the selling price is unstable, and the land tenure is insecure. Currently, farmers that are insecure in their land tenure often work some land where they hold the ownership but also other land where they do not. In this case most of them grow corn on the securely held land and grow other crops on the land without a land certificate or land with a PBT5. However, the increased concerns over deforestation issues affect the corn farmers in Nan and discourage them from continuing to grow corn. Throughout the interviews other land-use problems concerning agricultural work were discussed. However, even though the low-quality corn that is grown on any type of land cannot be sold to the large feed companies, they can always find another purchaser in the corn market. Consequently, the major problem is one of state management because deforestation still occurs if the land tenure is ambiguous, and the state is still concerned with its power rather than protecting national resources. However, forest preservation and community development are hampered by the problem of land ownership and a lack of access rights (Sunderlin, Larson, and Cronkleton, 2009). Clear distribution of land ownership is important and is related to conservation issues.

**4.4.2 The land issue and conflicts**

Apart from the situation of corn farmers and their use of land, the management of the state agencies is also part of the deforestation problem.

(1) First, the overlapping responsibilities among the different state agencies make it difficult for the staff. This is the issue that was mentioned by the director of the Nan Royal Forest Department. For example, there are three state agencies that take responsibility for forestry preservation: the Department of National Parks, Wildlife and Plant Conservation ( DNP), which is responsible for forestry preservation (around 43.06%); the Agricultural Land Reform Office (ALRO), which is responsible for forestry preservation in the degraded forest areas (around 6.92 %); and the Royal Forest Department (RFD), which is responsible for

forestry preservation in 50.02% of the deforestation area) (Provincial Office of Natural Resources and Environment Nan, 2016).

> The people who accuse the officers for not controlling land use and who neglected to prevent the farmers from expanding the land for corn farming, do not understand that there are three state agencies that are responsible for forest preservation in Nan. The different agencies apply different laws. It sometimes happens that although the forestry preservation is the responsibility of the DNP, the RFD is blamed.
>
> (Director of the Nan Royal Forest Department)

(2) The second point is uncertainty regarding government policies. For example, the areas of responsibility of some state agencies often change. This affects farmers that are insecure and unstable in their use of land, and that risk having their land confiscated by the state at any time (Mongkolijarernsakul, 2015). However, the incompatible situation of land use and the extension of corn farms leads to conflicts among the state agencies and cultivators in some areas. The director of the Nan Provincial Royal Forest Department mentioned that the conflicts are related to property rights. When the state enacted the National Environmental Quality Act B.E. 2535 in 1992, it preserved some land in the province to be used as forested land in order to protect the richness of the environment. Despite this, part of the land was used by the villagers and the needs of the local people were ignored. Since in Nan province the majority of land is owned by the state, the local people did not have any bargaining position. The government authorities required that the local people evacuate or stop growing corn on the preserved land. The Royal Forest Department has been responsible for the implementation of this new land-use policy, which has created conflicts among the local people and the officers in the department. According to the director, some of the officers were in favour of the protection of the villagers' rights and they believe that the land should be used by the local people, while at the same time trying to evacuate the villagers. In September 2017, the farmers from Ban Na Noi district, which

has a high percentage of corn farming, responded to the state policy trying to control corn farming in Nan by protesting. These farmers were no longer allowed to work on the land that they had used before (Khasod, 2017).

Based on the problem above, this study argues that the causes of deforestation are not only because of extended corn farming, but that management by the state agencies is also part of the deforestation issue. Moreover, the development policy that offers credit to the farmers and price guarantees for the corn produced is also indirect support from the government that affects the increase in corn farming in the north (Mongkolijarernsakul, 2015). However, in order to control corn farming by stopping the purchase of corn from land that has no certificate seems to benefit the large feed mill companies and relieves the problem. On the other hand, as long as the corn is still in high demand then the farmer will find a way to sell the low-quality corn to other feed mills or export it. Therefore, sustainable management of corn farming needs is a serious concern, and how state power controls the land and forest management must be reviewed.

**4.5 The Response of corn farmers to state policies**

This last section reflects on the response of the corn farmers to the crisis of corn cultivation in Nan. Since deforestation became an issue around 2011, it has affected the life of corn farmers. The rights of the corn farmers in Nan have been neglected by the state since the state issued policies to promote growing corn in the other provinces but strictly controlling it in Nan by cooperating with the large feed companies in order to ban the purchase of corn that comes from land without land certificate ownership. There are two important policies that affect the corn farmers. The first is forestry reclamation and the second is the project of corn growing in the dry season after the rice harvest season. Corn farmers have responded in four ways: 1) attending the project if they are qualified; 2) reducing the area for corn farms; 3) reducing costs; 4) resisting the state policy to return forest land to government control.

The first policy is the responsibility of the National Land Policy Council (NTC), which is a committee formed by the National Council for Peace and Order (NCPO)[12] on behalf of the Thai government and includes the prime minister as a director. The aim of the policy is to return forest land to government control in order to solve the problem of damaging encroachment on forests, and a policy goal is to increase the forest area by reclamation. Nan is one of twelve provinces that is a target area for the policy. The NTC declared to the National Legislative Assembly, on 12 September, 2014, that the committee had been working on a strategy for natural resource management, with the aim of balancing preservation and sustainable land use. The farmers that have no personal land are allowed to use the government land to farm but have no rights over the land. In addition, the government will support the farmers in finding a suitable career in different areas (Land Acquisition Subcommittee, 2017). For this project, the state agency promotes farmers in changing from growing corn to other perennial crops as well as controlling the land use. Only the secure farmers can take part in the project. However, most of the corn farmers have been growing low-quality corn and selling it to buyers that do not pay attention to the land certificate. Corn farmers in some areas have protested and claimed the right over the land that they have farmed since their ancestors' time.

The second is the project of growing corn in the dry season after the rice harvest season. The website of the Ministry of Agriculture and Cooperatives disclosed the following cabinet resolution concerning budget allocation for the project in the year 2017-2018. The project is part of the policy aiming to create stability for agricultural goods and agricultural workers' income from corn for feed. The purpose is to encourage the farmers to grow corn instead of out-of-season rice in order to supply the domestic product in the dry season. The target groups are farmers in 31 provinces with an area of 700,000 rai. Moreover, the project will benefit the

[12] Thailand has been controlled by the NCPO since 22 May, 2014. The present government was established following an army coup d'état and the head of the NCPO is now the prime minister of Thailand.

farmers that lose money from growing rice in the dry season, and they will receive more income from growing corn. The farmers that join this project will be funded 2,000 baht per rai from the government. However, no farmer can receive compensation worth more than 15 rai for land that has a title deed. The budget for this project is 1,400 million baht (Ministry of Agriculture and Cooperatives, 2018). It is important to note that most of the farmers in Nan want to join the project, but they are limited by the conditions attached regarding land-use rights. However, the corn farmers in Nan have been responding to the situation and both policies in four ways.

(1) The first response is that the farmers want to participate in the government project of corn growing in the dry season after the rice harvest season. However, they are obstructed by the conditions of the project, especially the issue of land certificates. Moreover, Charoen Pokphand (CP) and other large companies such as Betagro Group play an important role in the policy as the suppliers of the seed and eventual purchaser of the high-quality corn. The project supports the corn farmers that have ownership of the land and farmers that grow the corn under a contract with the supplier company. The problem is that the majority of the farmers in Nan could not participate in this project because of land ownership issues. During the fieldwork, the project had just been announced. Pu Yai Muean, head of the village said, "I want to register but I am not sure whether they will accept me or not because our qualification will be rechecked. Another condition is I will receive the money only after our corn is guaranteed by the company". The project aims to provide good-quality corn and to clarify the source of the corn production. However, the insecurity of the farmers and their rights are overlooked.

(2) The second response is to reduce the area for corn farming. Most of the corn farmers said that they have stopped growing corn on land that has an issue of land ownership certificates or reduced the area of corn farming. Some of them now grow fruit trees, which are supported by the Nan Provincial Agricultural Extension Office. Jaloon told me about his situation:

> I think growing only corn is quite a risk at this time because it needs a lot of money for investment. I planned to reduce the area of corn planting from 100 to 40 rai of the land with title deed. I also do agroforestry. This will be helpful when the price of corn decreases. I grow many types of plants in the same area such as mango, tamarind, rambutan, lime, orange, bamboo, and lychee. This year, the main income of our household is from tamarind.

The same situation also happened to In Tha, who is a corn farmer in another village:

> I remember that corn has been a part of our family since I was a kid. But at that time market demand was not that high like it is today. For my generation, I could build up a fortune because of corn farming which I have done for 20 years. I have a house and both of my sons are educated and have jobs. Our life is better than in the past. I own around sixty rai in different places, and I also grow diverse types of plants such as teak, rambutan, mango, sticky rice, and tobacco.

Although In Tha and Jaloon are farmers, they are heads of the village and work closely with state agencies, which makes it easier for them to adapt to the policy. Moreover, their financial background is better than the other farmers in the villages.

(3) The third response is cost reduction by using low-quality seeds. The farmers that are in this group are able to grow corn even if the large companies' policy is to ban corn from land illegally used. They can sell the low-quality corn to other buyers. In this case, I talked with Chana, a farmer in Wang Sa district that has the highest corn production in Nan. He stated the following: regarding market prices:

> We have to predict the market price in advance. If next year, the price of corn is not good then we will buy low quality seed which costs around 500-600 baht per ten kilos. The high-quality seed is around 1700 – 1800 baht per ten kilos. When selling, we can choose the merchant that gives us a fair price.

(4) The last response is to resist the state policy on returning forest land to government control. As the Director of the Royal Forest Department mentioned above, many farmers have been affected by this policy, which has resulted in a very dramatic and sometimes violent situation. For example, on some occasions, the royal forest officers have forcibly and violently thrown farmers off the land using weapons or destroying their farms. This includes protesting farmers that were no longer allowed to work on the lands that they had worked before (Khosod,2017).

However, the interesting point arising during the fieldwork is that none of the corn farmers interviewed said that they would stop growing corn. They still want to continue growing it, as corn farmers, if they have a chance.

**4.6 Conclusion**

This chapter presented information about the everyday life of corn farmers in the small villages in Nan Province, Thailand. They are at the beginning of the corn supply chain and have been working on corn farms since their parents' generation. Corn growing boomed around 1990 and prospered after that. The high demand for corn, as well as the policy to support agriculture by the government, encouraged some villagers to return home as farmers again. However, since the issue of deforestation came to the fore, the villagers have faced insecurity regarding their farms, which is related to land use, and face accusations of being the cause of environmental problems. Most farmers have been planting corn on land that has no land certificate. This chapter argues that the ambiguity of the state policy regarding land use and forest management is the cause of the deforestation in Nan. The Thai state administers power through control and managing resources from the past, especially the transformation of forests and land into capital to promote agriculture production (Chapter two) (Vandergeest P and Peluso N L,1995; Vandergeest P,1996). For instance, during the development period (1960s) deterritorialization was used to promote the cultivation of corn on state lands without giving ownership. Later,

territorialisation was used to expel farmers from the land and forests when an environmental crisis existed. Moreover, the story of the interaction among the corn farmers and the loan and agricultural supply sector reflects the exploitation of farmers in the network of corn production. The interesting thing is that despite this, those villagers do not give up; all of them try to find ways to survive through negotiation and resistance.

In the next chapter, Chapter 5, the environmental problems that relate to corn farming in Nan will be discussed using the political ecology approach.

# Chapter 5

# The Political Ecology of the Supply Chain: Deforestation, Chemical Use, and Burning



**Objective of the chapter**

The objective of this chapter is to examine the complex environmental problems—deforestation, chemical contaminants, and air pollution—that are not only caused by corn farming but relate to the unequal relationships created among actors, and the success of the agribusiness of the corn and chicken industry in manipulating state policies to make a greater profit. Corn production is considered both the cause and effect of environmental degradation.

## 5.1 Introduction

Environmental problems and deforestation in Thailand—and Nan Province—have been noted many times in the mass media (TV programmes, newspapers). It is well known that these are related to economic development. Interestingly, such issues concern the government and people external to the local population in Nan. This observation can be illustrated by reporting a conversation between me and a businessman that has been in Nan for 20 years and that works in different business areas. He explains the interesting changes in Nan from an outsider's point of view.

The middle-aged man was previously a soldier in the northeast before settling down in Nan Province. In addition to owning a coffee shop, he works in real estate and owns small beef cattle farms.

> The deforestation problems have been discussed in the media and concern the state and the middle class in Bangkok. At the same time, farmers have faced the problem of land ownership while the price of land in Nan is increasing.
>
> The issue of deforestation is part of a broader problem of conflict and competition among Nan's influential, prominent capitalists. This group would include the owner of CP whose powerful company plays an essential role in agribusiness in Thailand, especially the corn market in Nan, and a bank owner who is very close to the royal family and works with their projects for the development of Nan.
>
> (Pod, Businessman)

Although he is not directly involved in corn farming, his views reflect awareness of the role of higher powers in relation to land and forest use in the highlands. It is interesting that, as with the conversations with the corn farmers, no mention of any problems with deforestation was made, while he repeatedly mentioned problems to do with land ownership and access, and it is through this connection that the deforestation issue is seen as relevant in Nan.

As mentioned in Chapter 4 deforestation in the north is not caused solely by the actions of corn farmers but is also as a result of official policies supporting the agricultural expansion and stability of the state. However, environmental issues cannot be understood without first understanding the political and economic conditions in which they arise (Bailey & Bryant,

1997). It also confirmed that the environmental problems during the Anthropocene era are not a result of the earth's ecosystem itself, but the new forms of governance and institutions surrounding the industry (Ogden et al., 2013) This study then considers environmental problems from a political ecology view. This chapter focuses on investigating the dominant forms of knowledge and practice of Thai corn farming that have led to ecological degradation and the natural resource management practices of the state.

As a result of the intensive use of non-organic fertilisers and herbicides on corn farms, there are various forms of environmental damage, such as deforestation, air pollution (smoke), and soil degeneration. The problem is aggravated by the negligence of state agencies and the considerable support for the agribusiness sector.

Of course, it has long been acknowledged that environmental degradation of the agricultural sector has been a consequence of the 'progress' of humanity, and recent examples would include the 'Green Revolution' in Mexico in the 1940s, 1950s, and Asia in the 1960s (Lily, 2014; Melillo, 2012). The term 'Green Revolution' refers to "the controversial array of programs and policies that introduced high-yield seeds, intensive irrigation techniques, herbicides, pesticides, mechanisation, and petrochemical fertiliser to parts of the developing world" (Melillo, 2012, p. 1028). It is a significant part of "modern" knowledge and practice of agriculture that has been influencing agricultural development since 1960. These initiatives were partly based on scientific developments, although political agendas were also important. The genetic modification of rice, corn, and wheat strains that would prosper in different harsh climates worldwide led to successful use in Mexico and then in Asia/Southeast Asia (Lily, 2014). In Thailand, the Green Revolution began in the 1960s through the development policies of the state, based on the idea that natural resources would support economic growth as outlined in the First National Economic Development Plan (1961). During the 1960s and 1970s, imported synthetic fertilisers increased the yields of corn and wheat, which are staple crops. As

a result of using such fertilisers, the amount of nitrogen available to farmers in Asia and Latin America has been increasing (Melillo, 2012).

As the demand for corn has increased in Nan, the environmental situation has become more serious. Initially, corn production was introduced and controlled by state agencies and multinational companies, which supplied agricultural input and played an essential role in the new agricultural practices. However, the knowledge and practice related to corn farming were concerned with the environmental impacts that have followed during the subsequent 50 years. This chapter seeks to understand more about the context and problems of Thai corn farming since the Green Revolution model was introduced. First, the chapter begins to sketch the social background by discussing two important issues: (1) the ecological knowledge of agriculture and corn farming by Thai farmers, and also the government agencies; and (2) environmental degradation and the new cooperation between the state and multinational business. After this, the chapter moves on to analyse the three main environmental problems that have been caused by corn farming in Nan Province: deforestation is the most important to focus on, followed by air pollution and the excessive use of chemicals in corn farming. These are the critical elements to consider when focusing on corn farming and environmental degradation in the area. They also reflect the Thai state's problem in dealing with corn farming and environmental degradation, the issues related to the stakeholders in the enterprises, the farmers themselves, and the state.

**5.2 Ecological knowledge of highland agricultural and corn farmers**

At present**,** corn is one of the simplest plants to cultivate and generates more income within a shorter time than other crops[1]. Moreover, corn farms do not require much care, although their

[1] The official understanding of corn farming can be seen from the promotion of maize planting after rice harvesting of the Ministry of Agriculture and Cooperatives (MOAC), Thailand. The project began in 2017 with the main objective to reduce the number of rice fields. In the project, corn farming was introduced, seen as using drought-tolerant plants that were easy to cultivate. With higher demand and ready-to-buy corporations, the MOAC has encouraged the farmers in 31 provinces, including Nan, by supporting the production cost of THB 2000 per rai (Department of Agricultural Extention, 2018).

use has been seen as controversial (Walters, 2010). All of the corn seed used is genetically modified (GM) and can be sown in various terrains, so farmers can choose which type of seed suits their farmlands or follow the merchant's recommendations. At the same time, corn cultivation has been supported since 1960 by providing loans and allowing farmers to use as many chemicals as they can afford. It has also given farmers the freedom to cultivate land they do not own, even though this became an issue later. This section will emphasise the success of corn farming linked to the national economy and how it has been causing environmental degradation for nearly 50 years. Corn farming in practice and the environmental problems due to the state-supported increase in cash crop production will be discussed. Additionally, the state's inaction regarding the environmental problems will be considered.

Around 80% of the land in Nan Province is highland, of which 6 million rai are forested. Of the conservation areas, around 1.66 million rai have been taken over for farming (Royal Forest Department, 2017), and only 20% is lowland. Therefore, highland agriculture is the distinctive feature of the province, although people work on farms in both the highlands and the lowlands. Corn farming is the primary product and source of income for the local people, while rice production, which can be harvested only once a year because of limited water supply, is only for household consumption. Hence, corn farming has been a part of family life and the primary source of household incomes since 1970. One farmer, Por Sui ompares the past and present working on corn farms as follows:

> I have grown corn for more than 20 years. There were no other means of transportation in the area, so we used cows for transportation, and I had ten to twenty cows. Twenty years ago, the price of corn was around six satangs to two baht per kilo [gram][2]. At that time, we did not need much money to grow corn. We did not use fertiliser, herbicide, or pesticides. It is the essential difference. Now, the price is higher, but it fluctuates a lot**;** I don't know why. The most important thing in corn farm is capital (the money for investment).

[2] Satang is a fractional Thai currency equivalent to one hundredth of a baht. 100 satang = 1 baht (THB). One baht = 0.02 (GBP)

Most farmers also stated that growing corn is not difficult, and there is no need to take much care. At the same time, the demand is high. Another farmer, In Tha, stated that "the most important aspect of a new crop is money." At present, the quality of corn production depends on the quality of the seed. Farmers can find seed of different prices and quality; they also can identify the types of seed that suit various farming locations, whereas in the past the quality of the seed was not too different. After harvesting, the farmers can keep their seed for the next crop, but the product's quality is not as good due to such intensive farming. In addition, more investment (intensive capital) is needed to farm the land. However, neither Por Sui nor In Tha mentioned the problem of land use until it was asked, so, for a local people, capital is more important than questions of land ownership.

Until the mid-20$^{th}$ century, shifting cultivation sites was the primary agricultural technique in Southeast Asia's highlands and the north of Thailand (Rasul and Thapa, 2003). In the past, the farmers possessed the land by the right of use. For example, if a family had more than one piece of farmland, they moved to cultivate another after harvesting the first crop during the next season. This type of agriculture found in Southeast Asia is called swidden, slash-and-burn agriculture, or shifting cultivation (Rasul & Thapa, 2003; Wolfram, Cleandenning, Cram, & Kennan, 2016) . Swidden was common in the past, but with the change to sedentary agriculture, the issue of land ownership is essential, especially as the state wants to keep the land as its property. The three causes of this change to sedentary farming are land-use policies, market influences, and population pressure (Wolfram, Cleandenning, Cram and Kennan, 2016). This has led to a significant change in the north's agricultural practice, especially an increase in the intensive farming of cash crops such as corn, moving into highland areas, and the increased use of chemicals. In this sense, market influences significantly impact the expansion into the forest areas.

In the north of Thailand, most people that live in the mountain areas are tribal groups that formerly practised shifting cultivation until the 1970s. Due to the pressure of the growing population, the government introduced new policies to control shifting cultivation. Around two million hectares of forest were established as national parks and wildlife reserves (Turkelboom, Ongprasert, Thirathon, & Koen Van, 1996). The watersheds were classified into two types: forest protection and economic utility (Rerkasem & Rekasem, 1994). Zoning forest areas is a modern concept, part of the territorialisation of the state. However, the measure was relaxed with the boom in cash crops. The government has promoted crops such as rice, rubber trees, cassava, and corn since 1967 (the 2nd National Economic and Social Development Plan, 1967-1971). However, the growth of cash crops, especially corn, has significantly decreased the forest areas. Modern agriculture and industrial cash crops have changed land use and have demanded the use of more chemical products. Area zoning by type of usage seemed to reduce deforestation; however, some forest areas have decreased and been replaced with corn farms (see also Chapter 2, page 52-53).

### 5.3 Environmental degradation and the rise of cooperation between the state and agricultural business companies

The boom of corn farming began in the 1970s and has continued until now (2022). This period of over 40 years has witnessed the state allowing corn farmers to expand their farms into conserved forests, neglecting the consequences. In 2011, Bangkok and some agricultural areas in the country's centre faced a natural disaster from severe flooding. The situation was presented as being connected to the deforestation issue in the north, a critical watershed area in Thailand. In this view, the [corn] farmers in the forest and highlands were seen as the primary cause of deforestation that led to the floods. The resulting damage pushed the Thai state to be more concerned with solving the environmental issues that emerged from exploiting the forest and land through highland agriculture. After the flood, the state used its power over national

resource management to expel the farmers and to claim the land as state property. Additionally, the state has actively sought cooperation with the multinational agricultural businesses that run the Thai corn production businesses, which supply the feed and chicken industry, rather than with western powers, as happened during the Cold War.

The cooperation projects are to do with reforestation, reducing corn farming in Nan while increasing it in other provinces, and banning corn cultivation from farms with land ownership issues. The new cooperation between the state and the agricultural businesses aims to maintain economic growth by supplying corn to the chicken industry and increasing forest areas. The projects aim to protect and rehabilitate the forests and land, but this involves excluding the rights of corn farmers that cannot prove their right to the land even if they have worked it for a long time. This approach does not seem to be sustainable. The following three sections explore the connection between corn farming in Nan Province and environmental degradation.

### 5.4 Deforestation and the other environmental Issues related to corn farming in Nan Province

The severe flooding in 2011 in Thailand marked a significant turning point in raising the state's and peoples' concern about deforestation and other environmental problems. According to the World Bank, this flood caused at least THB 1.43 trillion or USD 45$ billion worth of damage (The World Bank, 2012). After the 2014 coup d'état, Prayuth Chan-O-Cha, a junta leader, launched NCPO Order No. 64/2557 (2014), called 'Reclaiming the forest' or 'Reforestation' as significant policies of the junta government[3]. The order and the then Master Plan to Solve the Destruction of Forest Resources, State Land Invasion, and Sustainable Management of Natural

[3] The 2011-flood occurred during Yingluck's cabinet; following on, Thai society faced a protracted political conflict until the coup d'état by Prayuth Chan-O-Cha on 22 May 2014. As the junta leader, Prayuth declared the 'Reclaiming the forest' on 14 June 2014 (NCPO Order No. 64/2014). Therefore, the order with the then Master Plan to Solve the Destruction of Forest Resources, State Land Invasion, and Sustainable Management of Natural Resources became the primary natural resource management policy until now.

Resources emphasised the strict arrest and suppression of forest intruders, with the 10-year goal of reclaiming 40% of the national area for reforestation. In the Master Plan, Nan was one of twelve provinces classified as severely critical areas in natural forest and land intrusion. In the Master Plan, it was implied that corn farming in Nan was perceived as the cause of deforestation (ISOC and MNRE, 2014), and the resultant floods. The concept of conserving the forest ecosystem for ecological and aesthetic reasons was first developed under the influence of the U.S. in 1967. The forest was divided functionally, for example, forests for timber production, national parks for recreation and travel, wildlife refuges for animal habitat, and watershed areas for river sources. However, there was no allocation for rural communities to use land for agriculture even when the forest is dedicated to production or conservation (Laungaramsri, 2005).

In this light, the forests' categorised functions reflected the advantages given to the middle class by state centralisation, whereas corn farmers and communities were excluded. As evidenced by 22 interviewees, all reported that the current forest policy, especially 'Reclaiming the forest,' does not allow farming without permanent land ownership, resulting in decreasing corn farming. Moreover, 298 villagers in the Na Noi district became suspects in a forest encroachment case after being called by the police to identify their land (in the forest) (The Momentum, 2018).

Moreover, air pollution with PM 2.5 in Thailand, which happened nationwide in 2018, was also another trigger for public concern about the causes of pollution. The government declared the Air Pollution Resolution on the National Agenda on 12 February, 2019. For the problem of PM 2.5, forest fires and man-made burning were identified as one of the leading causes, together with burning in farmlands both in corn and sugar cane fields. During one policy statement, the prime minister showed the example of the 'Nan Sandbox,' a project piloting the re-allocation of arable land, which aims to solve the problem of watershed forests, forest fires,

and finally PM 2.5 (Lertjarad, 2020). It was not only official perception; public concern was also expressed generally in a similar direction both in mass and social media.

Meanwhile, environmental problems, mainly deforestation and air pollution (haze and PM 2.5), re-emerged as a state concern due to intense pressure from society and the media. Subsequently, the corn farms in Nan are now strictly controlled by the state, while the state is proposing a policy to promote corn growing in other provinces where the farmers do not face the question of land ownership.

In cooperation with the agribusiness companies in the supplier and buyer sector, a "project of corn planting after the rice harvest season" (Department of Agricultural Extension, 2018) has been pursued with the objective being to solve the problem of decreased corn production rather than environmental degradation and the insecure life of the corn farmers. It reaffirms, amid the environmental crisis and conflicts, that the Thai state has the power to control and manage land and forest and support the agriculture business of the corn and chicken industry. This kind of cooperation, focusing on high profits and economic growth, has been influenced by the U.S. since the Cold War. However, it is not the stability of the state or political and border issues that are the focus now. Instead, precedence is given to stability in economic growth and recovery of the forests, as mentioned above, especially in the corn planting project and reforestation policy. However, the rights of the local people are the last thing that the state considers as a priority (see also in Chapter Two).

Even though most farmers work there, the corn farms in Nan with land ownership problems would be excluded from the recent project to promote 'Corn planting after the rice harvest season' (Department of Agricultural Extension, 2018) directed at rice farmers in the central region and the other provinces in the north to encourage them to grow corn following the rice harvest. The eligible participants will receive a subsidy and need to follow certain conditions and register if they would like to be a part of the project. For example, farmers will

receive government funds if they use high-quality agricultural products, especially a high standard of seeds, and follow the instructions of a specialist (from the feed mill company). Moreover, the right to use the land is a serious matter, and farmers have to register their land and prove that the lands are legally occupied. The farmers also need to show evidence of their occupation.

An official government statement from the Nan Province Agricultural Extension Office (2017) notes the conditions of the project as:

> (1) the Department of Agriculture would control the quality of corn seed to discourage the sale of low-quality seed and prevent the sale of seeds to farmers who do not have a title deed for their land.
> (2) the government needs to make clear which areas will be supported under this project; and
> (3) there is a need to be able to identify corn produced from legally farmed land and corn produced from illegally used land.
> (4) there is also a need to improve control over the chemical products that are used in agriculture in highland areas.
> (5) the project will be supported under the contract farming programme by two companies, CP, and Pacharat Ruk Samakki Nan Company.

In Nan province, 6,994 farmers applied to be part of the project, totalling 23,750 rai, all under farming contracts with CP (Nan Provincial Agriculture and Cooperatives Office reference, NA). As the total amount of land used for corn farming in Nan is 797,871 rai (including the land where the issue of ownership is problematic), only 2.97% of the land used for corn farming in Nan comes under this project. Thus, the project does not directly solve the environmental problems but instead creates others. It leaves small farmers that cannot demonstrate land ownership as victims of monopolisation and pushes away the environmental problems to other provinces.

Although the corn farms in Nan are now controlled, problems are moving to other areas beyond Thailand. The neighbouring countries of Myanmar and Laos face air pollution and land grabbing due to the same pattern of growing corn under contract farming (La-orngplew, 2012). Environmental problems—especially air pollution—have no national borders, and the agricultural companies can also cross borders and exploit any area if the state supports them as

investors. Today, air pollution from neighbouring countries also affects the provinces in the north of Thailand. For example, at the beginning of 2017, the smoke problem due to forest fires, burning of fossil fuels, and burning of agricultural waste such as corn cobs and corn stalks covered many areas of northern Thailand. They show up as a dense hotspot in aerial photographs, showing higher average temperatures in areas with higher pollution than normal. The number of hotspots varies according to air pollution; if the areas have many hotspots, then they originate from high air pollution (Wattanasombat, 2017). At that time, the hotspot showed dense areas of smoke in the centre of Shan State in Myanmar and another in the north of Laos; both are corn farming areas. The areas also form part of the project to promote corn growing in neighbouring countries along the border of Burma, Laos, and Cambodia under the contract farming system (Greenpeace Thailand, 2020; ThaiPBS, 2021).

In terms of feed consumption, in 2018, corn was expected to be used at the highest rate for poultry and swine feed, approximately eight million metric tonnes. In contrast, local corn production was forecast at five million metric tonnes (Thai Feed Mill Association, 2018). Moreover, according to the Thai Broiler Processing Exporters Association's report, the amount of chicken exported in 2008 was 401,494 metric tonnes, which increased to 801,371 in 2017. It can be seen that the introduction of corn farming and subsequent environmental issues in Thailand (and neighbouring countries) are in the 'web of life' (Moore, 2016) of chicken consumption demands. Hence, the global crisis of environmental problems and climate change today is the result of interrelated factors formed within a capitalist system: the cooperation between the state in developing countries and multinational companies ignores the rights of local people, and the exploitation of natural resources. Intensive global meat production and poultry consumption are massive and complex processes integrating capitalist economies. Increasing consumption has affected the supply chain all the way to feed manufacturers. Hence, soybean and hybrid corn production have changed farming being based on capital-intensive

techniques. Such a phenomenon signifies the primary process of the second food regime, which refers to the declining hegemony of great powers such as the U.S. At the same time, the role of multinational business has become more significant. As a result, the tension between nationally organised economies and transnational capital has been amplified (Friedmann and McMichael, 1989).

### 5.4.1 Corn farming and deforestation in Nan Province: whose problem is it?

Addressing the situation of corn farms and the decrease of the forests in Nan Province, this section discusses two points. First, there are different views on forest management and deforestation in Nan among the corn farmers, the middle class, and state officers. These differences are part of the primary cause of the problem, as they add complications to the solutions. Second, the deforestation and rehabilitation projects in Nan are part of a political debate that is less concerned with sustainability. Economic interests and conservation ideology also shape these two issues as the accumulation of capital and support for the growth of capitalism in Thailand are prioritised. At the same time, the reduction of differences or equal access to national resources by different groups is of less concern. The farmers, who work on what was once forest land, claim that they worked there before state control (Royal Forest Department and Department of National Park. Wildlife and Plant Conservation). This issue has been causing conflicts between the farmers and the state for nearly 30 years and is still ongoing.

#### (1) Differing views on forests and deforestation

When deforestation became an issue in Nan (after the severe flooding in 2011), the farmers were excluded from the supply chain of corn production with the state's official limitation on land ownership. Some of their products were also banned by the big feed mills companies. At the same time, some farmers were also victims of forced relocation under the reforestation projects (ad hoc replanting projects) by the state officers; the state is collaborating with agribusiness. In some areas, the conflict manifested itself in the farms being destroyed by

soldiers and other state officials. In addition, the farmers protested (KhaosodOnline, 2017). To discuss these points, the issue of how the forest has different meanings for different groups needs to be considered, and how this links to management.

The first group consists of the corn farmers in the villages. Those interviewed are small farming operators; most of them had worked as farmers on land inherited from their parent's generation. Their educational background varied between primary and secondary levels and living with debt. Working hard and supporting their children through higher education was a central concern for all the families. For them, the forest was simply an area for living and working.

In Tha told me that his family had survived by working on farms and the area around the farms:

> We get money from the farm, some vegetables from around the house, and also from the neighbouring area.

There is an overlap in the forest, farmland, living areas, and the workplace for corn farmers. Their primary concern is how the economy relates to their livelihood. However, when talking about forest degradation, it was found that they have a different understanding. Most interviewees stated that some areas without *'big trees' 'did not look like a forest'* but rather wasteland. However, there was some indication of sensitivity to environmental harm as most farmers stated that they did not cut down trees for farming as former generations had done. Then, "although the corn farms in Nan have indeed expanded, the trespass and encroachment of forests happens in other areas (districts and sub-districts—not in our area)," the head of Ban Hui Mong stated. It was noticed that most of the corn farmers that were interviewed did not mention environmental problems, at least not directly. Thus, it can be concluded that issues of environmental degradation are usually far from their minds.

Since the Cold War, deforestation in the north of Thailand has been an issue. The Mong people, a minority group that live in the highlands, were considered by the state to be the cause

of deforestation because they cleared land to grow opium. After the state suppressed opium growing and supported cash crop cultivation, they changed to growing corn and other plants supported by the state and NGOs. In addition, a concession-based logging business was also part of the story of deforestation in the north (Ganjanapan, 1995). The state definition of the former [forest] concession area is "degraded forest," where the state allows farmers to use the land temporarily, under state ownership. In addition, the decrease of the forest area and the growth of cash crops have been closely interrelated with the acceleration of economic development by the Thai government from the First National Economic Development Plan in 1960 (Kusantea, 2015).

In the past, opening up new land for farming was very common. Farmers were not greatly concerned about ownership rights when growing cash crops, especially corn, which the government had supported (through government loans and the agricultural land use policy). In addition, demand for corn for feed increased, so land rights were overlooked, and farmers felt free to expand their farmlands. They did not feel that the expansion of farms was an environmental problem. Regarding ownership, one of the corn farmers stated the following;

> "I have been a corn farmer for a long time, and the government should consider me as a farmer, not a squatter."
>
> Cha Na

Apart from the farmers themselves, there are at least two groups with different views. The first group comprises the state officers and the middle class, who have an ideology of preservation, and the view that the forest needs to be protected. Some of them run campaigns to protect places far away from them. For example, on 21 April, 2016, the famous rapper Mr. Abhisit Opas-Aimlikhit, or Joey Boy, posted a personal message on Facebook, expressing the need to assist with more than 500,000 rai of reforestation in Nan, as he had been challenged by

the governor of Nan[4] (Tnews, 2017). The background of his later project entitled, 'Plook Lei' [immediate planting] voluntary project in collaboration with the EGAT as a corporate social responsibility project, began in 2016.

However, the local people that have suffered from the national resource management policy are excluded from working on the land. The aim of local farmers is economic survival and negotiation for land rights (Pongpaijit, 2011); it is difficult for the farmers to engage with an ideology of preservation that excludes them from the area. However, corn farming and deforestation are complicated and need to be analysed at two levels. The first is the local level, shaped by the power of the social structure and the national market system. The second is the global level, including the power of global capitalism and multinational companies (Pongpijit, 2011). In the case of corn farming in Nan, it is not a simple issue of deforestation and rehabilitation under an ideology of preservation. The issue relates to the significant connection between the local farmers and the chicken industry linked to the corn supply chains and chicken production, which the agricultural business companies control.

The deforestation in Nan is further complicated by the activities and impact of external developers. For example, in Wang Sa District, more than 5,000 rai (800 hectares, or 1,976.843 acres) were acquired by a group of capitalists for transformation into resorts and for agricultural purposes. The forest officers, military, and local police considered this as illegal acquisition by the capitalist group (investors that run the business about the resort), not the local farmers. The officers believed that the farmers that are small farmers could not block the road themselves with heavy machinery and water pipe systems as the big corporation did (Thai PBS News,

[4] 'Plook Lei' (immediate planting) is an ongoing voluntary project led by 'Joey Boy,' a famous rapper in Thailand. The project was initiated because of a challenging quotation made to the 'keyboard gangster' by the Nan governor in 2016: "…[I] … will be hostile to anyone criticizing Nan Province for using Nan as a money-making tool in the post without any suggestion of what we must or should do. One, two, three, all keyboard gangsters. I have more than 500,000 rai of land for you to plant. Can you help me plant it?" 'Joey Boy' started by mobilizing funds and campaigning through his (social) network with the hashtag #ปลูกเลย [immediate planting]. The project's goal is to plant more trees in Nan province (ThaiPBS, 2016).

2016), which resulted in broader impacts for many people. At present, many areas in Nan, especially in the mountains, are popular among tourists, making the highlands desirable to investors.

**(2) The political debate between different groups concerning deforestation and the forest recovery project**

Understanding deforestation and forest recovery in Nan is an ecological issue and relates to political disagreements between the different groups. The problem in Nan has been relieved by the state policy and programmes to 'reclaim the forest.' There are also many other environmental projects from different sectors. At the same time, the state has a plan to support corn farms in other areas[5], so reducing land for corn farming in Nan does not mean that corn production overall is decreased.

Indeed, some Thai agribusiness companies have expanded the corn business to neighbouring countries, such as Shan State in Myanmar (Wood, 2015). This is part of the exploitation process under capitalism, which cooperates with the capitalist state and capital to take advantage of natural resources (Buck, 2007).

In fact, corn farming in Nan is related to the actions of the middle class in different areas. The middle class run many projects from Bangkok or other areas to plant more trees in the degraded forests. All projects aim to replant the land and forests. The following are examples of projects in Nan Province: one example is ″Wearing a hat and shoes to the bald mountain in Nan,″ a significant project in Nan that was referred to by different groups of people in the interviews (explained below); the 'Plook Lei' [immediate planting] voluntary project run by the famous rapper[6] with the EGAT as a corporate social responsibility project began in 2016;

[5] The program under the military regime aims to increase the forested area from 102 million to 128 million rai by 2027. (Hirsch,2019) Nan is also the main focus of the programme.

[6] 'Plook Lei' (immediate planting) is a continuing voluntary project led by 'Joey Boy,' the famous rapper in Thailand. He started by mobilizing funds and campaigning by his (social) network with the hashtag #ปลูกเลย (immediate planting). The project's goal is to plant more trees in Nan province (ThaiPBS, 2016).

'Plook Pa, Sang Kon, Bon Wi Thee Porpieng, Raksa Tonnam, Bantao Utoggapai, Changwat Nan' [Nan Reforestation Project—Model National Sustainable Reforestation Project] run by MFLF under Royal Patronage, which was scaled up from the former Royal Initiative project (MFLF, n.d.). Of course, the middle class has more power and impact than local farmers because the state supports them. Some projects are run under the royal family, the large agricultural companies, and Thai celebrities. Therefore, it could be said that the middle class also plays an essential role in deforestation, which it is claimed is caused by corn farming and farmers' practices. Their initiatives actively try to address environmental problems, and many projects are brought to Nan with the cooperation of local state organisations. The only benefit for the local farmer is temporary employment. In fact, I worked on a corn farm with the farm owner and a labourer, a hireling that had a truck to transport the corn from the farm to the local merchant's company: “I also work for the government project as a volunteer to grow the perennials and also be part of a research group from Kasetsart University that works on a sustainability project" (Song Karm, interview).

'Wearing a hat and shoes to the bald mountain' is a significant project of Nan Province; it is run by Nan Community College in Nan Province in cooperation with 47 organisations from 94 sub-districts. The urgent mission of the project is growing trees in the deforested areas. The long-term purpose is to improve the lives of people without destroying the environment according to the "Sastra Pra Raja" [the ‘King's Theory’] regarding the area management, for the upstream (forest), midstream (agriculture), and downstream (fishery) areas. The central concept for development was proposed and carried forward by King Bhumibol Adulyadej (former king of Thailand) (Thai PBS, 20 June, 2015). The location of the project is the "bald mountains," which are divided into three parts: the top of the mountains (upstream), the middle

of the mountains, and the foot of the mountains (downstream)[7]. The mountain tops are the areas that need to be urgently rehabilitated. In order to change the areas of crop cultivation to forest, this reforestation must be accelerated under the project work plan. Cooperation among networks, corporations, other organisations, and the farmers in those places that suffered from deforestation is ongoing. In addition, people concerned about the deforestation issue in Nan can assist the project by donating money (Thai PBS, 20 June, 2015). Reforestation seems to be the major project in Nan incorporating various groups of people.

However, the project also faced difficulties such as persuading farmers to change from growing opium to corn and other cash crop farming in the late 1970s (as indicated earlier). As the CP—the company running the CSR project—mentioned, 'persuading the farmers to switch from growing crops to planting perennials in order to create forests may not be easy because corn farming is the first and foremost means of livelihood for farming families'.

In the middle of the mountains, in Ban Huai Moung village, some farmers gradually have begun to plant perennials such as rubber trees, teak, mango trees, and other fruit trees. However, their primary income still comes from corn farming. Rung Sui, one of the farmers in Ban Hui Mong, stated the following regarding planting perennials:

> Maybe it is good to plant perennials for the long term, and it suits the farmers who do not have debts and have more land. Nevertheless, most of us work under debt, we receive income from corn farms twice per year or more, and we already have the market. Whereas for the fruit trees, we can only sell the product and find the market once per year. Although we are planting perennials, at this time, corn is still more secure in terms of income.

For the project to plant perennials to rehabilitate the forest (part of Wearing a hat and shoes to the bald mountain in Nan) to succeed, the director of the Nan Royal Forest Department is also concerned. One key problem is seeking a market for new agricultural products. He stated

[7] Bald Mountain refers to deforested mountain areas that are easily noticeable because they have no forest or trees and are compared to bald people. Some areas look dry. The word is very common in Thailand and is used in government documents.

that "the project needs a subsidy from the government in the beginning because it is difficult to find the new markets."

Another viewpoint came from the owner of the large agricultural shop in Ban Vang Sa, the district with the highest corn production in Nan. Commenting on the project, he stated the following:

> Although the farmers are changing to growing perennials, they still need to use as many chemicals as on the corn farms; maybe they will use more insecticide than needed for corn. This is another problem that I had already pointed out when the project's committee invited me to a meeting.

The store owner is in disagreement with the project. He reflects that he will lose some of his profits when the farmers stop growing corn. His store works as an agency selling agricultural products such as corn seed and chemical products for agriculture; his business also includes buying corn and selling it to the feed mills CP and Betagro. Nonetheless, his shop could adapt more quickly than the farmers could. For example, he said, "I don't mind if the farmers stop growing corn. I can promote other products that benefit the business."

When he was asked about a story that CP had stopped selling their corn seed to Nan Province, the owner did not answer directly, but said, "it is very easy if the farmers want CP's seed, we can find it in the nearest provinces. The problem is that the high-quality seed is expensive, and most farmers do not want to pay at this time".

Most of the corn farmers, who were asked about the quality of the seed, answered similarly, saying that CP's seed is of the highest quality but that the price is higher than that of other brands.

CP is the biggest multinational company in Thailand supplying agricultural products, corn, and other seeds. The company also run the business about feed mills, and chicken farm businesses Therefore, when Nan experiences deforestation, CP comes under the spotlight for seeking a way to escape the problem. It reacts by declining to purchase the corn grown on land without ownership rights and stops selling the corn seed in Nan. At the same time, the company

both runs and takes part in the environmental projects in Nan. In addition, the CP group moved toward the idea of sustainable development by creating a "Sustainability Office" in Nan on 5 September, 2019 (WeAre CP, 2019). CP is part of the story of deforestation in the province and intends to support the state policies for restoring the forest. In contrast, the state runs another project to grow corn in other provinces of Thailand. Consequently, the company has expanded its corn business into neighbouring countries.

Considering these projects, it was found that when the project aims to solve the problem of deforestation, it is still directed on the basis of specialist knowledge. It is run by scholars, technocrats, and government officials in different agencies, drawing on scientific evidence. Notably, the experience of the corn farmers that live in the area is ignored. The project's original idea has not changed, and the state has controlled resource management through the specialist knowledge of the Royal Forest Department.

Moreover, what is interesting about Thailand is that many rehabilitation or developmental projects referred to the royal family's initial concern. For example, the master plan for 'Reclaiming the forest' order cited the quotation of the former king Rama IX and Queen (the queen mother) as the conceptual framework. It is worth quoting as follows:

> "Forest officials should first plant trees in people's hearts. Then they planted trees on the ground and healed the trees themselves." (Royal speech of the former king Rama IX, 1976)
>
> "King is water, I will be a forest. A forest that pays homage to water. His Majesty built a reservoir. I will build a forest" (Royal speech of Her Majesty Queen Sirikit, The Queen Mother, 20 December, 1972)
>
> "Forests help absorb rainwater underground, called groundwater gradually drained into a stream as a canal, and it is a river for us to use. Therefore, we should cherish preserving the forest to retain upstream streams so that our children may not be in trouble" (Royal speech of Her Majesty Queen Sirikit, The Queen Mother, 11 August, 1991).
>
> (cited in ISOC and NRE, 2014, p.7-8)

In addition, there has been a royal initiative project developed by Her Royal Highness Princess Maha Chakri Sirindhorn, one of the sisters of King Rama X. The ‘Phu Fah Pattana

Centre project at Nan' [development centre at Phu Fah, Nan Province], a holistic development project, began in 1999, intending to pilot a development model and knowledge transfer. Currently, the RID operates with replantation as the main activity (Nan Province, 2020). Another restoration and sustainability project is run by a royal family organisation named the Mae Fah Luang Foundation. Similar to the former, the latter project aims to rehabilitate the forest in the watershed area—the same geographic area as that of a developmental project run by the Foundation—prompting the question of whether these projects will compete with each other.

Because Nan has been seen as an area sensitive to possible communist influence since 1960, this fact has encouraged the royal family to pay attention to the region and to support development projects, especially at the border. In addition, linking the reforestation project with the royal initiative could legitimise the project, reduce public criticism, and mobilise more support from different sectors at the same time. Moreover, it can be said that in Nan Province, most of the environmental rehabilitation projects are initiated by the state, the business sector, the elite groups, celebrities, and the middle class. At the same time, the local people are seen as part of the problem. It may be an example of a common problem regarding deforestation and restoration projects in Nan, which are often affected by the political debates among different groups, while the chief stakeholders—the local people—are left out. This political dimension could explain why a staff member of a local project could not accept being interviewed alone unless permission was obtained from the main office in Bangkok. Therefore, I sent a letter and some questions to the main office but received no reply[8].

### 5.4.2 Intensive Corn Farming and Chemical Use

Corn farming in Nan province is a deforestation issue and connects to the problem of chemical pollution. Although modern agricultural methods, and the Green Revolution, take advantage

[8] It was the same situation when I contacted CP about the first project: they kept postponing, and the letter was sent to other divisions but with no result.

of mass production, they also have drawbacks resulting from the high use of chemicals, which can cause contamination, soil degradation, and have ill effects on the health of farmers. In Thailand, these issues have been related to government policy, as supported by corporate capital groups. However, the use of chemicals on corn farms is a trade-off between profit and health risks. At the same time, productivity increases, and the farmers earn more money. However, the investment return is not worthwhile if their health is at risk and the high amount of chemicals used affects the sustainability of soil fertility. Moreover, using chemicals on corn farms in the watersheds or highlands is also claimed to be a cause of water pollution that will endanger people that live in the lower areas. The Nan River is one of the four main rivers that are the source of the Chao Phraya River in the central area, and it is one of Thailand's major rivers bringing richness to the plain[9].

In 2016 the mass media (including newspapers and TV programmes) reported on the research findings of a scholar from Naresuan University concerning the chemical contaminants in the Nan River. This study found that the herbicide Atrazine was present in the groundwater, surface water, tap water, and bottled water and exceeded the standard limits permitted. The research also found that Glyphosate, a carcinogen in fish, was present at a rate higher than the standard value. Also found were Paraquat and Chlorphyrifos above the standard level in vegetables, fish, soil, and water. Nan province has used up to 2,400,000 kilograms of agricultural chemicals per year (Kajitvichayanukul, 2016 cited Thairath online, 2016: Thai PBS, 2016), and corn farms have been referred to as the primary cause of the problems. After the disclosure, the governor of Nan province quickly responded by saying that such a problem cannot be solved at the provincial level because it relates to the import of chemicals, agricultural

[9] The Chao Phraya River (Mae Nam Chao Phraya) is the main river of Thailand. It provides nourishment to the agricultural area in the central plain. The four sources of the river in the north are the Ping, Wang, Yom, and Nan Rivers.

product policy, and has to be solved at the state level. The governor also mentioned the following:

> The former working group which had been responsible for managing the problem of chemical use in the agricultural sector in the past. At the same time, we proposed to the Ministry of Natural Resources and Environment to prohibit herbicides in the upstream forest areas, but there are limitations. The international free trade policy allows the country to continue to import herbicides and allows the farmers to use them freely"
>
> (Thairath online, 2016).

Different interest groups call for different responses. NGOs are pushing the government to ban and stop importing these products because they are dangerous[10]. The mass media have reported that Paraquat and Glyphosate have been banned in fifty-three countries, including countries in Southeast Asia such as Cambodia, Laos, and Vietnam. Their use has been restricted in 17 other countries such as the Philippines, Indonesia, and Malaysia, which set up the official license (PostToday, Oct 2019).

On the other hand, the corn farmers emphasise that in growing corn, agricultural chemical products are essential, and they cannot farm without them. One farmer mentioned that in growing corn, apart from the quality of seed, chemical products are also a necessity. The state also accelerated productivity by allowing farmers to use as many chemicals and agricultural products as they could afford and played a supporting role through a system of agricultural loans from the BAAC to help farmers buy supplies.

The determinant of high yields of corn in Nan is not based only on the expansion of farmland to new areas with fertile soil. The use of chemical products also helps to increase production. As the farmers reported, although the quality of seed is essential, the most important thing is the chemical fertiliser and the herbicide. However, while most farmers say that chemicals are essential and can be used as much as possible, this depends on their investment.

[10] Paraquat is a chemical that was first synthesized in 1882. It became known as an herbicide in 1955, was first commercially produced in 1962 by the company ICI in England, and was banned in 2007 (Thairath, Oct 2019).

The combination of agricultural input (seed, chemical fertiliser, and herbicide) has the significant effect of linking and indebting farmers to credit sources and markets. It has been a part of the cycle of an intensive farming system, dependent upon chemical products, even though the farmers realise that intensive corn farming, with the use of high amounts of chemical fertilisers and herbicides, will destroy soil fertility and also endanger their health in the long term. Most are concerned about these effects. For example, Parnee, a farmer and farmworker in Ban Huai Muand, stated that she stopped growing corn this year because her husband wanted to take a break from using chemicals and mentioned the health issues related to using them.

Thus, all of the processes involved in corn farming are full of risks. The corn seed used by farmers is chemically treated and is a hybrid seed covered with a chemical to preserve the quality of the seed and to protect against insects. When the farmers see the seed, its colour is dark pink, and some of this colour is left on their hands or gloves. The fertiliser is applied once or twice depending on each farmer, as the state does not regulate this. As Naree said, "we can use as much fertiliser as we can pay for. We learn the suitable amount from experience, from other farmers and reading the label on the bag at the beginning".

The state has ignored the use of agricultural chemicals, even though it affects farmers' health, the soil, and contaminates the river. The negative environmental impact has been part of the neoliberal reforms common to many areas. This exploitation of the environment from agricultural development happens in sub-Saharan Africa, Latin America, and Asia (Davis, 2006; Garcia, 2020). In Nan, state officers were not mentioned when the conversation referred to chemical products on farms. Without any intervention, it seems that the state disregards the exploitation of the environment and risks to farmers' health under a capitalist free market system.

However, while preventive intervention has not been pursued, the state has offered direct support in the form of basic insurance or a remedy for soil problems when farmers have

faced the effects of using chemical products, such as health problems and soil degradation. For example, Parnee's husband left the farm for one year to refresh his health away from the chemicals.

In Tha stated that he has had kidney and liver problems requiring x-rays and advanced medical treatment. Some of these problems were reported in a television programme shown on 5 July, 2016, which focused on the health issues in Nan caused by chemical residue. Currently, apart from the initial findings from the Naresuan University Researcher (Kajitvichyanukul, 2016), there is no other academic work to confirm whether the statistics for cancer in Nan Province are directly related to chemicals in the environment or not.

The combination of media and public concern has increased pressure on the state to ban Paraquat and Glyphosate. Biodiversity and Food Sovereignty Action Thailand (BIOTHAI) is a prominent NGO that campaigns for banning these chemicals. On the other hand, Paraquat and Glyphosate are still important to farmers, especially those that work in the highlands and cannot use machines or tractors to prepare the farmland. Burning is another technique used to prepare for the next crop, but this technique is claimed to be another cause of air pollution.

As mentioned earlier, it is clear that the state supports using chemical input in corn farming in two ways: direct sale from BAAC and indirectly through financial loans for farming. Based on the opinion of the farmers, they prefer financial loans because they are more convenient than buying from the BAAC. With the available choices in the market, they could choose from a range of different prices and various brands, including those offering promotions. This aspect was confirmed by Lung Thong, Na Sao, and Naree. An interesting point mentioned by one of the Nan Provincial Agriculture Cooperative officers was that “one particular major company has been influential in promoting its products through the banks”. However, during the conversation, he admitted that he was also instrumental in supporting and promoting these products to the farmers; therefore, this implied that that company's influence was also

transferred to the farmers by government officers like him. Sometimes, the company asks the local staff officer to invite the farmers to join a party promoting their products and the head of the village is usually invited. A state agency may also organise a similar party with the same purpose.

The second way that the state supports the farmers to use chemical products is to remedy the soil degeneration from intensive agriculture and the high use of chemical products through the Department of Agriculture Extension. 'Jalon', head of Chompu village, and other farmers, mentioned that the local agricultural agency offers to check the soil quality when the farmers ask for support. Soil degradation is remedied by telling the village head, who will then contact an agricultural officer to add lime (calcium) to the soil, which is free.

These two ways that the local state agency deals with farmers over the use of chemicals show that the state indirectly supports farmers in the use of as many chemicals as they want, even though they face the risk of side effects from high usage. In comparison, the use of chemical products for corn farming has been banned in other countries; the stories given in the fieldwork echo the looseness and lack of regulations by the Thai state, which promotes a capitalist system by supporting the agriculture business sector. This leads to economic growth at the expense of farmers' health and the state of the environment.

The use of chemical products in Thailand is complicated; it involves many actors on different levels. Besides NGOs and the Thai government, it relates to issues of global capitalism and multinational companies. The campaigns of the mass media and NGOs have put pressure on the state to ban three pesticides: Chlorpyrifos, Paraquat, and Glyphosate, owned by Dow, Syngenta, and Monsanto, respectively. However, the corn farmers in Nan did not mention anything about Chlorpyrifos, even though Thailand's National Hazardous Substances Committee voted in October 2019 to ban all three due to the dangers established by scientific evidence. It may be because the U.S. warned Thailand that the ban would interfere with

lucrative trade relations. As Gillam (2019) points out, the agrochemical industry players are devoted donors to the political machinery that runs Washington, and they expect a return on their dollars.

It is clear that banning chemicals in Nan is not a local issue; it relates to international free trade. The intensive use of chemicals is an essential process in corn farming; it can guarantee the corn product's quality. The farmers may receive more money when their product is sold to the large feed mill farms such as CP or Betagro. On the other hand, the farmers have to invest more and are in danger from the chemicals, while people that live around the areas of use are anxious and concerned about the residue and contaminants. In this case, the role of the state is quite different from that related to deforestation. The state, agricultural business companies, and other sectors promote the projects concerned with forest restoration. They also promote the policy to control the corn area in Nan while also promoting it in other areas. They also support the cultivation of fruit trees instead of corn, even if they may use more chemical products than corn (see interview with the owner of the agricultural products store, P 134). The state intended to ignore the danger of Paraquat and Glyphosate, although the contaminants are affirmed by research disclosed by the mass media (Yingkiatkul, 2016). However, in this case, the NGOs play a crucial role in putting pressure on the state to ban chemical products, but the farmers still use them. The Thai state applies the strategy of deterritorialisation to deal with the environmental issue (Vandergeest and Peluso, 1995), especially the intensive use of chemicals and haze pollution, in a way beneficial to the capitalist state and multinational corporations.

### 5.4.3 The Issue of Haze Pollution in the North

The cause of haze pollution in the north is not only because of the topography being a basin surrounded by mountains. Another critical factor is the burning of the forest and corn cobs coupled with smog from neighbouring countries (Thaipost, 2020).

> The number of corn farms in Thailand increased steadily from 2015 until 2017, then declined until 2019. At the same time, Myanmar (Shan State) shows the opposite

> situation from Thailand. There was a continuous decline from 2015 until 2019. Subsequently, the proportion of burnt areas of corn farms and total area in the Mekong Sub-region in the past five years is likely to increase from 14.69% in 2015 to 24.4% in 2019; the heat has been found in corn-growing areas in this subregion over time (Thaipost, 2020).

The statement above reflects the severe issue of air pollution related to corn farming. The interesting point is that the problem has not only been happening in the north of Thailand, but the haze has been crossing borders from neighbouring countries such as Myanmar and Laos (PDR). However, the increasing haze pollution in the Mekong Subregion has been significantly linked to the policy of the Thai state to control the corn farms in Nan province, and it seems as though burning is the same method used in the Mekong subregion[11].

Burning is a traditional method of cultivation that aims to prepare the land for new crops, especially for highland farms where tractors or other heavy machines cannot be used, as mentioned earlier. However, it was found that some farmers in the lowland areas also used burning to clear the farms after the harvest (Sutthi, 1989; Adelekeet al., 2017). Farmers also believe that the ash produced by the fires is a natural fertiliser and benefits the soil (Ketterings et al., 1999). Moreover, according to the corn farmers, a fundamental reason for burning is to reduce costs as the farmers do not need to pay for this clearance method. Although chemical products can help clear the land before the new crop, some corn farmers still burn the farm after harvest and use chemicals afterwards.

In 2017, the government ran a campaign to stop land burning because of the severe haze pollution in the north. However, the prohibition did not entirely work (Adeleke et al., 2017), as farmers can prepare their farms by burning between May and January but not between February and April. Because this is a sensitive period between the end of winter and the beginning of summer when the weather usually is very dry, and the risk of wildfires is high. In January 2020,

[11] The Asian Development Bank launched an economic cooperation programme in the Greater Mekong Subregion (GMS) in 1992, involving six riparian countries: Cambodia, the People's Republic of China's Yunnan Province, the Lao People's Democratic Republic, Myanmar, Thailand, and Vietnam (Asian Development Bank (ADB), 2015).

the problem was more severe than in 2019, with many provinces feeling its effects. Besides corn farms, sugarcane has also been promoted as a cash crop, and the farmers use similar farming techniques, including burning, which is also causing smoke and haze (Junpen et al.,2020).

Two farmers, one in the lowlands and another in the highlands, said the same thing: burning benefits the farmer and the soil but causes air pollution in the form of smoke. The better technique would be to plough with a tractor, but the limitation is that the farmers would need to pay for this, and tractors cannot be used in the highlands. One farmer that has been farming on the slopes mentioned that he has to pay 350-500 baht per rai for ploughing by tractor. A further problem is erosion in the wet season. However, the worst approach is to use agricultural chemical products.

> Agriculture in the highlands is much more complicated than in the lowlands because we cannot use any machine or labour-saving device used by farmers who work in the lowlands. The government is now controlling the burning because of air pollution, so we cannot burn the farm like we used to do in the past, even though burning reduces the cost and increases nutrients in the soil. However, nowadays, most of us use herbicides instead of burning.
>
> (Chana, a highland farmer)

> When preparing the land for growing corn, nowadays, the farmers cannot burn their farms as we did in the past. Most farmers in the village cultivate the land using a tractor. I pay 350 baht per rai. The government suggests that this cultivation method is more beneficial to the soil than burning. However, the farmers have to hire a tractor because we do not have our own; no farmer can afford his own tractor. We know that clearing the land by burning causes air pollution, but it helps to reduce the cost.
>
> (The head of the community, Wang Sa)

Even though burning on farms is being controlled in Nan and other provinces in the north, the haze pollution problem is still happening and is becoming more serious. A Greenpeace paper (2020) on the haze problem remarks that the more stringent measures when buying corn in Thailand may be one of the reasons why corn farming is increasing in other areas. Thai corporations are increasingly turning to investment in neighbouring countries, mainly on the borders. The corn-growing areas are expanding to compensate or increase the

productivity that may be missing from the former production in Thailand. Around 2016, there was a change in the measures for purchasing corn from farmers in Thailand when corn could only be bought from farmers that could show evidence of the right of ownership of the land. The result was farmers having problems selling their produce and residual production. The measures taken align with the change in the number of fire hotspots in Thailand that declined from 2016 and then peaked again in 2019 (approximately 14,000 hotspots in April). At the same time, the number of hotspots is rising in neighbouring countries, expanding production areas there which may be another strategy of the meat industry to meet the increasing demand from the world market for both meat and animal feed (Greenpeace, 2020).

The Thai capital is expanding corn farming into other countries, especially in Shan State, with the highest corn production in Myanmar (Woods, 2015). In 2016 the monthly statistics revealed that the number and density of hotspots in Shan State, Myanmar, which is adjacent to the northern region of Thailand, were significantly higher than in northern Thailand and more than double the number in the whole of Thailand (Wattanasombat, 2017). The causes of the haze are the support given to monoculture and the lack of a control policy. Moreover, the resultant haze has been fluctuating according to the price of corn (Prachachat New, 2019), with the Biothai Foundation finding a correlation between the purchase price of corn and the amount of crop burning, indicated by higher temperatures or hotspots. The finding showed that the higher the price of corn is, the higher is the number of hotspots. For example, in 2012, the price of corn was as high as 9.35 baht per kilogram, and the number of hotspots was as high as 27,033 points. When the price of corn dropped in 2012-2013, the number of hotspots decreased (Wattanasombat, 2017). Moreover, it was recorded that the haze from the agricultural activity had been linked to the corn farms in Shan State because the region of the ethnic minority population in the upland area has become a major CP corn production zone for the Chinese market (Woods ,2015; Woods, 2020).

## 5.5 Conclusion

The problem of air pollution through smoke and haze has been a growing concern for around five years. It is claimed that this pollution is part of agricultural activity. The problem arises not only in Nan and the north of Thailand; it spreads from the neighbouring countries of Lao PDA and Myanmar, with high corn production for feed (Chanhtong, 2013; Woods, 2015). The state and large-scale business are the most influential actors, the same as with the previously discussed problem (deforestation and contaminated chemicals). Both actors present their role as guardians of the environment by creating laws specifying a condition to ban corn that comes from farms that practice burning and those that have an issue over the right of land ownership. While the system devalues the corn farmers as marginal actors, some of them resist by breaking the burning regulations, thus reflecting the power of the weak to resist the state regulators. This resistance also occurs in the case of the land ownership issue (see Chapter 4, page 109-111).

Another interesting point is that when corn farms in Nan are claimed to be the cause of the environmental problems, the agribusiness sector relocates to other areas and benefits from the areas that have less regulation while still being supported by the state in the new areas. Moreover, most of the new areas are around borderlands with ambiguous regulations; therefore, business may benefit from border trade with particularities of frontier capitalism (Laungaramsri, 2011). In addition, attempts to solve environmental degradation sometimes create conflicts between the state officials and farmers.

Nan is an interesting province for three reasons; besides high corn production for feed, the province is also popular with tourists that like travelling in natural landscapes. Moreover, during the Cold War, Nan was a frontier province and the location of a communist camp. Following the Cold War, Nan has seen many development projects and corn growing is one policy that aims to solve poverty and increase incomes. Corn farming in Nan is a response for economic and political purposes. However, after the issue of deforestation and environmental

degradation was exposed, the corn farmers were viewed as trespassers. Some of the corn production was banned from large feed companies because of rightful ownership and the problem of burning. The response of the large companies seems to be one of protecting themselves from severe environmental concerns.

Moreover, the environmental issue related to corn farming has become a political “hot potato” between different groups at different levels of relationship. Awareness of the patterns of human-environmental interaction and the corresponding environmental challenges requires an understanding of the actors' unequal relationships (Bryant and Bailey, 1997). Most of the environmental issues in Nan concern the power of the Thai state to control agricultural practices and natural resources within the role of 'developing the state'. The model has been driven by national security and economic growth issues for more than half a century. Hayashi (2010) mentions that the end of the Cold War did not mean that the development of the state had ended. Although some claim that the developmental state model could only have succeeded and been relevant during the Cold War period and would not operate in today's global political and economic environment, this is not the case. In the Thai case, the model activated during the Cold War has continued to suit the military government in terms of mobilising its power to control and manage the national resources. However, the benefits to state development from economic growth and national security have not helped to solve the problems of environmental degradation in Thailand; in fact, they produce an unequal relationship among the actors, whether a state agency, the business sector, or small corn farmers. Meanwhile, the Thai state-agribusiness cooperation will flourish if the state continues to support the benefited policies. Economic growth is the paramount concern for the state, even with the development of monopolies, and shows no concern for worker exploitation.

The growth and success of the agribusiness, especially in the corn farming and chicken industry, influence the policies relating to corn production and environmental issues. In

addition, the role of businesses in solving deforestation through plantation forestry has expanded significantly (Puntasen et al., 1992), and this is quite obviously a deforestation issue in Nan. A study by Foley et al. (2011) analysed the significant causes of environmental degradation caused by human activities, including the changes to land use, the improved efficiency of agricultural systems due to the use of agricultural machinery, and the use of fertilisers with intensive chemicals in order to increase production. The case study in Nan highlighted the power of the state, international politics, and the role of multinational companies as significant factors that also need to be taken into account. In addition, in the case of Nan, the role of the mass media also has an important impact on the state, the agribusiness sector, and the Thai people, especially in raising concerns over the deforestation issue.

Indeed, environmental problems—deforestation, chemical contaminants, and air pollution—are not only caused by corn farming but relate to the unequal relationships created among actors and the success of the agribusiness of the corn and chicken industry in manipulating the state policies to make greater profit. The problem is more complicated when considered in the international free trade agreement context. Unregulated capitalism exploits the entire flow in the web of life: materials, land, labour, capital, and natural resources (Moore, 2016).

The next chapter reveals the complexity and stratification of the supply chain, a significant mode of production which is central in exploiting human labour and the environment.

# Chapter 6 - Stratification and Survival in the Supply Chain



**Objective of the chapter**

Chapter 6 unveils the complexity and stratification of the supply chain, which begins with the provincial corn farms in the north and ends at the feed mills and corn farms in the central region of Thailand. The chapter reflects on the social and economic context by focusing on the interaction among the corn farmers, middlemen, and the local state agency in the local market that is linked to the feed mills and the chicken industry. In addition, it outlines the struggle of all the actors trying to negotiate with the higher-level corn market, which is controlled by the state and large agribusiness companies and business associations. The supply chain mode of production is the main cause of the exploitation of human labour and the environment.

## 6.1 Introduction

The chapter aims to analyse the entire supply chain, arguing that stratification and survival in the chain have significantly affected sustainability, resulting in the exploitation process of human labour and the environment. It is argued that deforestation in Nan is caused not only by corn farmers.

This chapter discusses two important forms of agricultural production (corn and chicken production) and the supply chain, which has significantly affected environmental degradation in Nan province. It also discusses the inequality among the actors in the supply chain relating to the production of corn for animal feed and the chicken industry. Corn and chicken production and the supply chain have shared resources of production: land, forest, labour, capital, loans, the knowledge of farm management, the market, and the network. These various actors interact politically. For example, the Thai state plays the most significant role by making and enforcing regulations while, at the same time, agricultural business firms negotiate and deal with policies managing corn and chicken farming. The chapter examines the corn supply chain, highlighting the unequal power of different actors in these various interactions, which is important when analysing the capitalist mode of production. It is this process that reproduces the multiple inequalities and that involves both human and non-human exploitation.

First, the institutional processes involved in corn production are made clearer, especially in three aspects: (i) what the corn supply chain is, (ii) how it operates, and (iii) when the negotiation among the main actors takes place. Second, state power is examined and how it intervenes in the corn supply chain. The third and last section outlines the significant role of agribusiness firms in corn production and the chicken industry and their position in domestic and international markets. The study supports the sociogenesis concept, whereby part of the cause of environmental problems and climate change is attributed to the historical context of

political and economic development (Harvey, 2014). Thailand has been particularly affected by world political and economic changes.

### 6.2 The Corn Supply Chain in Nan Province from the Small Farmer to the Chicken Industry

In order to analyse the corn supply chain, the Commodity Chains and Global Capitalism approach is adopted, focused on a set of inter-organisational networks clustered around "one commodity or product, linking households, enterprises, and states to one another within the world economy" (Gereffi et al., 1994:2). Although the concept is often used in the fields of marketing and economic research, focusing on chain management, the CCGC concept is considered appropriate for this study in exploring the social context and interaction among the actors in different sections because it can signify echo the power relationship between them. This leads to a greater understanding of the mode of capitalist production in Thailand. The thesis is inclined to agree with the CCGC, that social relations and organisations shape the process of production, distribution, and consumption as well as paying more attention to analysing the strategies of negotiation among the actors and environmental exploitation throughout the chain.

The concept of supply chain is, however, considered broad because material suppliers, production facilities, distribution services, and customers are all part of a system that is linked together by the 'feed-forward' flow of materials and the 'feed-back' flow of information (Stevens, 1989). Hence, the study has not only focused on a series of stages lined up in a particular sequence of economic activities, through which materials, resources, and information flow, but it also requires studying a network of organisations whose relationships facilitate or obstruct the operation of the supply chain.

Moreover, the supply chain concept relates to the environmental and social issues that affect sustainability, but this study found that differences in the power of different actors to

negotiate are an important factor impacting sustainability in the supply chain. Previous studies (Newton, Agrawal and Wollenber, 2013; Wakobi, n.b.; Perez-Aleman and Sandilands, 2008) have often paid attention to the cooperation among actors in order to create socially and environmentally sustainable consumption in the supply chain and food system. However, to discuss supply chain issues reflecting the cooperation among companies and farmers, as well as NGOs, researchers (Perez and Sandilands, 2008). Yakovleva and Flynn (2004) have discussed the role of innovation in food systems and found that the interrelationships among food systems and sustainability in the U.K. chicken supply were essential to the success of the supply chain when trying to understand technological advancement relating to sustainability; hence both social and material factors of production must be taken into account, and this is also the case in Thailand. Although there is the need for sustainability, the corn supply chain in Thailand has limitations regarding sustainability when considering production interactions. The inequality in the power relationship among actors is considered to be the most important factor that makes sustainable development difficult. Furthermore, inequality and lack of negotiation are fundamental conditions for exploitation.

The characteristics of an agricultural supply chain such as those found in corn production are complicated; all actors are integrated and incorporated into vertical supply chains, and these create major obstacles for the small farmers because the regulations are created by the actors with the most power in negotiating—such as the middlemen and companies. Both are major factors that deprive the small farmers of power as part of the chain. Moreover, when analysing the supply chain, as well as the economic and political context, it was found that control and ownership of information, and the product brand and patent, are often obstacles that discourage other competitors from being able to enter and be part of the supply chain. As a result, current incumbents (middlemen and the companies) can accumulate capital from the supply chain and convert that advantage into financial capital, meaning that

corn production and the supply chain can be seen to run as a semi-monopoly with few competitors. Hence, when considering the operation of the corn supply chain with a view to sustainability, the success will be limited in a system where bargaining power is so unbalanced.

This study reveals that government policymakers, the dominant companies, and local merchants act as monopolies, and these power disparities create a limitation to the development of sustainability in the supply chain. This includes the power to monopolise land resources and maintain the ambiguities of the forest management system run by the state. In addition, due to the relationships within the chain, which is buyer driven, the purchaser has the overall power to set product standards, such as the quality of the corn required. Even though goods, capital, and knowledge are transferred all over the world, the steps and the complexity of the chains vary according to each type of supply chain. The competence and influence of stakeholders will therefore vary according to the type of supply chain and network involved. For example, processed food products have become an important part of the diet of consumers around the world while staple foods are still traded as commodities internationally; palm oil production in Indonesia comprises only a few large cooperatives, while the Cote d'Ivoire market comes from large numbers of small farmers (Newton, Agrawal and Wollenberg, 2013 p.17). In Thailand, the corn supply chain and chicken industry have been influenced by a few large companies.

This chapter examines the corn production chain and trade by focusing on the interaction among five organisations within the chain that have the power of negotiation. It also considers the state agencies and agribusiness companies that play an important role in deciding and controlling the regulations. Above all, state intervention, the network of middlemen (merchants), and the struggle of the small farmers are the major components in the success of the chain, and the development of the corn supply chain cannot proceed sustainably with these limitations.

- *The negotiation of different actors in the corn supply chain*

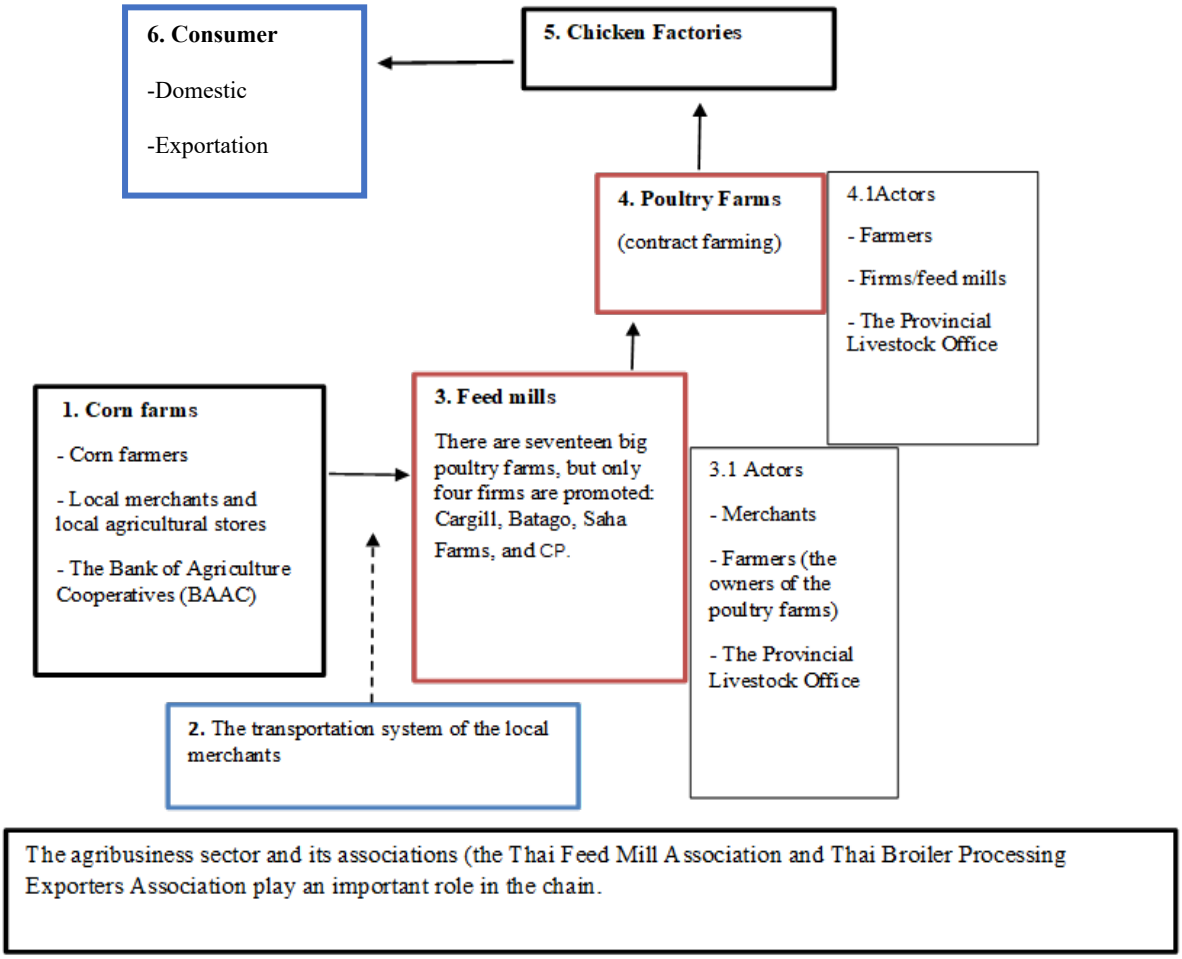
In order to understand the whole picture of the corn supply chain, which begins with the corn farms in the villages, the interaction among each actor and the five organisations involved in corn production along the corn trade route needs to be considered. The five units of corn production and distribution are called 'organisations' because most of them are social and economic units that operate under the state and the agribusiness firms' regulations. The corn supply chain is examined step by step and analysed following the points in Figure 6.1 (p 157). The six organisations are: 1) the corn farms in small villages; 2) the transportation sector; 3) feed mills; 4) poultry farms; 5) chicken factories; and 6) the consumer.

Previous studies on the corn supply chain in Thailand have been slightly different from this study. First, previous studies (Surathamchanya, 2001; Khao-Ian, 2009; Taloengsri and Pongkitworasin, 2012; Poramacom, 2013; Achavanuntak et al., 2014; Napasintuwong, 2015) focus on the trade of corn, and the components of the chain are grouped according to the differences at the market level, while this study focuses on the area of business and also the roles of sellers and purchasers. Second, previous studies have considered the business activities among different organisations. Although this study considers this aspect, it also examines state intervention and the role of agribusinesses that affect the organisation of the chain. The last point of difference is that this study places importance on environmental issues and the inequality of access to the sources of production (capital and land).

A previous study (Poramacom, 2013) outlines the corn supply chain in Thailand and provides a basic understanding of corn production in the country, showing the marketing channels for the corn and corn feed industry. The chain begins with corn production on the farms; the corn is purchased by field merchants or agricultural cooperatives and then sold to local merchants. In stage two, the corn is sold to a silo company, exporter, or poultry farm. In stage three, feed factories may either send their product (1) for export, or (2) to feed mill farms,

or (3) to distributors to large/small scale poultry farms, or (4) directly to small farms that are under contract (Poramacom, 2013). Besides the study above, Surathamchanya (2001) classifies the corn market into three levels. The first one is the village market, which is closer to the farmer than other levels. The business activities at this level are between the farmers, village merchants, and middlemen. The second level is the local market. This market is bigger than the first one and is located in an area that has good transportation links, such as in a main district or province. The merchants mostly sell the product at this level. The third level is the endpoint market, which is the last point of the domestic market. The market is able to determine prices by using available information on the product from the domestic and international markets. The purchasers include feed mills, large scale farms, exporters, and flour mills (Surathamchanya, 2001). This study uses the categorisation of the chain outlined above together with the chain that is found in the fieldwork. This has been developed to produce Figure 6.1. The organisations include the main actors, and their respective activities are discussed in the next section.

*Figure 6.1: Corn supply chain from the farms to the chicken farms*

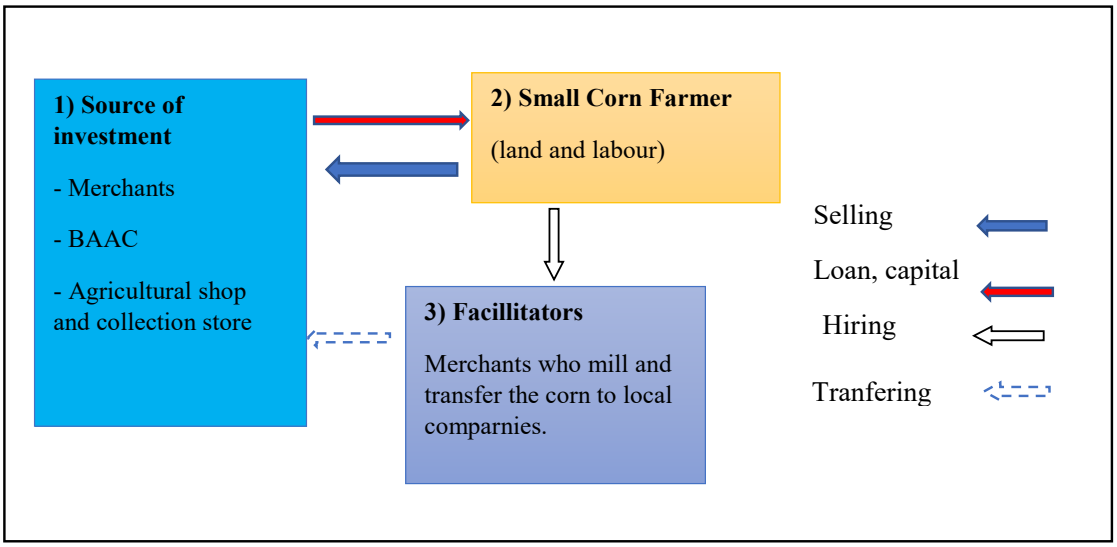



### 6.2.1 Corn farming: the interactions among the actors

This first section examines the interaction among the actors in the village market that takes place close to the farmers and their farms (Surathamchanya, 2001). There are three organisations: 1) the source of investment funds; 2) small corn farmers, and 3) facilitators (see Figure 6.2). Although the corn farmers seem to be the main actors with the important role of growing the corn, they have the least power to negotiate in comparison with other actors (Achvanuntakul et al., 2013). On the other hand, those holding the sources of investment funds have the greatest power, as they provide capital and loans. In addition, some of them also play the role of purchaser and seller. Furthermore, the power of the facilitators comes from their ownership of machinery (trucks, tractors, and mills) as well as their connections within the

network, which is important for both the purchaser and sellers. The facilitator can distribute benefits to each party (Pongkitworasin and Taloensri, 2012).

*Figure 6.2 The main actors in the village market*




- *The capital accumulation among the three main actors in the village market:*

> Most corn farmers in Nan are small farmers who cannot access the market by themselves, so they have to pay a lot to the local merchants who work as facilitators to mill and transfer the product; the merchants and the next level up in the market take all benefit from them (farmers).
>
> (The Director of Nan Provincial Commercial Office)

According to the statement above, it seems that within the same corn supply chain, all the other actors receive more benefit than the farmers. Therefore, the corn farmers as a group are disadvantaged compared to others. However, corn farming has been the main income source for the farmers' households and the high demand for corn is the main reason why the farmers choose to grow corn instead of other crops (Achvanuntakul et al., 2013). They can sell their entire produce at one time and receive money on the same day while other perennial crops need more than a year in order to recoup costs. Moreover, corn has a readymade market while the other perennial crops do not.

In addition, it is clear that the corn market in Nan functions as an oligopoly. The corn supply chain in Nan has been managed and controlled by the same influential group for fifteen years (Achvanuntakul et al., 2013) and most of the corn farmers sell their produce to the same purchaser that offers them credit and loans. This study found that corn farmers have little negotiating power, especially the farmers that have limited capital and transport. However, Navakitbumrung and Ruckyodthithum (2013) stated that the corn farmers are not always necessarily subordinate; they can choose the buyers that offer the high rates, although this situation rarely happened in the villages in this case study. It is possible that the location of the farms affects the power of negotiation because if the farms are located far from the main road, the farmers need to pay for transportation and depend on merchants that can support them at that time. This group of farmers that has limited access to vehicles is thereby positioned at the bottom of the chain.

Previous studies (Pongkitworasin and Taloensri, 2012; Achvanuntakul et al., 2013; Navakitbumrung and Ruckyodthithum, 2013) had similar findings regarding their study of the actors in corn production. This is illustrated in Figure 6.2, where the arrows direct the function and the role of the three actors.

First, the sources of investment are discussed. The role of this group of actors is to work as middlemen and includes merchants, the BAAC, and agricultural products stores. They provide capital in the form of loans in order to enable the purchase of agricultural products by the corn farmers (who do not have enough capital). The corn farmers in turn take the loan and the agricultural input in advance and consequently have to sell the corn to the middlemen as repayment. In their role as the purchaser, the middlemen can determine the conditions and the purchase rate, which the farmer is forced to accept. Although the purchase rate has been guaranteed by the state, the state-guaranteed price will apply only when it is sold to the feed mill company (the next market in the chain). Hence, the middlemen (as corn sellers) will receive

a higher price than the farmers (the first actors) when they sell to the feed mill firms (the destination of the corn). The lower is the price that the middlemen pay to the farmers, the higher are the profits that they will receive from the feed mill firms. However, the middlemen need to be paid sufficiently in order to be able to accumulate sufficient capital to invest in trucks and mills, which are central to the network. In their role as the source of funding they also control the quality of the corn product and only the high-quality corn will be sent to the large feed mill firms. The purchase price for this corn is determined and controlled by large multinationals such as the Charoen Pokphand Group, and the domestic price has normally been linked to the advanced maize market of Chicago Merchandise Exchange (CME) (Pongkitworasin and Taloensri, 2012).

The state agency, the BAAC, is the main source of investment funds; the bank fulfills the state's role in supporting corn planting by providing loans, selling agricultural input, and also playing the role of purchaser similar to other actors. The BAAC supports the corn farmers as purchaser (of corn production) and seller (agricultural input such as seed, fertiliser, herbicide). Though most farmers only use the bank to obtain loans, the amount of the loans is limited and there are regulations that some farmers cannot meet. In this case, they do not buy the agricultural input (seed, fertiliser, herbicide) from the bank nor do they want to sell the corn to the bank either. The farmers prefer to buy the agricultural input from the stores and sell their produce to the merchants because it is easier and they have more options when purchasing agricultural products and brands. As a seller, the BAAC has a limited range of product brands as well as transportation services. Moreover, when selling the corn production to the BAAC it takes several days to receive the money when it is recouped. Although the corn farmers seem to be passive in the chain, with the least power, they can manage to use the different sources by using them for different functions. For example, in the case of the independent and secure farmers, they use BAAC agricultural credit to buy the agricultural input from the shops and sell

the corn production to the merchant that offers the highest price. Through using agricultural credit from the BAAC as well as buying and selling the corn product to the merchants because it is easier, the corn farmers can survive among the other actors by dealing with this financial capital. However, the insecure farmers need to use loans from the middlemen because they cannot manage the credit, and corn is their sole source of income (see the differences among the farmers mentioned in Chapter 4).

These actors (the BAAC, agricultural and collection stores, merchants) take the role as middlemen that connect with the higher-level market to provide the corn and also to deal with the facilitators (described below) to collect the corn. They profit from both markets, and it is this problem that obstructs fairness in the chain. Most of the surplus is accumulated by actors in the middleman position, while the corn farmer has been receiving the minimum. During the fieldwork, I was told that the BAAC in Wang Sa District had a corruption issue with selling and buying corn produce. The director of the bank was forced to shift his position because of the corruption. The situation shows that those in the corn production process and the market make huge profits.

Apart from the sources of investment and merchants having more power in the local market, the facilitators are also important. Their role is to link the small farmers to the market, especially those farmers that do not have vehicles and whose farms are far away. Some of them are corn farmers that have their own mill or truck; the small farmers hire them to mill their corn and transfer the produce to the purchasing centres (the local companies/merchants). In some cases, the local merchants that provide the capital (agricultural input) pay for transportation and deduct the money after the corn production is sold to them.

### 6.2.2 Transportation sector: the interaction among merchants as sellers and feed mills as purchasers

This section refers to the next group of actors in the chain involved in the negotiation between the two main operational areas of the animal feed process. These are the feed mill firms and the middlemen/merchants (the store agency) that transfer the corn to the feed mill firms. In the case study, the middlemen/merchants play a key role in connecting the supply chain. Since most corn comes from small farmers that cannot access the capital and market for themselves, the middlemen/merchants provide access and thereby take advantage and accumulate profit without the state necessarily being aware.

Previous studies about the supply chain have focused on the cooperation among the actors in order to create a sustainable system for the corn supply chain (Aleman and Sandilands, 2008; Wakobi, 2013). However, this study found that the right to access land ownership and capital for production is a major obstacle to developing a sustainable supply chain. Moreover, the regulation to ban the purchase of corn from unidentifiable sources with the purpose of solving deforestation issues as well as benefitting the secure farmers and large feed mills has a negative effect on small farmers. In relation to the ban on the corn from unidentified sources, the middleman plays a key role by only taking high-quality corn that can be identified as coming from licit sources to sell to the large feed companies. The regulation concerning corn purchase is clear; the large feed companies such as CPF and Betagro accept only corn produced on land guaranteed by a certificate of ownership. For corn grown on land without these guarantees, the merchant needs to find other companies. This section discusses two related issues: (1) the destination of the high-quality corn within the sustainability chain and the market for lower-quality corn from unidentified sources; and (2) the inequitable state guaranteed price.

*(1) Selling corn to the feed mill firms; how this differs between the high-quality and lower quality corn*

The quality of corn and the level of demand from the feed mill firms are important criteria when considering the purchase price. This becomes clearer from a local merchant in Nan Province describing the process of selling corn to various types of feed mill firms. There are different qualities of corn, such as high, fair, and low grade, and they are transported to separate places. The corn at the fixed-contract rate has to be transferred every day to the large feed mill firm that has placed the order in advance. A merchant that collects and sells the corn from Wang Sa stated the following:

> We cannot send it all at once, so we have to send a succession of corn consignments until we complete the whole amount. The feed mills need corn to make animal food, and they have to use it every day in order to feed the chickens and sell some feed to the other chicken farms they are contracted to. We use trucks to transfer the corn and pay for their hire. However, the corn with the quotas is not difficult to manage because we just follow what is laid out in the contract. There is only one problem, which is when we cannot find corn in time, but this very rarely happens. Before signing the contract and getting the order, we have to make sure that we have enough corn in the warehouse. Apart from the corn which has been ordered, other high-quality corn will be sent to the large feed mills such as Betagro and CPF, and the other lower grade corn will be sent to the small feed mills, chicken farms, or for export. The price of the superior quality that is sold to the large feed mill companies is usually higher.
>
> (Midchai, a collector in Wang Sa)

Apart from the corn quota from the large feed mill companies such as CPF and Betagro that have a connection with the local merchants, most of the high-quality corn is transferred to the feed mill factories. The trucks carry corn for animal feed from the north to the centre, especially to Saraburi and Lopburi, the two main provinces that are the location of the feed mill firms and chicken farms. The large feed mill firms such as CPF and Betagro are the destinations for high-quality corn with a high purchase price. However, these large feed companies are able to buy or refuse corn—and can also offer a lower purchase price in cases where their staff judges that the corn is of low quality. A staff member of Saha Farm (a medium feed mill firm) that works as a buyer stated the following:

> The corn that is offered to our firm is not as good as the corn that is sold to CPF and Betagro, so the rate is not very high and depends on the quality of the corn. The trucks will go to the large firms first, and if the corn is rejected it will come to us.

In the second process of transferring corn to the feed mill companies, most high-quality corn that has been grown legally by corn farmers that have land security and capital is sent to these large feed mills. When considering the corn supply chain in which corn is sold directly to the large feed mills, it seems that the issue of deforestation is solved through cooperation between the merchant and the company because they reject the corn from unidentified sources. This would seem to make the operation of the corn supply chain sustainable (in terms of not decreasing the forest area).

Thinking about the framing of a commodity supply chain is useful to help classify the actors involved, as well as to consider the impacts of social inequality and also social justice. For example, there are consequences if regulations are followed only partially or unequally, so if considering only the corn that is sold to the large feed mills, it seems that only the purchaser (the large feed mill company) has been following the regulations covering sustainability, which ban the purchase of corn from the farms without a land certificate. This regulation relates to reducing the extension of corn farming in Nan and solving the deforestation problem. However, the corn that is sold to the large feed firms is only one part of the corn production in Nan; other corn comes from other sources that cannot show their certificate but are also found in the market. Moreover, most small farmers in the corn supply chain that cannot access the higher market are left behind in considerations of environmental sustainability.

The remaining lower-quality corn can be sold to other middle and small feed companies. One merchant mentioned that the process of selling it is not easy because he needs to deal with the various levels of feed mills and to sell the corn under the offered price. At the same time, the process of selling high-quality corn is not difficult because he does not need to show the document to identify the source.

> A market needs to be found for the other qualities of corn and I have a list of the buying sources. The price is lower than for the high-quality corn and the purchasers do not care about the sources of corn cultivation, whereas selling the high-quality corn requires showing a land ownership certificate to guarantee that the corn has been grown on land with the right of ownership.
>
> (Midchai, a collector in Wang Sa)

This is an interesting point, as the policy of the large feed mills is to ban and control corn that is grown on land without an ownership certificate, thereby reducing farm expansion, but the problem cannot truly be solved because some medium and small feed mills also need the corn and they do not care about certificates. In this way, the lower-quality corn without the land ownership certificate can be sold to other feed mills.

*(2) The inequitable guaranteed price*

One of the state policies to support corn farming and to help the corn farmers is to guarantee the purchase price. The problem is that most corn farmers cannot access this price because they cannot directly contact and sell the corn to the feed mills. The merchants and the farmers mentioned that there is a gap in the purchase rate. The farmers know it is difficult for them to get the guaranteed purchase price and some of them complain that it is unfair because they invest capital, labour, and time as corn growers. On the other hand, the merchants' view is that it is fair enough because they pay and give agricultural loans to the farmers as well as invest in transportation, which is difficult; the merchants have to pay for the trucks to carry the corn to the feed mills. Moreover, collecting the corn and finding the various levels of the market where the corn can be sold require having networks and connections. This is not easy. To exemplify the difference in price between high- and lower-quality corn, the high-quality corn can be sold at a high price of around 7-8 baht[12] per kilo (a price guaranteed by the government), whereas the merchants buy from the local farmers at around 3-4 baht per kilo. Although the function of a guaranteed price is to support the corn farmers, the problem is that the money does not go

[12] 1 GBP = 43.50 THB (rate December 2017)

directly to the corn farmer; the farmer has to share the guaranteed price with the merchant. However, the state has been ignoring this contradiction, although the secretary-general of the Feed Mill Association stated below that the feed mill firms follow the guaranteed price:

> All feed mills firms have followed the buying rate guaranteed by the state, we just pay the person who sells the corn to us, and all of the sellers are merchants, not farmers. The prices are controlled by the local merchants. If the farmers could sell the corn directly to the factory, they would receive as good a rate as we give to the merchants, but it is difficult for the farmer to transfer the corn to us. However, the state project known as "The Big Farm" may be able to solve the problem because the farmers can contact the feed mill by skipping the mechanism of local merchant management.

Indeed, the gap in the rate could possibly be solved by the Big Farm Project, but there are few farmers in Nan that can participate because of the need to be a landowner or to show a land ownership certificate. The right of ownership is the major problem for corn farmers in Nan. However, these issues are not considered when looking at sustainability in the supply chain. Both projects that are mentioned above (rejecting the corn where the source cannot be identified, and the Big Farm Project) have the significant aim to protect and support the large feed mills and the small group of farmers that are landowners, but most farmers have been growing corn on both types of land, with distinct types of seed, and selling it in various places at a flexible price.

### 6.2.3 Feed mill firms

The feed mill firms are an important sector that collects and transforms the corn into feed. The quality of the feed affects the quality of meat products, so high-quality corn is the most important factor, especially for the large feed companies. The large feed mill companies such as CPF specify the need for high-quality corn to make good quality seed such as brand CP or Pioneer; indeed, the price is therefore higher than for other brands. Hence, the large firms can determine the price and the quality of corn that is going to feed their poultry farms and they have an advantage over other firms and the corn market in the supply chain, acting within the sphere of being an oligopoly.

Although there are a lot of feed mill firms with different sizes of management in Thailand, there are only five companies that play an important role, and only two large companies have influence in terms of production volume. Normally, the large agribusiness companies have their own feed mill firms and also run the business of poultry farming and chicken production. The large firms such as CPF, Betagro, and Saha Farm have been developing the formula for feed used on their poultry farms and send it to the farmers as part of their contract.

In the feed mill firm sector, four actors have been involved in this section. First is the owners of the firms have the power to influence the corn market price. This first actor has enough power to negotiate with the state. The Thai Feed Mill Association is the management centre of the feed mill firm and helps to increase their power of negotiation. Second is the merchants that sell the corn. These actors play an important role by collecting the corn and selling it to the firms; they need to have a network and they receive benefit from the chain rather than the farmers. Their activity is to collect, transfer and purchase. Third is the poultry farm owners that work to feed the poultry with different types of feed, of which corn is the main ingredient. Fourth is the provincial livestock officer. The last actor has a significant role as a state agent. The veterinary officers have to monitor the quality of the poultry firms and the feed used by following the ISO standard (International Organisation for Standardisation) as the state authority. For example, CP and Betagro, the two big exporters of poultry in Thailand, work under ISO14001, which is inspected by the state agency.

When the purchasing and selling process comes to an end, the next stage is feed production. Chicken feed uses 60% of the corn for the carbohydrate component; however, this depends on the formula of each feed company. After production, all of the feed is sent to the poultry farms; at this point the farm owners or workers on the company poultry farm need to follow the regulations set by the staff of the feed mill firms because the composition of the feed

affects the quality of the poultry. All of the feed mill firms are controlled by the provincial livestock officer and the feed is randomly checked for its quality. However, this stage is not complicated in terms of the interaction between the actors. They are following the regulations and the management is quite strict.

In terms of location, most feed mill firms are located in the centre near Bangkok for infrastructure reasons and the convenience of transport. Moreover, the firms need to be close to the poultry farms for the convenience of transferring feed and monitoring farm management. The feed mill firms are easy to notice, close to the main road. Most can be seen along the road to Lopburi and Saraburi Provinces, where the main road is laden with trucks carrying corn, feed, and chickens. The two provinces are reachable from Bangkok within two hours, whereas it would take more than six hours to Nan. Although we can see the feed mills from the road when we drive to the Lopburi and Saraburi, we cannot see the chicken farms unless we drive through villages outside the town. The farms are hidden away from the community because of sanitation regulations.

**6.2.4 The poultry farm section and farm management**

Poultry farming is the sector that uses corn as feed. This section is included in the corn supply chain because the farmers provide a market for the corn and the demand for corn is related to the growth of the chicken industry. There are three main actors; 1) the poultry farm owners (the poultry farms belong to the agribusiness companies and the private farms work under contract); 2) the company and feed mill firms; and 3) the provincial livestock officers. The interaction among all actors is quite formal and follows the farm management regulations. The veterinary officers have a function to monitor the quality of the farms and to provide support for production standards. A veterinarian in Saraburi stated that all poultry farms need to work under contract with the company because that is the method to control quality and standards within the chicken farm management.

Hence, the companies are the main actors that play an important role in controlling poultry production, with the state facilitating. The farm owners (private farmers under contract) run the farms as workers that are paid for taking care of the chickens but that have no power to negotiate. Pee Peak, the owner of 20,000 chickens, stated the following regarding the sources of chicks:

> We (farm owners working under contract) cannot choose which farms to source our chicks despite knowing which farms produce the healthy chicks. Every process depends on the company. Moreover, I never see the contract; I just follow the regulations that the company staff tell me. Although we don't have the power to negotiate, most of the farm owners still work in the poultry business because it takes a relatively short time to earn big money. It takes around 35-45 days for one period of production and selling, depending on the breed of the chickens.

However, the poultry farm is the last destination of the corn used for chicken feed. The corn is mixed with other ingredients such as vitamins and vaccines and sent to feed the chickens. Most of the farm owners mention that corn is the best carbohydrate for affecting the size and weight of the chicken. One of the farm owners stated the following in this regard:

> The quality of the feed can be recognised from its colour. When the firm puts more corn into the feed the colour is yellow. That is good quality feed. On the other hand, the feed mill firms put another component to replace corn in the dry season when it is difficult to find corn; it easy to notice the difference.

The farm owners or the people that work on the farm cannot choose the type of feed; they need to follow the company's process of feeding, and the company will provide the proper feed for each age group of chicken. Even though most of the power concerning farm management is held by the company while the farm owners merely carry out instructions, it is the workers that carry all the risk.

(1) The background to poultry farming in two provinces: the view from the state actors

Information from two veterinary officers working in both provinces confirmed the same point, that the two main provinces are operating at full capacity in chicken production and the demand for corn is increasing, which means that the number of farms in other areas is also increasing.

According to information from the Department of Livestock Development in 2015, chicken farming and meat production are highly concentrated in central Thailand because of the facilities there, such as certified slaughterhouses, feed mills, and food processing plants. Both provinces run at full capacity in chicken farming and farms are controlled and supported by the Department of Livestock Development. Lopburi has the highest number of farmed chickens, more than 40,000,000 birds, and Saraburi produces approximately 30,000,000 to 40,000,000 birds (Thailand Department of Livestock Development, 2015). These numbers include both the company poultry farms with more than 50,000 birds and the private farms working under contract, which tend to farm around 10,000-40,000 birds. A veterinarian in Saraburi province mentioned the general situation of the farms in the two main provinces in the following:

> This province has several farms less than Lopburi and it is difficult to extend at this moment because of the environmental issues concerning the smell and dust pollution. Chicken farms have to be situated well away from town centres and residential areas, but this is inconvenient in terms of transportation. Lopburi has about two-thirds of the number of poultry farms that Saraburi has.

Further, a veterinarian that works in the Lop Buri Provincial Livestock Office confirms this, stating the following:

> The capacity for chicken farms in Lopburi is full, we cannot allow new farms. Moreover, currently complaints are being received about the smell and insects from the farm. The types of farms are varied but most of them are 'under contract 'poultry farms. It is necessary for them to work under contract because it relates to the source of investment fund, material for production (chicks, feed, vaccine and so on) and the buying market. However, the conditions of the contract are cumbersome. The farms with 3,000 birds or more have to follow the standard requirement monitored by the Livestock Office in each area. This is the reason why poultry farms need to work under a company contract because they are required to meet the controlled standard. Most of the chickens produced for exportation come from Lopburi. There are around 17 large poultry farms but only 4 firms that are promoted: Cargill, Betago, Saha Farm, and CP. Most companies mentioned above have their own farms and use contracted farmers.

The veterinarian of the two provinces made the same point concerning the capacity of the poultry farms; he stated that the entire province is full of poultry farms and the chicken industry keeps on growing. This information indicates the increasing demand for corn while the upstream actors face environmental issues as well as unbalanced power relationships.

(2) The poultry farm under contract: the loss of farm management

The demand for corn increases rapidly as the intensity of poultry farming increases as both sections (corn and chicken production) are in the same supply chain. While corn farming exploits the environment, poultry farming is in the same chain that consumes the richness of national resources as well as revealing the inequality among the main actors. The corn farmers have little power to negotiate and even the farm owners work as if they are mere employees in their own companies. Both sections are controlled by the power of the agribusiness companies. Corn farming was described in Chapter Four; now this section focuses on the poultry farms that are the destination of the corn. All of the corn is used for poultry farming and supports the chicken industry.

The owner of a chicken farm in Lob Buri that has been farming under contract since 1992 provided useful insights. This farmer has two chicken battery farms with 20,000 chickens under contract with CP. The farm has to be standardised and the entire process is risky, as indicated in the following:

> I have been running a chicken farm under contract farming for 25 years because I do not have money to invest. In the beginning, the farm was an open system, then in 1998, it was changed to the closed system called 'Evap'.[13] 'Evap' is the standard condition when farming with CP. I have worked with the company for 4-5 years.
>
> The first thing the farm owner has to do is to prepare a chicken battery before the company brings baby chicks to the farm. In this step, I had a problem with the quality of the baby chicks. The farm owner cannot choose the broiler breeder for his/her farm. The company will choose for us. Sometimes they had some chicks that are feeble or malformed and the farm owner has to get rid of them. This means that we have lost benefit because every chick was our investment.
>
> After the batteries are checked by the company staff, baby chicks will be delivered and raised on the farm. Generally, there are two sizes of chickens, the 35 day and 45-day chickens. The first one is a small size that is suitable for selling whole and it is sent to the KFC, and the larger size is sent to the factory. This time I got 45-day chickens. For the feeding step, there are 3 phases depending on the age of the chickens. I have signed a contract with CP, so I have to follow their procedures and instructions and also use their feed. There are 3 feed formulas named 510, 511 and 513; the first stage is for around 1-18 days which uses 510 because it has more

[13] Evaporation Emission Control System (EVAP) is the new technology that CP uses to prevent bird flu.

> protein, the second and last stage use more corn. I think the CP feed is good because they add a lot of corn, which is why the price is higher than other companies.
>
> (Peak, owner of a poultry farm)

Other farmers revealed similar information. They agreed that the quality of CP feed is better than that of other companies because CP feed uses a lot of corn. The farmers stated they can notice the differences by the colour of the feed. Some companies put cassava and soybean meal into the chicken feed; the colour is different and the price is lower. A farmer also mentioned that the low-quality feed 'sometimes has pebbles added' claiming it is good for digestion. Thus, the quality of other feed is not as high as the CP brand. Moreover, the quality of feed affects the size and quality of the chickens, which is important for export.

A similar issue was mentioned before, concerning the quality of corn seeds. Most corn farmers agreed that CP seed is the highest quality and that the price is also higher than with other brands. Peak, the owner of a poultry farm stated that CP has high standards and that the farmer that wants to sign a contract with them has to have ready cash to invest. However, the farmers have no power to negotiate even when they have felt that something is unfair. This unfairness occurs, for example, when the farmers cannot choose the chicks, and they feel that the purchasing process is unfair. Peak stated that she had never seen a contract, only the trading transaction, which is not allowed to be disclosed. Although the contract farming system has become successful in Thailand, resulting in economic growth, which has benefited the agricultural business, it has caused suffering for the farmers, who have been exploited and blamed for causing odour pollution and environmental deterioration.

Peak's story was no different from that of other farmers. However, the large companies such as CP and Betagro understand the whole picture, and the aim is to export a high-quality product. In order to accomplish this, the standard of farms needs to be controlled very strictly. On the other hand, working under contract with a local company aiming for domestic consumption is more relaxed in terms of quality control and the feed is completely different.

The result is that farmers that are contracted to large companies can earn their wages but have no other benefits; the farm owners have a guaranteed market with a minimum price for their corn. On the other hand, they relinquish the power to manage their farms.

### 6.2.5 The conditions of poultry production: from the domestic factory to the international market

> The fast-food retailers of Kentucky Fried Chicken require chickens that weigh exactly two kilograms in order to fit the size of their serving portions. Some segments of the Japanese market demand okra with 5 ridges on the fruit while others require 7 ridges. Baby corn exported to Europe and Japan must be between 4 to 7 cm long. On the global food market, varieties, shapes, and colors are now increasingly standardized and food safety regulations are becoming extremely strict (Delforge, 2007 p: 3).

The statement above demonstrates that the commodity supply chain is being controlled by the consumers that have more power than the producers. This results in extra costs for producers to conform with the strict regulations, and this reduces their profits.

The conditions of production have become paramount since agricultural production has become part of the globalised world market. Thailand is the world's fourth-largest poultry producer and third-largest exporter of poultry. Until relatively recently, the poultry industry had escaped scrutiny into violations of labour rights compared to other sectors, such as the clothing and fishing industries (Human Rights New Report 2019). Moreover, the trade agreement that Thailand has signed to cooperate with other countries significantly affects the conditions of exports. For example, Thailand has an FTA (Free Trade Area) agreement with Japan, which helps to increase chicken exports to Japan; hence producers have to follow the conditions set by the agreement. For example, the directors of Betagro mentioned that when sending chickens to Japan, “the conditions are very strict especially the mensuration of chicken size which is done by the human labour. This is an advantage for our country because labour is cheap”.

Corn and chicken supply chains have tried to minimise their costs by exploiting farmers, labourers, and intensive land use in order to make high profits, but this exploitation is not a new story or finding; it is a cycle reproduced in many areas, especially in developing countries

governed by a capitalist state like Thailand. The role of the state should be to supervise the labour market, and agribusinesses should be more accountable for both the conditions of labour and protecting the environment. In the case of Thailand, state regulations should not have been contributing or facilitating the growth of agribusiness; they should function independently and take the role of supervising, monitoring, and controlling economic activity in the country. The challenge for the Thai state is that historically the economy was built upon the power of monopolising natural resources, influenced by the ideas and institutions borrowed from colonial systems (Vengergeest and Puleso, 2006). This arrangement has supported agricultural businesses to increase their profit within the developing state (Fine, 2006). However, in current conditions, with reference to the processes of globalisation (Goss and Pacheco, 2007; Jessop, 2002) and the world environmental crisis, this study argues that the state is still important, but its power needs to be applied to monitoring and supervising production chains that are environmentally damaging and that breach human rights. At present, the state is failing to deal with these problems; moreover, the environmental problems linked to economic growth and state power are more complicated than in previous eras.

### 6.3 State regulations supporting the corn supply chain

The Thai state plays a significant role in the increase of corn production as a result of the success of poultry production. However, expanded production and consumption are also related to globalisation. In fact, the growth and success of the agribusiness sector represent a significant change arising from the policy of the state to support agricultural products for export.

State policies such as a pledging policy[14], price guarantees, and regulations have attracted all actors (corn farmers, local merchants, agribusiness companies) to invest in the

[14] The Agricultural Product Pledging Project is a method of solving the problem of agricultural product prices. When agricultural prices fall, the government will open a pawn of agricultural products by allowing farmers to pawn their products to the government at a reasonable profitable price, and if the price of agricultural products increases, the farmers will be able to sell that produce to merchants for higher profits than the government can provide (Phothisai, 2009).

supply chain. However, this study found that the chain has resulted in inequality among the large companies, merchants, and farmers, which affects the stability of the life of the small farmers as well as causing sustainability issues for the supply chain.

Three main state policies strongly echo state support for corn production. These policies encourage all the actors in the corn supply chain to continue working on the chain. The policies are a pledge policy, price guarantees, and the promotion of state imports, which all point in the same direction, that is, to promote the corn industry. It seems beneficial to all groups; the two policies—pledge policy and price guarantees— - support the farmers, while promotion of state imports with a reduced tax policy benefits the feed mill companies. Hence, the state's supportive policies result in farmers having a very high economic incentive to continue cultivating corn due to the low-price risks. It can be said that the higher demand drives up world market prices and as a result, domestic prices increase accordingly. On the other hand, when the price goes down, the state can help support the farmers.

**6.4 Role of agribusiness firms in corn production and the chicken industry**

The growth of the corn and chicken industries has been developed through cooperation between the Thai state and agribusiness. This cooperation affects the Economic and Social Development Plans, which are part of the modernisation and developmental model. The policy to promote agricultural products as export products in exchange for the imports of industrial products has had a significant effect on the growth of agricultural products. Corn farming and the chicken industry are part of the policy. This study argues that the success of the agricultural business sector is supported by the state and in turn, is supported by it. Since the corn and chicken markets have the characteristics of an oligopoly, the entire chain has been controlled by a few large agribusiness firms. Large agribusiness companies such as CP and Betagro play an important role in the development of the seed and the chicken breeds, in turn being influenced by the U.S.A and the three major export markets in Japan, the United Kingdom and China

(Department Trade Negotiation, 2020). The CP corn seed comes to the farms under the company contract and all of the corn farmers agreed that the CP seed is the best and the price is higher than others. The latest policy to promote corn farming in other areas is dependent on the use of the good quality of seed provided by the company. Furthermore, these companies also develop and have their own chicken breeds and chicken farms. Hence, it can be said that from the seed until the chicken production, relatively few companies are involved.

The power to negotiate with the state is also supported by two organisations: the Thai Feed Mill Association and Thai Broiler Processing Exporters Association. The director of the former claimed that the project of growing corn in the dry season was created and pushed on by the association, and the director of Betagro agreed.

The success of the agribusinesses of corn farming and chicken production is central to economic growth in Thailand. The state places priority on the agribusiness sector as the partner in developing the agricultural sector. As a result, the sector has the power to develop the business as well as to propose projects to the state. As such the sector works well alongside the state agencies, in partnership.

**6.5 Conclusion**

The chapter has analysed the corn supply chain in Nan, Thailand by applying the Commodity Chains and Global Capitalism model to the chain. It has been divided into three main sections; 1) the corn supply chain in Nan province from small farmers to the chicken industry; 2) the state regulations in supporting the corn supply chain; and 3) the role of agribusiness firms in corn production and the chicken industry.

The study found two key points. First, although the CCGC model focuses on the area of economics and management, this study applied the concept by considering the social context and the interaction among the actors within the power relationship. The CCGC and supply chain concept focuses on the sustainability of the chain; however, this study found that the conditions

of corn production limit the development of sustainable growth. This is because the corn farmers are disadvantaged as long as the middlemen, merchants, and feed mill firms have the greater power to negotiate and take advantage of the chain. Moreover, as long as the state only supports the large agribusiness companies, the sustainability and environmental problems will continue to be major issues within the chain. As a result, the character of the corn supply chain in Thailand has been controlled by large agribusiness companies.

The second point is that state policy has been supporting corn production from the sides of only those corn farmers that can access the main market and the feed mill firms in order to promote the chicken industry in the international market; the focus has been on maximising profit in this market. The study asserts that the role of the state is still important, but it needs to change to monitoring and regulating the chain rather than just supporting business interests. The state must have the highest power in the whole chain, which is thriving under a capitalist system that lacks regulation. Currently such an unregulated system results in human exploitation and a lack of concern for the environment, and is linked to the broader discussion of social justice issues in globalisation.

# Chapter 7 - Conclusion



**The objective of the chapter**

The objective of this dissertation was to analyse the situation concerning intensive corn farming and the complexity of the supply chain as it relates to the environmental impacts from deforestation, chemical use, and field burning in Thailand. It does this by addressing the four main research questions, discussing the findings and the concepts applied to the framework, and the limitations of the framework within the thesis. Finally, the discussion turns to the topic of the complexity stability of the supply chain and the role of the state in developing countries.

## 7.1 Introduction

There have been previous studies on corm farming and the supply chain in Thailand concentrating on social development and economics. However, the explanations from those studies concerned marketing, the activities of economic institutions, and the interaction among farmers and local agencies as middlemen. As such, they were insufficient for understanding the ongoing environmental problems. In order to understand the complexity of the supply chain and environmental degradation, this research aimed to understand the political ecology of corn production in Nan province, Thailand by unravelling the complex stratification of a food supply chain that is considered to exploit human labour and the environment. This study has examined the case and has tried to offer an intelligible explanation of the complex issue of corn farming, entangled with environmental degradation and the idealism of sustainability. This study has four main research questions:

1) How are the political issues in Southeast Asia during and after the Cold War related to agricultural development, the history of land use, forest management, and corn production in Thailand?

(2) What are the major cause of the multilayered exploitation in the corn supply chain and chicken production, and how have these been maintained? In order to understand this, the study focuses on the level of household production and the interaction among actors. Moreover, it links corn production to the growth of chicken production and the role of the state.

(3) What are the environmental problems that are relate to corn farming, and how are they connected to the accumulation of capital?

(4) What are the responses of the different actors in the corn supply chain to the environmental crisis in Thailand, and what interactions take place among them?

The theoretical framework applied in this study is capitalocene, introduced by Jason W. Moore (2016). The concept of capitalocene is derived from the combination of capitalism and eco-Marxism. The crisis that humans face today needs to be considered more profoundly and related to the drive of capitalism co-produced by humans and the rest of nature (Moore, 2016). Moore has affirmed that capitalism is the web of life that organised the institutions of the world, including the natural world, in order to generate profit. Hence the world crises of today, such as environmental problems and climate change, were integral to the accumulation of capital, and began around the early modern period. Moore has argued that climate change and environmental degradation were not caused solely by human activities. One should consider the factor of the mode of production in capitalism, which stands on the dualist ideology of nature and society and which focuses on the human centred and anthropocentric. This framework has been applied to enable the understanding of capitalist development in Thailand as well as the politics of the ecology of corn production and the supply chain. In addition, the concept of sociogenesis focuses on the social-economic context and the conditions of the environmental crisis. Applying the concept to analyse the specific case study of intensive corn farming and environmental degradation in Thailand, it was helpful to make the case study clearer by analysing the social and political context. This highlights the interaction among the political economy, environment, and climate in different areas of food production relating to the different trajectories of climate change (Harvey, 2016). Therefore, the evolution of the corn supply chain included the scale of an agricultural operation linked to changing land use, a state policy on corn production and trade, the change of domestic consumption patterns, and the emerging state and self-regulatory dynamics to mitigate climate change. Moreover, this research argues that politics and international affairs have played a significant part in corn production in Thailand, leading to environmental degradation. Moreover, the supply chain

concept has been applied to analyse the actors and their interactions in the chain. These reflections of power relationships are related to the access and use of natural resources.

A qualitative research method has been used to analyse the relationship among the different actors in corn production and the supply chain. It has been conducted using obtrusive methods, such as interviews and participatory observation, and unobtrusive methods such as observation and documentary analysis of public reports, including office documents published by state agencies and private companies. This study has attempted to identify actors in the supply chain and semi-structured interviews were conducted with 22 corn farmers, two local merchants, 13 government officers in state agencies, six business sectors, and four chicken farm owners. Thus, the corn supply chain investigated in this research has presented the voice of farmers and other actors. The resultant information indicated the inequality among those parties, which can be seen as a significant obstacle to sustainable development. The study also discusses household production and the interaction among the actors in the supply chain. It has drawn upon field data in different areas and with different actors in Thailand in order to analyse their roles and relationships with one another, and also reflects the voice of those people to the corn farmers, who are at the lowest rank in the supply chain.

## 7.2 The results of this study

### 7.2.1 The first research question

This study illustrated how political issues in Southeast Asia during and after the Cold War affected agricultural development, land-use history, forest management, and corn production in Thailand.

Answering this question, the historical development in resource management is part of the crucial political transition in Thailand and Southeast Asia; it relates to modernisation in two periods of time—the colonial period and the Cold War. The complexity of the sociogenesis of

environmental degradation in Thailand was disclosed by examining the mid-19th-century historical context of the establishment of state bureaucracy, for example with land and forest administrations to control the natural resources, which marked the beginning of capitalism in Thailand. Furthermore, the Cold War period was marked with social change according to the political temperature and the development schemes of the Thai government. Agricultural activities in remote and rural areas were encouraged. However, the subsequent changes in government policy created a problem that has remained unsolved and complicated until today. In different periods, the Thai state has introduced different policies regarding land and forest control, in terms of both territorialisation and deterritorialisation. Siam (the former name of Thailand) as a modern state has exercised its powers through the allocation of land and forest use since the 19th century. The first section discussed the significant influence of the colonial period, which was related to land and forest management. Siam was affected by colonialism, especially regarding administrative reform for resource management. The expansion of rice farming for trade affected land use and management because it increased the value of land. The state began to survey and measure the land using British methods, but this did not succeed because most farmers did not understand the system. In 1896 the Royal Forestry Department was established under the recommendation of the British with the primary purpose of collecting the income derived from teak concessions in the north. The land and forests were strictly controlled by the state, which represented the power of the state over natural resource allocation.

The second section pointed to international conflicts during the Cold War, which also affected Thailand, especially at the beginning of the National Economic Development Plan, which began around 1960. The plan was supported by experts from the U.S. and the World Bank at that time, and the Thai political structure was a military dictatorship, influenced by U.S. policy to prevent communism and to develop the country by following the modernisation

model. As a result, many development projects were initiated, such as road construction and corn farming. The first period and the beginning of the second period signify the period of territorialisation of the Thai state in natural resource management.

In fact, deterritorialisation began when Thailand undertook the First National Economic and Social Development Plan. The ultilisation of land and forests was stretched, and the state allowed people to farm on the state's land. The state supported the agribusiness companies and as a result, corn farms boomed from the 1970s, with the farmers clearing new land for production. The final section discussed the developmental issues related to corn farming. The land use for corn farms in Nan has been controlled, while growing corn in other provinces has been promoted. The Thai state then returned to territorialisation by cooperating with private companies to restrict land use for corn farming.

**7.2.2 The second research question**

This study highlighted how the primary causes of the multi layered exploitation in the corn supply chain and chicken production have been maintained.

The study demonstrates the mechanism of capitalist production in corn production and the supply chain, which aims to maximise profits by exploiting human labour and natural resources. This is maintained by state support and receives a payoff through the growth of capital. The study was made possible by documenting the interactions among the actors along the corn supply chain and in particular through the voices of the corn farmers, who have less power than others, as indicated. Moreover, the state policy for solving the problem of deforestation and promoting the growing of corn in other provinces continues to produce differences in power. For example, while the feed mill companies reject the corn where the source cannot be identified, simultaneously, the state policy promotes growing corn in other areas. This cooperation supports the companies and increases their power. Thus, state policy

has been supporting the corn production of those corn farmers that can access the main market and the feed mill firms to promote the chicken industry in the international market, and the focus has been on maximising profit in this market. This study highlights that the role of the state is still essential, but it needs to change to monitoring and regulating the chain rather than merely supporting business interests. Although the state has the highest power in the entire chain, corn production is thriving under a capitalist system that lacks regulation. Currently, this unregulated system results in human exploitation and a lack of concern for the environment, and can be linked to the broader discussion of social justice issues in globalisation.

### 7.2.3 The third research question

This study explored the environmental problems related to corn farming and, following this, how they connect to the accumulation of capital.

The three main environmental problems—deforestation, soil degradation and air pollution—have been related to the development and progress of agriculture in Thailand since 1960. The growth of capitalism in developing countries such as Thailand has depended on exploiting human labour and natural resources for over fifty years. For example, most of the capital pays for agricultural inputs. At the same time, corn farming households and neighbours, which constitute the primary source of labour, work on the land without a certificate of land ownership, burning farms after the harvest.

In addition, the causes of environmental problems in Nan are not just an issue of ecology but are strongly related to the political economy of the corn supply chain. Expanding corn farms and other field crops in Thailand has been a key part of economic development. It has also increased the number of small business farmers and the amount of agricultural land use. Despite this, agriculture brings about environmental degradation, as farming is not only a human activity: the entire process is regulated and propelled by a capitalist mechanism. Capitalism is

a frontier movement that facilitates the flow of materials, land, labour, capital, and natural resources (Moore, 2016). Besides farming, the thread of capitalism has been extended through cheap energy, food, raw materials, and labour (Moore,2014). Hence, it is understanding the capitalist mode of exploitation that is important for deeper knowledge of the capital-driven production processes that impact the natural environment. The exploitation process is another side of capital accumulation that has been taking place worldwide since the colonial period. However, these days, the process is being generated by the state policies and regulations of multinational agricultural companies, not from colonialism or the U.S.

### 7.2.4 The last research question

The study showed the responses of the different actors in the corn supply chain to the environmental crisis in Thailand.

Answering the last question is critical for connecting human activities, the state and company regulations and natural resources as they respond to each other in the crisis. Against the background of environmental degradation under the capitalist mode of production, the responses of the different actors shape the process of corn production and the supply chain.

Corn farming in Nan responds to economic and political purposes. However, after the issue of deforestation and environmental degradation was exposed, the corn farmers were viewed as trespassers on the land. Some corn was banned from being sold to large feed companies because of issues of rightful ownership and burning. At the same time, the response of the large companies seems to be one of protecting themselves from severe environmental concerns, as stated earlier. The state responds to the problem by protecting and rehabilitating the forest, and moving some corn farms out of Nan. These responses reflect another side to the web of life in the supply chain; all of the actors influence—and are a part of—each other. The response of the state and the large companies is to move in the same direction and to increase profit, while the

small farmers are struggling. The fundamental problem is dominated by dualism by categorising nature separately from society, as discussed in the concept of the Anthropocene. This can be described as a society without nature and nature without humans, including the binaries of intellectual/political or capitalism/nature (Moore, 2016).

**7.3 Discussion and arguments**

In this concluding chapter, the study revisits some of the answers explored above, drawing them together to produce new findings on the complexity of the supply chain. It examines how the political ecology of corn production in Nan province, Thailand is related to the Anthropocene and the capitalocene**.** I begin by discussing the ontology of the human and nature between both concepts. The dissertation has argued that social factors and nature cannot be separated when considering environmental issues—the social-political context, including the growth of agricultural capitalism, is an essential element of environmental degradation in this case. The dissertation supports the proposition that the categories of nature and society are fundamental to the environmental crisis of the modern era. These dualist categories of nature and society, as shown in the concept of the Anthropocene. On the other hand, the 'global ecology' perspective highlights human and non-human agents as a combination and co-producers that affect each other; humans are part of the natural world, whilst the natural world exists and affects human's lives, which has been called double internality (Moore, 2017). In the case study, the corn production and the supply chain reflect an intensive production system that has promoted a cash crop that has been tied to the capitalist mode of production since 1960.

Moreover, the chain is connected to chicken and poultry consumption in both the domestic and export markets. Hence the complexity of the supply chain and environmental crisis in Thailand affects—and requires a response from—all actors as the complex relationship has diverse dimensions. Capitalism has been compared 'the web of life', with includes complex

components and relationships both human and non-human; it includes various human organisations and processes, states and empires, world markets, and urbanisation (Moore, 2016; Moore 2013).

Second, the discussion considers the vital historical analysis of agriculture, food, and environmental crises. Harvey (2014) applied the historical interaction between socio-economic and biophysical environments in order to fully understand the trilemma complexity of food-energy-climate change. The environmental crisis in Nan, Thailand was found to be significantly related to the social context and political development of resource management in Thailand at the beginning of capitalist development, from the colonial period, continuing to the Cold War, and this continues to create problems in the present. At the same time, Moore (2017) highlights the world ecological crisis being caused by three historical turning points: (1) the Agricultural Revolution, in which the process of enclosure turned land into merchandise; (2) the Philosophical Revolution, in the dualism of Cartesianism—this is the fundamental idea that the categories of nature and society can be described as a society without nature and nature without humans, which led to the development of the Anthropocentrism approach; and (3) colonialism, which affected countries outside Europe and under which they became areas of production, and where surplus-value was transferred to the capitalist state centre. However, this dissertation emphasises that the historical approach is crucial for examining agricultural development and the environmental crisis; it reflects the political economics of the developments in Thailand.

**7.4 Contributions and Further Studies**

First of all, the dissertation has found that deforestation in the northern region of Thailand was not caused solely by the activities of corn farmers but was a result of official policies that encouraged agricultural expansion to promote the economic stability of the country. The environmental degradation and expansion of the corn farms have brought about the

reconsideration of the different actors in the corn supply chain whilst corn farmers have often been considered as a major cause of the problems.

While the environmental problems were occurring, some corn production was banned by large feed companies. However, the corn farmers were not passive but active in choosing their own destinies in different ways as active agents. The corn farmers have been continually growing corn by reducing their cost of production, for example by decreasing the area of their corn farms, using seeds and chemical products at a low price, and finding alternative markets in which to sell their corn. Some farmers have participated in the rehabilitation projects introduced by the state, non-profit organisations, and private companies to grow corn as well as perennial trees (fruit trees). Moreover, corn farmers asked to be a part of the agricultural production story, but not as forest trespassers. The protest of corn farmers in Ban Na Noi district has aimed to resist the state policy of returning forest land to government control. They reasserted that they had been working on those lands before it was changed to a watershed area or registered as a conservation area. The movements of those corn farmers can be considered as a contribution to the awareness of environmental issues as well as to the voicing of and asking for social justice.

In addition, the supply chain with the actors' voices is the focus of the dissertation and is a critical element in revealing the complex situation of the corn supply chain and environmental degradation. While the Commodity Chains and Global Capitalism model explores the entire chain and the exploitation of world capitalism, this approach includes a set of inter-organisational networks clustered around 'one commodity or product, linking households, enterprises, and states to one another within the world-economy' (Gereffi et al., 1994: 2). With the structural focus, the analysis of CCGC has the shortcoming of disregarding the social interaction of the actors. Therefore, commodity chain analysis has to show that social

relations and organisations shape society's production, distribution, and consumption processes. The dissertationemphasises the critical role of state action—particularly the policies that influence the commodity chain network's development and growing integration. Jackson and Ward (2010) suggested that studies of supply chains need to employ a life history approach and analyse the personal testimony of the key players involved. Therefore, this dissertation demonstrates the advantage of adding the voice of the voiceless farmers and their interaction with others in CCCG in order to better reveal the inequality of the relationships along the chain. Thus, to help understand this point, we need systematic data that reflect the interaction among the actors through the voice of related actors. This study complements the voice of corn farmers, with local merchants, which contributes to an understanding of inequality and exploitation. Essentially, this study fills a gap in the knowledge about the complexity of the supply chain and environmental degradation by exploring the institutional relationship of the actors in the corn supply chain.

However, this research does not seek to understand the entire supply chain, including chicken consumption. The dissertation highlights the corn supply chain under the whole chain, which includes the seed supplier and the end of the chicken meat consumer in both domestic and export markets. The CCGC approach (Gereffi et al., 1994) proposes to analyse commodity chains in terms of how social relations and organisations shape the processes of production, distribution, and consumption in society. The corn supply chain in this case study reflects the power relationship among the actors along the chain but the dissertation cannot cover the details of the consumption section of the chain. Thus, in the future, it would be fascinating to conduct complementary research that focuses on the complete supply chain, including consumption. Moreover, the dissertation uncovered the important issue of labour exploitation in the agri-food

supply (Davies, 2020), which is not discussed here. It is an interesting topic that requires further study.

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# Appendix A – Information sheets and consent forms

1. Information sheet and Consent form (English)

University of Essex

**Interview Information Sheet**

**Title of Study: Intensive Farming and the Changing of Ecosystem: A Case Study of Corn Field in Thailand.**

You are being invited to take part in this research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask us if you would like more information or if there is anything that you do not understand. Please also feel free to discuss this with your friends and relatives if you wish. I would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

**What is the purpose of this study?**

The purpose of this study is to investigate the relationship between environmental issues, corn farming and meat consumption in Thailand. The understanding of such is hoped to lead to a suitable policy. In order to achieve that this study will look at three aspects as follows; (1) to explore the socio-economic function of corn and the economic organisations' role in corn production and meat consumptions; (2) to investigate the changes of environment that might have deteriorated because of intensive land use for corn plantation, and (3) to investigate how do relevant stakeholders (farmers, corporations, state and non-government organisations) respond the environmental issues.

**Who is doing the study?**

The study will mainly be conducted by Ms Thitirat Kittiwiwat, who is now studying in the UK. Ms Thitirat is a PhD student in Sociology at the University of Essex, in the UK. Her supervisor is Professor Mark Harvey, at the University of Essex, UK.

**What will happen to you if you decide to be in this study?**

You will be invited to take part in an interview or a focus group, and be asked to talk about what are the process of production and the limitation of corn plantation? What do you think about the environmental problems in Nan province Thailand and How the problem have or have not related to the corn farming? The interview will last around one hour. A short form covering demographic details will need to be filled in after the interview. Please note that being in this project is up to you, and you do not have to take part. You are free not to answer any questions

you do not wish to answer, and if you start to take part in this project, you can change your mind later on. If you want, you can also ask me to delete certain things that you have told me. Participating or not participating in the study is up to you and you can also withdraw at any time.

**What are the possible risks of being in the study?**

There are minimal levels of risk involved if you participate in the study because all questions are general in the process of corn the production. You may feel some pressure or discomfort with some questions about environmental issue which sometime relate to corn farming. However, the information you share is entirely confidential and you are free not to answer any questions you do not wish to answer.

**What are the possible benefits of being in the study?**

There are no direct benefits to you for participating in the study but your answers will contribute to the knowledge in the sociology and also make a greater understanding in the complex situation in environmental issue and corn farming in the North of Thailand.

**What information do I keep private?**

I would prefer to tape-record the interview, but no-one will be identified by name on the tape. The tape will be kept as an electronic file and will be coded and secured using password protection. Any tapes will be destroyed when the research project is completed. If you would prefer not to be tape-recorded, I will take notes of the interview. The information recorded is confidential, and no one else except my research supervisor at the University of Essex in the UK will have access to the information documented during your interview. A copy of the final report of the study will be sent to you if you want to see the results of the study. This report will be in English, but the primary researcher will send a short summary of the research in Thai.

**If you have any questions or problems, whom can you call?**

If you have any questions about this study, you can call the primary researcher, Ms Thitirat Kittiwiwat at 44 (0)7784130928 or by email tk16632@essex.ac.uk

You may also contact her supervisor, Professor Mark Harvey by email mharvey@essex.ac.uk

## Consent Form

**Title of the project** **Intensive Farming and the Changing of Ecosystem: A Case Study of Corn Field in Thailand.**

**Researcher:** Ms. Thitirat Kittiwiwat

Please initial box

1. I confirm that I have read and understand the Information Sheet dated …….. for the above study. I have had the opportunity to Consider the information, ask questions and have had these questions Answered satisfactorily. ☐
2. I understand that my participation is voluntary and I am free to withdraw from the project at any time without giving any reason and without penalty. ☐
3. There are minimal levels of risk in the study because all questions are general in the process of corn production and some questions about environmental issue. I understand that, due to the nature of the stimulation used, entrainment sessions may not be suitable to individuals who suffer, or have suffered, from epileptic seizures, that I am aware of the potential risk accentuated with that, and I confirm that, to the best to my knowledge, I have never had epileptic seizures. ☐
4. I understand that the identification data provided will be securely stored and accessible only to the members of the research team directly involved in the project, and that confidentiality will be maintained. ☐
5. I understand that data collected in this project might be shared as appropriate and for publication of findings, in wick case data will remain completely anonymous. ☐
6. I agree to take part in the above study. ☐

| Participant Name | Date | Participant Signature |
|---|---|---|
| …… | …… | …… |
| RESEARCHER Name | Date | Researcher Signature |
| …… | …… | …… |

2. Information sheet and consent form (Thai)

University of Essex

**คำอธิบายในเข้าร่วมการสัมภาษณ์เพื่อการวิจัย**

**ชื่อโครงการวิจัย : การทำเกษตรแบบเข้มข้นและการเปลี่ยนแปลงระบบนิเวศ : กรณีศึกษาไร่ข้าวโพดในประเทศไทย**

ขอเรียนเชิญท่านเข้าร่วมการสัมภาษณ์เพื่อการวิจัย ก่อนที่ท่านจะตัดสินใจเข้าร่วมการสัมภาษณ์นั้น ท่านจะได้รับการอธิบายและทำความเข้าใจว่าเหตุใดผู้วิจัยจึงได้ทำการวิจัยในเรื่องนี้ และงานวิจัยนี้มีเนื้อหาเกี่ยวข้องในประเด็นใดบ้าง กรุณาศึกษาและทำความเข้าใจข้อมูลต่างๆ ด้วยความรอบคอบ หากท่านมีข้อสงสัย สามารถซักถาม หรือสามารถขอข้อมูลเพิ่มเติมจากผู้วิจัยได้

**วัตถุประสงค์ของงานวิจัย**

วัตถุประสงค์ของงานวิจัยนี้ เพื่อศึกษาความสัมพันธ์ระหว่างประเด็นทางด้านสิ่งแวดล้อม การปลูกข้าวโพด และการบริโภคเนื้อสัตว์ในประเทศไทย การศึกษาลักษณะความสัมพันธ์ดังกล่าวเพื่อนำไปเป็นข้อมูลในการจัดทำนโยบายด้านความยั่งยืน เพื่อให้งานวิจัยนี้บรรลุวัตถุประสงค์ที่กำหนดไว้ งานวิจัยจะมุ่งเน้นศึกษาใน 3 ประเด็นหลักด้วยกัน ได้แก่

1. ศึกษาบทบาทในด้านเศรษฐกิจและสังคมของข้าวโพด และบทบาทต่อองค์กรเพื่อเศรษฐกิจของการผลิตข้าวโพดและการบริโภคเนื้อ
2. เพื่อศึกษาความเปลี่ยนแปลงของสิ่งแวดล้อมที่อาจจะเสื่อมโทรม เนื่องจากพื้นดินที่ใช้ในการเพาะปลูกข้าวโพด
3. เพื่อศึกษาการตอบสนองของผู้มีส่วนได้เสีย (ชาวสวน ภาคเอกชน ภาครัฐ) ต่อประเด็นทางด้านสิ่งแวดล้อม

**ผู้วิจัย**

นางสาวฐิติรัตน์ กิตติวิวัฒน์ นักศึกษาระดับปริญญาดุษฎีบัณฑิต สาขาวิชาสังคมวิทยา มหาวิทยาลัยเอสเซ็ก (University of Essex) ประเทศสหราชอาณาจักร ที่ปรึกษาศาสตราจารย์มาร์ค ฮาร์ริ

**หากท่านตัดสินใจเข้าร่วมการสัมภาษณ์ในครั้งนี้**

หากท่านร่วมการสัมภาษณ์ แนวคำถามในการสัมภาษณ์นั้นจะเกี่ยวข้องกับกระบวนการและข้อกำจัดในการปลูกข้าวโพด ท่านมีความคิดเห็นอย่างไรต่อปัญหาสิ่งแวดล้อมในจังหวัดน่าน และปัญหาดังกล่าวเกี่ยวข้องกับการปลูกข้าวโพดหรือไม่อย่างไร หลังจากการสอบถามคำถามแต่ละข้อ ผู้วิจัยจะบันทึกข้อมูลที่ได้จากการสัมภาษณ์ลงในแบบฟอร์มที่เตรียมไว้ ทั้งนี้ ผู้ให้สัมภาษณ์สามารถปฏิเสธที่จะไม่ให้ข้อมูลในข้อคำถามข้อใดย่อมได้ ร่วมทั้งสามารถขอออกจากการให้สัมภาษณ์ได้ทุกเมื่อตามความประสงค์ อีกทั้งสามารถแจ้งความประสงค์ให้ผู้วิจัยลบหรือไม่บันทึกข้อมูลใดๆ จากที่ผู้ให้สัมภาษณ์ให้ข้อมูล

**มีความเสี่ยงใดจากการร่วมงานวิจัยในครั้งนี้หรือไม่**

อาจมีความเสี่ยงเพียงเล็กน้อยจากการให้สัมภาษณ์ เช่น คุณอาจรู้สึกได้ความกดดันจากการถามคำถามเกี่ยวกับประเด็นในด้านสิ่งแวดล้อม ทั้งนี้ ข้อมูลของผู้ให้สัมภาษณ์จะถูกเก็บเป็นความลับ

**สิทธิประโยชน์ที่จะได้รับจากการเข้าร่วมการวิจัยในครั้งนี้**

เนื่องจากการวิจัยในครั้งนี้มีวัตถุประสงค์เพื่อการศึกษาเท่านั้น ผู้เข้าร่วมการวิจัยจะไม่ได้รับสิทธิประโยชน์ใดๆ โดยข้อมูลของผู้ให้สัมภาษณ์จะถูกนำเสนอ เผยแพร่เป็นความรู้ในด้านสังคมวิทยา และเพื่อสร้างเสริมความรู้ความเข้าใจถึงความซับซ้อนของประเด็นในด้านสิ่งแวดล้อมและการปลูกข้าวโพดของจังหวัดน่าน

**ข้อมูลจะได้รับการปกปิดเป็นความลับ**

ผู้วิจัยจะทำการบันทึกเสียงของผู้ให้สัมภาษณ์ ทั้งนี้ จะไม่มีการระบุชื่อของผู้ให้สัมภาษณ์ลงในการบันทึกเสียง การบันทึกเสียงดังกล่าวจะถูกเก็บในรูปแบบอิเล็กทรอนิกส์ไฟล์และจะถูกเข้ารหัสความปลอดภัย ไฟล์เสียงทั้งหมดจะถูกทำลายหลังจากการวิจัยนี้เสร็จสิ้น หากผู้ให้สัมภาษณ์ไม่ต้องการให้บันทึกเสียง ผู้วิจัยจะทำการจดบันทึกเป็นลายลักษณ์อักษรแทนการบันทึกเสียง ข้อมูลการบันทึกเสียงจะถูกเก็บเป็นความลับ และไม่มีผู้ใดได้รับอนุญาตให้เข้าถึงข้อมูลดังกล่าวนอกเหนือจากที่ปรึกษาของผู้วิจัย ผู้ให้สัมภาษณ์จะได้รับรายงานสรุปผลการวิจัยตามความประสงค์ รายงานดังกล่าวจะจัดทำเป็นภาษาอังกฤษ ทั้งนี้ ผู้วิจัยจะดำเนินการสรุปภาพรวมของเนื้อหาโดยย่อ เป็นภาษาไทยอีกด้วย

**หากมีข้อสงสัย**

กรุณาต่อผู้วิจัยที่อีเมล์ tk16632@essex.ac.uk หรือที่เบอร์โทรศัพท์ 44(0)7784130928 หรือที่ปรึกษา ศาสตราจารย์มาร์ค ฮาร์วี อีเมล์ mharvey@essex.ac.uk

**แบบฟอร์มแสดงความยินยอมในการสัมภาษณ์**

**โครงการวิจัย : การทำเกษตรแบบเข้มข้นและการเปลี่ยนแปลงระบบนิเวศ : กรณีศึกษาไร่ข้าวโพดในประเทศไทย**

นักวิจัย นางสาวฐิติรัตน์ กิตติวิวัฒน์

1 ข้าพเจ้าอ่านและทำความเข้าใจเอกสารแนะนำโครงการ วันที่ .....
ข้าพเจ้ามีเวลาคิดทบทวนเกี่ยวกับข้อมูลต่างๆของงานวิจัย รวมถึงซักถามข้อสงสัยต่างๆ
และได้รับคำตอบเป็นที่พอใจ ☐

2 ข้าพเจ้าเข้าใจว่า การเข้ารวมโครงการวิจัยเป็นความสมัครใจและข้าพเจ้ามีอิสระ
ที่จะถอนตัวออกจากโครงการได้ โดยไม่จำเป็นต้องให้เหตุผลและปราศจาก
ผลกระทบทางลบใดๆ ☐

3 งานศึกษามีความเสี่ยงในระดับที่ต่ำมากเนื่องจากทุกข้อคำถามเป็น
คำถามกว้างๆในประเด็นเกี่ยวกับขั้นตอนการปลูกข้าวโพด ที่ดิน และสิ่งแวดล้อม ☐

4 ข้าพเจ้าเข้าใจว่าข้อมูลส่วนตัวจากการวิจัยจะถูกเก็บเป็นความลับ มีเฉพาะ
สมาชิกของทีมวิจัยที่จะสามารถเข้าถึงได้เท่านั้นและข้อมูลเหล่านี้จะถูกเก็บรักษาไว้อย่างดี ☐

5. ข้าพเจ้าเข้าใจว่าข้อมูลบางส่วนภายใต้โครงการวิจัยนี้ โดยเฉพาะผลการศึกษา
อาจถูกนำไปเผยแพร่ต่อสาธารณะอย่างเหมาะสม โดยไม่มีการเปิดเผยข้อมูลของกรณีศึกษา ☐

6. ข้าพเจ้าเห็นด้วย/ ยอมรับในการเป็นส่วนหนึ่งของโครงการวิจัยข้างต้น ☐

| ชื่อ/สกุล ผู้เข้าร่วมโครงการ | วันที่ | ลายเซ็น |
|---|---|---|
| ..... | ..... | ..... |
| ชื่อ/สกุล นักวิจัย | วันที่ | ลายเซ็น |
| ..... | ..... | ..... |

# Appendix B –Fieldwork in Thailand

| The fieldwork (Month) | Activities |
|---|---|
| Contract the gatekeeper and plan the fieldwork<br><br>October 2017: | I arranged for a trip to Nan province and made contact with a gatekeeper who works at Nan Provincial Agricultural Extension Office. He provided some useful information and a list of key informants at government offices such as a director of the Nan provincial agricultural extension office, an officer of Nan provincial agricultural extension office and an office of Nan provincial cooperative. Then, I made an appointment for an interview. I also showed them the letter from my supervisor and the recommendation letter from the university which I have been working for in Thailand. These have been very useful, especially when I needed to contact government officers and private companies. |
| Gaining access the village.<br>November 2017 | I contacted the head of Bang Huay-Muang village in Tha Wang Pra district. I stayed at the village for one week to interview the farmers (the interviews were conducted during 6pm-9 pm after they returned from their farm). At this stage, I had slightly changed my plan. I managed to interview 12 farmers in this village and then moved to the other village. The second village showed a higher proportion of corn plantation than the first village. I conducted 10 interviews with the farmers in the second village.<br>At the first village I had known the head of the village, and some of the farmers before, so it was quite easy to arrange an interview and participation. The second village is in Wand Sa district and for this village, it took time to find and approach a gatekeeper. I attended a meeting and introduced myself to two leaders of the village and made an appointment to visit and follow them to their farm. |
| Private companies (Mill industry)<br><br>December 2017-January 2018 | In the beginning, I contacted the Thai Feed Mill Association to arrange for an interview and to introduce myself to the other feed mills. I also interviewed staff from three feed mills (Betagro, Saha Farms, and Inteqc Feed). They provided a whole picture of corn market demand in the feed mill industry and suggested that the chicken industry in Thailand is still growing. I then made contact with Thai Broiler Processing Exporters Association and interviewed them before I returned to the UK. |
| Chicken farms and Farmers<br><br>(December 2017-January 2018) | For this part, fieldwork took place in Lop Buri and Sara Buri provinces. Both provinces are in the central part of Thailand. It was a 3-4-hour journey from Bangkok. Lop Buri is the area with the highest number of feed mills and chicken farms, and Sara Buri is the second highest.<br>- First of all, I contacted one of the Subdistrict Administrative Organizations in Sara Buri to interview and to find out some information about the farmers who own a chicken farm.<br>- I also made an appointment with the veterinarians who work in Lop Buri and Sara Buri provincial Livestock Offices. I |

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| | interviewed two veterinarians in both provinces and asked them to contact the owners of chicken farms for interviews. |

## Appendix C – An interview guideline

| Seed production. | |
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| Why this sector is important? | Seed is the beginning of corn chain. Therefore, in order to understand the seed production in Thailand, it is to start with the production process of seed. The interesting point is the success of the development of corn strain, Suwan 1, in Thailand since 1974. |
| Aim: | To understand the development of seed production especially corn production in Thailand. |
| How will the interview start? | |
| There are two main sectors: | Government, University research institution.<br>-National research Centre of Millet and Corn (Suwan farm)<br>Private sector, companies.<br>-Chia Tai<br>-Charoen Pokphand Food |
| The main questions: | 1. A history of the development of corn strain.<br>- How did you start your business?<br>- What are the government's regulation?<br>2. A process of seed production.<br>- How do they organize the seed farm?<br>- How do you ensure seed quality and produce quality?<br>- How do they choose the farmer to take part in the project?<br>3. A marketing management.<br>4. A successful case and some previous problems.<br>5. The environmental issues.<br>- what do you think about the environmental issue in corn farming in Thailand now?<br>Do your business have an impact on environment? |
| Corn process | |
| Why this sector is important? | - This process is the midstream of corn supply chain. There are two main sectors in this process. The first one is the farmers and field/local merchants and the second are the agencies that collect the product.<br>- This process is the main focus of the research because corn farming has been accused of causing deforestation in the north of Thailand. |
| Aim: | To study and understand the process of corn farming in the North of Thailand. |
| How will the interview start? | - Contact the District Agricultural office (Amphoe Tha Wang Pha) and arrange for the interview.<br>- Contact the head of the village (Ban Huey Muang). |

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| The interviewees and the question. | 1. The officer of district agricultural office.<br>General views:<br>- Could you explain about the agriculture system in Nan province?<br>- What is the proportion of corn and another dry crop in Nan province?<br>- Why the north of Thailand has the high proportion of corn a plantation in comparison to another regions?<br>- What do you think of 'the topography of Nan province is appropriate for corn plantation'?<br>- How many types of corn have been planted or used for plantation? And which one is the most popular?<br>- Could you please explain about the process of corn plantation?<br>- How many groups of people or agencies that are involved in corn production?<br><br>Policy support:<br>- Does the government have some policies to support farmers and how do these policies support farmers?<br><br>Environmental issue:<br>- What is the current situation of corn plantation in Nan province?<br>- What are the differences between the current and the past situation?<br>- What is your opinion about 'corn framing is the main cause of the problem' from the news and social issues?<br>- Are there any impacts of environmental issues on farmers or other agencies?<br>How do the government respond to the problems? |
| | 2.Farmers:<br>Agricultural background<br>- Could you tell me about your agricultural experience?<br>- How many lands do you have?<br>- What is the type of land?<br>- What is the plant that you grow now? Are they different from the past? why?<br><br>About corn plantation:<br>• Is corn the major crop of your farm?<br>• How long have you farmed corn?<br>• Why do you choose to grow corn?<br>• Could you explain the process of corn plantation?<br>• Where do you get the seed from?<br>• What are the differences in each types of seed?<br>• Where do you get the herbicide, insecticide and other chemicals from and how do you use them?<br>• Where do you get water supply from, and how do you manage water supply?<br>• Could you tell me about the process of harvesting and transferring corn? How many agencies are involved in this process and who are they?<br>• (what do you think) Who is the person/agency that plays an important role in the corn production and how, why?<br>Do you know where corn produce is delivered to? What is the final station of corn produce within the corn chain? |

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| | • Do you have any problems relating to corn farm? What are these problems? How do these problems have impact on you?<br>• If you have the problems, how they were solved and who is the person/agency that plays important role?<br>• Do you have any health problems? What are they? Is the issue related to work on a farm or not?<br>• What is the future plan of corn farming?<br>Environmental issue:<br>• Can you define 'environmental problem'?<br>• What are the environmental problems in Nan? And do you think they are related to agriculture sector or not?<br>• Do you think the agriculture especially corn plantation is related to environmental issue or not? How? Why?<br>If yes, who should be responsible for the problem? and how they should do?<br>Can the farmers participate in solving environment issues? If yes, how can they participate? |
| | 3.Field merchants /local merchants.<br>Could you tell me the process of transportation?<br>How do you make contact with farmer?<br>What work do you do in farming?<br>Please can you explain the process of farming?<br>How much do the farmers pay for work at the farm?<br>Is the payment different for each service provider? Why?<br>What is the final station that the farm produce is delivered to?<br><br>What do you think about the environmental issue in corn plantation? |
| | 3.The agencies that collect product. (Agricultural cooperative, Agricultural marketing co-operative and Silo companies)<br><br>Could you tell me, what is the function of the organisation?<br>What are the differences between the governmental agency and private agency?<br>Could you please explain about corn supply chain?<br>What is the next process in delivering corn produce? How do they deliver the produce?<br>What do you think about the environmental issue in corn production? |
| Deforestation in Nan | **Provincial (Nan) Forestry office**.<br>• The general question in a policy of forest in Thailand and Nan province.<br>• The situation of deforestation in Nan province, between the past and present.<br>• The major cause of deforestation, between the past and present.<br>• The relationship of corn farm and deforestation issue.<br>The policy for a solution |
| 3.Mill industry and the poultry farm | |
| Why this sector is important. | They are two main sectors in this part which are mill industry and the poultry farm. According to the food supply chain framework that is applied in the study. Mill industry and the poultry farm are the ends of corn chain that need to understand because the two last sectors are the downstream that can be related to upstream in corn production process. |

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| Aim | To study and understand the process of mill industry and poultry production. This sector will focus on the network of material that is produced the animal feed, where are they from and how. For the poultry farm will be focused on the process of poultry production through the process to the market. |
| The interviewees and the question. | 1. Feed Mill<br>raw material<br>How many types of animal food are there?<br>Could you explain the process of animal food and its component of chicken food?<br>What is the main component?<br>Where does the source of the raw material come from especially corn?<br>How many tonnes are/have been used per year?<br>Do you import corn from other countries? Does Thai farm produce enough corn?<br>How do the Thai government policy support raw material from farm (such as corn), provide some examples?<br><br>Do the government issue the policy to solve this problem<br>What are the impact factors for the price of raw material especially corn?<br>Does the environmental issue of corn farming has an impact of corn price? and how does the company solve this problem?<br><br>Product distribution:<br>Is the corn produce enough for domestic use?<br>What is the proportion of domestic sales and export?<br>What are the main markets for domestic sale and export?<br><br>environmental issue:<br>Does the company have any environmental policy? How? |
| | 2.Chicken Farms/farmers<br><br>background:<br>Could you tell me what you did before? Why did you choose to do chicken farm?<br>Could you tell me what size of your farm (small, medium or large)? How many chickens are there in the farm now?<br>Could you explain the process of chicken farm?<br>How many chicken breeds are there in the market? and which one do you use at your farm? Why did you choose this one?<br>Food:<br>Where do you get the food supply from? Which brand do you use? Why do you use this brand?<br>How much do you pay for food?<br>What do you do when the price is increased?<br>Do you know, what is the cause of increased price?<br>Do the government issue the policy to solve this problem?<br><br>Production:<br>Could you tell me, how do you care for chicken on the farm? |

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| | How long does it take to raise chicken to sell?<br>Have you had any problem? What are the problems? How do you solve the problems?<br><br>Marketing:<br>Could you tell me the sales process of chicken? How to sale?<br>Could you tell me the factor that affects the price of production?<br>Could you tell me the proportion between export and domestic sale?<br>Do you have any plan for your business in the future? do you want to expand the farm?<br>What are the differences between the contract farming and private farm? Which one is better? Why?<br>According to the bird flu, do you have any problem from it? How do you deal/handle the problem of bird flu?<br><br>Environmental issue:<br>Do you think if any process of chicken farm is related to environmental issue? |

## Appendix D - The farmers Demographics

| Farmer | Age | Village | Land ownership(rai) | | Plants | |
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| | | | Title deed | No title deed | Corn(rai) | Other |
| Farmer1 *(Soy)* | 37 | Ban Huai Muang | - | 20 | 20 | Rubber tree<br>Mango |
| Farmer *2 (In Tha)* (head of community) | 50 | Ban Huai Muang | 15 | 60 | 15-25 | Teak<br>Rambutan<br>Mango<br>Sticky rice<br>Tobacco |
| Farmer 3 *(Soi)* | 52 | Ban Huai Muang | 15 | 10-15 | 15 | Longan<br>Rubber tree<br>Rambutan<br>Sticky rice |
| Farmer 4 *(Ma Baue)* | 57 | Ban Huai Muang | 9 | 21 | 5 | Sticky rice |
| Farmer 5 *(Rung Noew)* | 60 | Ban Huai Muang | 29 | - | 19 | Rubber tree<br>Sticky rice |
| Farmer 6 *(Rung Tong)* | 68 | Ban Huai Muang | 15 | 10 | 19 | Rubber tree<br>Teak<br>Sticky rice |
| Farmer 7 *(Na Sao)* | 52 | Ban Huai Muang | 24 | 18 | 10-15 | Sticky rice |
| Farmer 8 *(Naree)* | 36 | Ban Huai Muang | 10 | 20 | 10 | Ginger<br>Lichee<br>Teak<br>Rambutan |
| Farmer 9 *(Payun)* | 43 | Ban Huai Muang | - | 15-18 | 15 | Sticky rice<br>Rambutan |

| Farmer | Age | Village | Land ownership(rai) | | Plants | |
|---|---|---|---|---|---|---|
| | | | Title deed | No title deed | Corn(rai) | Other |
| | | | | | | Mango Banana |
| Farmer10 *(Rung Kan)* | 60 | Ban Huai Muang | - | 14-15 | 12-13 | Sticky rice |
| Farmer 11 *(Chana)* | 55 | Wang Sa | - | 30 | 30 | Sticky rice |
| Farmer 12 *(Jarun)* (a head of community) | 57 | Bang Choom Pu | 50 | 25 | 40 | Tamarind Sticky rice Mango Orang, Lichee, lime, bamboo |
| Farmer 13 *(Siripon)* | 52 | Bang Choom Pu | 45 | 30 (rent 15 rai) | 45 | Tamarind, Longan, cashew nut Sticky rice |
| Farmer 14 *(Jomlong)* | 49 | Bang Choom Pu | 4-5 | 38-39 | 31 | Rubber tree Sticky rice |
| Farmer 15 *(Somchai)* | 58 | Bang Choom Pu | 10 | 45 | 47 | Longan |
| Farmer 16 *(Parthom))* | 45 | Ai | 25 | 25 | 25 | Rubber tree Perennial plant Tamarind, cashew nut |
| Farmer17 *(Po Tawin)* | 56 | Ai | 20 | 20 | 40 | Sticky rice |
| Farmer18 *(Sangwain)* | 59 | Ai | 40-50 | 30 | 20 | Rubber tree Sticky rice Teak |
| Farmer19 *(Mongkong)* | 52 | Ai | 52 | - | 40 | Teak Rubber tree Sticky rice |
| Farmer20 *(Kamontip)* | 39 | Bang Choom Pu | 31 | 31 | 50 | Sticky rice |
| Farmer 21 *(Pran)* | 48 | Bang Choom Pu | | | 100 | |
| Farmer 22 *(Mearn)* (a head of comunity) | 58 | Ai | 49 | 30 | 20 | |