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Changing Living Spaces

Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present

Edited by Satoshi Murayama, Žarko Lazarević and Aleksander Panjek

Interdisciplinarne perspektive
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Changing Living Spaces

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Koper 2024

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Back cover: Cows Kept on the Riverbank of the Mishing Village, photo by Haruhisa Asada.

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Table of Contents

An Introduction to the Living Spaces Concept

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Kagawa University, Japan

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> The demise of old ways of living can cause anguish, and a deep sense of loss. It is a little like the extinction of older species of animals. [...] This is an issue of some seriousness, but it is up to the society to determine what, if anything, it wants to do to reserve old forms of living, perhaps even at significant economic costs. [Sen 1999, 241]

The aim of this book is to collectively discuss the developmental phases from agricultural societies to industrialized societies and finally to post-industrial low-carbon societies in the cases of Eurasian economies, which have followed different developmental pathways towards modernity from early modern times to the present, although with the dominant presence of small, even tiny, landholder structures. Based on the different economics of environment, we explored changing Living Spaces: Where have florae, faunae, and humans lived in the past? Where do they live today? Where will they live in the future?

First, we applied a comparative approach to the ecological foundations of local case studies. Practices of different economic structures and levels of development can contribute to a broader generalization of modernization processes on a global scale. Second, we focused on rural areas. Local natural resource use, economic systems, and pathways to modernization allowed us to identify traditional economic and environmental management solutions that can serve as models for future rural development policy.

A clear difference between the pre-modern economy and the modern economy is that the latter includes the development of scientific/socio-technological knowledge and global dependence on the use of fossil fuels. The globalized fossil fuel economy emerged in the second half of the nineteenth century and is dramatically changing the contemporary world.

Murayama, S., Ž. Lazarević, and A. Panjek, eds. 2024. *Changing Living Spaces: Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present*.Koper: University of Primorska Press.

The two economies have rarely been discussed together. According to Jeffery D. Sachs (2008, 222), his evolutionary scheme of economic development includes two parts: (1) the traditional subsistence economy, and (2) the modernized economy, which evolved from a trading economy to an emerging market economy and on to an innovation economy. The scheme is based on Euro-American, Japanese, and global economic development. The newly economically developed countries all initially belong to a traditional or emerging market economy, which eventually evolves to the second stage. Sachs' scheme can be described as a traditional evolutionary understanding with developmental stage theories.

On the other hand, the early modern or pre-modern world can be viewed from two different aspects. According to Wrigley's argument, the pre-modern era is understood as a transitional period to modern fossil fuel society: (1) as a process of liberation from agricultural constraints in organic economies (Wrigley 2016), and (2) as a process of long-term establishment of differentiated organic economies (over at least hundreds of years), almost as in the case of European and Japanese agricultural histories. However, developing countries have often been unable or have not had the opportunity to complete the development of their own organic economies, as they have been and are being swept up in a short and precipitous time by the global fossil fuel society.

Wrigley's work on the path to sustainable growth opened a new horizon in the history of energy. Subsequently, Paolo Malanima (2020) revealed a unified global history of the earth during the long nineteenth century, from the end of the eighteenth century to the beginning of the twentieth. The history of labour dependent on fossil energy reached its peak on the eve of the First World War. Organic economies, whose ecological foundations varied around the globe, had various long histories based on Living Spaces. However, with the advent of the concept of energy efficiency, the history of production evolved to tell an economically similar global history, introducing the 'Anthropocene' that is currently transforming the Earth.

Paolo Malanima's excellent work following Wrigley's history of liberation from the natural constraints of organic economies to sustainable economic growth would suggest something else, what might be called a 'tragedy' of sorts in environmental history caused by global economic development. It is true that 'animals and humans are poor converters' of food to work (Malanima 2020, 495). But does this history of efficient fossil fuel 'production' really cover the entire spectrum of 'production'?

In the mid-nineteenth century, Marx and Engels used the multi-layered German term 'Verkehr,' which in the German-speaking world in the eighteenth century originally meant service and transportation of materials but evolved into a universal meaning of social contact and dealings, from which the usage of the word to mean sexual intercourse or an association to be established was derived, eventually including the definition 'traffic'. This term, translated simply as 'intercourse' in the following passages in English, may symbolize an economically oriented social change in the nineteenth century. However, such a controversial argument is beyond the scope and role of this discussion chapter (Karatani 2012).

After describing the *German Ideology* from 1845 to 1846, Marx and Engels tended not to use the term 'Verkehrsverhältnisse' ('modes of exchange') which covered material exchange and human intercourse, e.g. physical-material/mental-cultural production/exchange and species' reproduction in the single concept of 'Verkehr', but only the concept of 'Produktionsverhältnisse' ('modes of production'), or economic relations of capitalistic production, in order to identify the fundamental problem of capitalism, which was their main issue in line with the *Communist Manifesto*. This may mark the beginning of the Age of Economy. However, in this book, which takes a broad approach to economic and environmental history, we should be reminded of the following original message of Marx and Engels.

> Die Produktion der Ideen, Vorstellungen, des Bewußtseins ist zunächst unmittelbar verflochten in die materielle Thätigkeit & den materiellen Verkehr der Menschen, Sprache des wirklichen Lebens. Das Vorstellen, Denken, der geistige Verkehr der Menschen erscheinen hier noch als direkter Einfluß ihres materiellen Verhaltens. [Marx and Engels 2017, 135]

> The production of ideas, of conceptions, of consciousness, is at first directly interwoven with the material activity and the material intercourse of men — the language of real life. Conceiving, thinking, the mental intercourse of men at this stage still appears as the direct efflux of their material behaviour. [Marx and Engels 1976, 42]

Production methods in Japan are thought to have changed dramatically under the influence of Euro-American industrialization in the later nineteenth century with the introduction of machinery and fossil fuels. In agriculture, the economy of large-scale farmers began to develop, especially in Hokkaido. However, the economy of small farmers did

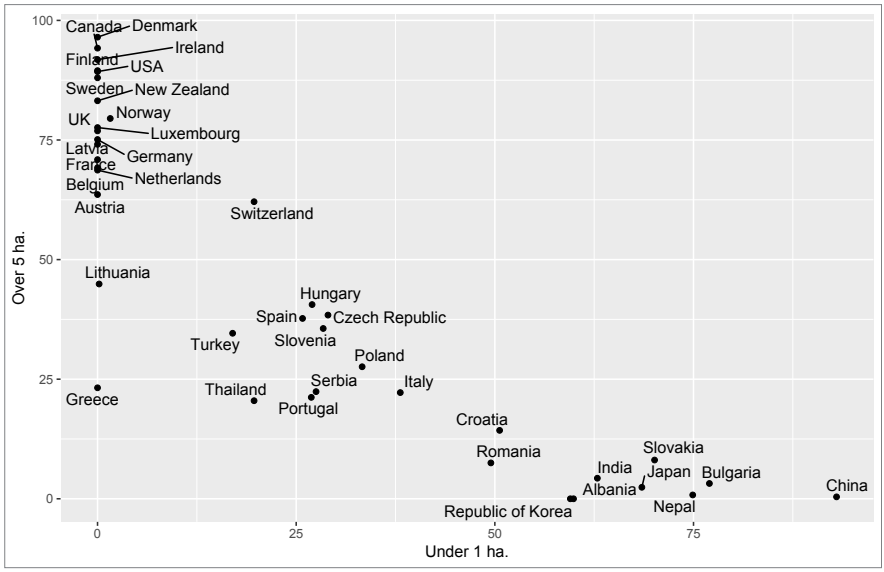

Figure 1 Farm Size of Agricultural Management

Notes The x-axis shows the ratio in percent of farmland in the management scale < 1 ha; the y-axis is the ratio of the farmland in the management scale > 5 ha. Countries were selected based on the availability of farmland management data. *Source* Figure 1 was compiled by original calculation and plotting based on the data derived from table A 2: Agriculture's importance in the economy and labour force, fertilizer use intensity, farm size and women's involvement in agriculture, in Food and Agriculture Organization of the United Nations (2015).

not disappear immediately, but was sustained until recently. The current period of population declines finally began to destroy the traditional peasant economy. Figure 1 is a correlation chart of the ratio between, in percent, of the farmland less than 1 hectare (ha) and the ratio, in percent, of farmland more than 5 ha. On the left side, you can see many countries, with Europe and America leading the way. However, in farmland less than one ha, there are predominantly many countries where it is not counted with land for agriculture. Figure 1 shows not only Japan, but also other Asian countries and Eastern European and Mediterranean countries such as Slovenia and Italy, which are relatively small landholding countries.

Small farms cultivating less than 1 ha of arable land do not exist in the countries that form a group on the y-axis: Canada, Denmark, Ireland, Finland, Sweden, the United States, and others (figure 1). This book is not concerned with these countries, but with the countries where such small-

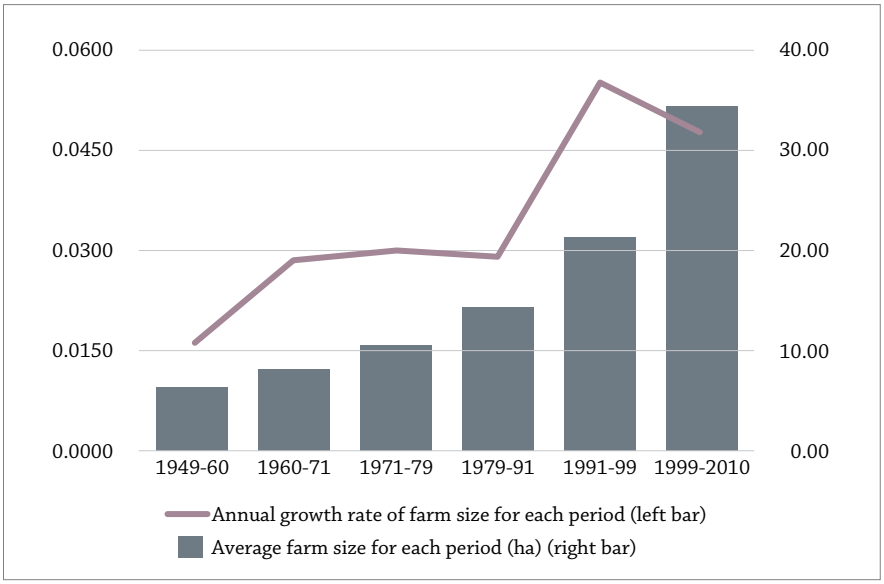

Figure 2 Expanding Farm Size in Hessen, Germany, 1949–2010

Source Figure 2 was compiled by original calculation based on the data derived from Hessisches Statistisches Landesamt (2012b) (1.2 Betriebe). The average value of farm size within the period shown in figure 2 is the average value of the first-year data and the last-year data of each period.

scale farming still exists. In Slovenia, the share farmland of over 5 ha is 35.6 percent, while in Japan it is only 2.4 percent. But the difference with the large farm countries is significant. The average farm size in Japan in 2009 was 1.9 ha, in Australia 3023.7 ha, in the USA 198.1 ha, in the EU (average of 27 countries) 13.5 ha, in Germany 45.7 ha, in France 55.8 ha and in the United Kingdom in 2007 58.8 ha.[1]

At this point, it should be noted that a decisive change in agricultural scale is also taking place in Germany. For example, the expansion of farm size in Hesse, a German state, has accelerated since the 1980s. While in 1949 the average farmland was 5.8 ha, by 2010 it had increased to 43.0 ha. In 2012, the average for Germany was 55.8 ha and for Hesse 43.0 ha (Hessisches Statistisches Landesamt 2012a). There was no change in the average between 2010 and 2012. The average farmland size in Germany is somewhat smaller compared to other European countries. However, it must be considered that the extent of this farmland expansion is not

1 Norin-Suisan-Gyo no Genjyo ni tsuite [About the current state of agriculture, forestry and fisheries] 2010.

constant. As can be seen from figure 2, which shows the annual growth rate of farm size, the change seems to have been observed only since the 1980s.

The history of farm size in Hesse may give us an opportunity to reflect on what issues we should focus on in the countries where small-scale farming still exists. First and foremost, we should not overstate the differences noted in figure 1, because small-scale farming was prevalent until the end of World War II even in areas where large-scale farms dominate today. There must be a reason why the small farming families survived. Moreover, the process of their gradual decline should be analysed. Living Spaces determined by ecological and climatic conditions would be spatially differentiated; therefore, the optimal size of farmland could vary depending on farmers' choice of agricultural products. Could consumer demand and technological development or economic growth be determinants of farm size?

The case of Japan may be typical, but it is only in recent years that the old way of small farming and the traditional way of life are disappearing along with their hydrological and environmental base. The devastation of mountain villages in Japan is particularly severe as the country becomes a society of declining population, driven by a falling birth rate and an aging population. Sen's point quoted at the beginning of this article is correct. However, the argument that the old historical period or the Industrial Revolution is the key to the transformation of the working environment and living standards has been challenged by new economic history research findings in recent years. The dramatic changes in the Living Spaces in mind may be found in much later periods. Once again, it is time to question the meaning of long-term economic growth.

Osamu Saito[2] considers four factors of economic growth in the early modern period – capital, division of labour, technology, and population – as stated by J. Mokyr. These factors affect the elements of Living Spaces: the settlements of the inhabitants, the agricultural fields, the forests, the rivers and the mountains, the network of economic resources, and the transportation system. Let us restate these four factors: (1) How was capital accumulated and what was its relationship to economic growth? (2)

2 Saito (2010, 4): 'By "Smithian growth", however, I mean something different from Joel Mokyr's definition, which embraces both static and dynamic gains. Also, Mokyr denotes just one source of economic growth, others being Solovian, Shumpeterian, and Boserupian: with this typology, one can periodize history as moving from the Malthusian to the Smithian, then on to the Shumpeterian.'

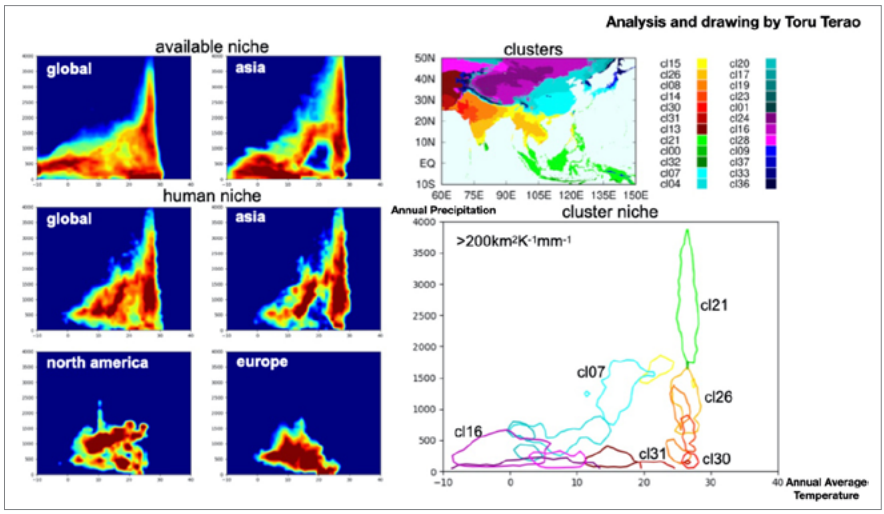

Figure 3 Living Spaces in European and Asian Climate Pattern: Precipitation and Temperature

Author Toru Terao. *Notes and sources:* Toru Terao visualized demographic distribution patterns over Eurasia following the method of Xu et al. (2020). They investigated the distribution of population, the climate niche, within the available climate space on the globe. The population data Toru Terao utilized is the estimate for 2015 from the History Database of the Global Environment (HYDE) 3.1 (Klein et al. 2010). For the climate data, WorldClim 2.1 (Hijmans et al. 2005; Fick and Hijmans 2017) is used. All the terrestrial areas are redistributed in the MAT-AP space to show available climate space over landmass (figure 4a). Similarly, we visualize available climate spaces for Asian (60-150E, 10S-50N), European (10W-60E, 30-70N), and North American (170-50W, 25-70N) regions (Figs. 4b-d), the global and regional demographic distributions over the MAT-AP space, which is termed the human climate spaces.

How did the division of labour develop and what was its relationship to market growth? (3) How did technology – especially scientific technology, accompanied by social technology – contribute to economic growth? (4) How should we consider the role of population?

H. D. Thoreau, A. Smith, J. Schumpeter, and E. Boserup refer to these four factors in their basic discussions of economic growth in their respective fields. Saito points out the need to move from Malthusian limits to growth to Smith's division of labour and to take a chronological view of Schumpeter's growth paths (Saito 2008, 51–54). Indeed, it seems reasonable to assume that socioeconomic development worldwide has occurred along this developmental path, but this growth has been accompanied by spatially and locally complex processes determined by habitats.

Table 1 Elements of Living Spaces

1) Animals	2) Plants
i) aquatic animals	i) greening
ii) wildlife	ii) forestry (afforestation, deforestation)
iii) domestication	iii) wild plants (edible, medicinal, spiritual)
iv) zoo and aquarium	iv) crops (agroforestry, agriculture)
v) species preservation and extinction	v) invasive species
	vi) species preservation and extinction
3) Microorganisms	4) Water
i) biosphere/photosynthesis/energy	i) urban water
ii) atmosphere	ii) lakes and river water
iii) microbes	iii) ground water
iv) infectious diseases and vectors	iv) wetlands
v) pandemic/endemic	v) seas and oceans
vi) zoonosis	vi) irrigation
5) Air	6) Land
i) atmosphere	i) lithosphere/cryosphere
ii) clean air	ii) soils/fertilizer
iii) air/space pollution	iii) earth movers
iv) weather	iv) cultural/ecological landscapes
v) climate change (anthropogenic and natural)	v) continents and islands
7) Disasters	8) Foods
i) natural events	i) food security
ii) extreme weather events	ii) food and technology
iii) anthropogenic environmental disasters	iii) animal husbandry/pastoralism
iv) historical records	iv) land and sea nomadism
v) mitigation	v) material circulation (land and sea links)
vi) resilience and recovery	
9) Waste	10) Humans
i) biological waste	i) gender/sexuality/social capital
ii) chemical and hazardous wastes	ii) population/family
iii) waste management	iii) ethnicity
iv) material circulation	iv) nature views/religion/ethics
v) consumption behaviour	v) ecological footprint
	vi) education

In Eurasia, Europe has a much lower population density (22 people per square kilometre; Soumu-sho Toukei-kyoku 2013, 24) than Asia (132 people per square kilometre; Soumu-sho Toukei-kyoku 2013, 32). But such a simple discussion immediately fails if one does not limit space to residential areas only, but also includes mountain areas, lakes, rivers, and oceans. Let me first make a brief comparison of climate patterns between Asia and Europe: figure 3 shows only the differences in Living Spaces due to the distribution of precipitation and temperature. The spread of human settlements differs greatly between Asia and Europe. In Asia, the Living Spaces are composed of a wide range of regions, from low to high temperatures and low to high precipitation. There is a big difference between Asia and Europe. The concept of Living Spaces covers the full range of space-place issues: (1) residen-

tial places such as cities, towns, and villages and their socioeconomic, geographic, and climatological conditions; (2) sources of various resources and their transportation; (3) geographic dimensions of cultural identification; (4) nature-induced disasters and disaster-prone areas; (5) the Earth and changing natural conditions.

Table 1 was originally prepared when the author was president of the Association for East Asian Environmental History (AEAEH) and held the 3rd East Asian Environmental History Conference (EAEH 2015) in Takamatsu, Japan. The conference was attended by researchers from all over the world who are mainly concerned with the environmental history of East Asia. Each session was organized according to the interests of each participant in different research topics and issues. The goal was to form research groups among academics based on their research interest instead of national identities. The table was compiled with Akihisa Setoguchi (past president of the East Asian Environmental History Society), Anne McDonald, and others.

The Living Spaces Approach (LiSA) is a holistic approach that is the antithesis of the analytical segmented approach. However, the approach does not exclude an analytical segmentation and could combine some different analytical dimensions. Table 1 shows the elements of Living Spaces divided into ten overarching themes: (1) animals; (2) plants; (3) microorganisms; (4) water; (5) air; (6) land; (7) disasters; (8) foods; (9) waste; and (10) humans. Each topic has an original approach as academic fields have developed along the lines of disciplines relevant to the topic. However, depending on the selected theme, several academic approaches from different unrelated fields may be combined into one innovative approach, adding a new dimension to existing academic fields. In this sense, LiSA is an innovative approach to local and regional studies and fieldwork.

This innovative approach to historical and contemporary studies allows for the creation of a new study of transport relations between humans and nature, using multidimensional disciplines, depending on the issues to be addressed. However, a contemporary of Marx and Engels, Friedrich Heinrich Riehl, never saw such a deep connection in 'traffic'. Riehl used this three-dimensional word, encompassing material exchange, intercourse, and traffic, entirely without sceptical and critical thinking, although he did introduce the influential term 'the whole house', meaning the management of a German family's home (Riehl 1854). At one time, a leading German medievalist, Otto Brunner, developed Riehl's concept as a social history of the family, but was heavily criti-

cized by social and agricultural historians because the concept seemed ideological and was hailed by the Nazis as representative of the ideal German family (Jütte 1984; Opitz 1994).

Brunner not only developed the concept from Riehl's journalistic essay, but also derived ideas from historical sources on rural farming: 'Hausvaeterlietratur', which contains almost all the elements of Living Spaces. He introduces as the context *Georgica curiosa oder Adeliges Land- und Feldleben* (an encyclopaedic textbook on all aspects of domestic and agricultural life for nobles) by Wolf Helmhards von Hohberg (Brunner 1980, 104). However, LiSA differs from this kind of holistic understanding of a closed territory subject to cultivation because it starts from the idea that each element should have its own place and space: we do not want to discuss a single habitat, but multiple habitats.

Secondly, while 'the whole house' delimits the habitats within a closed terrain that changes structurally within a society, the habitats are constantly changing in the interplay between nature and humans: 'Economics is literally doctrine of the oikos, of the house in the most comprehensive sense, of the "whole house", to speak with Wilhelm Heinrich Riehl, who described these social entities, now only partially alive in peasant life, at the moment of its disintegration or, nevertheless, its resignation.'[3] The term 'the whole house' encompasses almost all the elements of Living Spaces, but can only symbolize one aspect of the structural and conceptual history of humanity and society.

The 1960s marked a milestone in historical research, because now not only the family but also the environment became the subject of historical research. Historical demographic research took a new step. Sixty years have passed since then. Brunner's theory of the whole house was also a precursor of this era. However, there were many mythical debates at the time, such as the nineteenth-century view of the family, which was incorporated into the 'curse', i.e., the historical shift from the extended family system to the nuclear family system. Many of these debates have been rehashed in later studies. On the other hand, family history research, which once flourished, is no longer as present as it once was. As Claudia Opitz noted, the interest of German historians shifted from structural and conceptual history to the history of interests and sensibilities and to defining a field in which progress was expected. In the mid-1990s, Opitz

3 Brunner (1980, 104, 109): *Die Kategorie des 'ganzen Hauses' verschwindet* [The 'whole house' category disappears]. See also Trossbach (1993) and Groebner (1995).

even suggested that it was better not to engage with Brunner's concept (Opitz 1994, 97). Joachim Eibach also developed discussions in 2011, on which an edited book was published in 2020 (Eibach 2011; Eibach and Lanzinger 2020).

At first glance, the refocusing on people as internal nature seems to be a human-centred view of history, but from an environmental history perspective it reflects the need to develop a new discussion of the relationship between humans and nature. In other words, although trends may have led us away from direct research on the history of global environmental problems, historical research on environmental consciousness has become mainstream. In this sense, while even Marx and Engels cut off their conceptual world from 'Verkehr', it may be time to return to 'Verkehr'. The direction of Eibach et al. can be judged as environmental history along this line because the relationship to physical backgrounds is more observable in the representation of individual sensibilities than in the structural problems of society. The LiSA in this book presents not only human self-understanding through historical materials, but also the changing natural environment described in historical materials and current information. We need a new perspective on how to incorporate the natural and quasi-natural world to write economic and social history. But how can we understand too diverse and scattered arguments and historical evidence in an integrated way?

Historical research is still tied to the language of each country and is usually conducted in groups within a country, making it difficult to have cross-national discussions. While it is possible to obtain figures for universally extensible statistical indicators such as fertility, mortality, or core GDP, it is far from easy to deal with cultural events that involve different narratives. The same is true for the study of environmental history. The diversity of ecological and climatic environments on Earth is subtly argued in historical studies, including economic history and even environmental history. Different lifestyles may or may not be optimal anywhere on the planet. Minor and subtle differences that are important to coherent human life are often ignored.

Looking to networks such as the Social Science History Association and the European Social Science History Conference, it was expected that the ten groups would work across national boundaries and regions in the future. However, the AEAEH, which has transformed itself into the Asian Association for Environmental History (AAEH) in July, 2023, has not yet successfully developed these issue-based networks.

On the other hand, twenty-seven networking groups are active under the European Society for Social Sciences and History, regardless of nationality (as of September 2020; European Social Science History Conference n.d.). These academic activities began in 1996 when the first academic journals on environmental history appeared. There were groups that participated from the beginning as academic meeting societies, groups that originally existed but later disappeared, or newly formed groups. Since academic societies are grouped together with a social science approach, the direction of today's research can be seen in the organization of the groups: Africa, Antiquity, Asia, Criminal Justice, Culture, Economic History, Education and Childhood, Ethnicity and Migration, Family and Demography, Global History, Health and Environment, Labour, Latin America, Material and Consumer Culture, Medieval, Oral History and Life Histories, Politics, Citizenship and Nations, Religion, Rural, Science and Technology, Sexuality, Social Inequality, Spatial and Digital History, Theory and Historiography, Urban, Women and Gender. These twenty-seven groups may see the reasons and motivations for their ongoing activities in their own methodologies and areas of interest, in existing historical research groups, or in contemporary social issues.

Two world-class academic journals have been published in environmental history research, first developed in the 1960s: *Environmental History* (an American journal founded in 1996) and *Environment and History* (a European journal founded in 1995). Furthermore, the World Environmental History Conference has been held once every five years since 2009. Many panels and sessions have been organized at the conferences of the European Environmental History Society, held biennially, the American Environmental History Society, held annually, and the World Environmental History Society. There have been, of course, various trends in research themes.

Considering the different themes that had been addressed to date, we came up with sixty-five keywords to cover as many topics as possible. These keywords can be found in table 1, where five or six sub-items (keywords) are provided under each overhead item: (1) Animals, (2) Plants, (3) Microorganisms, (4) Water, (5) Air, (6) Land, (7) Disasters, (8) Foods, (9) Waste, (10) Humans. The fifty-five keywords and ten overhead items as keywords amount to sixty-five keywords. We also kept in mind the wide range of socio-economic history, geography, meteorology, and other related academic journals that cannot be listed herein.

Table 2 Book Chapters and Elements of Living Spaces

Elements of Living Spaces	Chapter	Part I				Part II				Part III			Total
		1	2	3	4	5	6	7	8	9	10	11	
1) Animals	i) aquatic animalså												0
	ii) wildlife												0
	iii) domestication	1		1			1						3
	iv) zoo and aquarium												0
	v) species preservation & extinction												0
	Total		2				1				0		3
2) Plants	i) greening	1											1
	ii) forestry (afforestation, deforestation)	1	1			1							3
	iii) wild plants (edible, medicinal, spiritual)												0
	iv) crops (agroforestry, agriculture)	1		1		1	1		1	1	1	1	8
	v) invasive species												0
	vi) species preservation & extinction												0
	Total		5				4				3		12
3) Microorganisms	i) biosphere/ photosynthesis/energy											1	1
	ii) atmosphere			1							1		2
	iii) microbes												0
	iv) infectious diseases & vectors	1											1
	v) pandemic/endemic									1			1
	vi) zoonosis												0
	Total		2				0				3		5
4) Water	i) urban water								1				1
	ii) lakes and river water	1				1					1	1	4
	iii) ground water	1										1	2
	iv) wetlands	1										1	2
	v) seas and oceans								1		1		2
	vi) irrigation	1		1						1	1	1	5
	Total		5				3				8		16
5) Air	i) atmosphere										1	1	2
	ii) clean air												0
	iii) air/space pollution												0
	iv) weather	1									1	1	3
	v) climate change (anthropogenic and natural)			1						1	1		3
	Total		2				0				6		8
6) Land	i) lithosphere/cryosphere							1					1
	ii) soils/fertilizer	1				1	1	1	1	1		1	7
	iii) earth movers												0
	iv) cultural/ecological landscapes			1				1			1	1	4
	v) continents and islands												0
	Total		2				6				4		12

Continued on the next page

Table 2 *Continued from the previous page*

Elements of Living Spaces	Chapter	Part I				Part II				Part III			Total
		1	2	3	4	5	6	7	8	9	10	11	
7) Disasters	i) natural events	1				1					1		3
	ii) extreme weather events										1		1
	iii) anthropogenic environmental disasters												0
	iv) historical records		1						1			1	3
	v) mitigation			1									1
	vi) resilience and recovery	1										1	2
	Total	4				2				4			10
8) Foods	i) food security						1			1	1		3
	ii) food and technology	1	1	1		1				1	1	1	7
	iii) animal husbandry/ pastoralism	1											1
	iv) land and sea nomadism												0
	v) material circulation (land and sea links)								1	1	1		3
	Total	4				3				7			14
9) Waste	i) biological waste								1				1
	ii) chemical and hazardous wastes												0
	iii) waste management								1				1
	iv) material circulation								1	1			2
	v) consumption behaviour	1											1
	Total	1				3				1			5
10) Humans	i) gender/sexuality/social capital	1			1				1		1	1	5
	ii) population/family	1	1		1		1		1		1	1	7
	iii) ethnicity			1				1					2
	iv) nature views/religion/ ethics			1				1					2
	v) ecological footprint							1		1			2
	vi) education							1					1
	Total	7				7				5			19

Perhaps the logic of exclusion is almost absent from this list. Each chapter of this book may deal with only one item, or it may deal with several. To determine which are addressed in each chapter, the authors were asked to check off each relevant item. The number '1' was included so that each column can be summed. As table 2 shows, there are relatively few chapters on animals, microorganisms, air, or waste. However, it can be observed that this book has developed discussions by combining the elements of Living Spaces in a comprehensive manner.

Identifying the individual elements is not the only goal of this approach. LiSA can also clarify various issues related to the individual elements or combinations of elements. In setting the three components of

Table 3 Book Chapters and Issues of Living Spaces

Issues of Living Spaces	Chapter	Part I				Part II				Part III			Total
		1	2	3	4	5	6	7	8	9	10	11	
Subsistence	food basket	1				1			1		1		4
	water supply	1								1		1	3
	health care and medical treatment								1				1
	management of infectious diseases	1											1
	family demography	1	1	1			1						4
	dwelling safety					1				1		1	3
	avoidance of quarrels, struggles and wars			1									1
	Total	7				5				5			17
Sustenance	family strategy and integrated peasant economy	1	1	1	1		1	1					6
	local administrative capacity	1				1						1	3
	fiscal state policy	1	1								1	1	4
	agricultural and manufacturing productivity	1		1		1	1		1			1	6
	technological development	1		1		1		1	1				5
	capital accumulation	1											1
	market and commercial development	1							1		1		3
	natural disasters and risk management	1	1			1				1		1	5
	inter-regional/national political risk management					1						1	2
	Total	15				12				8			35
Changing Living Spaces	minimum life security area		1			1				1	1	1	5
	heat energy supply area												0
	local knowledge and educational system		1	1				1	1			1	5
	urban-rural relations	1	1		1				1		1		5
	city systems								1		1		2
	trade and transaction area	1		1			1				1		4
	biodiversity and productivity development	1				1						1	3
	disaster-prone and safety area	1				1				1		1	4
	hydro-climatological conditions			1						1		1	3
	climate change									1			1
	Total	11				8				13			32
	Total	16	7	8	2	10	4	3	8	7	7	12	84

Table 4 Regional Differences of Discussed Issues

Issues of Living Spaces	Chapter	Europa				Japan					South Asia		Total
		1	2	4	11	5	6	8	9	10	3	7	
Subsistence	food basket	1				1		1	1				4
	water supply	1			1					1			3
	health care and medical treatment							1					1
	management of infectious diseases	1											1
	family demography	1	1	1			1						4
	dwelling safety				1	1				1			3
	avoidance of quarrels, struggles and wars										1		1
	Total	8						8			1		17
Sustenance	family strategy and integrated peasant economy	1	1	1	1		1				1	1	7
	local administrative capacity	1			1	1				1			4
	fiscal state policy	1	1						1	1			4
	agricultural and manufacturing productivity	1			1	1	1	1		1	1		7
	technological development	1			1	1		1			1	1	6
	capital accumulation	1											1
	market and commercial development	1						1	1				3
	natural disasters and risk management	1	1		1	1				1			5
	inter-regional/national political risk management					1				1			2
	Total	17						17			5		39
Changing Living Spaces	minimum life security area		1			1			1	1			4
	heat energy supply area												0
	local knowledge and educational system		1		1			1		1	1	1	6
	urban-rural relations	1	1	1				1	1				5
	city systems							1	1				2
	trade and transaction area	1					1		1		1		4
	biodiversity and productivity development	1			1	1				1			4
	disaster-prone and safety area	1				1				1			3
	hydro-climatological conditions				1					1	1		3
	climate change				1								1
	Total	12						16			4		32
	Total	16	7	3	11	10	4	8	7	12	7	3	88

this book: subsistence, sustenance and changing Living Spaces, table 3 shows how each chapter narrows down the issues in each context by targeting the elements and items of Living Spaces. As shown in table 3, this book addresses twenty-six topics.

Table 3 divides the topics into three sections and shows which topics are covered in each section. Regarding subsistence, only the food basket was discussed in each section: social and economic contexts; resource use; natural variables. Almost all the issues of sustenance were covered in the chapters of each part, excepting fiscal state policy and capital accumulation. Finally, changing Living Spaces could not contain the discussions on heat energy supply area. Clearly, future research in this area is desirable.

Although there is a relatively large amount of research on Japan and Europe in this book, there is one topic that has not been addressed in either region: 'the resolution of disputes, struggles, and wars'. On the other hand, the regional study of South Asia has only two chapters. Therefore, many of the themes have not been fully developed. These include 'local administrative capacity' and 'fiscal state policy', which are part of the section of sustenance, and 'family demography' in the subsistence sector.

Comparing Europe, Japan, and South Asia, the difference in the existence of administrative data is significant. While there are significant differences within Europe and between Europe and Japan, there are also fundamental differences in historical data and current regional information on colonized areas. Even when the same academic question is asked, the evidence for the argument itself varies widely. However, this means not only that international comparative research is difficult, but also that it is important to find ways to overcome the imbalance highlighted by table 4.

At first glance, the elements of Living Spaces may look like a multi-faceted list. It is indeed multi-faceted and interrelated, pointing to specific problem areas and issues. However, as noted earlier, academic areas where there is insufficient research accumulation can be highlighted as areas where future progress can be expected. As before, future environmental history research will involve economic history research, social history research, general history research, archaeology, and other disciplines. The concept of Living Spaces, including its components and various combinations of components, helps identify relevant topics and, thus, disciplines. A multidisciplinary field of environmental history can develop as a new form of ecological research that incorporates geography, meteorology, network science, and many other related fields, and

can then feed back into socioeconomic history research as a new topic. In this sense, this book can be seen as an attempt to take a comprehensive multidisciplinary approach to history and present studies in Eurasia. Not only in Asia, but also in Europe and the United States, such an academic approach that combines historical and contemporary field studies in a Living Spaces concept has not been done before.

Let us revisit the theme of this book. Why did we choose Living Spaces as our research target? In other words, why 'Living' and why 'Spaces'? History is mainly concerned with human history, but humans are not the only living organism on Earth. Microorganisms, bacteria, or viruses at the boundary between living and non-living organisms should be an important topic of historical research. But this book could not deal with such topics, while crops (agroforestry, agriculture) are treated in several chapters from an economic-historical perspective. We should be able to have further discussions when we ask ourselves to what extent crops can be discussed as living organisms and not as commodities.

Why spaces and not a single space? This point has already been explained. Places and the spatial relationships of their components are closely related to the concept of 'transport', which was the research goal of early Marx and Engels. Transportation systems that link cities to other cities or rural areas, and even rural areas to other rural areas, show that space and local networks have multiple spatial relationships. The concept becomes even more complex when human relationships are included. Cultural commonalities associated with spatially distinct territories are important themes in both environmental and economic history, but the relationship has even deeper implications: the fact that local administrative capacities in South Asia have not been fully explored in the Asian studies in this book has very important implications for habitats. Whether it is historical research or current fieldwork, research cannot move forward without materials that provide sufficient information.

Finally, it seems that we can find a point of contact with J. R. Hicks' theory of administrative revolution, based on his *Theory of Economic History*. We are the first to take up his argument, which has not been discussed, mainly because of the difficulty of discussing modern history retrospectively. It is also necessary to understand modern society in the historical context of state formation and national development, focusing on Europe and the United States. Hicks points out that it is the 'administrative revolution' that can explain the historical breakthrough in all the historical events discussed: It was the First World War (1914–18). In the

colonized territories, the nation's 'governments discovered – to their astonishment and sometimes to their dismay – what power, what economic power, what power over their own peoples had come into their hands' (Hicks 1969, 162). Regional administrative power did not develop sufficiently, and in other developed countries local and regional-level administrative power eventually came under the control of overwhelming foreign pressure on national governments.

I think this is a question of environmental decision-making: is it an individual, a company, a government, or an international organization, including local governments? The mechanism of decision-making and its impact on the environment should be critically different between corporate and government agencies and smallholder economies that are struggling to improve and conquer the environment in front of them. It has never been recognized that for the actors who determine these environments, the Living Spaces are different from each other. The Living Spaces of a nation and the Living Spaces of an individual cannot be identical. In the study of environmental history, these issues, which have already been discussed in a fragmented manner, have never been systematically discussed in conjunction with economic history research. This hypothesis needs historical evidence in the future.

> Au total, les problèmes d'environnement, plus que toutes les autres contradictions des sociétés économiquement développées, renvoient à une réflexion sur l'autogestion. [Attali and Guillaume 1974, 197]
>
> [All in all, environmental problems, more than all the other contradictions of economically developed societies, refer to a reflection on self-management.]

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have been built up, and next year we are preparing for the launch of an Asian Association for Environmental History. A new research group, The Historical Association for Environmentally Local Economy (HAELE), is also being set up (Living Spaces Project n.d.). This chapter has been considered as part of those preparations and during individual workshops and conferences and would not have been born without the advice of many colleagues and friends. But of course, all discourse is the responsibility of the author himself.

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Part One

Social and Economic Contexts

1

The Privatization of the Common Real Estate in Lombard Alpine Valleys in the Nineteenth Century: Social, Economic, and Environmental Effects

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Introduction

This paper deals with the effects of the privatization of common real estate in the Italian Alpine valleys in the nineteenth century, mainly in Lombardy. The sale of a large part of the common real estate greatly changed the methods that the Lombard communities normally used to increase production (or to maintain the same yields) on their properties as well as the system for distributing the associated 'fruits' (grain, hay, wood, as well as the rent from pastures, smelting furnaces, mills, etc.).

The villages located in the Alpine valleys gradually lost their social and economic equilibrium, which also had a negative impact on the environment. The privatization of common real estate was not the only factor that destroyed the existing equilibrium; however, It had relevant effects and it also weakened social cohesion and made the local economy less resistant to changes brought about by technological advances in transport and industrial production. Thus, many Alpine villages that had been able to maintain a stable population structure for centuries lost a very high proportion of their population within a few decades. Only in some valleys, which produced high quality artisanal products and had a favourable location in relation to lowland markets, the effects were limited, and

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the foundations were even laid for the creation of new industrial districts in the Alpine valleys.

Our work allows scholars concerned with the factors affecting livelihood outcomes, sustainability, and social and demographic change to obtain some evidence from past privatizations. It also shows how the mismanagement of natural resources produced negative environmental impacts from the very beginning of industrial development (in this case, the Italian one). Finally, it shows that privatization processes had different effects, sometimes negative, depending on the assets affected by the new regulations that favoured private landowners instead of communities.

The Management of the Lombard Alpine Common Real Estate Before its Privatization

At the end of the eighteenth century, in some villages of the Alpine valleys, there were institutions called *vicinie*, formed by the members of families who had lived in the village since the Middle Ages or, since 1764 in the Republic of Venice, by residents who came from families that had lived there for at least fifty years. These institutions owned real estate or had rights to it and managed it through public assemblies. Participation in these assemblies was compulsory: if absence was not justified (e.g. in the case of illness or work outside the village), financial penalties were provided. Local statutes specified when the assembly was to be convened and the majority required for valid decisions, such as rules for electing people who had to ensure the proper use of common resources. It was the case of the people managing the common real estate and the 'guardians' who checked compliance with the rules for the use of the common properties, especially the correct way and time of their use. These people made sure that the decisions of the inhabitants about the use of the 'commons' and the distribution of its fruits were respected.[1]

The common real estate consisted of: (a) forests, which provided raw materials for heating, cooking, buildings, forges, (using charcoal) and tanneries (using the tanning agent); (b) pastures, which provided fodder

1 About the management of the 'commons' in Italian ancient States during the eighteenth and nineteenth centuries see, among others: Lorenzini (2020), Bonan and Lorenzini (2019), Ongaro (2016), Mocarelli (2013; 2015), Tedeschi (2011; 2013; 2014), Alfani and Rao (2011), Barbacetto (2008), Pieraccini (2008), Casari (2007), Conte (2002), Corona (1997), Scarpa (1996), Cacciavillani (1988), Farolfi (1987), Pitteri (1985), Guidetti and Stahl (1976), and Tocchini (1961).

for cattle and sheep; (c) low quality arable land and outbuildings such as barns, haystacks, stables, etc.; and (d) smelting furnaces, mills, sawmills. Thus, they were economically important for the village and the survival of its inhabitants, especially the poorest families. If the yields of fruits for human consumption such as cereals were low, the yields of forage and wood were good, both in quality and quantity. Common pastures and forests usually made it possible to feed local livestock and secure firewood for family needs. Common buildings obviously enabled inhabitants to better conserve their fruits. In some villages, they also enabled local artisans to + and sell high-quality handmade goods.

The Assembly also had to decide on all periods of working time concerning free services for the maintenance of roads and the eventual reconstruction of dams, bridges, etc. In the villages having furnaces and forges, it also decided on the division of wood for domestic use (heating and cooking) or for local handicrafts. Regarding the common real estate, the assembly also determined: (a) fines for damages caused by unattended cattle or for people who picked fruits prematurely; (b) the rent for local and foreign cattle breeders who used the common meadows from June to September (when they went back to the plain with their cattle); and (c) the taxes paid by all families for the co-ownership share. Finally, the assembly voted on how the fruits of the common property, i.e. both the harvest and the rent, should be divided among the families.

The management of the common property was especially difficult when the economic and weather trends were negative. In these cases the poorest families tried to harvest more fruits than they were entitled to, which led to disputes with other inhabitants and especially with the managers of the common property, who usually had high professional qualifications and were able to ensure a good income for their families. Thus, sometimes fierce disputes arose over the distribution of the fruits of the common real estate. This explains why it was absolutely forbidden to participate at assemblies with weapons, sticks, or other offensive objects and why the use of the commons was regulated in every detail by statutes.

In the Alpine valleys of Lombardy, the common real estate belonged to communities because: (a) it was impossible to find a private owner; (b) the communities received the real estate by legacy (a rare case, since legacies were usually reserved for ecclesiastical institutions); (c) the communities acquired the real estate from people who were unable to pay their debts (an uncommon case, since family networks that controlled the local credit system gave borrowers long payment terms to avoid protests that dis-

turbed the social peace in the community); (d) the communities obtained the rights to use the properties from the state; (e) the buildings or structures were constructed through the collective labour of the villagers (e.g. a stable, hayloft, furnace, mill, or sawmill); (f) the state granted the use or management of that property (e.g. a bridge, a road, a forest) in exchange for a share of the fruits and/or full maintenance (this usually happened in the valleys that belonged to the Republic of Venice).

The goal of common real estate ownership was to improve the quality of life of the inhabitants in a harsh environment like that of the Alpine valleys. For the poorest families, the fruits of the common property were usually essential for survival, and this explains why they received a significant part of the proceeds. The remaining fruits were distributed to other inhabitants who owned real estate and paid the corresponding taxes; the distribution concerned wood, hay, shrubs, and fruits such as walnuts, chestnuts, berries, etc. It was also possible to share cash – the income from the lease of pastures, parts of forests and rural buildings.

All the families living in the village had the following rights on the common real estate: the *erbatico* (to gather up the wild grass, medicinal herbs and sods), the *legnatico* (to gather up shrubs, firewood and all wood waste that could not be used to produce charcoal), the *pascolo* (to drive their cattle to pasture, but only the bovines, because the sheep had to use specific and limited areas, while the goats were forbidden everywhere), and the *spigolatura* (to gather up all the seeds left after the harvest). Families also had the right to collect leaves (to prepare bedding for the cattle) and stones (for building), as well as wild vegetables and fruits. For the payment of a fee, it was also possible to plant trees (usually chestnuts and mulberry trees) and harvest their fruits for years, or collect waste in the woods and use it as fertilizer and, in autumn, to spread on the streets of the village a layer of dry grasses and straw that usually served as fodder and bedding for the cattle. During the autumn and winter, animals (and sometimes people) left their droppings on this mantle, which absorbed them: thus, in the early spring, the families who had paid for such a right cleaned the roads and fertilized their plots of land. Finally, all families could rent a pasture for cattle breeding and some wood for felling; in this case, however, they were in competition with the 'foreigners' who offered higher rents.

The main problem for the local administration was obviously to find the right compromise between the rights of the villagers and the correct use of the commons; it was difficult to control and coordinate the use of

common real estate and to evaluate the real needs of the poor families. To secure more fruits for all villagers, it was necessary to increase production and yields. However, most Alpine communal lands were on soils of poor quality or had limited exposure to sunlight during the day (a few hours or not at all in the colder months), so the real improvements associated with expensive investments were generally small.

The division of the fruits from the use of the common real estate constituted only a part of the budget of the Alpine families. Most Alpine people survived thanks to the Integrated Peasant Economy (IPE), which combined agricultural income with income from other work carried out in the valley or from temporary emigration to farms or towns on the plains.[2]

The IPE represented an important and efficient barrier against permanent emigration from the Alpine valleys and ensured a stable (sometimes growing) demographic condition. Depending on their professional skills, all members of Alpine families were engaged in many different activities, including agriculture, animal husbandry, forestry, and, where there were mines and forges, iron extraction and the artisanal production of iron and brassware. The most skilled men worked as artisans in forges or as woodcutters or charcoal burners. The others worked in other productive fields inside the house (spinning and weaving) and outside (paper mills and sawmills) or in the transportation of raw materials and finished or semi-finished products. The women took care of the house, the small plots of land and the few livestock that the families owned. In addition, seasonal migration was an important source of household economy: adult men worked mainly harvesting grain and grapes on the plains or as porters or masons in the towns; adult women usually worked as cleaners or servants. Their professional skills were well known, and their wages were very competitive in the labour market of the plains, both in the countryside and in the cities.

The income generated by temporary migration allowed the integration of household income and ensured the survival of Alpine families, including the poorest ones; only when the harvest was scarce due to bad weather conditions and/or the negative economic trend severely reduced IPE income, did the poorest families of the village face serious problems. However, since the negative trends in agriculture and industry were few, the poor families were supported by the richest families in their village.

2 About the concept of IPE cf. Panjek (2017; 2024). See also Viazzo (1988), Coppola (1991), Lorenzetti and Merzario (2005), and Tedeschi (2015).

In fact, the latter influenced the management of the common real estate and the distribution of its fruits; they wanted to make money, of course, but they also wanted to ensure social peace in the community and therefore increased the share of fruits for the poorest families. Moreover, they usually controlled the local credit system, since they also managed, together with the local clergy, the local ecclesiastical institutions that lent money. Small church offerings, rich donations, and legacies related to real estate enabled the ecclesiastical institutions to help poor families, but also to finance artisans and, in general, all the people who lived in the village and ran workshops or other economic activities. Since the villagers all knew each other, it was difficult to remain indifferent to the livelihood problems of the poorest families and the financial needs of the artisans. Loans had very favourable conditions, because the goal was to improve the quality of life of the inhabitants and to ensure social peace; they allowed the richest families to increase their prestige and gain recognition and power in the village.

The IPE and the richest families' attitudes allowed the Alpine villages to maintain a good economic and demographic equilibrium during the eighteenth century, especially in the Alpine valleys that belonged to the Republic of Venice. This was also favoured by low taxes and high tariffs to protect local production. Moreover, the wide range of handmade goods produced in these valleys (firearms, cutlery, swords, agricultural tools, frying pans, sheet metal and gutters, steel and ploughshares, depending on the specialization of the village) allowed diversification of supply on international markets while limiting competition between Alpine villages.

These positive results were also based on: (a) a division of firewood and charcoal between the iron and brass manufacturers and the inhabitants of the village, which privileged the needs of the workshops; (b) the continuous improvement of the quality of the workshops' production, which also depended on new investments made possible due to the favourable conditions of the local credit market; and (c) a strong link between the latter and the real estate market, since the land was used as a guarantee to obtain financing by the local ecclesiastical institutions.[3]

3 About the credit and real estate markets in the Alpine valleys, see the case of Eastern Lombardy: Tedeschi (2007; 2008).

The Economic Changes in the Lombard Alpine Valleys During the French and Austrian Domination

The economic context that allowed the maintenance of social and demographic equilibrium in the Lombard Alpine valleys changed greatly in the nineteenth century: political choices and technological innovations led to a gradual reduction of Alpine self-governing institutions and their role in the maintenance of common resources. As a result, the area of common real estate and its economic function decreased for the people living in the Alpine valleys. The increasing financial needs of the state and the consequent increase in real estate taxation made it more and more difficult to manage Alpine common land;[4] this means that the progressive reduction of common real estate was attributable to the state, i.e. to the same institution that had previously allowed Alpine communities to manage the commons thanks to the rights granted to villagers to most (and often all) of the fruits.

At the beginning of the nineteenth century, real estate taxation increased sharply due to the new Napoleonic cadastre, and this reduced the actual revenues that Alpine villages could distribute to their communities. The Napoleonic wars reduced the public funds available to local administrations and, consequently, their control over the exploitation of common real estate as well as investments, to obtain the same yields. Moreover, the first decades of the century were characterized by the adoption of new laws based on the bourgeois ideology that assumed that the improvement of production depended on the abilities of entrepreneurs, which were considered better than those of collective institutions from the Middle Ages. The French (and after the fall of Napoleon, the Austrian) authorities considered that private owners were better able to exploit the real estate than the Alpine communities, and so they favoured the sale of the commons, or its lease if it was not possible to find new buyers and if the majority of the villagers managed to prevent the sale.

In 1820, new Austrian legislation favoured the sale or lease of communal land, and a further reduction of communal land was related to the law enacted in 1839, which provided for the forced sale of a large part of Lombard common real estate (Raccolta Atti Governo 1820; 1839; Pitteri 2005); the goal was to increase the output of these common lands through

4 About the relevance of public institutions' choices for the social and economic evolution of a State or a region see, among others, North (1990; 2005). Concerning the Lombard case during the nineteenth century, see: Locatelli and Tedeschi (2017; 2018a; 2018b; 2022).

new investments by private landowners. If in the past the sales of common real estate had depended on financial needs, now they were compulsory whenever the commons were not cultivated or not used as pasture (a rare occurrence in the Alpine valleys), but also when they did not guarantee a good income. The new objective was to improve the fiscal contribution of the Alpine villagers by increasing the yield of the Alpine communal lands. The Austrian authorities evidently underestimated: (a) the social and economic importance of the common real estate and the traditional rules for its use; and (b) the real costs and the real possibility of improving the production and yields of Alpine pastures, forests and less fertile arable land. Thus, as a consequence of the new legislation, the Alpine communities had to pay more taxes than before, but they also had to continue to satisfy the same needs of the villagers, whose income kept decreasing due to other factors that depended on the improvement of technology in the field of transportation and industrial production.

It is important to point out that the tax increase for the Alpine villages of western Lombardy, which were part of the Austrian Empire, began in the last decades of the eighteenth century. In order to reduce the public debt and rationalize the taxation of real estate, the Austrian government decided to create a new cadastre and to eliminate all favourable fiscal rules related to the commons. The tax burden was low and the new fiscal system, based on a stable tax for many years, favoured landowners who invested in improving the real estate yields. Since the new taxes depended on the estimate of annual ordinary production, any fruit produced in excess of the fiscal estimate did not form a tax base. However, the real impact on the quality of life of the Alpine villagers was not fully understood by the authorities, since the new cadastre came into force only a few decades before the Napoleonic wars and, moreover, did not concern most of the Lombard Alpine villages, which were located in the eastern part of the region, that is, in valleys that until the end of the eighteenth century belonged to the Republic of Venice or to the Swiss canton of Grison. Moreover, few villages were located near the plain; on the contrary, in eastern Lombardy many villages were far from the markets in the plain. In the nineteenth century, the increase of taxes and the consequent recessionary effects on the income of the villagers had more relevance, along with their impact on the sales of the Alpine common real estate. Finally, the new French laws limited the villagers' ability to intervene in the decisions of the authorities. For example, all restrictions on the sale of common real estate disappeared, since the *vi-*

cinie were abolished in 1806 and the rights were transferred to municipalities. The consent of most families living in the village was no longer required for the sale of property; it was thus easiest for the local administration to put 'commons' on the real estate market. The French government affirmed the absolute priority of its needs over the other collective institutions; the sale of the *beni nazionali* showed that collective property could be used to improve public finances. The *beni nazionali* were the ecclesiastic institutions' properties which were confiscated and then sold by the State after the French invasion (on Lombardy, Cova 1963a; 1963b; Farolfi 1967).

The attitude of the new authorities eventually led to the gradual purchase of commons by the richest families in the region or foreigners who invested in real estate to exploit it or as collateral for loans.[5] Some new landowners, seeking a quick return on their investment, changed the main cultivation and/or practiced overexploitation of their new properties without considering the associated negative impacts on future production and the environment. They did not invest to improve yields, as the increase in productivity was small and, moreover, had positive effects only in the long term. However, in the first years after the privatization of the commons, the government and the Alpine villagers were deceived about the positive effects of the new laws. By selling the common real estate, communities received the money they needed to meet their needs, and they were able to help the poorest families who had lost their rights to the commons. They also had the prospect of further revenue from a portion of the taxes on: (a) the former common real estate; (b) the fruits (wood, hay, etc.) sold by the new landowners; and (c) the rent of the former common pastures and forests. At the same time, the new landowners increased their income and amortized the amounts spent. This economic development finally allowed the Austrian government to increase fiscal revenues, which was the real goal of the new laws.

However, in the second half of the nineteenth century, the negative economic trend forced new landowners to save the cost of routine maintenance of their new real estate and to increase the exploitation associated with it. The attitude of the new landowners created significant environmental costs by encouraging indiscriminate tree cutting and the

5 About the effects on the Lombard economy and real estate market of the new cadastre and new taxes from the second half of the eighteenth century to the end of the Napoleonic period, see: Locatelli and Tedeschi (2012) and Mazzucchelli (1984).

associated reduction in forested area. This reduced the future availability of timber and caused landslides and flooding in some Alpine valleys. In addition, the overuse of pastures gradually reduced the amount of forage available for cattle-breeding; this, of course, had a negative impact on rents and local dairy production.

While it was possible to recover from the damage to the former communal meadows in a short time, it took a long time to remedy the damage to the communal forests. Every mistake in cutting the trees resulted in a significant reduction of the forested areas. If the different times required for the regrowth of the trees were not respected, a progressive deforestation started. Thus, in the Alpine valleys, even if the families and the artisans demanded an increasing production of firewood for heating and cooking and more charcoal for the forges, it was not possible to increase the felling of hardwood and mixed coppice *(bosco ceduo forte e misto*). The villagers knew that the initial advantage would lead to less raw material in the future. This explains why the right of *legnatico*, as well as the contracts for the exploitation of communal forests, strongly regulated and limited wood production. Only the needs of the government, for example to increase the production of ships in the Venice Arsenale or of weapons in the valleys, had the power to temporarily increase the exploitation of the Alpine forests.[6]

New landowners, who sometimes did not live in the village or the valley, ignored these rules and their goal of preserving the forest; they were not obliged to respect them and cut in excess. And even when there were laws regulating the use of the commons, some new landowners (or their tenants) evaded the controls and misused the real estate; the amends (when paid) did not compensate for the costs of restoration in the following years.

The area of former common real estate decreased or changed its characteristics. In many cases, larger trees were replaced by coppice (in order to have new wood in the short term) and new mulberry trees were planted (the cold temperatures in the valleys did not allow profitable silk-

6 About the strategies and problems concerning the management of Italian Alpine forests, a wide bibliography exists. See, among others, Bonan (2019), Occhi (2017), Lazzarini (2009), Agnoletto (2005), Visconti (2002), Agnoletti (1998; 2002), and Sansa (1997). See also Agrawal (2007) and Gibson, McKean, and Ostrom (2000). Concerning the supplies for the strategic needs of the Republic of Venice, see: A. Lazzarini (2014; 2018; 2019) and Mocarelli and Ongaro (2017). See also references in note 1.

worm breeding, but the sale of mulberry leaves in the hills and plains provided relevant earnings). However, the related earnings were offset by the progressive deterioration of timber quality and the decline in the value of mulberry leaves from the mid-nineteenth century onward due to the arrival of the *pebrina*.[7]

The over-exploitation was sometimes associated with the presence of services in favour of the villagers, in order to reduce the investment for the improvement of the former common real estate; when new landowners had to respect these services, part of the profits was reserved for the people who had the related right. This lengthened the payback period and increased the willingness of new landowners to exploit the real estate. If the members of the local administration were not able to sell the commons at a good price and were forced to lease them, the tenant had to respect the services, thus recovering the lost income through excessive use of the pastures or forests. It was a real compromise; the services should have been abolished to avoid overexploitation, but in this case the local administration had to compensate the villagers who lost their rights.

The best condition for the Alpine villages (and also for the environment) occurred when most of the families protested and forced the local administration to sell only part of the common real estate and rent the other to the villagers at a low cost. In this way, all services could be maintained and the local tenants continued to abide by the rules that prevented unfair use of the common real estate. However, this situation did not last long: increases in taxes forced communities to raise rent, eliminate services, or sell. Sales also occurred when the low quality of common real estate made prices too low. It was more profitable to rent, but if the tenant could not pay the rent because his income was too low, the local administration had to sell.

The Lombard Alpine Valleys in The New-Born Kingdom of Italy

The entry of the Lombard Alpine valleys into the new Kingdom of Italy did not improve the situation. Faced with the reduction of common real estate in area and cadastral value (in the valleys of eastern Lombardy it was almost 15 and 43 percent, respectively), the new Italian government increased taxes to pay for the costs of Italian political unification. The Alpine communities had less money for the poorest families and the outlook was not good: the distribution of the real estate in the Alpine valleys

7 About the silk industry granting high income for the Lombard economy and the negative effects of the *pebrine,* see: Fumi (2019), Tolaini (2022), Tedeschi (2006) and Moioli (1981).

was changed and the number of landowners increased, especially those who worked in manufactures such as forges or cattle breeding. They generally used their new property as a guarantee for loans they needed and made few investments to improve yields. Moreover, in 1877 a new law allowed unlimited exploitation of the forests, and the damage to the environment obviously increased. The new landowners were cutting more trees than before because they were supplying wood to the sawmills (and also to some tanneries) in the valleys to increase their market due to the new demand from the cities in the plains. Where the number of trees decreased sharply or coppice replaced all the larger trees, the roots were no longer able to hold the soil, resulting in new landslides and floods. The same disasters occurred in the mountains, where forests were replaced by cultivated land and pastures (with equally low yields). Thus, the environmental costs were higher than the loss of income due to inefficient collective use of the common forests. It was not until the late 1880s that the Italian government changed the legislation and avoided excessive logging; however, the existing damage took a long time to repair.[8]

At the same time, the overexploited pastures provided less forage for the cattle-breeders, who demanded a reduction in rent. This meant that the local administration received less money and, in general, a further reduction in the work necessary to improve (or at least maintain) the yields in the meadows and/or hay. It often became more profitable to have meadows without cattle and sheep because this allowed for three rich cuts (June, August, and September) and the sale of hay in the market on the plains. This, of course, reduced livestock and associated fertilizer, because leases usually stipulated that animal manure had to remain in the meadow; this ultimately reduced yields and the revenue generated by the use and/or sale of this manure. At the end of the nineteenth century, new agricultural institutions, the *Cattedre ambulanti*, financed new studies and projects to change the trend. The new goal was to increase the size and quality of the meadows and in this way improve cattle-breeding and related dairy products, whose economic importance continued to grow.[9]

8 About the excessive deforestation in the Lombard Alpine valleys and its effects during the nineteenth century, see Fusina (1856) and Rosa (1878; 1882).

9 The *Cattedre ambulanti* coordinated the activity of farmers and breeders and favoured the diffusion of more productive cultivation practices and more efficient productive systems, see: Failla and Fumi (2006). About the evolution of the Lombard dairy sector during the nineteenth century, see: Rosa (1888), Tedeschi and Stranieri (2011), and Besana (2012).

At the end of the nineteenth century, the area of common real estate in Lombardy remained relevant (for example, in the valleys of eastern Lombardy it was 50 percent), but especially in the high valleys there were many *incolti produttivi*, that is, uncultivated plots of land that were no longer used as meadow or forest. The quality of common real estate and the associated capability to produce fruits declined, and compared to the Napoleonic period, the decline was significant in both size and value. In the valleys of eastern Lombardy, for example, the area decreased by almost 30 percent, and the cadastral value was reduced by more than 70 percent. The common real estate ownership obviously brought fewer benefits than before and did not allow the Alpine communities to help the villagers, especially the poorest families. This happened while Lombard agriculture in the plains and hills registered a great improvement in production and yields in the nineteenth century, thanks to technological innovations, new landowners who made appropriate investments, and the introduction of various agricultural contracts that allowed for the efficient management of plots of different quality and crops.[10]

These events explain why the quality of life of Alpine families declined sharply in the second half of the nineteenth century. The main problems, of course, affected the poorest families, who depended on the rights to the fruits of the common real estate: the loss of this income was not compensated by subsidies of the authorities. The latter kept decreasing as the Alpine communities received less money than before through local taxes and rents of forests, pastures and associated buildings.

Other decisions of the Italian government and the impact of technological innovations worsened the living conditions in the Alpine valleys. The Kingdom of Italy expropriated part of the assets of the ecclesiastical institutions and these reduced the aid and credits that had previously been guaranteed to the villagers and their workshops. There were no banks in the Alpine valleys (the first ones arrived in the 1880s) and this led to a lack of financial liquidity and consequently to a decline in artisan activity.[11] At the same time, local artisans had to face competition from products made in the new factories in the plains where the workforce was cheap and the quality-price ratio was good. The quality of the handmade

10 About the evolution of Lombard agriculture during the nineteenth century see, among others: Fumi (2022), Tedeschi (2017), and Locatelli and Tedeschi (2018a; 2018b).

11 About the Lombard banking system during the nineteenth century, see: Cafaro (2000; 2002).

goods of the Alpine workshops was usually higher, but it was necessary to lower the price or direct production towards high-value niche markets. In addition, the rent for Alpine pastures for cattle-breeding decreased due to the development of new large dairy farms in the plains and the spread of modern stables for year-round cattle breeding, reducing transhumance between the plains and the mountains in the summer. This also lowered the rent for the buildings where the cheese was made and, of course, the production of Alpine cheese and the associated local taxes on trade. In addition, technological innovations in transportation, especially the spread of railroads, increased the competitiveness of raw materials coming from transalpine countries and reduced the market in the plains for the Alpine mines, whose sales depended on the demand of local workshops.[12] Finally, the progressive introduction of agricultural machinery in the plain and the great agricultural crisis of the 1880s meant that seasonal work was no longer available in the countryside. Many villagers thus lost their temporary work in the plain and the income it provided.

This situation led to the definitive emigration of many families and thus to a decline in the population of the Alpine villages in Lombardy. These lost more than 20 percent of their inhabitants, but the demographic decline sometimes reached 45 percent in the high valleys, which were far from the main markets in the low valleys and plains. For many families in the Alps, the income from IPE and the use of common real estate was not enough to survive. The only solution was to emigrate permanently to the low valleys or the plains, although some also sought new work in other European countries or crossed the ocean to reach North America or Latin America. The privatization of the commons with the aim of increasing fiscal revenues and improving the quality of life of the Alpine inhabitants did not have the expected results and, together with other factors, contributed to the destruction of the existing social and economic equilibrium.

However, this process did not affect part of the villages in the low valleys, where there were iron, brass, or textile manufactories that produced high-value goods for niche markets (e.g. cutlery, weapons, metal tools). These workshops continued to sell their products in the lowland markets, thus preventing the increasing migration of the inhabitants. The professional skills of the villagers and their ability to diversify their products

12 About Lombard mines, see: Calegari and Simoni (1994), Trezzi (1992), Piardi and Simoni (1982), and R. Predali (1980).

and resist the negative economic conjuncture (sometimes by over-exploiting their workforce, represented by members of the artisan family) played a fundamental role. The strategic decision of the richest families to divide the firewood and charcoal between the iron and brass manufacturers and the villagers, giving priority to the needs of the workshops, allowed the latter to keep the prices of the raw materials they used low and to obtain competitive final prices. During the twentieth century, some Alpine villages specialized their production and strengthened their position on the lowland market (and later on the international market); a great attention to the improvement of know-how and a production organization that privileged the employment of family members allowed the workshops to develop into small and medium factories. In a context where many Alpine villages greatly reduced their population and were excluded from the Italian industrial development, some villages resisted and became competitive industrial districts.[13]

It is important to note that the privatization of common real estate represented only one of the factors explaining the demographic decline of the Alpine valleys, while the privatization of forests was the cause of new environmental damage. The frequency and the negative effects of landslides and floods increased, causing considerable economic losses in some Alpine villages. Faced with severe damage to their houses and/or workshops, the inhabitants definitively decided to emigrate, as had happened before to the poorest families. The skills of the artisans were obviously powerless in the face of the forces of nature that destroyed buildings and cultivated plots of land (e.g. Rohr 2020).

Finally, it is interesting to note that the decline of common real estate ownership also took place in other Alpine areas of northern Italy, such as Piedmont and Veneto; the economic and demographic effects were even more severe than in Lombardy. In Piedmont, the strong demographic decline was favoured by the absence of low valleys, that is, most of the villages were far from the lowland markets and lost a high percentage of their inhabitants. Moreover, many factories producing iron products left the valleys, preferring the Ligurian coast. Finally, the steeper slopes caused

13 About the industrial development in the Lombard Alpine valleys, see: Mocarelli, Ongaro and Tedeschi, (2021), Trezzi (2015), Marchesi (2003), Besana (2003), Tedeschi (2001), Mocarelli (1997), Colli (1997), and R. Merzario (1989). See also M. Romano (2012) and Conca Messina (2022).

greater environmental damage than in other Alpine valleys.[14] In Veneto, where the characteristics of the Alpine valleys were similar to those of Lombardy, the economic crisis depended mainly on the loss of traditional foreign markets related to the fall of the Republic of Venice and, in the second half of the nineteenth century, on the lack of demand for Alpine products in the Venetian plain, where the industrialization process had not yet begun. Moreover, there were fewer mines in the Venetian valleys than in Lombardy and, in addition, the actual taxation of real estate (according to the new Austrian cadastre) was higher than in Lombardy, which obviously deprived the Alpine villagers of more financial resources and prevented them from improving the quality of their production.[15]

Conclusion

Until the end of the eighteenth century, the communities in the Alpine valleys of Lombardy, organized as self-governing institutions, realized a balanced use of the available resources. They used the common real estate to guarantee further income to the families of the villagers, especially the poorest ones. The gradual failure of the existing social and economic equilibrium in the nineteenth century was the result of many factors, but the crisis began with the introduction of new taxes on real estate and its rent, which the French and Austrian governments decided to impose in order to improve fiscal revenues. The villagers' quality of life also deteriorated due to the spread of the ideology of the new bourgeoisie, whose economic and political power greatly increased by profiting from the progressive decline of the aristocrats, especially the rentiers. New laws were enacted to favour the privatization of the commons, and they were obviously based on the concept that a private landowner exploited real estate better than a community. Thus, bourgeois families acquired a relevant part of the commons and, instead of improving yields, practiced overexploitation of pastures and, above all, of forests, provoking negative consequences both for the families of Alpine villagers, as well as for the environment. At the end of the nineteenth century, the area, the fruits produced and

14 About migration in Piedmontese Alpine valleys see, among others, Ramella, Ottaviano, and Neiretti (1986), Ramella (1984), Allio (1984), Albera (1995), and Audenino (2019). Regarding the mines and the industrialization in Piedmont and Liguria, see: Abrate (1960) and Nicco (1995).

15 About migration in Venetian Alpine valleys see, among others, Fornasin (1998), Lazzarini (1998), Zalin (1998), Fornasin and Lorenzini (2020). Concerning Venetian mines and manufactures during the nineteenth century, see also: Vergani (2003).

the value of the common real estate were greatly reduced, but even the privatized lands had low fertility and low yields. Many Alpine families had to emigrate, reducing the population, especially in the high valleys, which were far from the markets in the plain. At the same time, excessive deforestation and reduced 'maintenance' of the forests increased the frequency of landslides and floods, causing significant economic damage in the valleys and the emigration of families who lost their homes and/or workshops. However, in this negative context, some villages resisted the negative economic conjuncture and produced high quality goods for niche markets. These did not suffer demographic decline and gradually participated in the Lombard industrialization, creating small but very efficient industrial districts. This also explains why in the Lombard Alpine valleys the depopulation of the mountains did not reach the impressive levels indicated by the INEA inquiry in the 1930s for Piedmont and, though to a lesser extent, for Veneto.[16]

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16 About the economic development of the Italian Alpine valleys during the Nineteenth century see, among others, P. Tedeschi (2002, 61–78), L. Mocarellli (2002, 79–90), and G. Scaramellini (1978). About the INEA (Istituto Nazionale di Economia Agraria) enquiry, see Istituto Nazionale di Economia Agraria (1938).

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2

Peasants, Land, and Work: Structures of Peasant Economy in Slovenia in the Interwar Period

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Structures

In the interwar period, Slovenia was a predominantly agrarian society, with agriculture still contributing half of the national income. About 60 percent of the population depended on agricultural income (Erjavec 1928, 12). As an economic and social group, peasants were crucial to social stability. Agriculture itself struggled with numerous difficulties related to the intensification of production. Although the obstacles were many, contemporaries focused on the fragmentation of land ownership and the geographic characteristics of the environment, as well as agrarian overpopulation as a ratio between population size and disposable income. The above factors determined the economic and social conditions in the countryside.

In 1931, Alojzij Jamnik published a book entitled The Causes of Our Poverty (Vzroki našega siromaštva), in which he tried to answer the essential question of the reasons for the crisis in the countryside. The Great Depression, which affected almost everyone in Slovenia at that time, was not the reason for his reflections. He had already started writing the book before the outbreak of the Great Depression, and its publication merely coincided with it. Jamnik analysed the problems over a longer period and identified the structural weaknesses of Slovenian agriculture as the main cause of rural poverty. In his opinion, these weaknesses included the fragmentation of farms, low productivity, and, consequently, low re-

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turns from agricultural labour. Combined, these phenomena expressed themselves in the agrarian overpopulation. Jamnik also emphasized that peasants were not sufficiently educated. His assertions were no exception, for he was merely repeating what was already the public consensus. Jamnik distinguished himself by emphasizing entrepreneurship, the principle of which was to become the basis of the peasant economy. He did not claim that peasants lacked entrepreneurship, but rather that this quality should be much more emphasized. According to his concept, peasants should use all possible sources of income, regardless of whether these came from the agricultural or non-agricultural part of their activity.

The analyses have shown that, in general, two types of farms can be distinguished in terms of the principle of management. Thus, Jamnik distinguished first the small 'subsistence' farms, whose goal was to ensure the basic survival of the family members, who were the only labour force, and who had to perform hard, even excessive physical labour. Access to the market was sporadic and limited to satisfying immediate cash needs (Jamnik 1931, 10). These farms, prevalent in the contemporary land ownership structure, did not have the potential for more because they were small or even extremely small. Market-oriented production was virtually impossible on such farms, as they lacked the resources to invest in productivity improvements, which were also difficult to justify economically. The landowners and their families were trapped in a kind of vicious circle of poverty, i.e. low productivity, low income, low savings and investment, and slow (nonexistent) capital accumulation.

The second type of farms, according to Jamnik, included those that were integrated into the 'monetary economy', i.e. the economy that was mainly or at least partially dependent on the market. This type included medium-sized (more than ten hectares) and large farms, which were rare in the prevailing fragmented agricultural land ownership structure. These farms were to be the protagonists of entrepreneurial farming. Jamnik set the bar extremely high with his criteria. Thus, he counted only a few farms in the second group because such a farm requires from its owner a considerable degree of general and professional education, skill, ability to divide labour, rationalization, possession of money, desire to speculate, entrepreneurship, ability to draw up relatively complicated business plans for a very intensive exploitation of all production possibilities and means, knowledge of commercial circuits, understanding and aptitude for the production of high-value, very valuable and easily tradable goods (Jamnik 1931, 12).

Although Jamnik referred to two generalized and idealized types of farms (two extremes), his analysis illustrates the severity of economic problems in agriculture and the social plight of the peasant population. The first type of farm was highly prevalent in the countryside. They had extremely low yields. Income from agriculture was insufficient to meet the needs of social and economic modernization. New income could only be generated through non-agricultural activities.

In the countryside, all these processes occurred spontaneously, automatically and slowly. It was a generally accepted fact that the agrarian economy involved a combination of different, complementary, knowledge and experiences, and thus also formed the basis for the economic initiatives of the peasant population in different directions when opportunities arose or there was a demand in the wider economic area. Like any other activity, agriculture is not one-sided. Farms and rural areas as a community are a microcosm in which various economic and inter-branch relationships intertwined (Lazarević 2014b, 46–62). Measures to diversify farm income further tied peasants as communities and individuals to the world of the capitalist economy. It also allowed them to imagine the world beyond agricultural self-sufficiency and provided space for social modernization, which was one of the fundamental drivers of economic modernization and income diversification.

It was normal for the agricultural population to be engaged in various aspects of the economy – not necessarily all the time, but in parallel with agricultural activities. Farms were thus a multifaceted economic space in which necessity or expected utility dictated the choice of economic activities in addition to agriculture. In such a context of the peasant economy, peasants pragmatically pursued various activities to increase and diversify their income. To achieve this goal, they were not only willing to work and learn, but also to change the organization of sales activities. The dynamics of change were also present. In the long run, individual non-agricultural activities appeared or disappeared, depending on the social and economic context of the wider environment.

Land Ownership Structure

In the interwar period, the fragmentation of land ownership was one of the basic facts that determined the results of agricultural work, the structure of the agrarian economy and the standard of living in the countryside. Half of the entire Slovenian territory was devoted to agriculture (fields, gardens, meadows, pastures, vineyards); 45 percent of the territo-

Table 1 Land Ownership Structure in Slovenia in 1931

Size of farm in ha	Number in %	Land area in %
up to 0.5	11.8	0.4
0.5 – 1	8.5	0.8
1 – 2	12.7	2.3
2 – 5	24.4	9.8
5 – 10	18.7	16.2
10 – 20	15.8	26.9
20 – 50	7.0	24.0
over 50	1.1	19.6

Source Tomasevich 1955, 287.

ry was forests, while 5 percent of the land was not suitable for cultivation (Lavrič, Mal, and Stele 1939, 327).

The structure of land ownership shows that the distribution of land was very uneven. On the one hand, many peasants owned tiny plots of land, and on the other hand, very few peasants owned large tracts of land. In this context, it should be emphasized that in the case of Slovenia, one cannot speak of large landholdings with a lot of arable land, since large farms usually included extensive forest areas. In such cases, the management of forest potential was the main activity. The 1931 farm survey showed that one-third of farms were smaller than two hectares, while one-fourth were up to five hectares in size. The distribution of land also posed a significant problem for adequate cultivation of the fields. Most farmers did not own a homogeneous piece of land, but small plots in different locations. There were 1,882,245 plots in Slovenia, far more than the population. The structure of forest ownership was equally fragmented. Before World War II forests were distributed among 140,000 owners of a total of 680,922 hectares of forest. Forest ownership larger than 50 hectares was rare (only 0.5 percent) and accounted for 30 percent of the total forest area. Most of the forests were owned by farmers who possessed less than five hectares of forest (Šivic 1939, 344) - in fact, on average only 3.8 hectares (Cimperšek 2016, 147).

In the case of agricultural and forest land, the structure of land ownership was not the only problem. The structure of forest land was even more worrisome. Few farmers owned a homogeneous piece of land. Usually, their agricultural or forest holdings consisted of various small parcels of land in geographically separate locations. All these posed challenges to proper management of fields and forests. Unsurprisingly, it was found that small farms were the least profitable and that forests owned by peas-

Table 2 Agrarian Overpopulation in Slovenia

	1921	1931	1938
Agricultural population (in thousands)	639	690	722
Cultivated land (in thousands of hectares)	324	362	375
Livestock in animal units (in thousands)	639	558	544
Agricultural population per single hectare of cultivated land	1.97	1.91	1.93

Source Tomasevich 1955, 322.

ants were the worst managed, since the main goal of management was short-term yield.

At the level of public discourse, agriculture and forests represented the indispensable element of rural survival. The desire for a political intervention that would ensure a more balanced structure of land ownership was constantly present, especially to ensure land and forest ownership of sufficient size for small and micro farms. According to the prevailing opinion, the ideal farm consisted of about five hectares and had a production potential that ensured the survival of a farm family. Due to political pressure, agrarian reform was introduced after World War I, but it did not bring the expected results. Reality and political illusions could not be reconciled. This was due, on the one hand, to the small number of large estates with extensive arable or forest land and, on the other hand, to their uneven geographical distribution (where there was a lot of forest, arable land was scarce and vice versa).

When the results of agrarian reform were analysed in the late 1930s, it was found that they had little or no effect on land tenure. On average, interested small farmers received only 0.66 ha of arable land, and even that only in the eastern parts of Slovenia. For 22,000 peasants who owned hardly any land, the reform certainly represented an important advantage, as it partially eased their situation: they could now produce somewhat more food. However, this was hardly enough for bare survival, and they had to look for other sources of income to keep up with the demands of social modernization.

Agricultural overpopulation posed an acute economic and social problem in the countryside. By World War II, this problem was exacerbated as population growth outpaced increases in agricultural productivity. In addition, opportunities for non-agricultural activities were limited.

Agrarian overpopulation had negative effects on agriculture. The decline of livestock and the expansion of cultivated land were related to the need to increase food production to keep pace with population growth

(Tomasevich 1955, 337). The abundance of labour also did not encourage intensification of production. Growth in agricultural productivity was too slow. This was not the optimal solution for agriculture, because livestock was its most profitable branch.

Profitability of Agriculture

As a relative term, agricultural overpopulation also depended on the profitability of agricultural labour. In this context, we have the data on the average profitability of farms of different sizes. The profitability data are calculated per farm with the average structure of farm and forest. The calculation does not consider the information on the profitability of livestock production. The statistical data on cattle production show that the number of cattle increases with farm size. On average, farms smaller than five hectares owned two cattle per farm. Farms that were even smaller typically owned one animal or not even that (Uratnik 1938, 61). The data on average income per farm indicates unfavourable conditions.

The income of farms was modest. The differences between types of farms were significant. It was only on farms of nearly ten hectares or more that profitability began to increase, and its level becomes more meaningful and realistic when compared to the wages of workers at that time. The average annual wage of workers in the second half of the 1930s was about 9,000 dinars (Kresal 1995, 13). The figures are revealing in themselves and give an indication of the depth, scope, and stratification of poverty in the Slovenian countryside. We come even closer to a realistic assessment of the circumstances of poverty if we also consider the average number of family members. The estimated average size of peasant families was slightly more than five members (Maister 1938, 94). Except for bare survival (and even that barely), the small farms did not ensure anything else. This is also confirmed by other data. Given the cost of living, the agricultural production of small farms (up to two hectares) was sufficient for only one person, while farms between two and five hectares were sufficient for 3.32 people on average. Only farms of ten hectares or more could support more people living in an average rural family (Uratnik 1938, 61).

This shows very clearly that small farms (up to two hectares) were not sufficient for even the basic existential needs of all family members. Even at the average level, the statistics reflected reality. To meet the food needs of their entire family, farmers had to look for additional land and labour. In the category of farms up to one hectare, leased land accounted for 27 percent, while in the category between one and two hectares it was 17

Table 3 Estimated Average Annual Income of Farms in the 1930s in Dinars

	Under 2 ha	2–5 ha	5–10 ha	10–20 ha	20–50 ha	Over 50 ha
Fields	1,150	3,700	7,100	10,700	14,000	31,000
Meadows and pastures	240	1,430	2,800	5,300	11,000	41,500
Vineyards	540	1,246	1,500	1,850	2,020	8,000
Gardens and orchards	180	432	750	1,020	1,380	8,000
Forests	45	240	420	2,080	5,240	36,600
Total	2,155	7,048	12,570	20,950	33,640	125,100

Source Uratnik 1938, 61.

percent. Even among farms up to five hectares in size, the percentage of leased land was 10 percent. Only among the larger farms was this percentage statistically insignificant (Uratnik 1938, 53).

The dilemmas of agriculture were presented without any embellishment by Anton Pevc (1924, 5), who wrote the following: 'In Slovenia it will be necessary either to increase agricultural production or to reduce the peasant population by half'. He was also convinced that this would happen by itself, but that such an outcome should be prevented by agricultural policies that would ensure the restructuring of Slovenian agriculture for the purpose of more efficient production and an increase in the size of farms. He was convinced that small farms did not meet the conditions for long-term economic survival. Meanwhile, another contemporary of Pevc wrote that small farmers who owned up to two hectares of land had already approached the position of wage labourers (Möderndorfer 1938, 155).

It was more than obvious that smallholders desperately needed other sources of income to meet investment or social modernization needs. Even with leased land, farming was not enough as a main activity. In light of this information, critical observers questioned who a farmer was in the first place. They wondered whether the official figures of 154,628 farms in Slovenia before World War II were even close to being realistic. The criterion they used was precisely the source of income. If most of the peasants' income came from non-agricultural activities, then, according to the critics, it was completely unjustified to count the owners of such 'farms' and their family members, among the agricultural population. Half of all farms, the majority of whose income came from non-agricultural sectors, were smaller than a single hectare (Uratnik 1938, 54). This was followed by farms up to two hectares in size, and then farms between two and five hectares in size. Of the total number of all farms whose main income came from the non-farm sector, 84 percent were no larger than five

hectares of land. The main source of income of 20 percent of all registered farms was not agriculture. The information that almost 12 percent of Slovenian farms officially measured only up to half a hectare of land convinced these observers that the data on the number of farms were exaggerated. They were convinced that for this 12 percent, most of the income was generated through wage labour on other farms or off-farm, as well as through various production activities. Based on the economic calculations and the structure of farms, they estimated that only 65,000 farms, or 42 percent of all farms included in the statistics, actually made a living from farming, representing 55 percent of the total rural population (Bohinjec 1938, 236–7).

Hidden Unemployment

The agrarian overpopulation raised other questions as well. It was more than obvious that the problem was hidden unemployment or underemployment in the countryside. I use the term 'hidden unemployment' to refer to the lack of employment on farms, but this was not officially measured or recorded. According to the study conducted in the second half of the 1930s, there was a gap between the available labour force and the amount of labour available on farms. The number of labourers exceeded the amount of available labour in agriculture. The study was based on evaluations and averages, and days off were also considered. Nevertheless, the results were very indicative of the extent of social hardship in rural areas – especially on small farms that could barely provide full employment for farm household members.

The data presented include only the work directly related to agricultural activities. Hrvoj Maister, the author of the study, added to the presented figures several agricultural activities related to domestic work and livestock breeding. The data on the active farming population showed that the potential number of working days was 83,444,000. The difference testifies to the 'unemployment' or underemployment of the peasant population, which varies seasonally. In the summer – i.e. the period of greatest workload – it was about 8 percent. In winter, however, it was much more pressing, reaching 37 percent. These abstract figures must be translated into everyday life. According to this criterion, 63,000 people in summer and 155,000 people in winter did not have full employment (Maister 1938, 105). The study was conducted at the level of Slovenia as a whole and refrained from highlighting regional specifics, although the author did point out regional differences. In general, the pattern that

Table 4 Workload at Farms in Workdays

Sector		Workdays used per year		
		Summer	Winter	Total
A	Farming	2,563,000	601,000	3,164,000
	Vineyards	6,625,000	875,000	7,500,000
	Gardens	4,180,000	770,000	4,950,000
	Pastures	4,180,000	195,000	4,950,000
	Fruit cultivation	1,978,000	419,000	2,397,000
	Total	35,982,000	4,750,000	40,732,000
	10% correction*	3,598,000	475,000	4,073,000
		39,580,000	5,225,000	44,805,000
B	Forestry	3,419,000	2,151,000	5,570,000
	Hunting	167,000	83,000	250,000
	Gathering**	750,000	-	750,000
		4,336,000	2,234,000	6,750,000
A+B	Total (A+B)	43,916,000	7,459,000	51,375,000
	5% correction***	2,196,000	373,000	2,569,000
	Total	46,112,000	7,832,000	53,944,000

Source Maister 1938, 97–105.
Notes * Required due to deficient statistics. ** Gathering dry firewood, mushrooms, forest fruits, raking leaves, etc. *** Required due to deficient statistics.

emerged was that the more fragmented the land ownership, the greater the overcrowding in agriculture and the extent of insufficient employment of the farming population.

Addressing Underemployment

The insufficient employment of the peasant population posed an urgent social, economic and political problem. The way it was addressed varied and, above all, was long-term. In his study of agricultural development in interwar Yugoslavia, Jozo Tomasevich wrote that agricultural overpopulation was a complex social and economic phenomenon that required a balanced and long-term approach if its consequences were to be mitigated. It was the underemployment of a significant percentage of the agricultural population that posed the most acute problem in the countryside. Numerous processes helped to reduce overpopulation in agriculture and increase employment among the rural population. The difficulties were alleviated by emigration, employment in industries other than agriculture, declining births, increased acreage, growth in productivity, reduced livestock, and agricultural crafts and industrialization (Tomasevich 1955,

Table 5 Possibilities for Increased Employment of the Peasant Population

Process	Duration	Potential
Emigration	long term	significant
Increase in arable areas	short term	limited
Employment in industries other than agriculture or at other farms	long term	significant
Reduction of births	long term	significant
Increased productivity	long term	significant
Reduction of livestock herd	short term	limited
Agricultural crafts	short term	significant
Industrialization	long term	significant

327–43). These processes can be divided into those with short-term effects and those with long-term effects and distinguished according to their potential to reduce agricultural overpopulation.

The breakdown presented indicates that the processes were interdependent and that, in fact, they raised the question of the development model of society. The measures that alleviated the situation were mostly of a long-term nature. Economic growth, the process of industrialization, a decline in the birth rate, and an increase in agricultural productivity had already been occurring since the 1890s. These trends continued in the interwar period. However, population growth still exceeded economic growth. In the interwar period, the increase in arable land (15 percent) was short-lived. The process was not only limited in its possibilities, but also had unfavourable consequences. As arable land continued to increase, pasture land shrank and livestock consequently decreased. Livestock numbers were reduced by 15 percent (Tomasevich 1955, 334). As a result, the potential income of farmers also decreased. Agricultural productivity increased gradually and in the long term, but it was too slow compared to population growth (Maček 1993). Consequently, the potato began to gain importance in the structure of crops. No cereal could compete with the economic value of the potato, i.e. its high yield, nutritional value, and versatility. Given the growing demand for food, this was very important. Employment in non-agricultural industries – in the service sector of the urban economy – was also limited. The growing agricultural population exceeded the absorptive capacity of the service sector. Meanwhile, industrialization was only in its early stages.

Rural areas were thus caught in a snare of acute short-term social crises and the inertia of the long-term perspective. In the mitigation of the problems of small farms in the short term, we can distinguish between three strategies that were used to increase the employment of the popu-

Table 6 Sources of Income Other than Agriculture

Source of income	Farm size				
	0–1 ha	1–2 ha	2–5 ha	Over 5 ha	Total ha
Cottage industry	801	462	692	1,537	3,492
Wage labour at other farms	9,988	4,294	4,466	2,585	21,333
Various wage labour	1,269	696	832	697	3,945
Employment in craft industry	2,303	944	1,140	911	5,298
Total	14,361	6,396	7,130	5,730	33,717

Source Uratnik 1938, 67.

lation. Income was diversified, and different sources of income were integrated. These were not new approaches, but those that had been tried in the period before World War I and had already been documented in the era of the Habsburg Monarchy. These strategies can be defined as general ways to overcome the income constraints of small farms. We should also highlight another phenomenological feature. In general, income diversification strategies mostly depended on the framework of the informal economy. Initiatives and practices were territorially dispersed, were rarely taxed, and were not statistically tracked. The integration of different sources of income had a significant impact on alleviating the daily hardships of the peasant population, as it contributed to a better farm balance.

Wage labour on other farms, seasonal migration abroad and the so-called cottage industry (agricultural production of various goods) represented the first type of income diversification. In this context, we may well hypothesize that these strategies involved the commercialization of existing surplus labour capacity, leisure time, certain experience and skills (available or acquired along the way), and local raw materials. Cottage industries were based on undemanding technologies that required little or no skill. It was relatively easy to adapt to such crafts, since it was enough to learn on the job. However, these products were cheap and, accordingly, the pay was modest. If the other conditions were met – i.e. demand or, in the case of production, trade channels that brought producers and consumers together – it was relatively easy for farmers to enter into additional employment.

Emigration

Emigration to the United States of America and other European countries contributed significantly to reducing agricultural overpopulation

and insufficient employment. It was mainly the agricultural population that emigrated (Valenčič 1990, 43–82). According to some sources, 23 percent of the population left the Slovenian territory in the period before the First World War (Peternel 2003, 29). Slovenia is undoubtedly one of the countries with the highest emigration rate from the second half of the nineteenth century. On the European average, the proportion of emigrants in relation to the population was 12.3 percent (Massey 1988, 385–6). In the long run, emigration did not solve the problem of agricultural overpopulation until the First World War, but it did alleviate it to such an extent that a partial restructuring of agriculture became possible. Indeed, emigration contributed to a reduction in the pressure on farm income. While maintaining the same standard of living, farmers were able to allocate some of their resources to much-needed investments, which, along with agricultural policies and the growth of financial intermediaries, allowed for an improved standard of living (Lazarević 2015, 62–73). With the new borders and changing attitudes toward migration on a global scale, the opportunities for permanent emigration were severely limited after World War I. The so-called seasonal migrations became frequent. It was precisely this kind of agrarian migration that was the predominant form of foreign migration prior to World War II. In the spring, a large portion of the population set out for farms throughout Western Europe and returned in the fall as soon as the harvest was in. Seasonal migrations were typical of eastern Slovenia, the region of Prekmurje, where overpopulation was highest and land ownership was most fragmented (Lazarević 1994, 74). In the interwar period, internal migrations also gained importance. These resulted from ongoing industrialization and the accompanying urbanization and involved the resettlement of the population from the countryside to the emerging Slovenian industrial centres (Slovenska novejša zgodovina 2005, 495–7). However, industrialization was not so pronounced that it completely solved the problem of overpopulation in the countryside.

The large-scale migration from the countryside contributed to a reduction in supply on the agricultural labour market. It partially alleviated the problems stemming from the agrarian overpopulation and inadequate employment of the peasant population and also provided additional sources of income. The remittances sent by back home emigrants to their families or relatives were an important contribution to alleviating social and economic circumstances in the countryside (Lazarević 2017, 49–66).

Table 7 Employment in Agriculture and Forestry

Types of employment	Number of employees
Permanently employed at farms	50,000
Wage labour on farms	50,000–60,000
Wage labour in vineyards	14,000
Wage labour in forests	7,000
Total	121,000–131,000

Source Uratnik 1938, 12.

Wage Labour

Wage labour was by far the most important category for earning additional income on small farms. There were many opportunities, but even contemporaries emphasized that the supply of labour exceeded the demand. On the one hand, farms larger than ten hectares already needed additional labour during the peak season, as family members could not do everything on their own. On the other hand, smaller farms also had a surplus of labour available due to the problem of agricultural overpopulation.

As for employment in agriculture and forestry, we should distinguish between two categories. The first was permanent employment, where people did all the work in agriculture, forestry or the household. As a rule, permanent employees were not married. They belonged to peasant households and lived on the farms where they worked. They were paid in kind – with food, clothing and shelter. Only occasionally did they receive modest monetary payments. The second type of employment was not permanent, but rather temporary, when seasonal work in the agricultural sectors required a larger number of workers. In the interwar period, this type of work was paid almost exclusively in the form of money. These workers, paid according to working days, were mostly hired by the owners of the larger farms, i.e. those that owned more than ten hectares of land. According to the calculations, the hours spent by farmers and their families on farms smaller than five hectares working and securing resources for survival represented only 40 percent of their total available working time. To secure additional resources for survival or for investment in economic and social modernization, they had to resort to off-farm labour. For a significant portion of the rural population, wage labour was therefore crucial. According to the 1938 study by Filip Uratnik – the only researcher to address these issues – between 121,000 and 131,000 people were said to have earned additional income by working on other

farms, mostly in their immediate vicinity, toward the end of the 1930s. Altogether, these people made up one-third of the peasant population. If their dependent family members are taken into account, these figures increase dramatically. Because of the prevailing low average income in agriculture, the wages of temporary workers were correspondingly modest. Filip Uratnik estimated that the average daily wage of temporary workers was half that of industrial workers (Uratnik 1938, 5–12; 62–76).

Cottage Industry

The list of agricultural crafts shows a wide range of potential economic initiatives and relationships that are outside of agriculture or derived from agricultural activities. It offers a number of opportunities for farmers in the process of income diversification – a variety of options for integrating the different sources of income that offered themselves as parallel or complementary economic activities. For example, in the Velike Lašče district, the following economic activities of peasants were registered before World War II: production of linen, hats and straw hats, tailoring and dressmaking, furriery, butchery, leather industry, shoemaking, carpentry, carts, saddles and barrels production, milling, locksmithery, production of tubs, production of wooden goods, toothpicks, baskets, rakes and pitchforks, manufacture of hats from hazel dormouse fur, sawing, blacksmithing, manufacture of hoods, masonry, manufacture of lime, charcoal, resin and potash, manufacture of hangers, wicker baskets, toys, dolls, musical instruments, wooden shoes, ropes and brushes. Among trading activities were listed trade in mixed goods, peddling, selling at fairs, trade in wild birds, forest fruits, medicinal herbs, dormouse skins, wooden goods, and even smuggling (Markun 1943, 60–2).

In discussing cottage industry, we must distinguish between two types of crafts: the more sophisticated and the less sophisticated cottage industry. The former possessed more aesthetic elements and was sometimes even artistic in nature, while the latter was characterized mainly by its utilitarian character. Thus, lace-making belongs to the former, while the latter includes a range of everyday products made of wood (buckets, baskets, toothpicks, spoons, ladles, sieves, etc.) and straw (baskets, mats, etc.) or pottery, to name just a few examples. It is obvious that the latter type of peasant production was based on the easily accessible and cheap raw materials that were abundant in the countryside and were available either on the farms themselves or in their vicinity. After all, Slovenia was a country with more than 60 percent forest cover. Clay was equally acces-

sible throughout the Slovenian territory. Straw was a by-product, as grain was the most important crop. On this basis, the production of straw hats began in Domžale as early as the end of the nineteenth century. After the First World War, production increased, which gave many peasants from central Slovenia the opportunity to participate in this process by making the straw braids needed for straw hats (Moder 1962, 73–84).

The agricultural cottage industry was supplemented by a distribution system, and a functional division of labour established itself. The role of local merchants as intermediaries between farmers/producers and consumers was indispensable. There were a few examples of cooperatives, to take care of collective sales and raise the price of products (Mohorič 1950–51, 23). However, the results were not encouraging, despite the examples of good practices and government support. These cooperatives, too often constrained by local conditions, were unable to achieve the economies of scale necessary for their existence and operations to influence existing distribution and price relationships. Moreover, they were preoccupied with themselves in the 1930s because of the constant threat of illiquidity. Documents show that farmers sometimes marketed their products themselves, especially at fairs, whose economic importance gradually declined in the interwar period despite their large numbers. Nevertheless, the practice of peddling persisted (Zdovc 2006, 95–103). In a broader sense, peddlers were local product intermediaries who were part of the system of division of labour in cottage industries. Peasants from the Ribnica area were a classic example: they moved from village to village or from fair to fair, selling retail wooden products directly to consumers (Trošt 1950–51, 28–67). In the interwar period, potters from the Prekmurje region also continued this tradition (Novak 1950–51, 130). The ceramic craft or pottery was mainly present in the eastern parts of the country. There were many potters there, as the initial conditions for this activity were modest, while the raw materials were abundant, cheap and easily accessible (Karlovšek 1950–51, 87–111; Novak 1950–51, 111–30). Pottery was a typical example of an activity in decline, because kitchen utensils made of metal and porcelain had already begun to displace traditional pottery. This was only one specific example of the general trend of increasing industrialization, which affected the market opportunities of the craft. Another example was peasants' textile production, which – with a few exceptions, as the precisely documented example of Bela Krajina shows (Račič 1950–51, 142–58) – had already practically disappeared before World War II.

On the other hand, handicrafts with added value in the form of aesthetic or even artistic connotations (e.g. lace-making) continued to flourish. The scope and volume of lace-making continued to increase. This craft already traditionally enjoyed strong support from the authorities through organized and planned training, as well as the procurement of patterns and organized marketing (Kravos-Lombar 1938, 212–4; Račič 1938, 235–43). Lace-making had a long tradition. The production and sale of lace was already well established, and in the interwar period these activities spread to Upper Carniola as well. In a way, lace-making was a regulated craft, as lace makers were provided with product samples and design made by professionals according to contemporary aesthetic and artistic criteria as well as market requirements. Artists and professional lace makers were an integral part of the process of promoting the production, design and marketing of lace, all with generous support from the government. The basketry example was similar in some ways: it shows how effective agricultural income diversification strategies and practices, combined with local initiatives, readily available raw materials, and government support, can be in the long run. The examples from around Ptuj and Radovljica bear witness to this (Ogorelec 1938, 233–4; Patik 1938, 251–6). However, cottage industries could also disappear, as the example of agricultural textile production shows. On the other hand, they could also reassert themselves, as seen in the example of toy production around Velike Lašče after the First World War. The planned toy production was the initiative of a few enterprising merchants who organized production among the farmers, procured models and sold the toys on the Yugoslav market (Markun 1943, 62).

Cottage industry certainly represented a significant share of the employment of the agricultural population – with differences across the regions and strata, naturally. For the interwar period, realistic estimates indicate that at least 25,000 people were permanently or periodically employed in craft production (Lavrič, Mal, and Stele 1939, 391), 5 percent of the total agricultural population. If we also take into account hired labour and seasonal migration, we can make an additional estimate that before World War II the standard of living of at least a quarter of the agricultural population depended heavily on additional income from activities other than farming. This income was crucial to the economic equilibrium of small farms. By encouraging the additional education of the farming population through various vocational trainings, the authorities supported the process of income diversification (Pretnar 1938, 257–

60). At this point, we must draw attention to another aspect of the policy of income diversification in agriculture: women were very much involved in this process. Contemporaries estimated that the proportion of women was dominant in both cottage and wage labour. Together with activities to improve domestic labour and the processing and commercialization of agricultural products on the farms themselves, this affected the perception of the economic value of women's labour (Gosak 1939, 433–7). Consequently, this also influenced the social emancipation of women in the context of the traditional ideology of gender relations and the gender division of labour in the agricultural economy.

Forests played an important role in integrating different types of income. The economic potential of forests was considerable, and the population was heavily dependent on forest resources. The role of forests in income integration was multifaceted, and people met some of their food needs through foraging. Forests were also important for livestock – for grazing or for the care of animals. On the other hand, wood was of great importance as a raw material. It enabled a large part of the Slovenian population, including peasants, to participate in the timber trade and therefore represented an important and relatively stable source of income. As a raw material, it was also needed for the development of various production activities in the countryside. For a long time in the twentieth century, the population depended on the use of wood as the main energy resource. Before World War II, an average household is said to have consumed at least 7.3 m3 of logs or wood, especially hardwood, for heating and cooking. Even then, the data was controversial, as it was very difficult to estimate the consumption of firewood in the countryside, where farmers mostly owned forest land. It was also noted that the market was supplied mainly by farmers who owned small forests, and that the preparation and sale of firewood was an important element of agricultural income (Sunčič 2015, 93–140).

Conclusion

The insufficient employment of the agricultural population due to rural overpopulation constituted one of the most urgent problems of agriculture before World War II. In this context, it is also necessary to take into account the fragmented land ownership structure, which resulted in low average profitability of agricultural labour. Small farmers urgently needed sufficient sources for their survival and for social and economic modernization, but the fragmented land structure made it impossible for all the

vital needs of the farmers and their families, as well as their life goals, to be met solely by agricultural income. There was a gap between the available labour force and the amount of labour available on farms: the number of laborers exceeded the amount of labour available in agriculture. Overpopulation as an abstract concept took the form of widespread unemployment or underemployment of the rural population in everyday life; precisely such a situation was one of the crucial problems in rural areas. With additional employment, which also brought additional income, there arose not only the survival of peasant families, but also the possibility for small investments, and economic and social modernization. In order to overcome the constraints of unfavourable land tenure, peasants had to find additional employment, thus the various sources of income. This was the only way they could meet their cash needs to finance the rising cost of living and keep pace with economic and social modernization. Diversification of agricultural income was therefore a social and economic necessity. Farmers who owned up to five hectares of land were in a particularly difficult position. However, farmers or the agricultural population did not practice income diversification or integration only because they had to – of course, the desire for a higher income or greater income stability and an improvement in the family's standard of living was also extremely important. Emigration, employment on other farms, and agricultural production of various commodities were among the most important measures for integrating the various sources. All these processes improved the situation in the short term and thus also contributed to economic and social stabilization in the countryside before World War II. The concept of the integrated peasant economy proved to be appropriate to interpret the economic and social processes and development trends in rural areas.

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3

Living Spaces of Ethnic Groups and their Relationship with the Ecological Environment in Assam, India

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Introduction

Northeast India, which lies between South Asia and Southeast Asia, is a crossroads of cultures. The region is far from the political centres of either region, and until the mid-nineteenth century, population density was extremely low. While the other northeastern Indian states are characterized by rugged mountains or high plateaus, much of Assam consists of highly productive, low-lying alluvial land ideal for agriculture. Due to the fertile soils along the Brahmaputra River and abundant rainfall from the southwest monsoon, rice has traditionally been grown in Assam. Throughout history, people from all over the region have settled in the area in search of arable land. Early inhabitants included the Bodos from the Himalayas, who came here before the birth of Christ, and the Ahoms from Yunnan Province in southern China, who settled here in the thirteenth century. For centuries, other indigenous ethnic groups have maintained their unique customs, languages, livelihoods, and religions.

When considering modern Assamese society, one cannot ignore the influence of the British colonies. Today's problems in Assam, many of which have to do with land and resources, have their origins in the colonial period (Saikia 2011, 13). In the pre-colonial period, Assam had a low population to land ratio (Guite 2019, 13). For example, in 1853, the population of Assam was 1,059,513 and the total cultivated area was 1,575 square miles out of 30,241 square miles. The population is ethnically diverse and scat-

Murayama, S., Ž. Lazarević, and A. Panjek, eds. 2024. *Changing Living Spaces: Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present*.Koper: University of Primorska Press.

tered over vast plains. Therefore, securing a population to cultivate the vast land has always been a challenge to effective state building.

British colonial rule in Assam began in the mid-nineteenth century. During the colonial period, the British administration brought various ethnic groups from different parts of the Indian subcontinent to work in the sparsely populated wastelands of Assam. The newcomers included Bengalis, Nepalis, and other tribes who arrived in the late nineteenth century. Given the growing need for revenue during this period, the colonial administration expressed a desire to promote jute cultivation in the rich alluvial areas of the Brahmaputra Valley (Saikia 2011, 326–7). Since local farmers lacked sufficient skills and motivation for jute cultivation, the Assam administration argued that the best available alternative was to bring in farmers from East Bengal. In addition, Bengali jute mills put pressure on East Bengali farmers to grow jute in the Brahmaputra Valley. The majority of these newcomers were Muslim peasants.

Rapid reclamation by Muslim peasants was initially welcomed by Assamese Hindu elites (Saikia 2016, 87). In the following decades, the wealthy Assamese farmers, merchants, and absentee landowners derived enormous profits from the settlement of the immigrant peasants. However, this situation did not last long. Assamese nationalists, legislators, and the press disapproved of the immigration of Muslim peasants and their rapid reclamation, fearing that the land of the native Assamese would be seized by them. While revenue officials in Assam claimed that no surplus land was available for new settlements, the Assam Muslim League Ministry decided in 1943 to open surplus reserves to immigrant peasants under a scheme called the 'Grow More Food' campaign.

Until the mid-twentieth century, when the state's population began to grow significantly, there were fewer problems between Hindus and Muslims or different ethnic groups in the region. However, in the late twentieth century, as population density increased in the Brahmaputra floodplain and cultivable land became scarce, social problems such as conflicts between different ethnic groups and political movements for autonomy by ethnic minorities began to emerge. The state-wide anti-Muslim immigration movement in the early 1980s (Baruah 1999; Dutta 2012) and the Bodoland movement that violently demanded the independent state of the Bodo tribes in the 1990s are two notable examples (Basumatary 2012; Saikia 2015).

Social unrest in the late twentieth century hampered the economic development of the state. Even today, Assam has no significant industry,

and the state's economy is based primarily on subsistence farming. About 75 percent of Assam's 31 million inhabitants are engaged in agriculture and related activities (Government of Assam 2016), which are still carried out with traditional implements. Apart from state subsidies or government loans, the flow of capital into the peasant economy is far below the national average (Saikia 2016, 327). The Green Revolution, the flagship programme of the Indian government in the 1960s and 1970s, has not covered this region. Compared to the agrarian situation in western states such as Punjab and Haryana, where the peasant economy has improved over the decades, the situation in Assam has deteriorated in the twentieth century.

However, studies on the current economic backwardness and agricultural stagnation in Assam attribute the underdevelopment of the agricultural sector to the lack of scientific knowledge among farmers and the traditional socio-economic institutional complex (Das 1984; Phukan 1990). While the security situation in Assam has improved over the years and the state domestic product (SDP) has been steadily increasing since the 2000s, the agricultural sector continues to grow at a snail's pace (Government of Assam 2017).

How did local farmers in a multi-ethnic society in the Brahmaputra Valley sustain themselves through subsistence agriculture? How can the peasant economy be sustained without the capital input of the public sector? These are the research questions posed in this study. The background of the state's economic problems is examined in this chapter from the perspective of the ecological environment. The unique environment of the Brahmaputra floodplain could help local people sustain subsistence agriculture without using modern technologies such as groundwater irrigation or high-yielding varieties (HYV). In this context, it is important to focus on the relationship between ethnic groups in the region and the local environment in which they live. Ethnic groups originating from different homelands have different cultural backgrounds and diverse knowledge and skills regarding the use of natural resources for their livelihoods. Here, the author examines the living spaces of different ethnic groups in the Brahmaputra Valley, the geographic patterns of their living spaces, and their everyday practices related to local resources. The characteristics of peasant agriculture in the multi-ethnic society of Assam are discussed using micro-observations from different regions of the state.

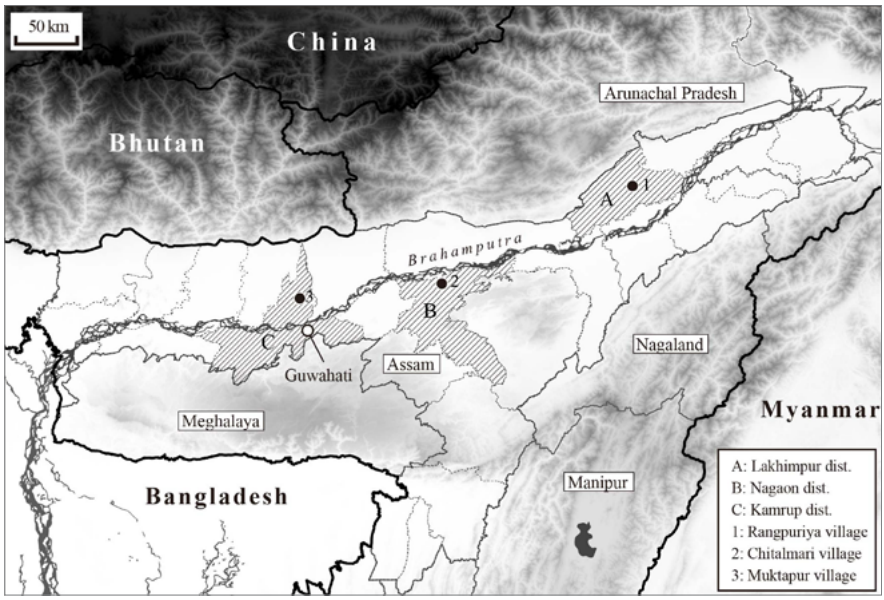

Figure 1 Study Area

Study Area

The Brahmaputra Valley, lying between the eastern Himalayas to the north and the Meghalaya Plateau to the south, covers an area of 56,339 km2, which is 72 percent of the total area of Assam (Gopalkrishnan 2000, 31). It is about 750 km in length from east to west and about 80 km in width from north to south. It is an alluvial area with an elevation of 30 m in Dhubri in the west and 130 m in Tinsukia in the east.

The valley can be divided into three zones – the floodplain, the middle plain and the foothills – according to the different ecological conditions, which vary according to the distance from the main stream of the river. The floodplain is seasonally inundated by the Brahmaputra and its tributaries, including their sandbanks. The middle lowland zone is far from the main stream, has a low risk of flooding, and is therefore suitable for agriculture. The foothill zone is the transitional area between the valley and the hills of Bhutan. It consists of coarse sediments, which makes it difficult to obtain surface water.

This chapter examines the living spaces of different ethnic groups and their adaptation to the local ecological environment in three regions of the valley: the Lakhimpur district in the east, the Nagaon district in the central region, and the Kamrup district in the west (figure 1). In Lakhimpur

district, the proportion of Muslim immigrants from East Bengal, or present-day Bangladesh, is relatively low, while it is higher in Nagaon district and Kamrup district. Each district is inhabited by many ethnic groups: indigenous and immigrant, tribal and nontribal, and Hindu and Muslim. Some villages are inhabited by a single group, while others are inhabited by multiple groups. In the latter villages, the dominant group was identified to make distribution maps.

Primary data were collected through an oral survey and field observations conducted in three districts between 2008 and 2019 to identify the dominant groups in the villages and their livelihood patterns. The 2011 Census Village Directory was also used as a secondary source to analyse the location and structure of villages in the region (Asada 2013). This database contains information on characteristics such as code, name, area, number of households, population, facilities, and land use.

Ecological Environment and Living Spaces of Different Ethnic Groups

Location of Villages by Ethnic Group in the Lakhimpur District

First, information on the predominant ethnic groups from 981 villages in Lakhimpur district was obtained from the oral survey. The number of villages by ethnic group was as follows: mixed groups (mainly the Asamiyas) in 348 villages (35 percent); the Mishings, 235 (24 percent); the Ahoms, 145 (15 percent); the Ex-Tea labour tribe, 64 (7 percent); the Bengalis, 43 (4 percent); the Kacharis, 41 (4 percent); the Nepalis, 23 (2 percent); and others 82 (8 percent). Although the number of villages with mixed groups is the largest, most groups live separately from other groups and are clustered in specific areas within the district. The location of these villages provides information about the settlement pattern of ethnic groups (figure 2a). A comparison between their location and the ecological classification map (figure 2b) helped clarify the relationship between ethnicity and ecological environment. For example, the villages of the Nepali and Ex-Tea labour tribe are located near the piedmont zone bordering Arunachal Pradesh, while the villages of the Mishing and Kachari are located in the floodplains and river islands of the Brahmaputra and its tributary Subansiri. The Ahom and Bengali villages are not located in these ecological zones, but mostly in the lowland zone near national highways and towns.

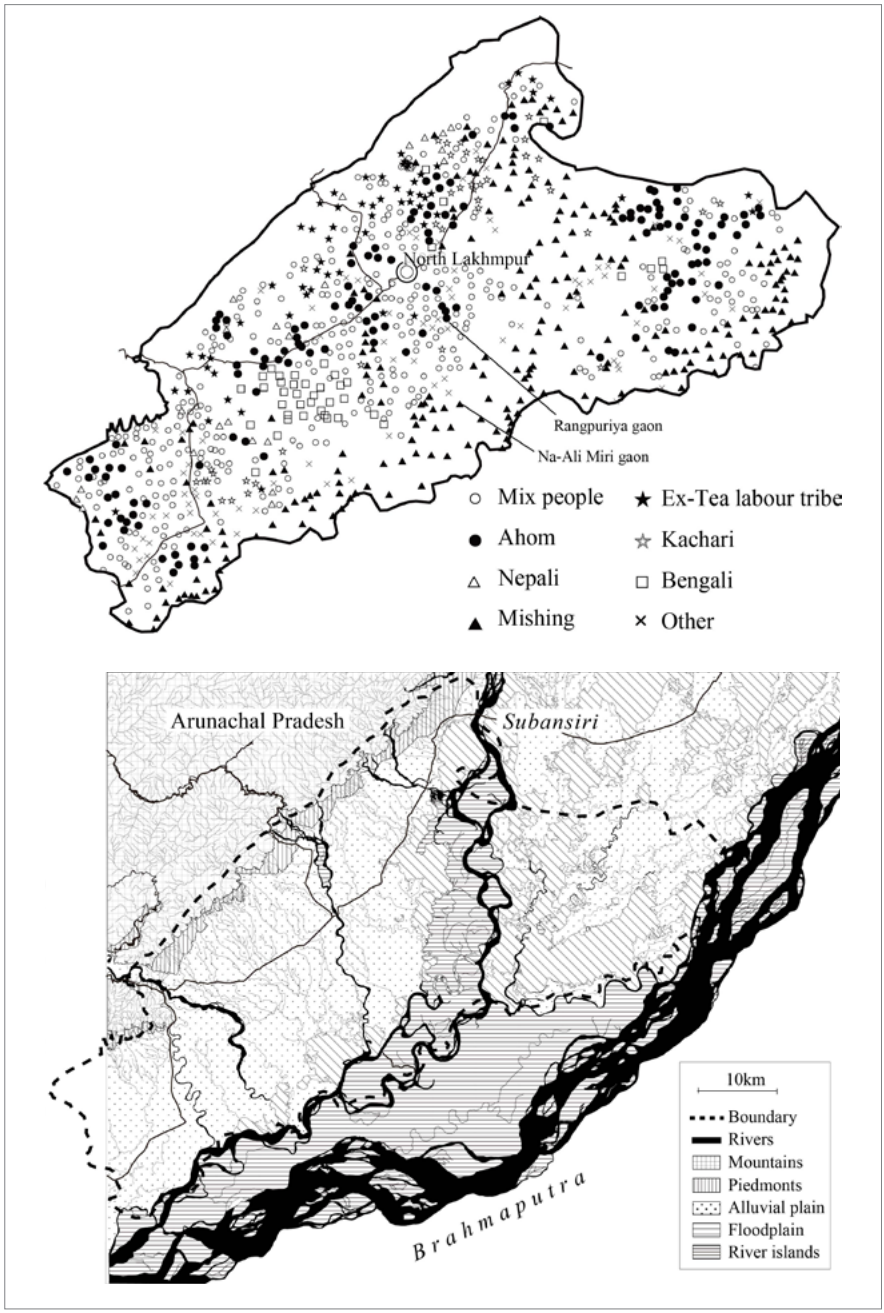

Figure 2 Living Spaces of Different Communities in Lakhimpur District

Notes a) village location by ethnic groups; b) classification of ecological environment

In considering the current settlement patterns of each ethnic group, it is important to note the historical background of their migration. Until the eighteenth century, the district was sparsely populated with the Asamiyas from western Assam and the Mishings from the hills in Arunachal Pradesh. The Asamiyas lived in the plains, while the Mishings lived near the rivers. In the nineteenth century, the Ahom migrated from the southern bank of the Brahmaputra and established villages in the plains. At the same time, the tribe of Ex-Tea labour came to work in the tea gardens established by the British in the piedmont area. Finally, in the twentieth century, immigrants from Nepal and Bangladesh migrated to the region (Gopalkrishnan 2000, 257–76). There was little unoccupied land left for those who later migrated to the district.

Interaction Between the Ahoms and Mishings

The ethnic groups in the study area live in different ecological environments and have different livelihoods that allow them to interact with other groups through the exchange of agricultural products and labour services. Here, the Ahoms and the Mishings are taken as an example and

Figure 3 Mishing Woman Working in the Ahom Village

the interaction between them is examined based on the author's field observations.

The Ahoms and the Mishings have different livelihood patterns. This difference has led to the Mishings working in Ahom villages, where transplanted rice (known locally as *sali* rice) is the main monsoon crop (Asada 2011). The main agricultural working season is from May to August, when ploughing and transplanting are done, and from October to November, when rice is harvested. In contrast, broadcast rice (known locally as *ahu* and *bao* rice) is the main crop in Mishing village. The peak season of agricultural activities here is from January to March, when ploughing and harvesting (e.g. mustard) is done, and in June, when *ahu* rice is harvested. Mishing women come to the Ahom village to do agricultural work for daily wages in July-August and October-November during the low season in their own village (figure 3).

Because most of their villages are near towns, the Ahoms have more opportunities to earn off-farm income than the Mishings. Nowadays, more and more Ahom villagers work in towns, so they have less time to engage in agricultural activities on their own farms. In addition, during the transplanting or harvesting seasons, it is difficult to find wage labourers for agricultural activities, so they rely on agricultural labour from other villages. Mishing people have fewer opportunities to find work in towns, and most villagers still practice traditional farming with low productivity. They therefore go to work in Ahom villages to earn cash income needed for their children's education and daily expenses.

The difference in land use between the villages of the two groups also plays an important role in their interaction. In the Ahom village, which is located in the middle lowland zone, a back swamp is used as a rice field. There is little land available for cow herding on the natural dams, so the cows have to move to the roads even during the rainy season. Therefore, some Ahom villagers keep their cows in Mishing villages, where sufficient land and pasture is available near the river bank or rice fields after harvesting *ahu* rice (figure 4). Those who take care of the cows in Mishing village receive milk and newborn calves in return. The milk produced in Mishing village is sold in the market of a nearby town. When the cows are able to provide sufficient draft power to plough the fields or are large enough to be sold at the market, they return to their owners in Ahom villages.

In return for caring for their cows, the Ahom sometimes care for the children of the Mishing. Primary and secondary schools in riverine areas such as Mishing villages are often closed during the rainy season be-

Figure 4 Cows Kept on the Riverbank of the Mishing Village

cause the water floods them and they are difficult to access. As a result, schools in the Mishing village cannot always provide a satisfactory education. Therefore, some Mishing children go to schools in and around Ahom villages to receive a better education. However, when living with a family in Ahom villages, Mishing children are required to help in the household and in agriculture. They remain in Ahom villages for several years until they complete secondary or post-secondary education.

Such interactions between the Ahoms and the Mishings are not observed in all households. However, the few Ahom and Mishing families that do interact in this way have developed close relationships with each other over many years. Such personal networks between different ethnic groups enable different types of cooperation in the multi-ethnic society of the Brahmaputra Valley.

Livelihood and Land Use Pattern of Muslim Immigrants

Living Spaces by Ethnic Groups in Nagaon District

Nagaon is one of the districts with a higher proportion of Muslim residents in Assam, which according to the 2011 census is 1.56 million (about

55 percent of the district's total population of 2.82 million). In the older Nagaon district, which includes the present Morigaon district, the number of Muslims was 12,578 (4.8 percent of the total population) in 1901 and increased to 359,519 (40.5 percent) by 1951 (Barooah 1978). Previous studies indicate that Muslims who migrated to Assam initially settled in the floodplains where no indigenous Hindus had previously lived (Bhagabati and Das 1992). Therefore, this section identifies the geographical pattern of Muslim settlements in the district.

Information on the residents of each village in the northern part of the district (Nagaon, Rupahi, and Dhing Revenue Circle) was obtained through interviews with residents and from the 2001 Census Village Directory and Administrative Atlas. Of the 520 revenue villages in the three revenue districts, information on the predominant resident community was obtained from 499 villages. One hundred and ninety-two villages are dominated by Muslims (including both immigrant and Assamese Muslims), followed by 146 villages with indigenous Hindus (Assamese Hindus, hereinafter Asamiyas), 12 villages with Karbi, 8 villages with Bengali Hindus, 8 villages with Ex-Tea tribes, 7 villages with Larun (Tiwa), 7 villages with Kachari, 4 villages with Bodo, 2 villages with Nepali, and 2 villages with Sikhs. There were 110 villages with multiple ethnic groups living together, and the main ethnic group could not be determined during the survey.

From the distribution map summarizing the results of the survey, it can be seen that the villages dominated by the Asamiyas are distributed from the national highway near the town of Nagaon to the foothills on the southern side, while the villages dominated by the Muslims are distributed between the national highway and the banks of the Brahmaputra (figure 5a). The distribution pattern also agrees well with the boundaries of the ecological environment (figure 5b). That is, the Muslim immigrants settle mainly in the areas affected by the seasonal floods, while the Asamiyas live in the central lowland zone in the south, which is not affected by the floods of the main stream. There are villages of Ex-Tea tribes, Karbi and mixed ethnic groups near the hills in the southern part of the study area. Villages of other Scheduled Tribes (e.g. Bodo, Lalung, Kachari) are scattered between the Asamiyas and Muslim residential areas.

The ecological environment of Muslim-dominated areas was originally unsuitable for human settlement. No large embankments were built in Assam during the British colonial period, but after independence, construction of embankments along major rivers began in 1954, and by 1978

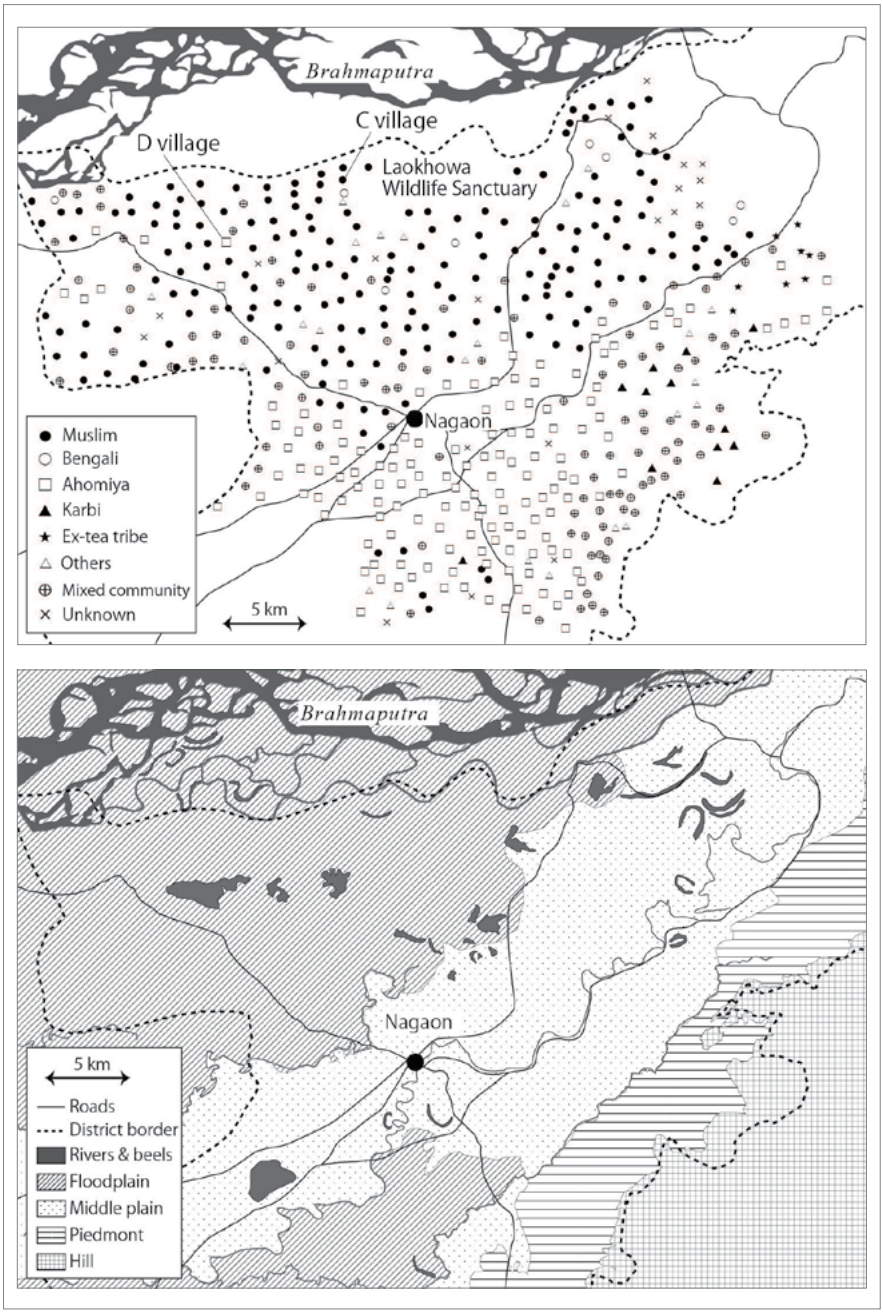

Figure 5 Living Spaces of Different Communities in Nagaon District

Notes a) village locations by ethnic groups; b) classification of ecological environment

embankments totalling 4,000 km had been completed (Kar 2014, 16). In Nagaon district, it was difficult to live in the floodplains near the main stream of the Brahmaputra, where water entered during the rainy season, but around 1960 an embankment was built along the main stream, making it easier to control the river water. It is likely that Muslim immigrants settled in the floodplains where few people previously lived.

Livelihood Activities of Muslim Immigrants

The field survey was conducted in Chitalmari village (hereinafter village C), one of the villages dominated by Muslim immigrants in the Brahmaputra floodplain. In village C, the hydrological environment outside and inside the embankment is very different, and the livelihood activities of the villagers also differ accordingly.

The area outside the embankment is completely inundated by the flooding of the main stream during the rainy season (June-September). The water depth reaches up to 2-3 m in some places, making agricultural activities impossible. During this time, some villagers catch wild fish with nets, but this is not an efficient method and not very profitable. When the rainy season ends and the water level drops, vegetable cultivation such as chili and mustard begins in October, followed by *boro* rice cultivation in December. Since river water drains completely during the dry season, groundwater is pumped up from tube wells to irrigate the cultivated areas.

The agricultural landscape inside the embankment is completely different. As long as the embankment does not collapse, no river water can flow into this area. However, during the rainy season, most of the land is flooded, except for the roads and the homesteads that were created in the uplands of the village due to the rise in groundwater level and rainfall. It is impossible to plant rice inside the embankment during the rainy season. Since the hydrological environment can be controlled to some extent even during the rainy season, jute is grown in the higher areas instead, and other cultivated areas are used as ponds for fish farming. In the dry season, *boro* rice is grown on all cultivated land.

In the village studied, a cropping pattern combining *boro* rice during the dry season and fish farming during the rainy season is common. Fish farming begins in April. The purchased fish fry are thrown into a pond on homestead land and raised until they reach a certain size. After that, when the water accumulates in the cultivated areas, the fish are released there. The farmed fish species are common carp (*Cyprinus carpo*), silver

carp (*Hypophthalmichthys molitrix*), grass carp (*Ctenopharyngodon idella*), Bafu (*Catla catla*), Rou (*Labeo rohita*), Kuhi (*Labeo gonius*), Bagu (*Labeo bata*), Magur (*Clarias batrachus*), Chital (*Notopterus chitala*), and others. During the rainy season, fish are bred in flooded croplands by feeding mustard pomace and rice husks and adding vitamins. In November, when the water level of the cultivated areas drops, the fish are caught with nets and offered for sale in weekly (*hat*) and permanent markets in the surrounding towns. The cultivation period of *boro* rice and fish partly overlaps, which causes problems for farmers because they cannot start cultivating *boro* rice when the fish in the same cultivation field are already fully grown. In the cultivated areas, *boro* rice ploughing is started in November, and transplanting is done from January to February of the following year. *Boro* rice harvesting takes place in May and June, but the period overlaps with the input of fish fry.

The farmers in the study village have solved this problem by vertical land use. They dig a portion of the cultivated field about 8 feet deep to store water during the dry season. Fish fry are released in April before the rainy season begins. At this time, *boro* rice is still planted on the other side of the cropland before harvest (figure 6). During the rainy season, the groundwater level rises as rainfall accumulates, flooding the entire cultivation area and allowing a large area to be used for fish farming. When the rainy season ends in October and the water level begins to drop, it is time to harvest the adult fish. The fish harvest lasts until January of the following year. At this point, the water has only accumulated in the lowest part dug into the cultivated land, and on the opposite side, where the water has completely dried, preparations for the next *boro* rice crop can begin. In addition, it is also used as a seedbed for *boro* rice.

This technique of digging up part of the cultivated land to both raise fish and grow *boro* rice has several advantages. One is that the topsoil of the rice field is cultivated and puddled for planting rice seedlings, which facilitates the supply of inorganic nutrients from the soil into the water when the water level rises during the rainy season. This becomes a good nutrient for fish. Faecal matter and weeds mixed in the soil also dissolve in the water, which is beneficial for fish growth. In addition, when harvesting *boro* rice, only the rice ear is cut off and the lower stalk is left in the field. The remaining stalks are submerged and rot during the rainy season, which is also a good fish food.

Many villagers admit that the profitability of fish farming is so high that rice is grown to increase fish catches. In *boro* rice cultivation, the cost

Figure 6 Land Use of *Boro* Rice-Cum-Fishery in Muslim Immigrants' Village

of chemical fertilizers and diesel fuel for pumps is high, and the profit after selling the product is lower. Villagers must grow a certain amount of *boro* rice to produce rice for home consumption and straw for livestock feed. *Boro* rice cultivation is not very important as a source of cash income because sufficient profits can be made from fish cultivation.

Interactions Between Muslim Immigrants and Indigenous Hindus

From the results obtained, it can be concluded that the Muslim immigrants found the utility value in the ecological environment of the floodplains where the indigenous people did not live, and they achieved high land productivity by developing technologies that did not exist in Assam. Previous studies have argued that they threaten the livelihoods of indigenous communities because of their high productivity. However, from the author's field survey, Muslim immigrants and indigenous communities are not always in conflict; rather, the livelihood activities of Muslim immigrants support the lives of indigenous communities.

An example is the production and supply of food. As mentioned earlier, Muslim immigrants modify the original environment to grow fish, *boro* rice, and other crops year-round, and they earn a cash income by sell-

ing their products through agents or markets. The food produced in their villages is transported not only within Nagaon district but also throughout the state, and is consumed by many local people. Among them, the fish supplied by the Muslim immigrants have a special importance for the Hindus in Assam. In Muslim villages, fishing begins in November, when the rainy season ends and the water level in the cultivated areas begins to fall, and it reaches its peak in January. In mid-January, Hindus in Assam celebrate Magh Bihu, one of the three Bihu festivals during the year. Magh Bihu is an annual event when all the work of rice harvesting is completed and farmers can rest at home. During the festival, it is customary for families and relatives to visit their native homes and eat fish and duck meat (Borah 2005, 23–4). On Uruka Day, the eve of Bihu, people in rural villages go to nearby rivers and ponds to catch fish with bamboo fishing gear. On the same day, people in the towns go to the market to buy fish. A certain amount of the fish consumed by Hindus living in the towns during the Bihu festival is supplied by Muslim immigrants. Although they do not participate directly in the festival, they use it as a great business opportunity. When the price of fish increased during this period, some villagers from village C made a turnover of more than 1 *lakh* rupees in one day in Uruka by supplying fish for the town dwellers.

In contrast, Muslim immigrants also depend on the Asamiyas in the study area. One example is rice straw, which is essential as cattle feed. In Muslim immigrant villages, cows used for tillage are gradually being replaced by power tillers and tractors, but many households keep cows to produce milk for their own consumption. It is important for these households to have fodder for their own livestock throughout the year, but the straw from the *boro* rice they grow is not as good as fodder. *Boro* rice is harvested from May to June, which is the beginning of the rainy season. After harvesting, the rice straw is piled up and stored in the homestead garden. However, since it is in the open, it gets wet from the rain and rots easily. Cows do not eat rice straw that is wet and damp. In addition, *boro* rice grown in village C is a high-yielding variety (HYV) whose stalks are generally harder than those of local varieties, so they do not fall over when a large amount of chemical fertilizer is applied. Because of this characteristic, the stalks and rice straw of HYV *boro* rice are not suitable for livestock feed.

Some Muslim immigrants who grow only *boro* rice buy rice straw as cattle feed from the Asamiyas who grow *sali* rice (figure 7). *Sali* rice is harvested in November and December, when the rainy season is over and the

Figure 7 Rice Straw Brought from Asamiyas Villages

straw can be fed to cows in a sufficiently dry condition. Since the prevalence of HYV in *sali* rice is limited in the villages of indigenous communities, it is possible to obtain straw of local varieties suitable for feeding to cows. Therefore, Muslim immigrants visit village D or other Asamiyas villages near Nagaon town to buy surplus rice straw in cash. In the past, rice straw was available free of charge, but recently the value of the leftovers after harvest has increased, and villagers have to pay some money for rice straw.

The interviews in village D also revealed that some Asamiyas learned agricultural technologies from Muslim immigrants. They saw that Muslim immigrants in nearby villages had started *boro* rice cultivation and began to learn the technique through personal communication. Although the area under *boro* rice cultivation in village D is small, the knowledge and skills of Muslim immigrants can help increase agricultural productivity in villages of indigenous communities.

As stated above, the presence of Muslim immigrants has become indispensable in contemporary society in Assam. Moreover, Muslim immigrants also depend on the indigenous communities for their livelihood and they need to maintain good relations with each other, at least in economic terms. The conventional view that Muslim immigrants threaten the survival of indigenous communities does not necessarily correspond to the reality of Muslim immigrants trying to coexist with indigenous people.

Changes in the Land Use Pattern of Indigenous Hindus

Living Spaces by Ethnic Groups in Kamrup District

The last case study was conducted in Kamrup district and shows how important the living spaces of different ethnic groups are for agricultural development. In this region, the differences in the ecological environment are relatively smaller than in the other regions, with a gentle slope extending from the floodplain near the Brahmaputra to the foothill zone along the border with Bhutan. The urban city influence is more dominant than the environmental factors. The state capital, Guwahati, attracts people living in the surrounding rural villages. The distribution pattern of villages by ethnic groups roughly shows the pattern that Asamiya villages are located near Guwahati, Nepali villages are located in the foothill zone, and Bodo villages are located in the middle plains (figure 8). However, the differences between the living spaces of each ethnic group are not as clear as in other regions. Like living spaces, livelihood activities are almost identical among ethnic groups. They mainly grow rice in the rainy season and some vegetables in the dry season.

However, the living spaces in the region historically showed a different pattern. The Bodo people first lived in the northern part of the region, but population density there was low and much land with forests remained unused. In the 1950s and 60s, some Asamiya farmers who lived in villages near Guwahati migrated to the northern region in search of large arable land. At that time, people could freely own unoccupied land after reclaiming trees and grass themselves. Field research has shown that the people of Asamiya moved northward during this period in search of resources. However, the direction of human movement is now reversed. Some of the migrated Asamiyas living in the border area with Bhutan have migrated to the southern region near Guwahati in the last decade. The value of the land has declined for villagers as they show less interest in continuing farming. More villagers prefer to work off-farm or in white-collar jobs, which are more feasible in urban areas. The number of households migrating south is not large, but many people are going to the southern region near Guwahati to work.

The political factor also influences the movement of people in the region. The northern part of the region (the area between Goreswar and the border with Bhutan) was declared an autonomous Bodo region in 2003, promoting the Bodo First policy. Non-Bodo people, including the Asamiyas, are relatively disadvantaged in the region and have difficulty finding

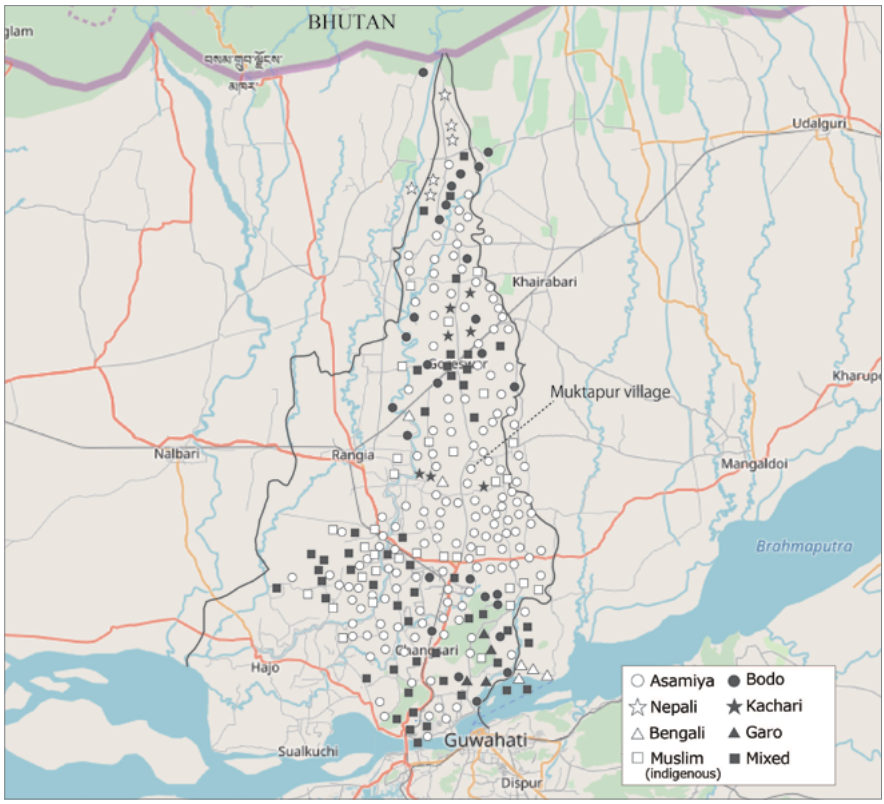

Figure 8 Village Locations by Ethnic Groups in Kamrup District

official jobs or accessing the tax system. This newly introduced policy is one of the factors causing more Asamiyas to migrate to the southern region.

As a result of historical and political factors, living spaces of ethnic groups in this region are to some extent blurred. Although there is a certain pattern of distribution of villages by ethnic groups, in this region not only the influence of the ecological environment but also the distance from the urban centre is predominant. This is also related to the gradual change of livelihood patterns from agricultural to non-agricultural activities.

Motivational Changes of Farmers Towards Rice Cultivation

In recent times, labour shortage in agriculture due to rural-urban migration has become a challenge for Muktapur village. The growth of the urban industrial sector has attracted rural labour. Since the village is not

far from the urban centre of Guwahati, more and more villagers are looking for white-collar jobs or entrepreneurial activities instead of continuing to work in agriculture, a sector that requires significant input costs and hard labour. Thus, interest in rice-based subsistence agriculture has gradually declined among village youth. Given the declining interest in agriculture, farming activities can no longer be sustained at the previous level, leading to changes in the use of agricultural land and associated environmental changes.

Several additional factors have contributed to this trend. The first is the low rice yield in recent years. In FY 2016, rice yields in Assam averaged 2.1 t/ha, below the national average of 2.6 t/ha and only half that of the highest-yielding state, Punjab (4.0 t/ha; Government of India 2017). Along with Bihar and Odisha, rice yields in Assam are among the lowest in the country. The low yields are related to the predominance of HYVs. HYVs accounted for 71 percent of total rice production (in terms of area under cultivation) in FY 2014 and only 66 percent for *sali* rice, the main rainy season rice crop (Government of Assam 2016). Without adequate irrigation facilities, HYVs, and chemical fertilisers, rice yields in Assam remain much lower than in other Indian states, making it difficult for farmers to earn sufficient income from rice cultivation.

The second factor is unstable weather conditions. Monsoon rainfall is characterised by large annual fluctuations and has shown an overall decreasing trend after 2000 (Jhajharia et al. 2012; Fukushima, Kanamori, and Matsumoto 2019). When rainfall is low in June and July, the first half of the rainy season, transplanting work on non-irrigated cropland cannot be carried out at an appropriate time, severely affecting yields (Asada 2012, 76–8).

The third factor is rising wages for agricultural labour. Rice cultivation requires wage labour for transplanting and other tasks. However, in Assam, daily wages of labourers have roughly quadrupled in the last 10 years (from Rs 65 per day in 2006 to Rs 241 per day in 2015). As a result, landowners are finding it difficult to hire workers to grow rice because the costs exceed the benefits. In 1991, farm owners accounted for 51 percent of the total labour force in Assam; however, this number declined to 36 percent in 2011 (Government of Assam 2017). However, during the same period, the share of agricultural labour in the labour force declined only slightly from 12 percent to 10 percent. These trends may reflect a situation where incomes are better for wage labourers than for farmers who employ labour.

The fourth factor is the economic policy of the Indian government. The Food Corporation of India (FCI) regularly buys more rice and wheat produced in Punjab and Haryana than in Assam. In 2016, the FCI purchased 372,443.12 tonnes of rice from Assam, which is only about 7 percent of Assam's total rice production of 5,127,000 tonnes (Government of Assam 2017). In addition, the Indian Public Distribution System (PDS) discourages local farmers from growing rice in their fields. The PDS distributes rations, including rice produced in Punjab and Haryana, to 'above poverty line' (APL), 'below poverty line' (BPL), and 'Antyodaya Anna Yojana' ('poorest of the poor', AAY) households at prices far below market levels. Because government policies do not encourage local farmers in Assam to engage in subsistence agriculture, Assamese residents have little incentive to grow staple crops in their own fields.

These factors have combined to reduce the incentive for agriculture in Assam, leading to changes in agricultural land use. Various impacts of changes in agricultural land use are already being observed, including reduced expansion of rice acreage, changes in the rice field ecosystem, and changes in rural landscapes. The following section discusses the resulting changes in land use in the context of Muktapur village. Both cultural and economic factors influencing current land use patterns are discussed.

Conversion of Farmland to Other Land Uses

Much cultivated land has been converted to uses other than rice cultivation. In the 2018 Kharif season, 6.7 hectares of agricultural land in Muktapur village were not cultivated and lay fallow due to lack of water or labour, or because of decreased productivity, especially at higher elevations. Apart from the fallow land, the abandoned cultivated land is mainly used as forest land or fish ponds, depending on the size and distance from the owners' residences.

In Muktapur village, 63 out of 491 households converted part of their cultivated land into forests. On average, 0.04 hectares per household were converted in this way, representing about 11 percent of each household's cultivated land.

In addition to planting trees, villagers in Muktapur also worked to create fish ponds on formerly cultivated land (figure 9). Of the 491 households in the village, 164 have converted some of their cultivated land into fish ponds; thus, this approach is more widespread than converting cultivated land into forest land. The average area of fish ponds is 0.08 ha, which is about 20 percent of the total cultivated area per household. Fish

ponds are less conspicuous than tree stands, making it more difficult to observe such changes in the rural landscape. However, the permanence of this conversion strongly suggests that villagers are becoming less interested in agriculture.

The construction of fish ponds is not a new practice in the village. When sons become independent from their parents and build a house in new locations, the soil is usually taken from cultivated land and a pond is built in the place where the excavation is made (Deka and Bhagabati 2015, 40). Such ponds are called Kal and have no levees. During floods in the rainy season, wild fish from the surrounding waters can enter unhindered. Fish species caught in Kal include Puti (*Puntius chola*), Goroi (*Channa punctatus*), Magur (*Clarias magur*) and Singi (*heteropneustes fossilis*). These fish are used exclusively for household consumption and cannot be monetized.

However, since the 2000s, ponds have been dug on cropland for various purposes. Some households have begun converting cultivated land previously used for farming into ponds to raise fish for income. These ponds are called Pukuri, and are separated from the surrounding ecological environment on all sides by embankments 1 to 1.5 m high (Deka and Bhagabati 2015, 40). Instead of collecting wild fish, Pukuris are used for aquaculture by filling them with fish fry. The most commonly farmed fish species include Rou (*Labeo rohita*), Mirika (*Cirrhinus mrigala*), Bakuwa (*Gibelion catla*), and silver carp (*Hypophthalmichthys molitrix*). These fish fetch high prices in the market, and some can sell for more than Rs 500 per kilogramme.

Croplands that are converted to fish ponds usually share some common characteristics. First, cultivated land is selected that is relatively low lying. Some low-lying cultivated land is flooded during the rainy season, making drainage difficult. Since such land is not suitable for rice cultivation, it is readily converted into fish ponds. In addition, land plots of a certain size are usually selected for conversion into ponds. In some cases, an entire plot of cultivated land is converted into a fish pond, and in others, rice is grown on the remaining parts. For households that have several cultivated areas in the village, the areas near the residence are usually selected for conversion into fish ponds. The reason is that the fish might be stolen from the pond at night and the owners can monitor the theft of fish ponds near their residence.

The conversion of cultivated land into fish ponds by agricultural households has economic reasons: fish farming requires less labour than rice

Figure 9 Ponds Created in Cultivated Lands

farming and offers higher profits. Households that lose labour due to the death of husbands or sons sometimes cannot maintain their rice fields and therefore convert them to ponds. Unlike rice farming, where income is volatile, income from fish farming is stable and relatively high. In households where sons do not have regular jobs, fathers sometimes build fish ponds to provide a stable income for their sons who will inherit the land.

However, building fish ponds can be difficult and costly for individual farmers. A landowner first turns to a contractor, a Tikedar. During the rice growing period in the rainy season, Tikedars bring tractors to cultivate the farmland for seeding. However, during the dry season, there is no demand for rice cultivation, so these individuals are usually engaged in road construction and housing projects. Tikedars use heavy machinery to excavate the cultivated land. If the landowner wants to keep the excavated soil, he has to bear the cost of excavation. However, if the landowner does not need the soil, the contractor can buy it on the spot, so excavation costs often approach zero. In this way, even households with limited funds can excavate farmland and convert it into a fish pond.

For landowners, building fish ponds is more advantageous than converting them to forest land, not only in terms of financial cost, but also in terms of labour cost. In order to profitably sell the fish raised in the pond, the fish must be caught and transported to a market. Catching fish in the pond is more labour intensive than harvesting rice. The Hindus in the village catch fish for their own consumption, but rarely offer them for sale for religious reasons.

However, Muslims living in neighbouring villages play an important role in converting cultivated land into fish ponds and transporting fish to market (figure 10). The Muslim traders not only catch fish but also sell eggs and fodder to help Hindu landowners start fish farming. It is said that in the past, the Muslim earth diggers (Mati Kata) dug the ponds in the rice fields by hand instead of using machines. Often, Muslim fish traders (Mach Bepari) living in the surrounding villages are invited to collect fish from Hindu ponds. Currently, a group of 5 to 6 traders live in the area around Muktapur village. When they are called, they use a huge net that covers the entire pond to catch the fish, and the landowners are paid on the spot according to the weight of the fish caught. In this way, the landowners can earn an income from the fish ponds with little effort.

Muslim fish traders tend to have many male children. Therefore, each son inherits relatively little arable land from his parents and cannot support his family by farming alone. They can earn an income by catching and selling fish in Hindu villages. In the past, they used to catch fish only in the dry season when the Kals dried up. However, as the number of Pukuri ponds in the cultivated areas has increased, these Muslim fishermen visit many villages throughout the year with their nets on bicycles.

Conclusions

In this chapter, the living spaces and livelihood patterns of various ethnic groups living in the Brahmaputra Valley in Assam were studied. In Lakhimpur district, the different ethnic groups live in different ecological environments and their cropping patterns also differ according to the micro-ecological environment, especially the amount of surface water. These differences allow the different ethnic groups to interact with each other through the exchange of livestock and agricultural labour. Similar geographic cooperation exists between Hindus and immigrant Muslims in Nagaon district. The living spaces of these communities are geographically separated by the availability of water. Their land use patterns are also different. Nevertheless, they rely on each other to maintain their

Figure 10 Muslim Fishermen Around Asamiya Villages

economic relationships. In Kamrup district, the living spaces of indigenous Hindus and other ethnic groups are also not clearly demarcated. In this district, contact between different ethnic groups occurs more frequently than in the other two districts. In addition, farmers in the indigenous Hindu villages have recently lost motivation to continue rice cultivation for various economic reasons; the labour and skills of neighbouring Muslims have enabled the conversion of cultivated land for other purposes.

The various ethnic groups living in the Brahmaputra Valley have different knowledge and skills regarding the use of local natural resources. Although rice-based peasant agriculture in Assam is overall low in productivity, farmers in the region compensate for production deficits by exchanging labour and agricultural technologies with other ethnic groups. Integrating the knowledge available in the region can help locals to sustain their daily livelihoods without the use of modern technology or public funds. The traditional wisdom of geographical cooperation has also enabled different ethnic groups to avoid conflicts with each other. The above micro observation shows the unique economic development path

followed by the multi-ethnic society in Assam, which promotes sustainability rather than productivity by sharing the diverse knowledge of resource utilization among the ethnic groups. Since the Brahmaputra Valley originally has abundant natural resources, it is reasonable to assume that farmers in the region do not need to further increase their productivity to sustain their livelihoods.

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4

The Transformation of the Migratory Strategies of the Rural Population During the Second Half of the Eighteenth Century: A Case Study of the Royal Town and Estate of České Budějovice (Budweis)

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Mobility Controls and Migration Research

Czech demography defines migration as 'spatial movement of individuals across any border (mostly administrative) connected to changing place of residence, whether short-term, long-term, or permanently' (Kalibová, Pavlík and Vodáková 2009, 66). Historical demography defines it as 'geographic change' or 'spatial movement' (Maur 1978, 145–52). If it is permanent, it is migration; if it is brief (or temporary), it is called mobility.

Czech historians began to study the mobility of the early modern Bohemian rural population in the context of the so-called 'second serfdom' (Míka 1957; Válka 1958). The first efforts to limit mobility in the Bohemian lands can be traced to the period after the Hussite Wars in 1434. Some serfs experienced problems in proving their allegiance. The Bohemian Estates (the national parliament) dealt with this issue in the second half of the sixteenth and at the beginning of the seventeenth century. The effort to limit the mobility of serfs can also be demonstrated using the legal regulations that were issued for each estate by the manorial offices (Černý 1930, 89, 345, 347, 351).

The proceedings of the Bohemian Estates between the end of the Hussite Wars and the first half of the sixteenth century were analysed

Murayama, S., Ž. Lazarević, and A. Panjek, eds. 2024. *Changing Living Spaces: Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present*.Koper: University of Primorska Press.

by Alois Míka, who examined the circumstances in which release letters were issued by overlords to their serfs (Míka 1960, 187–226). As a Marxist historian, Míka regarded the absconding of serfs from their overlords as a form of class struggle carried out by the rural population. Another Czech historian, Josef Petráň, analysed the resolutions of the Bohemian Estates from the second half of the sixteenth century and the beginning of the seventeenth century, using them to study the control of serf mobility (Petráň 1957; 1964, 188–208). Josef Petráň reached a compromise conclusion: 'there were overlords who tolerated somebody else's serfs on their manorial estates – and also the possibility for their own serfs to leave for another estate' (Petráň 1964, 208). Czech Marxist historians debated whether absconding represented a form of class struggle. Josef Macek called the absconding of serfs an 'individual and hidden form of class struggle during feudalism'. By contrast, Arnošt Klíma ruled this out 'for its apparent passivity and the individual attitudes of the absconders' (Klíma 1955, 56; Macek 1957, 299–301; Toegel 1960, 191). Most historians of the Marxist era strove to 'portray a hard and laborious life of our ancestors, common and brave individuals … protesting in a distinctive and sometimes determined way against their feudal oppressors and exploiters' (Šindelář 1949; 1981; 1985, 72).

A new perspective on the issue of the Bohemian 'second serfdom' was formulated by some members of an international research project entitled 'Social structures in early modern Bohemia' which was carried out between 1996 and 1999.[1] For the English-speaking scholarly world, the issue of the 'second serfdom' in the Bohemian lands has been examined in the work of Sheilagh Ogilvie, who had participated in this international research project (Ogilvie and Edwards 2000; Ogilvie 2005; Klein and Ogilvie 2016; Šouša 2018).

Social Stratification

At the top of the Bohemian village hierarchy were the 'peasants' (Czech: sedlák or rolník, German: Bauer), who held enough arable land to subsist entirely from agriculture, paid the highest manorial dues and state taxes, and owed the largest quantity of forced labour to the land-

1 Cerman and Luft (2002, 353–67). In the conclusion of the latter book there is a complete bibliography of publication output from the research project 'Social Structures in Early Modern Bohemia' from 1996 to 2004. You can find basic information about this project, including the list of all publications, on the website.

Figure 1 The Region of South Bohemia and the Actual Borders of the Czech Republic (Map By Václav Černý)

lord, often with draft animals as well as human workers. Below the peasants came the 'smallholders' (Czech zahradník, German Gärtner) who held some arable land but not enough to subsist from, paid lower dues and taxes, and owed forced services to the landlord with human labour only. Finally, the 'cottagers' (Czech chalupník, German Häusler) held only their own cottages and gardens, paid minor dues and taxes, and owed lighter (though increasing) labour to the overlord. All other Bohemian serfs lived in households headed by members of these three official strata, as family members, servants, or inmate-lodgers (Czech podruh, German Hausleute or Hausgenoßen). A few outsiders, mainly freemen (Czech svobodník, German Freibauer) and Jews (Czech žid, German Jude), also lived in Bohemian villages under special 'privileges' granted by the landlord (Klein and Ogilvie 2016, 505).

Release Letters as Historical Sources

A serf was legally subject to the estate on which he was born. If somebody wanted to leave the estate legally and permanently, they had to obtain the permission of the lord of that estate. This process generated 'release letters' or 'letters of discharge' (figure 2), which are the main source of evidence used in this article.[2] The Czech term for these docu-

2 The source and its use were described by Maur (1978, 67) and Čáňová (1986, 151–2).

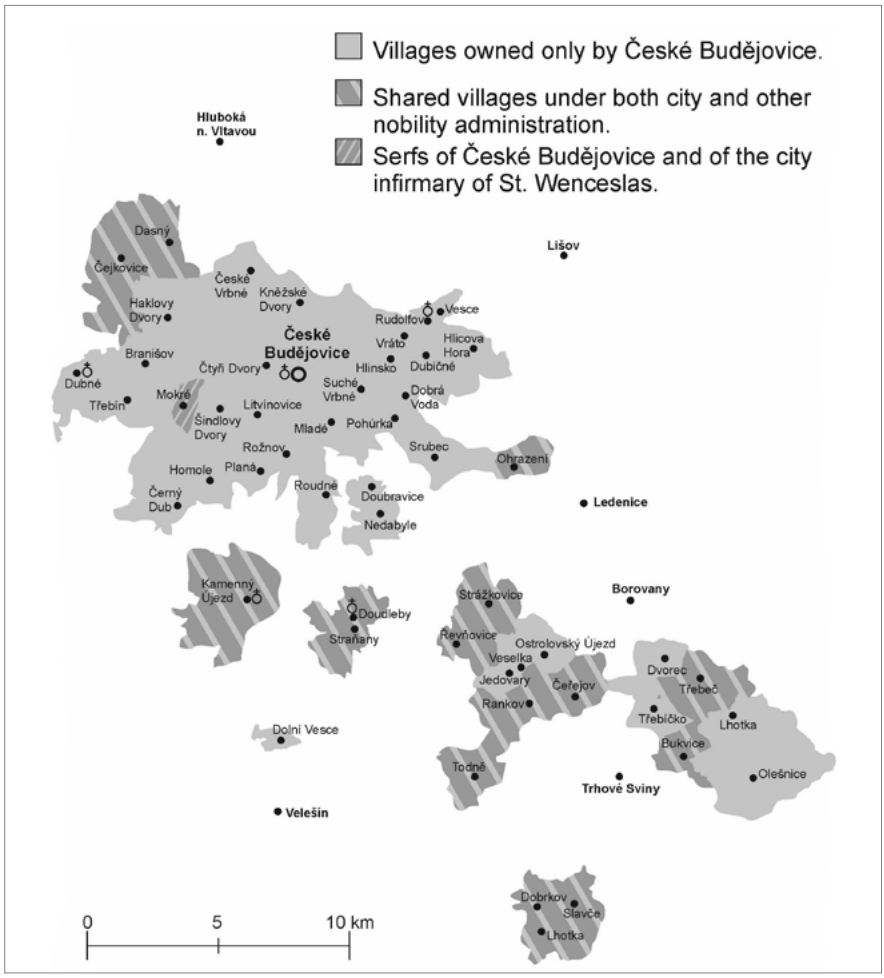

Figure 2 The Microregion: The Estate of České Budějovice after 1750 in Detail (Map by Václav Černý)

ments is zhostní list (short version zhost) or výhostní list (short version výhost),[3] while the German term is Entlassungsbrief or Losbrief, sometimes Wegloßbrief.[4]

3 In nearby Poland, matters involving serf migration were handled in a similar manner. In both countries, a term derived from Roman law was used: manumissio (German Manumissionsbrief) to describe the act of a landlord releasing one of his serfs of his own accord (Trojanowska 1987–1988).

4 In Lower Austria it was called Dimissionschein or Entlassungsschein (Feigl 1998, 43, 46, 50).

As a result of the military events and mortality crises (such as plague, famine and other epidemics) which occurred in the Czech Lands[5] during the Thirty Years' War (1618–1648), an estimated 1.25-2 million people died. Afterwards, many landlords' estates lacked population and manpower. This led to increased efforts by landlords to tighten control over serfs' mobility. Gradually, this generated a set of documentation which included not only release letters but also serfs' applications giving their reasons for wishing to emigrate, and sometimes letters explaining the circumstances under which migration would take place if permission was granted.

Labour scarcity after the Thirty Years War thus motivated landlords to exert greater control over people's geographical mobility in the framework of the 'second serfdom'. Until the abolition of Bohemian serfdom on 1 November 1781, there was a rule that any serf who wished to leave his or her lord's estate permanently (e.g. for marriage) had to obtain a permit from the lord. Most release letters authorized serfs merely to move from one lord to another, not to be altogether free. If a serf wanted to marry a freeman (somebody who was not the serf of any lord), take over a piece of real estate in a town, or seek employment elsewhere without specifying a target destination, he or she had to be set free. Apprentices and journeymen who wanted to learn a craft or gain experience in their occupation required a sort of recommendation letter in order to obtain a temporary release from serfdom. Among individual estates, exchange of serfs took place on the principle of reciprocity. On the estate of České Budějovice in the second half of the eighteenth century, it was relatively rare for the overlord to refuse to release serfs; refusals took place only in rare cases, for example in the case of a craftsman who would be hard to replace. This finding cannot be generalized to the entirety of Bohemia, where the situation differed across regions and time-periods. On the estate of Frýdlant between 1583 and 1692, for instance, 21 per cent of applications for migration or emancipation permits were rejected by the overlord (see Ogilvie

5 The 'Czech lands' or the 'Bohemian lands' – in a historical context, Czech texts use the term to refer to any territory ruled by the Kings of Bohemia, i.e., the lands of the Bohemian Crown as established by Emperor Charles IV in the fourteenth century. This would include territories like the Lusatias (which in 1635 fell to Saxony) and the whole of Silesia, all ruled from Prague at that time. After the conquest of Silesia by the Prussian king Frederick the Great in 1742, the remaining lands of the Bohemian Crown – Bohemia, Moravia and Austrian Silesia – have been more or less co-extensive with the territory of the modern-day Czech Republic.

2005, 81). The number of release letters granted on the estate of Pardubice in the seventeenth century (1617-1652, 1654-1690) was also low and fluctuated a great deal from year to year (see Maur 1983, 17). But on the estate of České Budějovice in the second half of the eighteenth century, which was a period of plentiful population and high labour availability, most applications were granted.

The research presented here analyses release letters issued between 1750 and 1787. Why this particular period? Release letters already began to appear on the estate of České Budějovice in the early eighteenth century, but did not occur en masse until after 1750, when their number trebled compared to the preceding period. In 1781, serfdom was abolished in Bohemia and release letters lost their importance, but the records continued to be kept until 1787. The archival documents used here are held in the State District Archives in České Budějovice – České Budějovice Municipal Archives.[6] This compact collection of records includes not only release letters, but also serfs' applications.[7] The personal applications made by would-be migrants or their relatives (such as parents or intended husbands) make it possible to analyse the context and extent of migration in the rural population.[8] The manorial lord could also request the release of a serf with a letter of intervention, after prior agreement.

A certain sum of money had to be paid to the landlord for any individual to be released from serfdom. Most of the documents used were written in German,[9] which dominated public records in Bohemia in the second half of the eighteenth century. Czech-language applications by the Czech inhabitants occur only sporadically, with three surviving cases in the documents used for this study. Only rarely (in two cases) do we also find release letters in Latin; these were issued by the Catholic Church.

6 Archive 'release letters' consist of two parts: SDAČB, TA, Ss, Tematická řada, Obyvatelstvo, listy propouštěcí (1676–1787) and SDAČB, TA, Ss, Poddanské vsi.

7 These sources were brought to attention by Kubák (1964).

8 The complex analysis was done by Grulich (2018).

9 German settlers appeared in Bohemia and Moravia as early as the twelfth and thirteenth centuries. Most towns that became economic centres were founded by German colonists. In big towns, the German population predominated until the second half of the nineteenth century. The Renewed Land Ordinance (1627, 1628) established German as the second official language in Bohemia and Moravia and declared it to be of equal status to the Czech language. Czech still predominated in the countryside, but German prevailed in towns and among higher social strata.

The release letters examined here do not, unfortunately, document all cases of migration in the area under study. Serfs of the estate of České Budějovice were allowed to migrate without permission if the migration took place within one or more estates of the same overlord. The release letters preserved in the České Budějovice City Archive only document bi-directional 'exchanges' of serfs – both inwards and outwards – between the estate of České Budějovice and those surrounding estates that were owned by other landlords. A compact collection is represented here by the release letters issued on the occasion of a serf's marriage. The Catholic Church was not allowed to conduct a wedding between individuals from outside the estate of České Budějovice unless they identified themselves clearly. When an inspection was carried out, it was documented by an annotation in the marriage register, which recorded the feudal allegiance of the couple. It is very unlikely that someone with dubious feudal allegiance would have been able to enter into a marriage.

Structure and Use of the Research Database

In the Bohemian context, release letters have not yet been regarded with great interest. In the past, historians have occasionally drawn attention to their existence, but have never analysed them using a well-organized database. This study is the first attempt to undertake such an analysis. It began by creating a Microsoft Access database which brougt together all available information about the context of each serf's release from serfdom. First, the dates of the beginning and end of the release procedure were entered. This was followed by the would-be migrant's personal information: their first name, surname, sex, marital status, and occupation.

The database also included the would-be migrant's place of origin and their place of residence after the end of the migration. Individual localities were entered into web search engines (*Google Maps* or *Mapy.cz*.) This made it possible to determine the distance which the migrants moved. The place of origin and the target destination were mostly verifiable when a serf transferred from one overlord to another. The type of the original and final settlement – whether it was a town, suburb, village, or manor – was also entered into the database. When a serf was given his or her freedom, only information on the original location was known, so the distance of migration remained unknown.

Two-thirds of all documented cases were associated with a marriage, so the data on the migrant could be checked using the marriage registers. The basic sources here consisted of the parish registers of the St. Nicholas

Church in České Budějovice. These were used to identify cases of migration that arose in connection with marriages. Besides the place of origin, these registers also recorded the place of temporary residence of the groom, the bride, and their parents. On the basis of these parish registers it was possible to trace the change of overlord, because feudal allegiance was noted down for every married couple. Each person was identified via allegiance to his or her own family and to the overlord.

Cases of serf migration were analysed for the whole estate of České Budějovice, which consisted of one town (České Budějovice, see figure 1), one small mining town (Rudolfov), and 48 villages (see figure 2). Information about migrants was sought in the records for one urban parish and 18 rural parishes. Additional information on the migrant's marriage partner (first name, surname, marital status, social status, and occupation) was obtained from the marriage registers.[10] In the case of younger or dependent persons, data on their parents were also transcribed. The marriage registers made it possible to obtain information that was not included in the release letters.

The Estate of České Budějovice – Population And Economy

This study focuses on the migration strategies of individuals who were serfs of the estate of České Budějovice, located in the south of Bohemia (see map 1). The year 1751 saw the formation of the administrative region of Budějovice and the establishment of the so-called regional office. The town also became the seat of the Bishop and the centre of the newly established Diocese of Budějovice in 1785. So it came about that the municipal, regional, and episcopal administrations were located in the same place. The spatial expansion of the town is evidenced by the increasing number of houses – from 494 in 1757 to 632 in 1789. Exact population numbers do not survive, but estimates based on the number of communicants suggest that the town had 4,000 inhabitants in 1750 and 5,400 in 1785 (Grulich 2013, 122–5).

10 These parish registers are held in SRAT, PRRC, PD (Borovany 3, 10; Boršov and Vltavou 3, 4, 15; České Budějovice 7, 8, 13, 14, 56, 57, 58, 59, 60, 82, 91, 93, 97, 98; Černice 5; Číměř 10; Dobrá Voda u Českých Budějovic 19, Dolní Slověnice 4; Doudleby 2, 3; Dubné 2, 3, 7; Hluboká and Vltavou 9, 24; Horní Pěna 11; Hosín 14; Jílovice 5; Kamenný Újezd 25, 26; Lednice 1, 2, 3; Lišov 3; Mladošovice 4; Nákří 2; Němčice 5; Nová Bystřice 19; Pištín 13; Rudolfov 3; Římov 4; Soběnov 3; Štěpánovice 1, 6; Střížov 3, 4, 19; Trhové Sviny 14, 15, 16; Velešín 4, 9; Žumberk 4, 5). For digital copies see Digital Archives (n.d.).

In the heart of the town, the area enclosed by the town walls, there mainly lived families of craftsmen and merchants. They were not serfs but freemen. The town was a centre of production and trade. In 1757, 237 craftsmen were registered there. The local economy mainly focused on textile production (the town had 18 woollen-weavers, 13 linen-weavers, and 10 stocking-makers) and food production (there were 28 butchers, 15 bakers, and 15 brewers) (Chalupa et al. 1964, 116–7). The town also profited from the salt trade. Salt from Upper Austria was imported to České Budějovice and then transported on boats down the River Vltava as far as Prague. Approximately two-thirds of the town's population lived from crafts and trade. Only one third of the town's population owned land in the surrounding countryside, comprising a total area of 931 hectares in 1757. The immigration of serfs from the countryside boosted the growth of three suburbs. These free rural labourers found employment as lodgers in the buildings of the town's demesne farms.

Immigration and Emigration

The surviving records for the period 1750–1787 yielded a total of 1,073 applications for release from serfdom.[11] Of this total, immigrants slightly outnumbered emigrants. There were 567 immigrants (52.8 percent of the total), which included serfs who transferred over from other lords to the royal town of České Budějovice. There were 506 emigrants (47.2 percent of the total), in which a serf of the town of České Budějovice was granted his or her freedom (284 cases) or was transferred to another lord (222 cases).

The mutual release of serfs between individual overlords followed the principle of reciprocity. There is a widely held view that manorial offices, in order to maintain mutual balance, would release equal numbers of serfs. However, the present study found that the numbers of individuals released into the lordship of the town of České Budějovice was higher than the numbers of outgoing individuals. For example, there were 91 applications for release from serfs from the estate of Český Krumlov to transfer to the lordship of the town of České Budějovice. But only 15 applications for release (one-sixth that number) were made for transfer in the opposite direction. The greatest interest in change of lordship in favour of the town of České Budějovice was evinced by serfs of the Vyšší Brod monastery (on the estate of Komařice). From this estate, 96 serfs

11 From the perspective of historical demography, a representative sample is a sample having more than 1,000 units, see: Maur (1978, 72–6).

were ceded to the lordship of the town of České Budějovice, whereas in the opposite direction it was only one-third that number (32 serfs). The clear superiority in the numbers of immigrants relative to emigrants provides evidence that the estate of the royal town of České Budějovice was an attractive target destination for migrants.

What do these findings tell us about the 'second serfdom'? Marxist historiography traditionally emphasized the binding of serfs to the land. This study does not provide evidence of complete restriction of serf mobility by manorial lords. Nevertheless, we can observe efforts by lords to exert control over migration. Temporary mobility by serfs was not made conditional on the granting of a release letter. The assumption at the time was that serfs would earn money to support themselves and then after a time would return home. It was mainly in the case of the town and suburbs of České Budějovice that an individual who wanted to undertake a long-term working sojourn away from their estate of origin was not legalized or organized until they got married.

It was only on the estate of Komařice, which was the property of the Cistercian monastery of Vyšší Brod, can we observe a clear effort to get back eight serfs who were working for wages on demesne-farms near the town of České Budějovice in 1753. Referring to the 'Renewed Land Constitution of 1627' (Jireček 1888, 456–566), the Vyšší Brod monastic officials demanded that their serfs not be employed on the estate of České Budějovice without the permission of the lord. In reality, the interest of the estate of České Budějovice in obtaining an outside labour force dominated over observance of the legal requirements. Out of the total of 1,073 applications for release, only eight applications were rejected. Release from serfdom was denied to those who first absconded and then applied for legal release from serfdom. The reason for refusal by the lord may have been that he wished to compel the individual to perform compulsory military service or to retain an individual who specialized in an occupation which was important from the viewpoint of the manorial economy.

Period of Processing Applications

Applications for release from serfdom were dealt with all year round. Most of them were handled during January (176 cases, comprising 16.4 percent of the total) and October (152 cases, comprising 14.2 percent of the total). Since most applications were related to marriage, the connection to the religious year is evident (Grulich 2000, 79). People were not allowed to enter into marriage during Advent (December) or Lent (March

and April), so they submitted their applications in advance of those times of year (Dokoupil et al. 1999, 82–3). There was a strong tendency to hold the wedding ceremony in the village of the bride's parents.[12] Marriages of individuals who had not yet been released from serfdom were very exceptional. The feudal allegiance of both members of a married couple had to be identical. It was unthinkable that a husband and wife would have different overlords. When a woman gave birth to a child before obtaining a release letter, her existing feudal allegiance automatically passed to the offspring.

In one-third of all the cases analysed (366, comprising 34.1 percent of the total), it was possible to determine the period between the submission of an application and the issuing of a release letter. When a serf was transferred to a neighbouring estate, his or her application was handled positively within a few days, a maximum of one week from submission of the application (244 cases, comprising 66.7 percent of the total). The duration of the release procedure, however, could be as long as 14 days (46 cases, comprising 12.6 percent of the total) or even 4 weeks (51 cases, comprising 13.9 percent of the total). This situation might have been caused by complications in the reasons for treatment of the application or by difficult communication between individual overlords, which had to overcome long distances. It was exceptional for the handling of an application to take longer than one month (25 cases, comprising 6.8 percent of the total). The short duration of the release procedure, which can be demonstrated in most of the examined cases, testifies to a responsive attitude of manorial lords to most of the cases analysed in this study.

Personal and Family Status of Migrants

Among the applicants for release from serfdom, most were individual persons (1,004 cases, representing 93.6 percent of the total). Women (594 cases, comprising 55.4 percent of the total) outnumbered men (410 cases, comprising 38.2 percent of the total). The same is when broken down by marital status: unmarried women (550 cases, comprising 51.3 percent of the total) outnumbered unmarried men (378 cases, comprising 35.2 percent of the total). These proportions must be considered against the background of the fact that most of the release letters were issued in connection with marriage. From the viewpoint of Bohemian society in that

12 The wedding ceremony was held in the village of the bride's parents not only in the Czech lands, but in other areas too, for example in France, see: Hayhoe (2016, 22).

time, a man was supposed to be able to support a family. At the moment of his marriage he was expected already to have a stable income based on tenure of a rural landholding, a craft workshop, or a commercial enterprise. This was possible provided that the man owned some property in a particular area. Under these circumstances, it was logical that a migrating woman would follow her new husband to the locality where the couple would then settle.

The low number of widowed persons applying for release letters can also be explained by property relations. In this case as well, the place of residence was more often changed by widows (37 cases, comprising 3.4 percent of the total) than by widowers (11 cases, comprising 1.0 percent of the total).

Situations in which several persons applied for release from serfdom in a single release letter were quite rare. Among the applicants were childless couples (12 cases, comprising 1.1 percent of the total) and married couples with between one and six children (30 cases, comprising 2.8 percent of the total). It was very exceptional to find applications for change of feudal allegiance by a single person accompanied by a child, a widowed person, or an unmarried mother (25 cases, comprising 2.3 percent of the total). Sibling groups were also not very common among migrants.

Distance of Migration

The distance between the place of origin and the target destination could be established in about three-quarters of all cases (821, comprising 76.5 percent of the total). Some serfs applied to change their feudal allegiance but then actually remained in the same locality; there were 67 such cases, comprising 6.2 percent of the total. This situation transpired because 14 villages of the estate of České Budějovice were divided into multiple sections, which were held by different overlords. This meant that serfs in that locality were shared among two to six overlords. The most intensively divided village was Kamenný Újezd. Serfs from this village were shared among the town of České Budějovice, the estate of Český Krumlov, two monasteries (Český Krumlov and Vyšší Brod), an archdeaconry (Český Krumlov), and a priest via the *fabrica ecclesiae*. In localities in which serfs were shared among several manorial authorities, a serf had to apply for a release letter even if he or she was only moving from one house to another within the same village.

Although villagers would sometimes move to places far away, in most cases they migrated short distances (Hayhoe 2016, 25–9, 59–63). When

serfs migrated, their type of settlement tended to remain the same, that is, they typically moved from one village to another. This was true of three-fifths of all cases of both emigration and immigration. Serfs in rural areas searched for partners or jobs in the immediate neighbourhood of their locality of residence. More than one-fifth of all individuals applying for release letters (224 cases, comprising 20.9 percent of the total) migrated only to the nearest village, that is, within a distance of 1-5 km. A similar proportion of cases involved migration within a distance of 6-10 km (192 cases, comprising 17.9 percent of the total) and 11-15 km (130 cases, comprising 12.1 percent of the total).[13] In general, the mobility of the rural population typically took place within a range of 20 km, the return trip to which could be covered on foot within one day. Spatial mobility within a distance of 1-20 km was involved in almost three-fifths of all recorded cases (611 cases, comprising 57 percent of the total).

The frequency of migration decreased with increasing distance.[14] A bidirectional exchange of serfs can be observed between the territory administered by the town of České Budějovice and the surrounding manorial estates, monasteries, towns and parishes. As far as long-distance immigration was concerned, only one tenth of immigrants to the estate of České Budějovice (53 cases, comprising 9.4 percent of the total) came from outside the Budějovice region. People more often came from more distant regions of Bohemia (37 cases, comprising 6.5 percent of the total), compared to Moravia (8 cases, comprising 1.4 percent of the total) or Upper and Lower Austria (6 cases, comprising 1.1 percent of the total).[15] Serfs emigrating from the estate of České Budějovice, on the other hand, preferred the capital city of Vienna to provincial Prague. Even though Upper Austria is not far from České Budějovice, the rural population tended to migrate to Lower Austria, where Vienna is located. Men migrated in lower numbers than women, but over greater distances.

13 'Micromobility', which was a part of everyday life in rural society, is the term given to migration within a range of 14 km from the place of residence, see: Andersson (2018, 83–9) and Wyżga (2019, 195–262).

14 It would be extremely interesting to analyse migration across language 'borders', because in the proximity of the town of České Budějovice there were villages with both Czech and German inhabitants. A more precise distinction between the Czech and German nationality emerged as a result of growing nationalism after 1848.

15 The issue of immigration and emigration between the Czech and Austrian lands has been addressed in Komlosy (2003, 150–205, 282–92).

Migrants' Reasons for Relocating

It is very unlikely that the rural population wandered randomly around the country. If a serf applied for release from serfdom, he or she already had an idea about what they wanted to do by migrating.[16] It was possible to give only one reason in the application, but to increase one's chances of a positive response, it was not exceptional for an applicant to provide multiple arguments (Grulich 2019, 153–66).

Marriage

The key to understanding migration in this region of South Bohemia between 1750 and 1787 is marriage, which was the reason for migration in nearly two-thirds of applications (677 cases, comprising 63.1 percent of the total).[17] The reason is simple – labour mobility was typically temporary, so rural people changed their place of sojourn without obtaining the prior consent of the landlord. There was no need to obtain a release letter for short-term labour mobility. The situation got complicated when a serf found a life partner in his or her new place of work. Entering a marriage in the marriage register required writing down the serf's feudal allegiance. Marriage then legalized a person's present sojourn.

Marriage migration was usually associated with the process of taking over a landholding arising from the retirement of the parental generation. It was also sometimes connected with release from the army. Through the medium of marriage, particularly in the case of the town or its suburbs, a long-term working sojourn away from the individual's locality of origin was legalized. Among the reasons for entering into marriage given in serfs' applications were death of their parents, poverty, employment opportunities, and the related earning of a livelihood.

Death of Parents

The second most important argument used in applications for change of feudal allegiance was the death of parents.[18] Here it is necessary to bear in mind that in Bohemia during the second half of the eighteenth century, the age of death for adults varied between 54 and 57 years (Fialová

16 Research into reasons for migrating is limited by the richness of the sources, see: Hayhoe (2016, 101–24) ('Migrants' Reasons for Moving').

17 Marriage migration in the parish of České Budějovice (1750–1824) was analysed by Josef Grulich (2006).

18 The number and age of orphans have been examined in Skořepová (2016, 115–20).

et al. 1996, 190). For girls, the death of parents was associated with the necessity to search for a life partner and enter into marriage. Parentless adolescent boys preferred to enter military service, which represented a promise of financial security. In some cases, the death of parents is mentioned in connection with the necessity to learn a craft (as an apprentice) or gain practical experience in it (as a journeyman). Another alternative offered to boys and girls was employment as servants or labouring lodgers.[19]

Employment

Employment is mentioned not only in connection with death of parents. It was also linked with the pursuit of economic security, which was in turn associated with searching for a life partner, entering into marriage, entering into service, legalizing one's residence, incurring extraordinary expenses, enlisting in the army, obtaining a livelihood, or taking on a landholding.

Employment was directly related with entering into service. The release letters give evidence of some cases in which a young man from a village, thanks to his skills or education, was employed by a lord – a nobleman, a military commander, county marshal, or mayor. That sort of service involved a very different scope of employment from the duties performed by a servant or labouring lodger.[20]

'A Softer Job'

Applications for release letters sometimes included requests for a 'softer job.' Agricultural work was physically demanding, and some individuals tried to avoid it by adducing hope of lighter work was a reason sometimes given by younger men applying for release into apprenticeship. According to the orphan registers, the age of apprentices varied between 5 and 22 years. Among the most popular occupations were mason, tailor, carpenter, and smith. Boys who wanted to learn crafts usually entered into apprenticeships with master craftsmen in the town of České Budějovice itself. There are also isolated cases in which application was made for release to study at the Piarist Gymnasium (a grammar school)

19 Guilds provided networks of support for traveling male journeymen, but they strictly controlled craft work of unmarried females, including servants, see: Ogilvie (2003, 115; 2019, chapter 5).

20 More about servants and labouring lodgers can be found in Grulich (2008, 203–20).

in České Budějovice. Rural girls who did not wish to work in agriculture sought jobs as maids in urban households. Women outnumbered men in the urban population because of the large number of female household servants.[21]

Recruiting and Military Service

The period under analysis here (1750–1787) included the Seven Years' War (1756–1763), which generated an increased demand for soldiers. Many recruits came from the rural population. In their applications for release from the estate, would-be soldiers usually announced that sooner or later they would leave the estate to serve in the army.[22] In some cases, a father applied for the release of a son in the son's absence. Men who were serfs of the town were mostly recruited by the artillery, whose barracks were situated in České Budějovice. The army valued young men who able to practise certain crafts (such as smiths, wheelwrights, and saddlers). Enlistment in the army is observed in connection with the death of parents and the incurring of extraordinary expenses. It was expected that the individual's financial obligations would be covered by the regular pay of a soldier. However, not every villager was interested in military service. In a number of cases, a man who had been designated to serve in the army was given a deadline by which he was required to secure a substitute to take his place.

From the Army to Civilian Life

Particularly after the end of the Seven Years' War (1763), there are also frequent cases in which a soldier returned to civilian life.[23] If he had not been released from serfdom before his enlistment in the army, he might apply for release after his return home. This took place in connection with a marriage, transfer of parental property, or completion of apprenticeship. There are also sporadic examples in which a soldier prolonged his

21 The labour migration of women – unlike that of men – is often neglected in historical sources and contemporary statistics, see: Hahn (2008, 85–98).

22 'The 'fiscal-military' state […] converted taxpayers' money into mercenaries' salaries, thereby contributing to the mobilization of wage labor and its spatial mobility' (Lucassen and Lucassen 2009, 366).

23 By using lists of serfs from the estate of Protivín (1780–1830), Václav Černý demonstrated that between one-fifth and one-quarter of recruits had died during military service. He also documented that veterans sought to get married, take over a landholding and practice a craft after their return (Černý 2017, 23–37, 34–6).

military service several times. The return home took place within an interval of 7 to 21 years from enlistment. Some of the returnees resisted carrying out hard agricultural work, instead seeking to learn a craft and practice that occupation.

Old and Sick People

A serious problem was represented by the need to care for old and sick people. Serf applications show that the closest relatives were held responsible for providing for people in illness and old age. In such cases there were two possibilities. Ageing individuals sometimes applied for release letters that would enable them to live with offspring elsewhere, who promised to take care of them. Alternatively, adult offspring might apply for a release letter so they could return home to help their parents. The desire to take over ageing parents' property was another motivation for applying to return home to provide care in old age. In Bohemia until 1787, the youngest son was preferred as heir to the landholding, whereas after that year it was the eldest son who was supposed to inherit.[24]

Better Livelihoods for Young and Old

Other documents preserved in connection with release letters provide evidence not only of care for ageing parents, but also of efforts to provide for physically handicapped children. Most frequent were applications from parents who connected the change of their place of residence with the possibility of providing a better subsistence for such children. In several cases they explicitly stated that they would be able to live from begging in another locality.[25]

Scholars should scrutinize the reasons serfs gave on these applications. In order to obtain the issuance of a release letter and, above all, to avoid the fee for the issuance of the document, some exaggerated their age, sometimes even claiming to be over 100 years old. Advanced age was combined with illness, difficult living conditions, and alleged poverty (Grulich 2007, 271–5). In the case of men, poor physical condition could be further emphasized by a note stating that the man in question could not be drafted into the army. Many applicants tried to get permission for a 'soft job' by referring to their poor health. The above-mentioned argument

24 The development of the Bohemian law of inheritance is addressed in Velková (2009, 150–5).

25 Landlords were unwelcoming toward vagrants and beggars and punished them by imprisonment, see: Zeitlhofer (2014, 165).

was often used when someone wanted to learn a craft or study in the Piarist Gymnasium (a grammar school).

Conclusion

In the second half of the twentieth century, Czech Marxist historiography strove to paint a static picture of rural society,[26] deliberately representing a picture of the 'Dark Ages' in which serfs were fully occupied by forced labour services for their landlords, so that they were permanently tied to the land. Some versions of the concept of the so-called 'second serfdom' assume that the nobility and gentry completely dominated their serfs and made use of a variety of laws issued by the provincial authorities and ordinances issued by the nobility to enforce their exploitation of the serfs. Because of these laws and ordinances, it was argued, the spatial mobility of serfs was strictly controlled and intentionally restricted. From a Marxist perspective, the flight of the serfs was seen as one of the forms of class struggle.

However, recent studies on the migration and mobility of the rural population show a completely different situation. From the sixteenth to the eighteenth centuries, manorial authorities did not enforce effective control over their serfs did not completely limit migration and mobility in the countryside. Consequently, counter to the laws of the provincial authorities and the ordinances of the nobility, serfs left their estates of origin without permission in order to secure better livelihoods or higher earnings. If the lord to whom these serfs were subject learned by chance about their sojourn elsewhere, the general lack of manpower made it difficult to put them on trial for illicit departure from the estate. Usually, once their absence was discovered, their stay in their new location was legalized or they were required to return home but were not punished.

In a situation in which the whole area of South Bohemia and even some villages were divided among several different landlords, the noble landlords had no choice but to grant almost all applications by their serfs for a change of allegiance or release from serfdom. The idea that the manorial officers placed major obstacles in the way of issuing release letters is completely wrong, at least for this South Bohemian estate in the second half

26 Some western European historians defend the concept of a static rural society. For example, Scarlet Beauvalet-Boutouyrie's survey of French demographic history argues that France 'was a country with very little mobility, of which population was fundamentally stable. People lived in the parish in which they were born or close by' (Beauvalet-Boutouyrie 2008, 92).

of the eighteenth century. In the interests of free movement of labour and in conformity with the principle of reciprocity, the manorial officers approved, except for some cases, all the applications that were submitted for permission to change overlords or place of residence.

The analysis of the historical sources carried out in this article makes clear that acts of migration took place among all classes of rural society, but especially among those persons, whom the inheritance law did not guarantee taking over a family landholding.[27] Possession of a landholding was a key factor that influenced the spatial mobility of Bohemian serfs. In the light of the historical sources analysed in this article, it is possible to demonstrate the existence of a rural society which was not static but rather quite dynamic, in the sense that spatial movement played a significant role.[28]

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27 From the point of view of Bohemian inheritance law, it was not permitted to divide a serf´s landholding. If a couple had several offspring, only one of them (usually a son or a daughter´s husband) was entitled to take over the family holding. All the other offspring were supposed to get an inheritance share and were expected to seek their living outside the family home (Procházka 1963, 453–511).

28 The idea of a rural society that was not static but rather very dynamic has also been demonstrated for Sweden and Poland (Andersson 2018, 239–51; Wyżga 2019, 405–10).

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Part Two

Utilization of Resources

5

Utilization of Grass and Wood in Common-Use Imperial Land and Incorporation into Conservation Forest in Yamanashi Prefecture in the Early Twentieth Century

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Introduction

Japan is a mountainous country with few plains, and most of the forests are in mountainous regions. The word *sanrin* (mountain and forest) is used to describe this landscape. Moreover, Japan is a country where regenerative forestry has developed since the early modern period, although such forestry sites were limited (Totman 1989). Therefore, another word, *rinya*, denotes a combined concept of forest and wilderness. This is because although today's mountains are almost entirely covered with trees, in the past there were many vegetation and grassy mountains that was intermediate between forest and grassy mountains.

Fujita, showing the use of *rinya* on a map of Japan, gave an impression of the transformation of grassy mountains into plantations from the end of the Edo (Tokugawa) era to the present (Fujita 1995). In addition, Ogura attempted a statistical analysis to determine the change in the area of grassy mountains from the Meiji period (1867–1912) to the present throughout the country (Ogura 2012, 206–7). He assumed that the wilderness area at the beginning of the twentieth century was about five million hectares (the total area of *rinya* was about 24 million hectares). However, it is difficult to determine the accuracy of statistics collected during the Meiji period, when grassy mountains were rapidly declining.

Murayama, S., Ž. Lazarević, and A. Panjek, eds. 2024. *Changing Living Spaces: Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present*.Koper: University of Primorska Press.

Moreover, such statistics do not provide information on the vegetation that lies between forests (area with trees) and wilderness (area without trees). Similarly, previous studies have examined grassy mountains in the early modern period[1] and provided an overview of their use in each study area, but these data are unfortunately not detailed.

In Japan, the first Forest Act was enacted in 1897 (Meiji 30), establishing the system of conservation forests, primarily to conserve water sources and prevent landslides through logging regulations and management requirements. A well-known reason for this was the severe damage caused by floods, which were common in many areas at the time. At the same time, the River Act and the *Sabo* (landslides prevention) Act were also enacted (Ohta 2012, 122–4). Although rapid modernization changed not only the legal system but also society and the economy, rural people still needed grassy and bushy mountains for agriculture and daily life.

The materials traditionally collected by rural residents from the grassy and bushy mountains are called *koshiba-shitakusa* (Takemoto 2021a, 416). These include *kaya*, *karishiki*, firewood and fallen leaves. *Kaya* is Japanese silver grass that has been used as manure, fodder for cattle and horses used in ploughing and other agricultural work, and as roofing material. *Karishiki*, the budding branches of broad-leaved trees that sprout in early spring, were trampled into rice nurseries and rice paddies as green manure. Firewood was used as fuel for boiling, cooking and heating. The ashes after burning were used as fertilizer. Fallen leaves were also used as compost in the fields.

The *sanrin* from which these resources needed for daily life were obtained often took the form of *iriai* commons, which were jointly administered by the commoners. However, when the Meiji government clarified ownership of the *sanrin* for tax purposes, these *iriai* commons were also

1 There are a few detailed studies about *sanrin* resource utilization by residents. Mizumoto (2003) clarified the vegetation of mountains in Iida, Nagano Prefecture in the seventeenth century as follows: grass and twigs, 63.9%; mix of grass and pine and deciduous trees, 8.2%; deciduous trees, 10.9%; mix of deciduous and coniferous trees, 11.4%; and bare mountains, 6.2%. However, according to Tokoro (1980), in *Kinsei ringyo shi no kenkyu*, *karishiki,* utilization in the Chikuma area in the 18th century drawn from hamlet records was 15–35 *da* of *karishiki* for 0.1 *cho* of rice paddies (25 *da* on average), and 15 *da* of *karishiki* for 0.1 *cho* of fields were needed. Tokoro also estimated that 20 *da* was needed for 0.1 *cho* of rice paddies and fields. Additionally, he mentioned 5–6 *se* of *rinya* was needed to collect 1 *da* of *karishiki*. From this data, the necessary *rinya* area was 10–12 times that of the paddy and field area. The consumed quantity of firewood was also 20–30 *da*/year/household. See also Furushima (1974, 111–25).

incorporated into the state or municipalities and divided among individuals, eventually blurring jurisdictional boundaries and making their responsibilities unclear. Moreover, residents were often only permitted to use the resources of the *sanrin*.

Objectives and Methods

In Yamanashi Prefecture, the study area of this chapter, many *iriai* commons were designated as imperial property in 1889 (Meiji 22). They were returned to the prefecture in 1911 (Meiji 44), and commoners were allowed to use and manage these imperial properties. In the mid-Meiji period before the return, the period covered in this chapter, this estate was called *iriai goryochi*, which can be translated as 'gathering place on the imperial estate', which is an oxymoronic expression considering that gathering was allowed on the site of the former *iriai* commons. *Iriai goryochi* is imperial land with recognized common use rights (Totman 2007, 136). In this chapter, this particular land is referred to as common use imperial land (CIL). The ownership, use, and management of *iriai* commons in Yamanashi Prefecture have been studied from the perspectives of the sociology of law and forestry.[2]

The most important material for this chapter is a report entitled '*Midai Gawa Iri Hoan-rin Hennyu Chousa-sho*' ['Survey Report on the River Midai water source for incorporation into conservation forests'] published by Yamanashi Prefecture in 1903 (Meiji 36). The purpose of this report was to incorporate this CIL into conservation forests in accordance with the Forest Act, which had just come into effect, to prevent damage from repeated flooding. As will be discussed in more detail later, although use was restricted by the Bureau of Imperial Estate (BIE), residents of the CIL were in fact using *sanrin* in the same manner as before it was incorporated into the imperial estate. The prefecture closely scrutinised the residents' use of *sanrin* to interfere with the BIE's management of the CIL.

The purpose of this book is to identify the impact of the changing socioeconomic and natural environment due to rapid modernization on the use and management of resources by the population. The key term 'living spaces' is used in this research. To achieve this goal, this chapter used the data in this report to clarify what institutions were introduced by the national and prefectural governments, what resources residents used, and

2 For example, Hojo (1979); Ohashi (1991); more recently Shiga et al. (2008).

how these affected the living space of Yamanashi Prefecture's mountain villages in the early twentieth century.

The units used in this chapter for area, weight, length, volume, and currency are described as follows:

cho	measure of area (0.99 ha; 2.45 acres)
tan	measure of area (0.1 cho; 0.099 ha; 0.245 acres)
se	measure of area (0.1 tan; 0.0099 ha; 0.0245 acres)
tsubo	measure of area (0.033 se)
shaku	measure of length (0.3 m)
shakujime	measure of volume used for wood (1 × 1 × 12 shaku; 0.324 m3)
kan	measure of weight used for fodder and green manure (3.75 kg)
soku	measure of volume used for twigs (converted to 5 kan; 18.75 kg)
da	measure of volume used for karishiki (converted to 6 soku, 30 kan; 18.75 kg)
tana	measure of volume used for firewood (6 × 6 × 3 shaku × 2/3 = 6 shakujime; 1.944 m3; converted to 500 kan; 1,875 kg)
yen	currency: one yen in the middle of the Meiji period was roughly equivalent to 4,500 times its present value, measured in terms of the price of rice
sen	currency (0.01 yen)

Establishment of the Forestry Division in Yamanashi Prefecture

At that time, Yamanashi Prefecture and the Prefectural Assembly were concerned about the annual flood damage. The first major step toward solving this problem was the 'Petition for the Protection of Forests', which was published under the joint names of the members of the Diet in March 1897 (Meiji 30), shortly before the passage of the Forest Act. One copy of the petition was sent to the Speaker of the House of Peers and the Speaker of the House of Representatives, and the other copy was sent to the Minister of Agriculture and Commerce and the Minister of the Imperial Household. The national government, however, was slow to respond. In December 1900, the chairman of the Prefectural Assembly submitted to the governor 'An opinion requesting the establishment of a division specifically for the purpose of demarcating forests and encouraging afforestation'. This opinion was discussed in the Prefectural Assembly and approved by a large majority (Yamanashi Prefecture 1903b; 1973, 779).

Among the reasons for the establishment of a specialized division by the prefecture were: (1) the allocation of some imperial forests to the ownership of iriai organizations and the prefecture and the correction of their allocation, (2) the clear distinction between conservation forests and common-use forests, and (3) the taking of measures to promote afforestation

and to spread the idea of forestry. The Forest Policy Department would be mainly responsible for (1) and (2), and the Afforestation Department for (3), with a Bachelor of Law and a Bachelor of Forestry, respectively, in charge. As a result, 'Division 6' was newly established in June 1902 (Meiji 35) and Otosaku Saito was appointed as the first head of the Division. However, no persons with a Bachelor of Law degree were hired and the Forest Policy Department and Afforestation Department were not created; instead, the Forestry Section and the Survey Section were established. In 1905, Division 6 was renamed the Forestry Division, but the duties of the Division did not change significantly at the time of its establishment (Yamanashi Prefecture 1922, 131).

The reasons why Saito was appointed as the first Division Head are as follows (Takemoto 2021b): he was born in Niigata in September 1866 (Keio 2) and worked for the Forestry Bureau as soon as he graduated from Tokyo Norin Gakko Ringaku-bu [Tokyo Agricultural and Forestry School's Forestry Department] in 1890 (Meiji 23), which was the first forestry school established in Japan. (Its present name is Department of Forest Science, Faculty of Agriculture, University of Tokyo.) Later, when the Sino-Japanese War broke out, he served in the war and was appointed head of the education and police station at Linkipo in Taiwan in 1896. The following year, due to difficulties during the Alishan Expedition, he returned to Japan and temporarily moved back to his wife's family home in Ichikawa, Yamanashi Prefecture.

On this occasion, Saito was confronted with a major flood disaster that killed more than 150 people in the prefecture. Based on this experience, he wrote his 'Opinion on Flood Control in Yamanashi Prefecture' in the *Yamanashi Nichinichi Shimbun* [Yamanashi Daily News]. He strongly advocated the incorporation of the devastated *sanrin* into conservation forests, using the Forest Act that had just come into effect, on the grounds that 'the cause of the floods is solely due to the deforestation of *sanrin* forests' (Saito and Aoshima 1899). Saito presented statistical data and pointed out that there were also many treeless areas in the imperial forests that should be converted into conservation forests. He also called for taking modernization measures, such as introducing laws to control forest fires, organizing grass mountains, promoting afforestation and holding tree planting days in elementary schools. At the same time, he showed consideration for local residents who used the grassy mountains for fertilizer and fodder by proposing specific and detailed measures to avoid inconvenience to them. However, after this contribution, he was trans-

ferred to Ishikawa Prefecture as an engineer and teacher of forestry. He had not been back to Yamanashi Prefecture for a little over three years before returning as Division Head.

As soon as Division 6 was established in 1902, the prefecture issued regulations for the conservation forests. In addition, a policy statement of Division 6, 'Forest Remediation in Yamanashi Prefecture', was published in September 1903 (Meiji 36). This statement was probably reviewed by Saito, who had become the Division Head the year before. The 'forest remediation' was to be applied to the devastated forests, first as a compulsory measure by including them as conservation forests in the Forest Act and ordering afforestation, and second as a supplementary measure by establishing seedling plots, providing seedlings, establishing model forests, and promoting forestry techniques (Yamanashi Prefecture 1903a). In the supplementary measures, Saito implemented in Yamanashi Prefecture what he had promoted in Ishikawa Prefecture (Endo 1938, 193–8). However, in the compulsory measures, it was necessary to work on developing laws and regulations that had never been introduced before.

Saito even created his own 'Instructions for Conservation Forest Incorporation Records' and published it in a journal so that other prefectures could use it (Saito 1903a; 1903b). He also created an example of the conservation forest ledger to be kept in the offices of towns and villages in the prefecture, and called for a nationwide unification of standards for keeping the ledger (Saito 1903a, 41–6).

Survey Report on the River Midai Water Source for Incorporation into Conservation Forests

Yamanashi Prefecture, which established the Forestry Division, prepared 'Conservation Forest Survey Guidelines' in consultation with the BIE and conducted a fact-finding survey to include CILs in conservation forests. As a result, a total of 34,377 *cho* were incorporated in the prefecture in 1903–1904 (Meiji 36–7), with the largest area of 5,390 *cho* in the Midai River basin (Yamanashi Prefecture 1922). This 'Survey Report' (Yamanashi Prefecture 1903c) initially contained the following information about the Midai basin:[3] (1) flood control and damage costs, and (2) water source area by land category. This information was compiled into a report on each of the two CILs in the water source area, the 36-ham-

3 The River Midai basin is located in western Yamanashi Prefecture (figure 10.1).

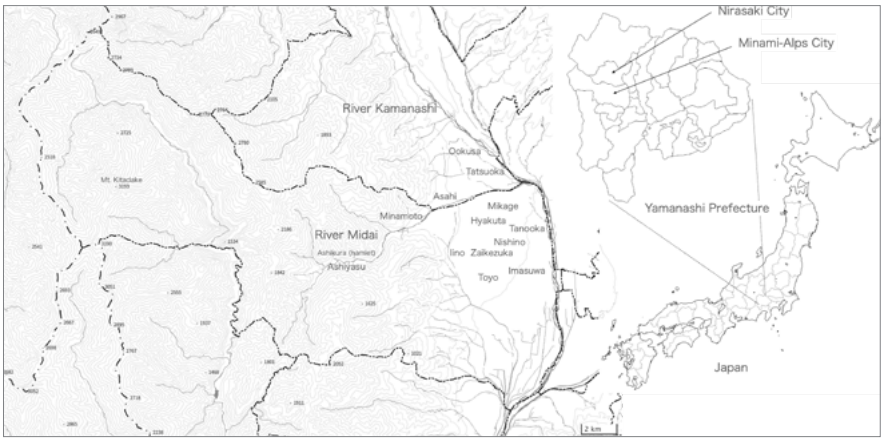

Figure 1 Map of the Midai River and the Villages in the Meiji Period That Are Now Part of the City of Minami-Alps, Yamanashi Prefecture

Source Prepared by the author on the basis of the map of the Geospatial Information Authority of Japan

let CIL[4] and the Ashikura CIL,[5] by interviewing residents and other concerned persons on the following topics: (3) forest condition (vegetation and degree of degradation), (4) BIE income from the sale of firewood, *karishiki*, and grass to local residents, and (5) implementation of the Regulation on Conservation and Supervision. In addition, with respect to the 36-hamlet CIL, the study estimated (6) the amount of wood and firewood collected by residents, (7) the amount of *karishiki* and grass collected and the area of grassy mountains used by residents, and (8) the cost of alternative fertiliser.

Flood Control and Damage Costs

The cost of the levees in the Midai River basin, which had been repeatedly flooded, was calculated as the sum of expenditures by the state, prefectures, and others, and averaged 14,353 yen/year in 1893–1902. Similarly, losses due to flood damage (e.g. damage to farmland) averaged 26,221 yen/year in 1892–1901. Both losses were enormous, underscoring the urgency of the flood control issue.

4 The 36-hamlet CIL was comprised of 13 new villages, or 33 former hamlets (table 1).

5 Ashikura, the sole user of Ashikura CIL, is the closest hamlet to the water source of the River Midai (figure 10.1).

Table 1 Villages and Hamlets Comprising the 36-hamlet CIL

Current municipality	Villages	Hamlets	Households	Grade
Minami-Alps City	Ashiyasu	Ashikura	116	1
		Anzuu	4	1
	Minamoto	Suzawa	16	1
		Ooarashi	14	1
		Shiomae	14	1
		Komaba	23	1
		Chikuyama	33	2
		Iino-shinden	122	2
		Arino	188	2
	Iino	Iino	285	3
	Toyo	Kmiimai	143	5
	Zaikezuka	Zaikezuka	232	4
	Nishino	Nishino	213	3
	Hyakuta	Dodo	225	3
		Kami-hatta	156	4
	Mikage	Yaghoshima	130	4
		Mujina	97	3
		Kami-takasago	106	6
	Tanooka	Tokunaga	68	6
		Enokihara	48	4
		Shimo-takasago	72	6
	Imasuwa	Kami-imasuwa	187	6
		Shimo-imasuwa		
Nirasaki City	Asahi	Kamijo-minamiwari	86	3
		Kamijo-nakawari	62	5
		Kamijo-kitawari	151	5
	Tatsuoka	Shimojo-minamiwari	90	6
		Shimojo-higashiwari	85	6
		Wakao-shinden	53	6
	Ookusa	Shimojo-nishiwari	—	—
		Shimojo-nakawari	34	5
		Kamijo-higashiwari	53	5
		Wakao	75	6
Total	13	33	3181	

Notes The actual number of hamlets in the 36-hamlet CIL was 33. This was because the other four hamlets gave up their use of the commons, while one hamlet (Iino-shinden) rejoined in 1883 (Meiji 16), when the Regulation on the Disposal of Grass and Wood was issued. 'Grade' refers to the amount of money each hamlet paid to the user organization of the 36-hamlet CIL. First-grade hamlets paid in proportion to the number of households, Second-grade hamlets 90% of the number of households, Third Grade 70%, Fourth Grade 50%, Fifth Grade 30%, and Sixth Grade 15%.
Source Yamanashi Prefecture (1903c, 27–35).

Water Source Area by Land Category

Since the ledgers prepared for tax collection did not show the actual area by land category for the Midai River water source, a new general 20,000:1 scale general map was first prepared based on the 200,000:1 and 20,000:1 maps of the General Staff Office. Then the boundaries and topography were drawn on the map by field survey, and each area was simply determined with a planimeter. As a result, although the ledger showed 20,000 ha for the entire water source area, the actual area was about 7,000 ha. The 36-hamlet CIL with 16,666 ha in the ledger was actually 4,103 ha, while the Ashikura CIL with 1,351 ha in the ledger was actually 1,184 ha. It became clear that these two CILs accounted for 75 percent of the total water sources. The rest were privately owned forests and fields in Ashiyasu and Minamoto villages.

Forest Condition (Vegetation and Degree of Degradation)

First, the forest conditions of the 36-hamlet CIL are shown in table 2. The 'grassy mountain' was not only easily accessible, but also a completely devastated area where only *karishiki* and grass were collected for manure and fodder. The 'deciduous broadleaf forest' adjacent to the grassy mountains was a degraded forest area, most of which had been overcut. *Karishiki* and bushes were harvested near the grassy mountains, and firewood was cut in inconvenient places in the back of the deciduous broadleaf forest, adjacent to the grassy area. A small amount of building material was harvested in the 'native conifer forest' near the summit. The 'newly planted area' where villagers had planted under the guidance of the prefecture was only four or five years old. Overall, more than 90 percent of the area was considered devastated or semi-devastated by the prefecture.

Next, the forest condition of Ashikura CIL is presented (table 2). First, 'grassy or bare mountain' accounted for 10 percent. 'Broadleaf forest on the verge of devastation' and 'coniferous forest on the verge of devastation' accounted for 48 percent and 13 percent, respectively, for a total of over 60 percent. 'Coniferous forest in natural condition', 'newly planted coniferous forest', and 'coppiced broadleaf forest' (*karitate-rin*) together accounted for nearly 30 percent of the total area. In the 'coppiced broadleaf forest' (*karitate-rin*) conceived by the village head, a fire line was established by prohibiting fire in the conventionally used grass cutting area. In the first year, an area with many broadleaf trees that sprouted and grew back, such as chestnut and oak, was selected, and the better

Table 2 Forest Condition of Two CILs on the River Midai

Vegetation	Area (*cho*)	Rate
36-Hamlet CIL		
Grassy mountain	1.128,52	0,28
Deciduous broadleaf forest	2.627,92	0,64
Native coniferous forest	263,01	0,06
Newly planted area	84,00	0,02
Total	4.103,45	1,00
Ashikura CIL		
Coniferous forest in natural condition	214,57	0,18
Coniferous forest on the verge of devastation	155,69	0,13
Newly planted coniferous foerst	55,32	0,05
Coppiced broadleaf forest (*Karitate-rin*)	74,50	0,06
Broadleaf forest on the verge of devastation	566,28	0,48
Glassy or bare mountain	117,97	0,10
Total	1.184,33	1,00

Source Yamanashi (1903c, 25, 91).

trees were retained at a ratio of about one plant/*tsubo*, which is equivalent to 3.3 square meters, and the rest was mowed along with the grass. In the second year, the superior trees left behind were mowed, leaving two or three sprouts if they were chestnuts, and five or six sprouts if they were miscellaneous trees. In the third year, one or two chestnuts and three or four miscellaneous trees were also left, and no maintenance was required after the fourth year. The 'coppiced broadleaf forest' (*karitate-rin*) significantly reduced the amount of *karishiki*, but increased the amount of branches used as firewood, so the number of villagers who demanded this method gradually increased, and it was used on a larger scale from the following year onwards. In this way, the area grew to 74 *cho* and 5 *tan* within four years from 1899 (Meiji 32). The Survey Report highly recommended this method. The forest condition of Ashikura CIL was rated as much better than that of the 36-hamlet CIL, which was attributed to the fact that it was common only for one hamlet and not for several hamlets.

BIE Income From the Sale of Firewood, Karishiki, and Grass to Local Residents

BIE income was revealed: the 36-hamlet CIL had 209 *shakujime* of lumber and 66 *tana* of firewood, for a total of 605 *shakujime* (100 *tana*), with a selling price of 59.1 yen/year (average for 1895–1902, excluding 1898). Likewise, it had 5,696 *soku* of twigs and 39,871 *soku* of grass, for a selling

price of 52.09 yen/year (average for 1895-1902). Residents paid a total of 104.61 yen/year, or 2.73 *sen/cho* (the total area of the 36-hamlet CIL was 4,103 cho) to the BIE. The amount/*cho* paid to the BIE by the 36-hamlet CIL and the Ashikura CIL was extremely low, considering that the Survey Report found that good forest land at that time brought in a net income of 40–50 yen/*cho*/year.

Implementation of the Regulation on Conservation and Supervision

The 'Regulation on the Disposal of Grass and Wood' [*Soumoku harai-sage jouki*] of 1883 (Meiji 16) was the prefectural government's first codification regarding resource extraction in the *iriai* commons. In accordance with this regulation, the prefectural government forced the 36-hamlet *iriai* commons in 1885 (Meiji 18) to each establish a 'Regulation on Conservation and Supervision' for grass and wood. However, the Survey Report showed that the prefecture did not conduct on-site inspections and left the matter alone, and that many of the agreements were not respected. In 1889 (Meiji 22), the *iriai* commons were incorporated into imperial ownership, and the following year the new 'Rules on the Disposal of Grass and Wood' [*Soumoku harai-sage kisoku*] were issued. After remaining untouched for some time, the 'Regulations on Conservation and Supervision in the 36-hamlet CIL' were reinstated in 1899 (Meiji 32). However, it was still not enforced because there was no on-site inspection or supervision. In the Ashikura CIL, the regulations were also introduced, but again they were not followed. After 1899, however, each of the five sub-hamlets in Ashikura began to take responsibility for creating coppiced broadleaf forests (*karitate-rin*).

For the 36-hamlet CIL, the amount of forest resources used by residents was surveyed. It is a case study of a mountainous area in western Yamanashi Prefecture in the middle of the Meiji period; therefore, it is limited by location and time. However, it is unique, accurate, and detailed data on the use of *sanrin* resources.

Amount of Wood and Firewood Collected by Residents

Firstly, the frequency of wood use by the residents and the amount of wood collected in each village were studied. Nine of the 13 total villages in the 36-hamlet CIL collected wood. The villages can be roughly divided into five villages (Iino, Minamoto, Hyakuta, Zaikezuka, and Nishino) that primarily used the 36-hamlet CIL and four villages (Asahi, Tatsuoka, Ookusa, and Ashiyasu) that also took wood from other locations (table 3).

Table 3 Timber and Firewood Collected from the 36-hamlet CIL

Villages mainly utilizing the 36-hamlet CIL (Iino, Minamoto, Hyakuta, Zaikezuka, and Nishino)					
		High use frequency	Low use frequency	Non-use	Total
	Number of households	200	600	836	1.636
	Average number of people entrering /household	2	1		
	Average days of entrance /person	100	40		
	With horse /person-day	10.000	4.000		14.000
	Without horse /person-day	30.000	20.000		50.000
	Total /person-day	40.000	24.000		64.000
	Quantity of collecting with horse /kan/day	40	40		
	Quantity of collecting without horse /kan/day	15	15		
	Total quantity of collecting with horse /kan	400.000	160.000		560.000
	Total quantity of collecting without horse /kan	450.000	300.000		750.000
	Total quantity of collecting /kan	850.000	460.000		########
	Total quantity of collecting /tana	1.700	920		2.620
	Residue /tana	170	92		262
	Sum total of quantity of collecting /tana	1.870	1.012		2.882
Villages utilizing the 36-hamlet CIL and other places (Asahi, Tatsuoka, Ookusa, and Ashiyasu)					
		Ashiyasu	Other three villages		
	Number of households	159	863		
	Firewood consumption per household /tana	4	3		
	Total firewood consumption /tana	636	2.589		
	Utilization rate of the 36-hamlet CIL	0,2	0,1		
	Total consumption of firewood from the 36-hamlet CIL /tana	127	259	386	
Sum total */tana*				3.268	

Source Yamanashi prefecture (1903c, 69–71).

The first group consisted of 200 households that used CIL frequently, 600 households that used it infrequently, and 836 households that did not use it, for a total of 1,636 households. In the case of the households that used the mountain area frequently, an average of two people per household entered the mountain area, and each person entered the mountain area about 100 days per year, resulting in 4,000 person-days. Of these, 1,000 person-days were with horses and 3,000 person-days were with-

Table 4 Estimated Quantity of Wood Collected from the 36-hamlet CIL

Type of wood	*Tana*	*Shakujime*	*Kan*	Rate
Timber	163,35	992,10	82.675	0,05
Firewood	1.960,20	11.761,20	980.100	0,60
Brushwood	326,70	1.960,20	163.350	0,10
Twig (moya)	821,75	4.930,50	410.875	0,25
Total	3.267,00	19.602,00	1.633.500	1,00
Total without twigs	2.445,25	14.671,50	1.222.625	0,75

Source Yamanashi prefecture (1903c, 69–71).

out horses. Those with horses could collect 40 *kan* per day and those without horses could collect 15 *kan* per day, for a total of 400,000 and 450,000 *kan*, respectively. For the 600 households with less frequent use, the total amount collected by those with and without horses was 160,000 and 300,000 *kan*, respectively. Together with 10 percent of the residue at the time of harvest and unit conversion, this amounted to 2,882 *tana*.

In the latter four villages, the utilization rate of the 36-hamlet CIL was low, 20 percent in Ashiyasu and 10 percent in the other three villages, due to the other mountains from which the wood was obtained. They mainly collected firewood, with each household consuming four *tana*/year in Ashiyasu village and 3 *tana*/year in the other three villages. Multiplied by the number of households, the firewood consumption was 386 *tana*/year in the four villages from the 36-hamlet CIL.

Table 4 illustrates the volume of harvested wood by type: timber, firewood, brushwood, and twigs (*moya*). The term '*moya*' was limited to this region and was commonly called *koshiba*. *Moya* was harvested from grassy mountains rather than forests, and the sprouts of broadleaf trees, generally at least three years old, were used as firewood. Excluding *moya*, the amount of wood collected was 2,445 *tana*, about 24 times the 100 *tana* paid to the BIE. The amount of *moya* collected was also 13 times the amount paid to the BIE.

Amount of Karishiki and Grass Collected and the Area of Grassy Mountains Used by Residents

Initially, seven villages used *karishiki* and grass from the 36-hamlet CIL (table 5). For each of these villages, the total area of rice paddies, fields, and nurseries was examined, and for each of these areas, the rate of use of *karishiki* and grass and CIL was also examined to determine the area of rice paddies, fields, and nurseries that were supplied with *karishiki* and grass from the CIL. Rice paddies accounted for 166.2 *cho*, or about 20 percent of

Table 5 Area of Rice Paddy, Field, and Nursery Where Villagers Used Karishiki and Grass from the 36-hamlet CIL

	Rice paddy in summer (wheat field in winter)					Other field					Rice nursery				
Village	Entire area	*Karishiki* / grass input rate	*Karishiki* / grass input area	CIL use rate	CIL use area	Entire area	Grass input rate	Grass input area	CIL use rate	CIL use area	Entire area	*Karishiki* input rate	*Karishiki* inpt area	CIL use rate	CIL use area
Iino	88,9	0,8	71,1	0,5	36,0	149,6	0,27	39,9	0,8	32,0	4,20	0,5	2,10	0,8	1,6800
Hyakuta	47,7	0,5	23,9	0,7	16,7	175,9	0,00	0,0	0,0	0,0	0,06	0,5	0,03	0,7	0,0203
Asahi	191,7	0,8	152,0	0,1	15,2	31,8	0,80	25,4	0,1	2,5	0,13	0,9	0,12	0,3	0,0318
Tatsuoka	173,0	0,0	0,0	0,0	0,0	63,6	0,10	6,3	0,0	0,0	0,00	0,0	0,00	0,0	0,0000
Ookusa	120,0	0,9	108,0	0,1	11,8	69,0	0,80	55,2	0,1	5,5	0,07	0,9	0,06	0,5	0,0300
Minamoto	170,0	1,0	170,0	0,5	85,0	51,0	0,90	45,9	1,0	45,9	10,20	1,0	10,20	0,8	8,1600
Ashiyasu	10,5	0,2	2,1	0,7	1,5	59,0	0,20	11,8	0,7	8,3	0,02	0,2	0,01	0,8	0,0024
Total	801,8	---	527,1	---	166,2	599,9	---	184,5	---	94,2	14,68	---	12,52	---	9,9315
Average	114,5	0,6	75,3	0,4	23,7	85,7	0,4	26,4	0,4	13,5	2,10	0,6	1,79	0,6	1,4188

Note: Only seven of 13 villages used the 36-hamlet CIL for *karishiki* and grass. Villagers grew rice in summer and wheat in winter on the same land. *Source:* Yamanashi prefecture (1903c, 72–9).

Table 6 Estimated Area of the Mountain for Collecting Karishiki and Grass in the 36-hamlet CIL

		Input to paddy and field		Total quantity	Collecting from mountain	
		Total Area	Quantity per 0.1 cho		Quantity per 0.1 cho	Total area
		(*cho*)	(*kan*)	(*kan*)	(*kan*)	(*cho*)
Karishiki	Rice paddy	166,20	204,0	339.048	48,0	706,35
	Rice nursery	9,93	50,0	4.966	1,0	496,60
	Total	176,13		344.014		1202,95
Grass	Wheat field	166,20	198,0	329.076	61,2	537,70
	Other field	94,20	198,0	186.516	61,2	304,70
	Total	260,40		515.592		842,40

Note Although the estimated total area of mountain needed for gathering *karishiki* was 1,202 *cho*, villagers gathered *karishiki* for rice nurseries and for rice paddies in the same place but at different times of the year. Accordingly, the total area needed to collect *karishiki* was 706 *cho*. The villagers cultivated rice in summer and wheat in winter on the same land, so the area of rice paddies and the area of wheat fields were identical.
Source: Yamanashi prefecture (1903c, 72–9).

the total area; other fields 94.2 *cho*, or about 15 percent of the total area; and nurseries 9.9 *cho*, or about 70 percent of the total area. Note that the fields used for rice in summer were used for wheat in winter, so both *karishiki* and grass were used.

Next, the amount of *karishiki* and grass needed per 0.1 *cho* of rice paddy, field, and nursery was determined by interviewing residents (table 6). These quantities were multiplied by the input area (table 5) to estimate the quantities and areas of *karishiki* and grass collected. The total amount of *karishiki* and grass collected, 859,606 *kan* (171,921 *soku*), was 4.3 times the 39,871 *soku* paid to the BIE. The estimated area of mountain needed was 706 *cho* for *karishiki* and 842 *cho* for grass, which could be covered by the 1,128 *cho* of grass-covered mountains and 2,628 *cho* of deciduous broadleaf forest identified in the forest conditions (table 2).

Cost of Alternative Fertiliser

The prefecture investigated how much it would cost per 0.1 *cho* to apply manure and fertilizer other than *karishiki* and grass to rice paddies, wheat fields, and nurseries (table 7). This suggested that if labour were paid to collect *karishiki* or grass, an alternative manure or fertilizer could be purchased for about half the cost. In practice, however, *karishiki* and grass could be collected for a small amount paid to the BIE when labour costs were not considered. In the rice paddies, labour costs were about 3 yen, which could be replaced with night soil or soybeans for half that

Table 7 Comparison of Manures Available for Agriculture in Yamanashi in the Mid-Meiji period

	Manure	Price (yen)	Quantity
Rice nursery (0.1 *cho*)	*Karishiki*	1.5–1.75	50 kan
	Night soil	0.275–1.375	6–30 koku
	Pea manure	0.4–1	20–50 kan
	Lime phosphate	0.9–1.8	1–2 kan
	Charcoal	0.75–1.8	1.5–3.6 kan
Rice paddy (0.1 *cho*)	*Karishiki*	2.71–3.195	204 kan
	Soy bean	1–2	1–2 to
	Night soil	0.75–1.25	1.5–2.5 koku
Wheat field (0.1 *cho*)	Grass	2.08–2.46	198 kan
	Night soil	1.6~2.5	100–160 kan
	Soy bean	2–3	2–3 to
	Lime phosphate	0.9–1.9	1–2 kan

Note Prices of *karishiki* and grass were estimated from labour costs.
Quantities of *karishiki* and grass were based on those calculated in table 6
Source Yamanashi prefecture (1903c, 80).

amount. In wheat fields, labour costs were 2-2.5 yen and could be replaced with lime phosphate for half that amount. In the nursery, labour costs were 1.5-1.75 yen and could be replaced by charcoal or lime phosphate for the same amount. The average percentage of *karishiki* and grasses applied to rice paddies, fields, and nurseries was 40-60 percent (table 5), but what other types of fertilizer were used was not reported.

Based on these findings, the Survey Report argued that it would be more profitable for BIE, the iriai commoners, and national land security to incorporate the CIL into conservation forests and then afforest it than to leave it as it was.

Concluding Remarks

The socioeconomic and natural environment in the mountain village living spaces of Yamanashi Prefecture in the middle of the Meiji period, which is the subject of this chapter, underwent very rapid change. The Meiji government enacted the Forest Act and other laws in response to frequent flooding throughout Japan, but the prefecture had developed countermeasures earlier or at the same time. Several years before Saito became Head of Division 6, he published a newspaper article describing his 'Opinion on Flood Control in Yamanashi Prefecture', in which he actively advocated the incorporation of degraded mountain forests, even on the imperial estate, into the system of conservation forests, which was

consistent with the flood control measures that the prefectural assembly was considering at the same time. As a result, the prefecture created Division 6 and introduced a policy of 'Forest remediation', enacting laws and regulations to this end. In particular, the prefecture was required to operate the system of conservation forests in accordance with the Forest Act, which had just come into force, in accordance with the prefecture's circumstances. The prefecture also made efforts to promote this policy by publishing it for the public.

The Survey Report on the Midai River water source included in the conservation forest revealed the cost of flood damage, area of water sources, forest condition of CILs, BIE income, conservation and supervision regulations, and the amount and area of *sanrin* resources used. Technologies such as planimeters were used, actual conditions were detailed through interviews with residents, and the necessary quantitative information was compiled. These results convincingly demonstrated to BIE that management of the CIL had been practically neglected. For the residents, the 36-hamlet CIL, which was in a state of disrepair, was contrasted with the Ashikura CIL, which was in relatively good condition, and it was shown that improvements could be made through resident innovation, such as coppiced forests called *karitate-rin*. At the same time, it was suggested that, given the labour required to do this, it would make more sense to purchase alternative fertilizers than to collect *karishiki* or grass, which would cause devastation.

Based on the data contained in the report, the 36-hamlet CIL had 28 percent grassy mountains and 64 percent degraded deciduous broadleaf forests. Ashikura CIL, on the other hand, had 10 percent grassy mountains and 48 percent degraded broadleaf forest. Compared to Mizumoto's (2003) study of Iida in Nagano in the early modern period, the 36-hamlet CIL had a higher percentage of grassy mountains and deciduous broadleaf forests, while the Ashikura CIL may have had a similar percentage. Vegetation such as planted forests and *karitate-rin* showed characteristics of the middle Meiji period. In addition, rice paddies received 204 *kan* per 0.1 *cho* of *karishiki*, fields received 198 *kan* per 0.1 *cho* of grass, and nurseries received 50 *kan* per 0.1 *cho* of *karishiki* (table 6). These inputs were less than half those found by Tokoro (Fujita 1995). However, the average percentage of arable land with *karishiki* or grass from the 36-hamlet CIL ranged from 40-60 percent. It is quite possible that they were mixed with other fertilizers, so it would not be surprising if the amount of *karishiki* and grass decreased compared to the early modern period. According

to Tokoro (Fujita 1995), 10-12 times the mountain area was needed compared to the field area, while in the case study in this chapter, 4.2 times the *sanrin* was needed for rice paddies and 3.2 times for fields. Just as the prefecture recommended the use of alternative fertilizer, the rapid changes in the socioeconomy would have led to significant changes in the use of *sanrin* resources.

Research on forest management in the colonies has shown that its characteristics can be found in five categories: redefinition of ownership, demarcation of forests, changes in the composition of forest vegetation, strict limitations on customary use, and control of burning (see Guha and Gadgil 1989, Roche 2010, Sivaramakrishnan 2008). The introduction of modern forestry in the colonies led to intense conflict between modern science, technology, and legal systems and traditional resource use due to unexpected climatic and vegetation conditions, as well as social and economic differences. The CILs in Yamanashi Prefecture in the early twentieth century were not a colony, but their actual situation fell under all these categories. The Survey Report was a proposal for what kind of ownership and use would be desirable for the residents and the prefecture in the chaos caused by rapid modernization.

Finally, another objective of this book is to compare living spaces in response to changes in socioeconomic and natural environments. As for the case studies in this chapter, further research is needed to compare these areas in Japan with mountain regions in Europe. For example, Kazuhiro Itami studied France and found major differences in grazing from those in this chapter (Itami 2020). In contrast to Europe, where afforestation and grazing clash, in Japan the national government and prefectures attempted to 'forestize' the traditional use of *sanrin* for flood protection and convert it into timber resources with high monetary value, as opposed to the traditional use of *sanrin* to obtain resources mainly for manure and fuel, such as *karishiki*, *koshiba*, and *kaya*. However, as part of a compromise with the residents, the possibility was created to switch to coppicing in addition to afforestation, which is an easy way to secure resources such as firewood. Our future task is to identify each of these compromises in micro-living-spaces in different regions and countries and discover similarities and differences.

Acknowledgement

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6

Horses in Early Modern Japan: Livestock Usage in Asaka and Katsushika Counties

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Background

Akira Hayami (2016) pointed out that in early modern Japanese agriculture, the relationship between factors of production shifted from the use of livestock (capital) to human labour (figure 1, table 1). He based this on his observation that the number of cattle and horses in Owari Province decreased in contrast to the increase in the local population. This is often referred to as 'Hayami's Industrious Revolution'.[1] This means that people chose to practice intensive farming to increase productivity on small areas of arable land using their own labour instead of relying on livestock.

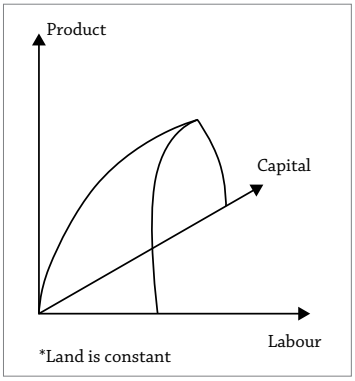

Figure 1
Production Function

1 See de Vries (2008). In de Vries', the meaning of industrious revolution is different from Hayami's.

Murayama, S., Ž. Lazarević, and A. Panjek, eds. 2024. *Changing Living Spaces: Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present*.Koper: University of Primorska Press.

Table 1 Number of Households, Population, Cattle, and Horses in Owari Province

	Around 1661-73	Around 1790-1820	Rate of change (%)
Number of households	47,822	79,254	+65.7
Population	265,522	331,678	+24.9
Number of cattle and horses	12,986	4,200	-67.7

Source: Adapted from Hayami (2003, 296).

However, Osamu Saito (2004) has already questioned Hayami's reasoning. Saito doubts that the observations from Owari Province can be generalised to the rest of Japan, explaining that the use of horses in agriculture was originally for horse manure rather than tillage. However, only regional studies were conducted on whether the number of livestock increased or decreased in each region and what farmers used them for.

This paper examines whether or not the number of livestock actually decreased over time, and uses available historical documents to show how they were used.

Setting, Data Sources

The regions mainly concerned in this paper are three agricultural villages (Shimomoriya, Komaya, and Hidenoyama) in Asaka County of Nihonmatsu Domain and villages near Koganemaki, a horse ranch run by the shogunate in Katsushika County in eastern Japan (figure 2).

In Asaka County, 41 villages were divided into three groups, namely Kōriyama-gumi (13 villages), Katahira-gumi (11 villages), and Ōtsuki-gumi (17 villages). Shimomoriya and Komaya belonged to the Ōtsuki-gumi, and Hidenoyama to the Kōriyama-gumi.

Koganemaki was located in the suburbs of Edo (now Tokyo), where the Shogun lived during the Edo period.

In early modern Japan, the Nihonmatsu Domain was known for its horse production, and many households in agricultural villages raised horses. To what extent did farmers benefit from this development? How was the number of horses raised by each household determined? Based on the *Ninbetsu-aratame-cho* (NAC), a basic source for historical demography, trends in village population and the number of horses raised in each village from the eighteenth to the nineteenth century are determined.

The observations on the distribution of cattle and horses in Japan are based on the *Kyōbuseihyō*, compiled in 1880 at the beginning of the modern era (figure 3). This is a record of military statistics compiled by the

Figure 2 Regions Studied

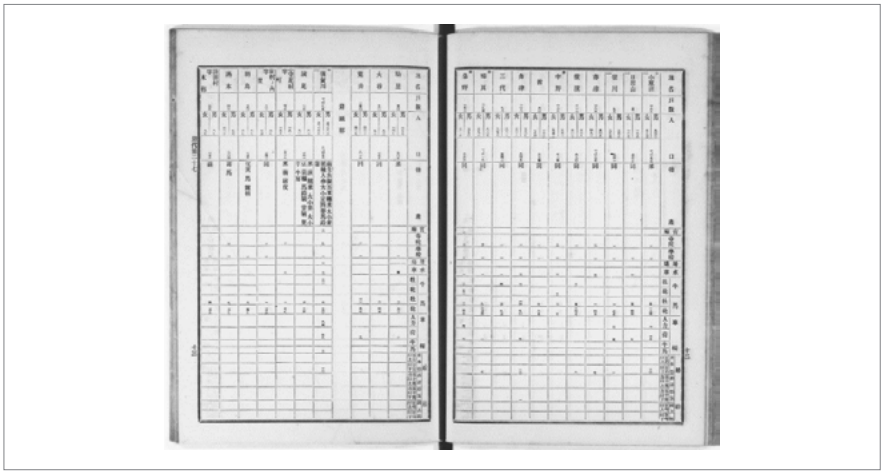

Figure 3 *Kyōbuseihyō* (1880a; 1880b)

General Staff Office of the Imperial Japanese Army. It contains county- and village-specific statistics on population, produce, schools, vehicles, and ships, and therefore provides useful information on the distribution of cattle and horses.

Village-specific changes in population and in the number of cattle and horses in the early modern period were determined using the NAC (figure 4). The NAC was essentially compiled each year, recording for each unit

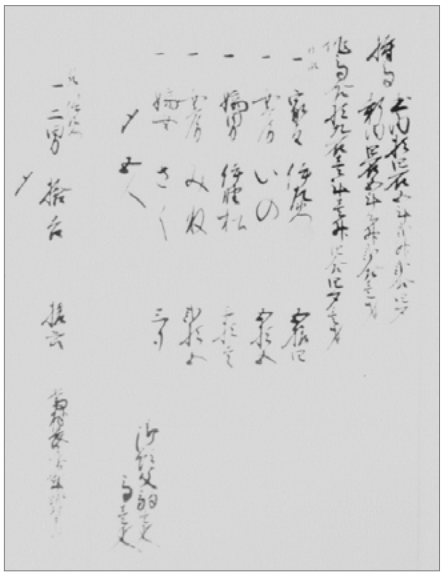

Figure 4
KCHM, *Ninbetsu-aratame-chō* of Shimomoriya (1833)

Figure 5
Horse-shaped *Haniwa* Clay Figure (Sixth Century) (ColBase)

(presumably a household unit) the head of household and its members, as well as their age and relationship to the head. Although records are missing for some individual years, the records used for Shimomoriya cover the years 1708–1869, for Komaya 1692–1855, and for Hidenoyama 1697–1870. In the figure, the page begins with the amount produced on owned rice paddies and crop fields (*mochidaka*) and the amount produced on cultivated land (*sakudaka*). The writing marked with a box refers to horses.

This paper examines a document (petition) from Katsushika County sent to the authorities by the village of Hananoi in 1724.

Brief History of Horses in Japan

It is believed that cattle were first domesticated in Japan in the third century and horses in the fourth century (Ichikawa 1981). From the fifth to the sixth century, horse breeding became a widespread practice, as evidenced by the excavation of horse-shaped *haniwa* clay figurines (figure 5). In the seventh century, military use of horses became important, and horses were managed by the *Hyōbu-shō*, the Ministry of War. According to the *Nihonshoki*, many pastures were established in 668. The *Shokunihongi*

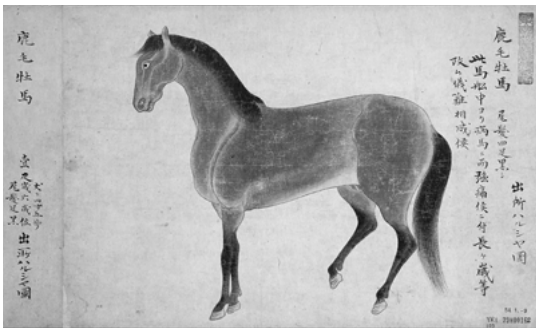

Figure 6
NDLDC, *Ikoku sanba zukan*

contains records of the establishment of ranches throughout Japan in 700 for grazing livestock and horses, and the establishment of state-run ranches in 23 countries, including Ise and Settsu in 707 (Keizaisasshisha 1897, 481; Ōmiya and Munemichi 1892a 12; 1892b, 24). In the Nara period (710–794), a new bureaucratic post for the management of horses, the *Meryō*, was established under the *Hyōbu-shō*. In the Heian period (794–1185), *Chokushimaki* ranches were established separately from the state-run ranches to raise horses to be offered to the emperor. They were located in Shinano, Kōzuke, and Musashi provinces, where there were vast estates. The Kamakura period (1186–1333) was a time when the samurai ruled, and in the provincial wars that followed, horses were raised mainly for military use.

When the Warring States period ended and the Edo period (1603–1867) began, the use of horses also became important for peaceful purposes. Samurai raised horses as a symbol of their social status, but sometimes owning good horses could be a financial burden.

In the Edo period, one of the most important uses of horses was to transport baggage and people from one post town to another. In the early modern period, *daimyō* (feudal lords) made a round trip from their territory to Edo every two years as part of the '*Sankinkōtai*' system. Therefore, many people and goods were transported via the main roads. The Tokugawa shogunate required people living along the main roads to keep horses. This was a burden not only on the post towns, but also on the residents of neighbouring villages, who were forced to keep horses to support the post towns.

In the early modern period, it was difficult for Japanese horses (native horses) to pull heavy ploughs because they were small, with a height of only about 130 cm. However, even in the early modern period,

Figure 7
Aguranabe (Kanagaki 1871–1872, 6–7)

Yoshimune Tokugawa (1684–1751), the eighth shogun of the Tokugawa shogunate, was interested in horse breeding and therefore not only imported Western horses (Persian horses, figure 6), but also invited the horseman Hans Jurgen Keiserling from the Netherlands to train the horses in Western horsemanship. Keiserling first demonstrated his horsemanship at the Edo Palace a year after his arrival in Japan in Kyōho 10 (1725). He occasionally came to Japan to teach horsemanship and knowledge to Matazaemon Tomita and other *umayaku* (horse trainers in samurai households) officials.[2] However, it was not until after the Meiji period (1868–1912) that horse breeding was practised at full scale and Western horses became mainstream.

With developments in horse breeding and changes in agricultural practices, including the shift to dry rice fields, horses became widely used in agriculture in the Meiji period. In addition, the relationship between horses and people changed in the Meiji period with the introduction of European and American culture and technologies. Such trends are depicted in the 1871–72 satire *Aguranabe* by Robun Kanagaki (figure 7). Wealthy-looking cattle are depicted in Western clothing. In the Meiji period, they gradually gained a kind of respect among people. Until then, cattle had been used mainly for carrying loads, but now they were brought to the dinner table as *gyū-nabe* (a dish of beef cooked in a hot pot at the table). The horse is drawn as a rickshaw man. Given the narrow and hilly roads in Japan, horses were not used to pull vehicles. However,

2 NAJ, *Norikata-kikigaki*.

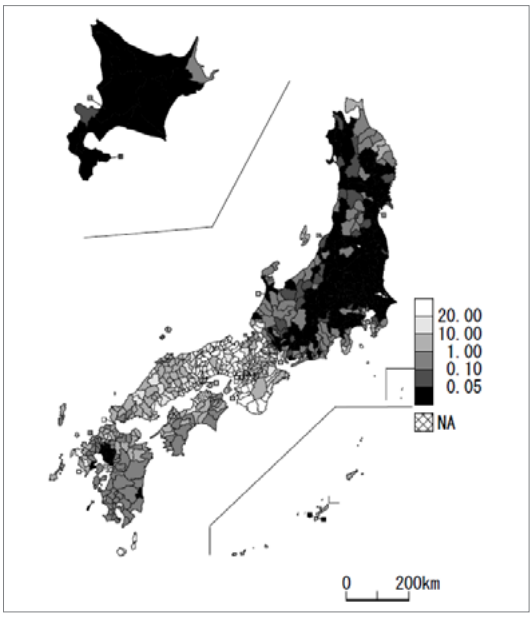

Figure 8
Distribution of Horses and Cattle in 1880 (Cattle / Horses) (by Miyuki Takahashi, Data Source: *Kyōbuseihyō* (1880a; 1880b)

in the Meiji period, horse-drawn carriages were imported from overseas, so horses, which traditionally carried loads on their backs, now pulled carriages.

A consideration of the distribution of cattle and horses in 1880 shows that horses were found mainly in the eastern regions of Japan and cattle in the western regions (figure 8). The distribution of 'eastern horses and western cattle' was already mentioned in the *Kokugyūjūzu* written by Kawahigashi Bokudoneinonaomaro in 1310.

There are three possible reasons for this distribution: (1) in the eighth century, the government in the Kinai region took the initiative to create pastures, but much of western Japan had already been developed and eastern Japan was selected for extensive pastures; (2) plough cultivation became popular in western Japan, so cattle were used there, while in eastern Japan, where plough cultivation was not as developed and the rice planting season was longer, horses were used because of their flexibility, and (3) in colder regions, it was important to collect horse manure, which was warmer than cattle manure.[3]

3 Details can be found in Ichikawa (2010).

Peasants and Horses (I): The Case of Asaka County in Nihonmatsu Domain

In the Nihonmatsu Domain, located in the northeastern part of Japan around the Nakadōri area in Fukushima Prefecture, horse breeding was an important industry. Therefore, the domain government encouraged its residents to raise horses, which was one of the few businesses that succeeded in this domain. The domain government appointed two officers to manage the horses, who were called *komabugyō*. The *komabugyō* took care of affairs in each district, assisted by local staff (*komatsuki)*. The domain conducted a district-wide survey (*uma-aratame*) every year. Some of the high-quality horses raised in the Nihonmatsu Domain were purchased by samurai; not only the lord of Nihonmatsu Domain but Tokugawa shogun bought them, and sometimes they were taken to the ranch of Koganemaki. Other horses were used to transport passengers and loads between villages and towns, especially on the highway from post town to post town. The Tokugawa shogunate required each post town to maintain a certain number of couriers and horses at all times. Neighbouring farming villages shared the burden (*sukegō* system); therefore, horses were raised in every village and household.

This leads us to ask three questions:

1. Did horse production create income for farmers?
2. What determined the number of horses kept in each village or household?
3. What kind of household was involved in horse production?

Some benefits of producing or using horses would be: (1) carrying loads (both for personal use and for revenue from customers); (2) horse manure (both for personal use and for sale); (3) selling horses in the market; and (4) horse oil, meat, and leather.

Sales at the market were handled by bids. The average price for a horse was about one *ryō,*[4] but high-quality horses sometimes sold for 5.5 *ryō* (Nukazawa 2010). It is assumed that 10 *ryō* would be enough to support the livelihood of one individual for a year. So, if one could raise a good horse, one could make enormous profits.

Next, the author explores the question of what determined the number of horses to be raised. The table shows the number of horses raised in the Nihonmatsu Domain in 1857. We can see that of the three *kumi* of the

4 Units of the monetary system in Japan during the Edo period.

Table 2 Number of Horses in Nihonmatsu Domain in 1857

County	Group	Horses used to carry goods	Stallions (borrowed)	Horses used to carry goods (leased)	Horses to ride (owned)	Total
Adachi	Shibukawa	127	19	2	110	258
	Harimichi	481	48	54	5	588
	Obama	180	26	15	32	253
	Sugita	135	11	-	-	146
	Tamai	427	4	1	-	432
	Motomiya	588	11	37	7	643
	Nukazawa	311	46	47	-	404
Asaka	Kōriyama	771	7	1	-	779
	Katahira	541	23	72	-	636
	Ōtsuki	883	26	25	-	934

Source Adapted from Nukazawa (2010, 81).

Asaka County, the Ōtsuki-gumi raised the most horses, followed by the Kōriyama-gumi. Using the NAC, we can confirm the change in the number of horses raised and the population in Shimomoriya and Komaya of the Ōtsuki-gumi, and Hidenoyama of the Kōriyama-gumi.

At the beginning of the period, no clear relationship was observed between the development of the human and horse populations in

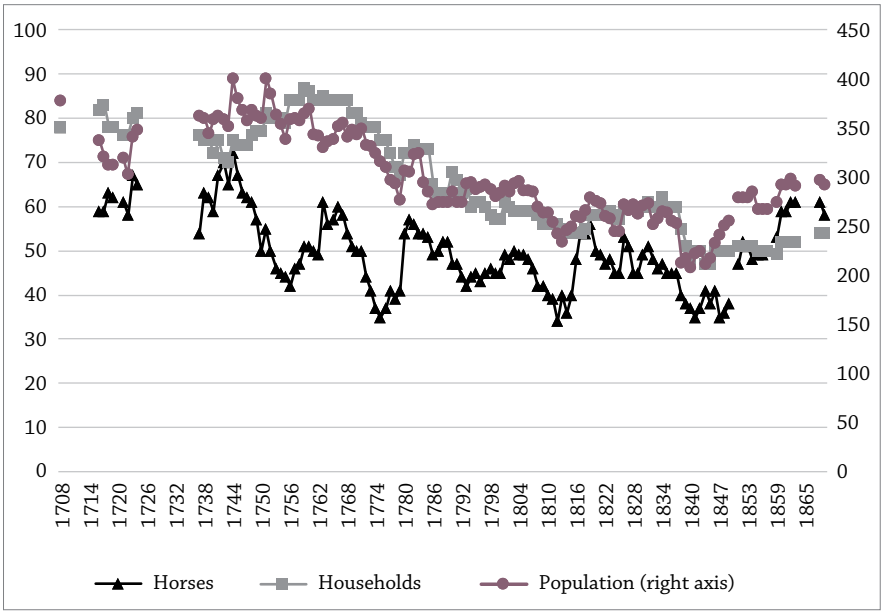

Figure 9 Population, Households, and Number of Horses (Shimomoriya)

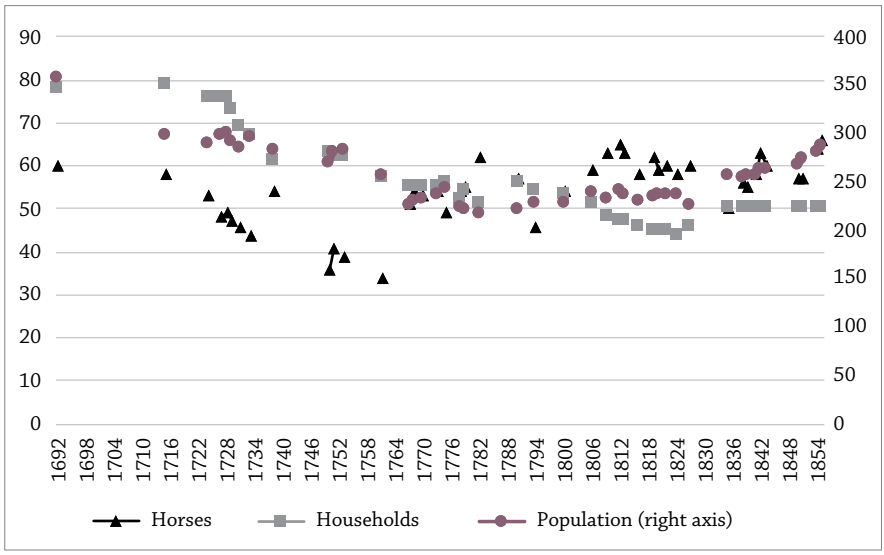

Figure 10 Population, Households, and Number of Horses (Komaya)

Shimomoriya. However, from about 1760, the number of horses raised began to decline. This is followed, with a slight time lag, by a decline in the human population and the number of households (figure 9). It is likely that when economic difficulties arose, people first sold their horses and households that were not viable were dissolved. The number of horses per household was less than one during most of the observed period, but toward the end the number of horses exceeded the number of households.

Sources for Komaya are lacking for many individual years. Therefore, it is difficult to understand the relationship between the number of horses and the number of households in a given period. However, from 1800 and beyond, the number of horses exceeded the number of households, and the number of horses per household was more than two. This indicates that horse production gradually became a common practice in the second half of the early modern period (figure 10). This increase in the number of horses was inconsistent with what Hayami called a 'declining trend in livestock' from the end of the seventeenth century to the beginning of the eighteenth century. However, a declining number of horses is also observed; thus, it should be noted that different sources from different periods may offer different views.

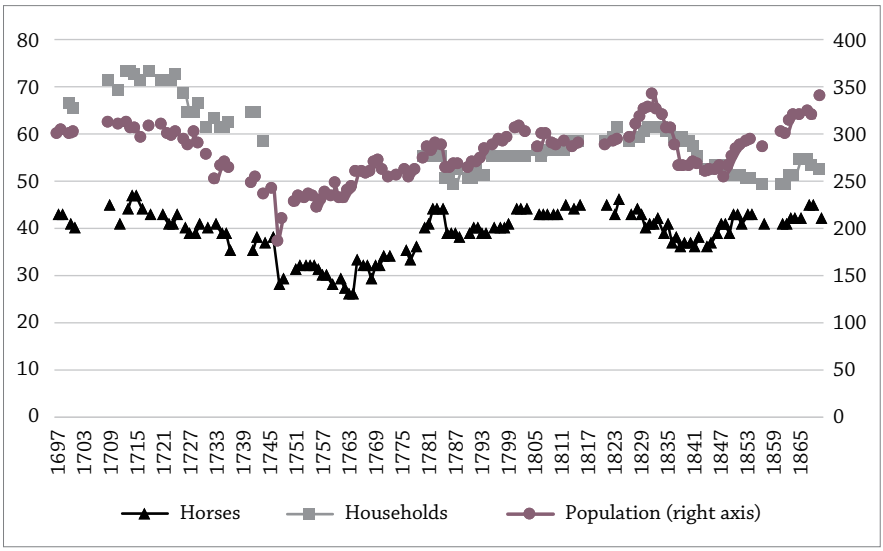

Figure 11 Population, Households, and Horses (Hidenoyama)

Cattle were also documented for Komaya in 1775 and 1779. In 1775, the household of a *nanushi* (village head) whose *mochidaka* (the legal amount of rice produced in one's rice field; this index represents the household's socioeconomic status) was 30.553 *koku*[5] owned three horses and two cattle, and a household with a *mochidaka* of 21.65 *koku* owned two horses and two cattle (the average village household produced 6.346 *koku*). There were years when the *nanushi* household owned more than 10 horses. Another household was recorded as owning two cattle in 1775. The same household owned one bull in 1779. The *mochidaka* of this household was 7.171 *koku*, a moderate amount of yield. In 1775, the family consisted of the head of the household, his wife, a son (age 17), a daughter (age 9), and no servants. Records show that in some years they kept a horse. The horse is often referred to as a '*chichikoma*' (literally, 'father horse', i.e. stallion), suggesting that they kept a horse that they leased from the domain to raise good horses. In 1819 and 1820, for example, they kept a *chichikoma*. The family at that time consisted of the head of household, Heizō (age 66-67), who was engaged in *shichimotsu-bōkō* (indentured servitude to pay off the mortgage) in the village, and the three remaining members: his wife Natsu (age 53-54), his daughter (age 37-38), and her husband from Echigo

5 1 *koku* is approximately 180 litre.

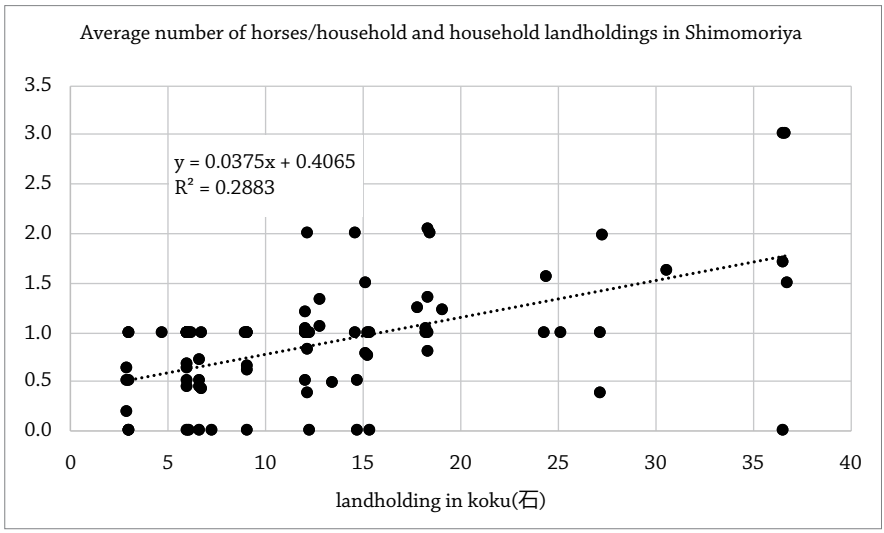

Figure 12 Household *Kokudaka* Landholdings and Number of Horses (Shimomoriya)

Province (age 39-40). Their *mochidaka* was unchanged at 7.171 *koku*, meaning that they were not wealthy farmers. The households in the village owned a total of 62 horses in 1819 and 59 horses in 1820.

In the case of Hidenoyama, the number of households and the number of horses seem to follow a similar trend, but the number of horses owned per household increased in the second half of the early modern period (figure 11).

Were households that owned horses wealthy? The author will use land ownership represented by *mochidaka* as an economic indicator for households and observe the relationship between *mochidaka* and the number of horses owned (figure 12). The data record household *mochidaka* and the number of horses owned by each household, and divide the total number of horses owned by households with a given *mochidaka* by the total number of households. If a household is documented with the same *mochidaka* for multiple years, it is counted multiple times.

The figure shows a weak positive correlation, or seems to indicate that the richer the household was, the more horses it owned. However, the coefficient of determination is only 0.2883, so such a relationship cannot be established with certainty. It appears that households with less than 10 *koku* owned less than one horse on average, while households with more land ownership owned less than two horses.

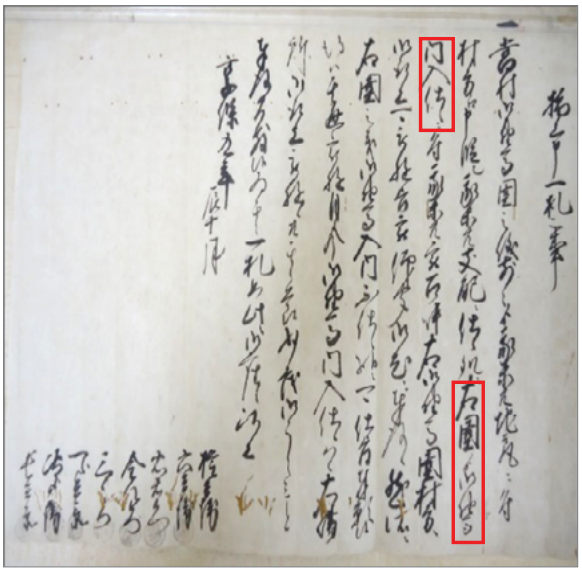

Figure 13
KC, *Sashiage mōsu issatsu no koto* (Petition)

The Tokugawa shogunate also showed interest in horse breeding in the Nihnomatsu Domain. A record from 1719 describes that 20 pack horses were sent from the domain to the Koganemaki ranch (Nukazawa 2010). The next section discusses the relationship between horses and local life in Koganemaki.

Peasants and Horses (II): The Case of Katsushika County

In some farming villages in Katsushika County, Shimousa Province, *goyōuma* (shogunate horses) damaged crops.

In Shimousa Province, horses had been raised on government-run ranches since the tenth century. In the Edo period, there were two government-run ranches in Shimousa Province, namely Koganemaki and Sakuramaki, where the Shogun's horses were raised. Koganemaki consisted of five pastures: Takadadai, Kamino, Nakano, Shimono, and Inzai.

The horses grazed freely in the pastures. Embankments or ditches about 3 metres high or deep were made between the pastures and the crop and rice fields to prevent the horses from running away from the pastures. However, the horses sometimes went into the fields and destroyed the crops.

One document refers to an incident in which horses broke out of the embankment into the village (figure 13). In the area marked in red, it states, 'The Shogun's horses came into the fields from the bank'. Each vil-

Table 3 Number of Horses by *Mochidaka* in 1813

More than (koku)	Less than (koku)	Number of households	Number of horses	Number of horses per household
<1	1	63	1	0.02
1	5	86	22	0.26
5	9	21	20	0.95
9	13	10	9	0.90
13	>13	8	10	1.25
		188	62	0.33

Source Adapted from Kobayashi (2019).

lage adjacent to the pastures (*notsuke* village) had income from the sale of firewood collected from the pastures, but occasionally suffered damage to the fields from invading horses. However, since Edo society was characterised by social stratification, people could not punish the Shogun's horses for destroying crops and rice fields.

In addition, the inhabitants of the *notsuke* villages bore the burden of duties such as patrolling the pastures. The officials who directed the villagers were called '*mokushi*' and had the status of samurai in the social hierarchy. Every two or three years, the grazing horses were driven to a certain place for the selection of the three-year-old horses. This event sometimes had a festive character. The good horses went to the stable of the Edo Palace, and those not selected were sold to farmers. The profit from the sale of the horses also served as a source of income for the Edo shogunate.

The horses sold to the peasants were used in the farming villages to carry loads or to make manure. The number of horses owned by the *mochidaka* category in the village of Fuse, a village in this region, is shown in table 3. Only a quarter of households with less than five *koku* owned horses, but many households with five *koku* or more owned at least one horse.

Conclusion

An illustration in the *Nōgyō Zensho*, written by Yasusada Miyazaki in 1697, shows cattle being used to till rice paddies, but no horses are being drawn. In addition, Kanehira (2015) presents material from the Meiji period explaining that 'horses were used exclusively for collecting manure, carrying loads, and soil puddling' and that 'horses were rarely used for tilling the soil, which was mainly done by hand'. In other words, as Saito (2004) noted, horses were used only to a limited extent in rice paddies in early modern Japan, and the main industrial use of horses was manure

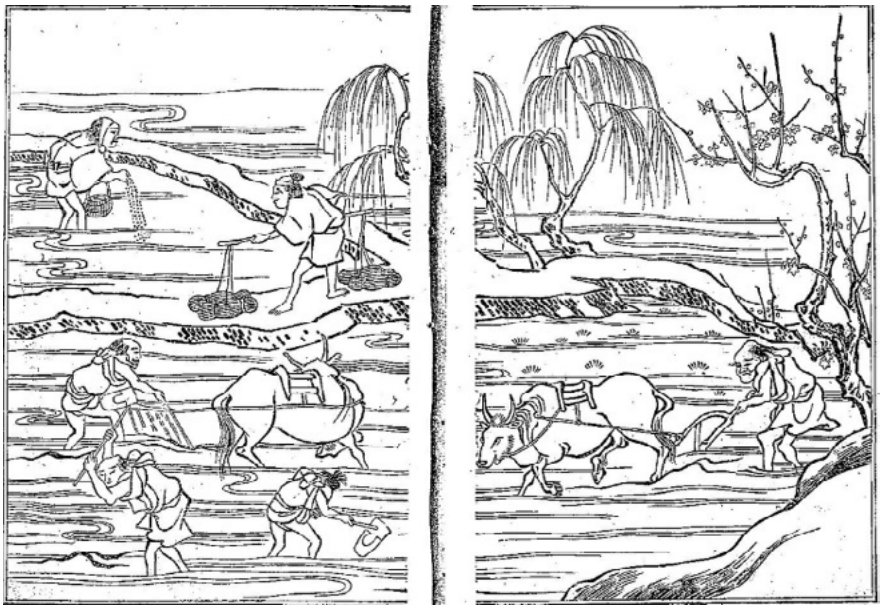

Figure 14 NDLDC, *Miyazaki Y. Nōgyō Zensho*

collection. However, in the latter half of the early modern period, farmers also began to buy fertilizers made from dried sardines. Horses, of course, also played an important role in transporting loads. In the Edo period, some peasants lived in '*magariya*', where houses were connected to the barn in the form of the letter 'L'. Horses were livestock with which they lived under the same roof; therefore, it was considered taboo to eat horse meat. Many households kept one horse, and wealthier households had two or more horses. In Shimomoriya, some households owned five horses.

There are local differences in the number of horses owned. According to Kanehira (2015), in the Morioka Domain (encompassing present-day Iwate and Aomori prefectures), which was also known for horse production, there was an estimated average of 2.4 horses per household, based on the number of horses recorded in a fire incident. However, this figure could include not only horses owned by villagers, but also those that were leased. Kanehira also points out that other documents indicate that one farmer owned at least 10 horses, another farmer owned a maximum of 24 horses, and some farmers without *mochidaka* (their own fields) had horses in their possession.

In the domain of Nihonmatsu, a farmer who successfully raised a good horse could sell it to the warrior class for a high price. It is believed that

this brought some profit. Since there were no major wars in early modern Japan, horses were never used in warfare, but such good horses were purchased by ranches run by the shogunate for a high price to be trained as military horses. The purchased horses were used when the Shogun went on falconry excursions. On the other hand, the farming villages adjacent to the government-operated ranches suffered from crop damage caused by the invasion of these horses. However, it was difficult for farmers to take effective measures against them.

While horses were an important source of income for farmers, they also posed a challenge by destroying their rice and crop fields.

Here I would like to return to my original question. Akira Hayami's 'Industrious Revolution' started from a phenomenon observed at the beginning of the early modern period in Owari Province, where the number of horses declined despite population growth, and led to economic growth in early modern Japanese society driven by an increase in per capita labour output instead of capital, in this context, livestock. However, horses were rarely used for ploughing fields in the early modern period (Saito 2004; Kanehira 2015). Moreover, time-related observations of population (or number of households) and number of horses in Asaka County show that when one variable increased, the other also increased, and likewise when either variable decreased; thus, they fluctuated in direct proportion to each other. Aside from being raised for sale in the market, horses in farming villages were mainly used to transport heavy loads and to obtain manure. Each household often owned a horse, which it raised in a small barn attached to the house where the family lived. Regionally, more horses were raised in eastern Japan than cattle. One of the reasons for this was that horse manure, which fermented at higher temperatures, was preferred in the cold regions of eastern Japan. In the Meiji period, when dry paddy farming was adopted, horses were increasingly used for ploughing and tilling. At the same time, improvements were made to raise larger horses.

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7

Traditional Pottery Making as a Local Asset for Sustainable Development in North East India: Larnai Village, Jaintia Hills, Meghalaya

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Traditional Pottery Making in North East India

Northeast India is one of the regions with diverse human-environment relationships. Although the region is known to be rich in research results in various fields of empirical science, it has not attained any importance to date when it comes to thestudy of the production of pottery. The proximity to the South Asian junction, East Asia and South Asian countries, as well as the natural and cultural linkages, can explain the diverse culture of the people living in this region. The unique climatic conditions favour the region with high to very high rainfall (Mawsynram and Cherrapunji in Meghalaya are known to be the wettest places in the world), along with its diverse natural vegetation, natural resources, and various plant and animal species. All of these shapes and influences the lives and culture of the people of northeast India (Hazarika 2006, 25).

However, the northeast of India is destined to play a crucial role in shaping India as a nation, especially in the eastern region of the country (Medhi 2003), as this area is referred to as 'the great Indian means of access'. The region lies between 20˚N and 29˚30' N latitudes and between 89˚46' E and 97˚30' E longitudes, commonly known as the land of seven sister states, namely Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, with the state of Sikkim being the most recent addition. The area includes several geographical subdivisions , such as

Murayama, S., Ž. Lazarević, and A. Panjek, eds. 2024. *Changing Living Spaces: Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present*.Koper: University of Primorska Press.

the Assam Valley covering the eastern Himalayas, Purvanchal and the Meghalaya-Mikir region, and the Brahmaputra Plain covering the hilly areas of the valley. Several tributaries and streams drain this region of the Brahmaputra and Barak rivers (Medhi 2003).

From a historical point of view, the production of handicrafts can be considered as having a well-thought-out logic and structure. However, since these traditional pottery products are unique and different from other products, they also convey a sense of attachment to one's cultural heritage. The replacement of indigenous handicrafts with industrial products can lead to the destruction and erosion of indigenous skills and knowledge. Clay cooking utensils, for example, would fit well with both the traditional lifestyles of indigenous societies and the environment. In contrast, plastic pollution is now considered one of the fundamental problems that developing countries like India need to address (Ziaee, Nadalian, and Marasy 2017, 297–8).

This study presents the environmental characteristics of the traditional production of pottery in a village setting. It conducts a case study because the article is an attempt to give a summary of the production of '*khiew ranei*'. In this article, a definition of the standards and criteria of traditional pottery production in relation to the environment is introduced, the process of pottery production in Larnai is described, and the environmental characteristics of Larnai pottery are explained.

The Objective, Data Source, Area and Methodology of the Study

This article provides an overview of pottery production in northeastern India and specifically of the Larnai women involved in traditional pottery making. It also explores the characteristics of Larnai pottery and how these traditional practices have helped them maintain their indigenous skills and preserve the culture of making traditional pottery (*khiew ranei*) that they inherited from their grandparents. Further research into the process of pottery making and how this has affected people's lives is also important and will be considered here.

Larnai is a small hamlet in Thadlaskein community and in the rural development block of Meghalaya. It has a population of 900 with a total number of 114 households. Larnai is located between latitudes 25°59'N and longitudes 92°19'E. It is about 51 km from Shillong, the capital of Meghalaya, and is located on National Highway No. 6, which is part of the Nartiang *Doloiship*.

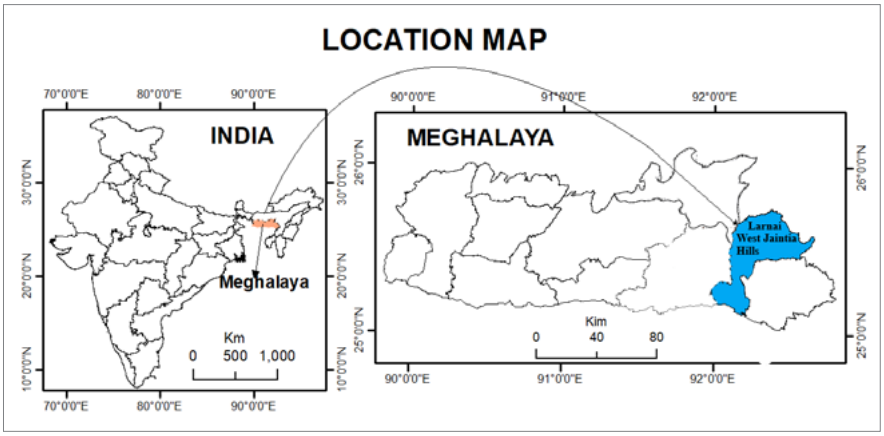

Figure 1 Location Map of the Study Area (Author: Monica Mawlong)

Primary data were collected through field observations and visits to active pottery workshops, and interviews were also conducted with artisans in Larnai. The secondary data were also obtained from various online sources such as documentations, newspapers, journals, etc. In this context, the important research questions of the current study are as follows:

(i) What are the characteristics of the local pottery of Larnai (*khiew ranei*)?
(ii) Which characteristics are compatible with environmental standards?

To understand the characteristics of Larnai pottery, a descriptive-analytical method was used.

The predominance of shouldered celts and the characteristic cord-stamped pottery characterise the pottery culture in northeastern India (Hazarika 2006, 29). Many excavation sites such as Sarutaru (Rao 1973, 1–9), Parsi-Parlo (Ashraf 1990), sites in the Garo Hills (Deshpande 1975) and Manipur (Singh 1992–1993, 21–35) have yielded numerous potsherds, especially cord-stamped and other handmade wares. The fast turning wheel was unknown to the Khasis and Jaintias. The pottery shows the survival of one of the oldest traditions of handmade traditional pottery production without any decoration or painting, as found in Larnai village in Jaintia Hills, Meghalaya (Hazarika 2006, 29). Pottery production may have been low because people used traditional materials.

In the modern communities of northeast India, the production of handmade cord-stamped pottery is now a living tradition among the Oinam village of Manipur, a Mao Naga tribe in the Senapati district of Manipur. They are still at a very primitive technological stage and make pottery using a crude moulding technique and hand-beaten methods. However, the cord-stamped pottery found in the archaeological sites of Manipur is different from contemporary pottery except in certain aspects of production and manufacturing technology. The Nagas make handmade pottery without the use of the wheel.[1] To date, the potter's wheel is uncommon among the Khasi in Meghalaya. Modern communities use handmade pottery for various purposes, such as cooking, storage, and making rice beer. The handmade pottery production in these tribal communities in north-eastern India can reveal the behavioural aspects of the culture and tradition of the people (Alemchiba 1967, 37–8).

Pottery in Larnai Village

In a few parts of Meghalaya state, remnants of the indigenous art of firing clay pottery are still practiced. Larnai, a small village about 2 hours' drive from Shillong in the Jaintia hills, is virtually the only known place where traditional pottery is still made. The ecological distribution makes the Jaintia hills a distinctly rich region in mineral resources. In addition to coal and limestone, there are numerous other mineral deposits in the region, including shale, phosphate, and bauxite.

Since time immemorial, the people of the village of Larnai have used this fireclay to make pottery, and still practice the tradition to a lesser extent. More than 20 different types of vessels needed for cooking, storage, preparation of drinks and rituals are made by the women with their bare hands (MTI, ODC-H, *Larnai Clay Pottery*). A variety of black clay collected from the Sung Valley is tempered on a cowhide or an apartment disc with fine grains of sand coloured green until it acquires a smooth shape. First, two pieces of a vessel are made and joined together with the wooden beater while they are leather-hard. The pottery is dried in the sun and then

1 A few villages produce pottery, notably Viswema and Khuzama of the Angami tribe; Thenyezuma, Runguzuam, and Kholazumi of the Chakhesang tribe; Tesminyu village of the Rengma tribe; Tokikehimi and a few other villages of the Sema tribe in Wokha; some of the Ao tribe; Kong-sang, Yali and Nakhhao village of the Chang tribe; Wakching, Shiyong, Leangha, Chui, Choshachinguyu, Longkai, Sheanga and Tangjen of the Konyak tribe; Ngura and Lungmutra of the Sangtam tribe; Noklu and Sao village of the Khemungam tribe and a considerable number of villages in Phom region. See: Alemchiba (1967).

smoked in a smoke chamber until it becomes hard and brittle. Finally, it is fired in an open kiln until the black soot is gone and the vessels are glazed. Pottery made here includes spout vessels, bowls on stands, lawn bowls with lids, smoke pipes, spherical vessels with high necks, elongated cylindrical vessels with wide openings, and flower vases, among many others. Before firing, a brown coating made from the bark of a tree called Sohliya, scientifically known as Myragi Nagi, is applied with a brush. The outer part and the inner surfaces are completely plain without any decoration. However, the fabric of the pottery is thick and coarse, which gives it an antique appearance.

In addition to agriculture and livestock rearing, the production of traditional handmade pottery from clay, *khiew ranei*, is an alternative source of income for several households in Larnai in the western Jaintia Mountains. The village of Larnai was the first to start making pottery by hand, and recently the village of Tyrchang, a neighbouring village of Larnai, has followed suit by making clay pots to meet the demand for clay products. They are located about 7 km from Ummulong village and are the only two places where this indigenous craft continues (Shillong Times 2015). This art originated in the hills and was passed down from grandparents to village women. The vessels look antique without losing the traditional flavour. The vessels and pots are unique and special because they are made for artistic representations and not for geometric accuracy.

In the villages of Larnai they want to preserve and carry on their traditional pottery craft and heritage without using the spinning wheel, a piece of traditional craftsmanship made only from palms. Larnai pottery demonstrates a true ancient tribal heritage. The most common products of Larnai pottery are the clay items intended for making Khasi pancakes, called '*kpu tharo*', and for the local distillery brew (Shillong Times 2015). Some distinctive shapes and forms have been passed down through generations, and some new forms have developed, but the tradition and its simplicity and crudeness remain. Although they were intended for the local market and had their basis in the rituals and the everyday needs of local people, the demand for these products today is mostly as faux-antiques (MTI, ODC-H, *Larnai Clay Pottery*).

Unlike in the rest of the world, only female artisans perform this craft – a craft that their grandmothers have passed down to their daughters for many generations. They have honed these skills over centuries, producing the finest handmade pottery and utensils for baking '*pu-tharo*' (a local rice-based snack) and other rice snacks, and for performing

religious rituals (MTI, ODC-H, *Larnai Clay Pottery*). The craft of pottery in Larnai is very rudimentary and crude. Without the use of spinning wheels, the traditional technique of pottery making is a craft that uses only the hands. These women are neither wealthy nor economically prosperous, but they are self-sufficient and willing to help each other in times of need. The women artisans of Larnai do not intentionally and purposefully want to adopt the modern spinning wheel or modern tools and techniques and technological advances. They know that while the introduction of modern tools and techniques would increase their income and make it easier for them to make the pots, they would not reap the desired quality. They firmly believe that they can reconnect with the people of the past by maintaining the skills passed down from their grandparents. In this way, they can preserve and maintain the cultures and traditions for future generations. By practicing the skills they received from their grandparents, they can learn from their imperfections and adversities and strive to become better. They believe that by working with their bare hands, they leave impressions on their hearts (Zizira 2019).

Considering the sustainability aspect of Larnai pottery, where much smaller pieces are developed by women artisans, it is easy to aim for a better market value that can benefit women through this traditional pottery making. An artisan from the village remarked, 'This craft is a part of us; we try to preserve the skills by introducing new designs and artefacts that a tourist can take as a souvenir and that helps us preserve the indigenous skills we are already equipped with.'

The artisans of Larnai inherited the technique from their ancestors, who believed it was gifted by God. In the past, the artisans of Larnai made pots to cook various things, but now they only make pots to cook '*pu-tha-ro*' (rice snacks). Recently, however, there has been a great demand for these clay products, not as cooking vessels, but as souvenirs, as they have a touch of antiquity.

Method of Production

Firstly, black clay locally known as '*khyndew iong*,' and grey clay known as '*khyndew khluit*' were collected from Sung Valley in West Jaintia hills,which is also known as the rice bowl of the Jaintia hills. Another special ingredient is also collected there from a depth of about six feet, the green stone called serpentine stone, which is tempered on cows' hide with fine granitic sand grains that have a greenish tint until it becomes like a smooth mould. Then the clay is mixed with the blue-green colour of

sandy clay materials, and beaten with hand tools to improve the potency and durability of the hide. After the clay is beaten to a certain consistency that makes it a smooth mould, the women potters begin shaping it into the desired contours with great care and skill. The raw clay profiles are then placed on wooden boards and first dried in the sun. Then they are placed in a smoke chamber in a kiln until they are completely dry. Finally, they are fired in a kiln at 500 to 1200 degrees Celsius for up to nine hours until the black soot is gone. The blue-greenish, sandy material facilitates the strength of the pots and helps them withstand temperature shocks (Zizira 2019).

The potter produces the characteristic black colour of the pots by quenching red-hot sintered pots in cold organic liquid immediately after the pots are removed from the hot kiln. The red-hot pots turn permanently black immediately after quenching, another unique technique used by Larnai potters. The organic liquid resembles a milky solution made from the crushed bark of a certain tree called '*Sohliya*', scientifically known as *Myrica nagi*. Foods prepared in such black pots taste better and have a longer durability. Once the baked pots are removed from the kiln and cooled, they are polished, shipped and sold in large quantities to traders in different parts of the Jaintia and Khasi hills (Zizira 2019).

Studies have been conducted to reduce the environmental damage in the production of pottery in modern times. These studies can identify several environmental standards for pottery production. Based on the current trend and conditions, pottery makers have followed certain standards. They mainly aim to use resources sustainably, thereby reducing pollution, increasing user satisfaction and prolonging the durability of a product (Ziaee, Nadalian, and Marasy 2017, 300).

The soil for the large potteries of Larnai is supplied by the surrounding fields. Due to the high iron content of the soil in this province, the colour of the pottery after firing is visually striking. Another characteristic of the soil is its resistance to thermal shocks, which has resulted in various dishes and objects that have been directly exposed to fire.

In the potteries of Larnai, the women artisans form SHGs (self-help groups). The latter usually take the main responsibility for making the pots, and the men help them with the more difficult tasks and work, such as collecting clay from the Sung Valley and transporting it from the fields to the workshop, or transporting the objects to the kiln or to the urban market. The activities up to making and drying are confined to the bound-

aries of the house, but for firing and marketing, human relations may extend to the village or neighbouring villages.

Pottery production is a seasonal occupation in Larnai, which villagers usually adopt as a second source of income in addition to farming. Therefore, extra time and energy are devoted to pottery making. The production of pottery in Larnai has taken place completely apart from technological progress. No machines and chemicals are used for the production of Larnai pottery.

Conclusion

Unlike most local pottery making centres in other parts of India, where pottery is produced for decorative and symbolic purposes, and pottery in Larnai plays an important role in the lives of local people, being an inseparable part of cooking in the region. The target market for these products is often the local communities, who are familiar with their use.

The beautiful ensemble of lawn bowls, kettles, teapots, mugs and trays are sold in the market and in various online stores. These clay products are also sold to traders from different parts of Khasi and Jaintia hills and travel as far as Mumbai and beyond. In the Jaintia hills, the pottery is used for baking '*pu-tha-ro*' (a local rice snack) and other rice snacks. These pots are also used for ritual purposes. The '*Dolloi*' of Nartiang – a village where Durga Puja is celebrated every year – orders these products for various rituals. These vessels are also sold overseas, with Thailand being one of the largest buyers. Modern and new designs are also being planned to expand the product variations and beautify the existing pottery. Apart from the Dolloi, who use the pottery made by the women artisans of this village for religious practices, their products are also recognized internationally and are in high demand, especially in countries like Japan and Korea, who also import and use their goods for their religious practices.

Environmental issues have become more important, so many practical studies have been conducted on the production and use of pottery. With the aim of spreading the culture and reducing the environmental impact in this field, the Larnai potters have created a product that serves as a valuable example of research and practical action.

Studies have shown that traditional pottery in this region has many local and environmental aspects. The explanation of these characteristics may lead the government or private institutions to initiate planning and policies to activate the current situation. To answer the main research question of the study, the aspects of Larnai pottery and the evaluation of

ecological characteristics, this study showed that some ecological standards are followed by local potters, thanks to their local knowledge that production and use are environmentally friendly. Promoting and encouraging local skills and potentials can lead to important steps in improving the production process, achieving sustainable development, and spreading the traditional pottery culture. From the study, it appears that the management by the women artisans of the village of Larnai is in harmony with the environment (Ziaee, Nadalian, and Marasy 2017, 314–5).

Therefore, raising people's awareness of the environment, spreading the culture, informing people about the benefits of using clay pottery, and improving the cycle of design, production, and marketing play an important role in preserving local pottery. Pottery can be an important source of income for the people in the villages of Larnai, and the government must pay special attention to it. Villagers have developed and improved their traditional pottery art skills. Therefore, this art of the villagers should be supported and promoted so that they can develop and expand their business. The residents of Larnai village need proper marketing and training techniques and know-how for manufacturing and packaging. These products can then be sold and promoted in the international market through social networks.

Acknowledgement

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8

Structural Changes in Fertilizer Circulation in Modern Japan: Analysis Based on the Change in Relationship between the Use of Night Soil and the Disposal of Human Waste

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Introduction

This study examines the structural changes in material cycles that accompanied economic and social changes in Japan during the nineteenth and twentieth centuries. In particular, we focus on the use of night soil in agriculture and sewage treatment in cities, and highlight the changes in the relationship between the two.

Agriculture is intrinsically based on the cycle of materials. Materials and their cycles are closely related to the natural conditions and agricultural technology of each era and region and change accordingly.

Take the example of fertilizer: in the Edo period, various organic materials such as grass, seaweed, shellfish, and animal dung were brought to agricultural lands, much of which was human waste. All of these were important fertilizers for farm self-sufficiency. As crop production increased, purchased fertilizers such as fish fertilizer (made from fish waste) and soybean meal were introduced for the market. Guano (bird droppings) was also newly introduced as a fertilizer, along with chemical fertilizers. The introduction of such fertilizers and their combinations led to changes in the mechanism of 'self-sufficient material cycles' within management

Murayama, S., Ž. Lazarević, and A. Panjek, eds. 2024. *Changing Living Spaces: Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present*.Koper: University of Primorska Press.

in the region as a whole. In particular, the linkage to the market economy through fertilizers and the entry into land-intensive agriculture as part of modern Japanese agriculture are noteworthy as major structural changes in the material cycle linking the soil and the dining table.

As for urban areas, cities in Japan developed in the nineteenth and twentieth centuries and experienced rapid population growth during the Industrial Revolution. While demand for food increased and agriculture flourished, the disposal of human sewage in cities became a problem. Accordingly, Japan experienced a major structural shift in material cycles in both rural and urban areas in this.

This study discusses the structure of the material cycle of fertilizers from the perspectives of agricultural and economic history, using Aichi Prefecture as a case study. In particular, we focus on Nagoya, which underwent remarkable urbanization, and the farming villages on the outskirts of the city, which played a role in supplying food to the city. Aichi Prefecture was selected because it experienced a notable increase in industrial production in modern times, while becoming one of the country's leading agricultural production areas. It has both agricultural and industrial characteristics.

In the following sections, we discuss the development of agriculture and changes in fertilizer use in Aichi Prefecture (Section 2). In particular, we examine the actual status of the use of night soil as a valuable material in terms of the relationship between urban areas (Nagoya) and suburban farming villages. Next, we clarify the state of urbanization in Aichi Prefecture from the Taisho period to the early Showa period and describe the problem of human waste disposal, which became an urban problem due to population growth (Section 3). Using Nagoya administrative documents, we focus on the history of attempts to municipalize human waste disposal. Finally, we discuss and summarize the structural changes in the material cycle between rural and urban areas (Section 4).

Agricultural Development and Fertilizer Consumption in Aichi Prefecture in the Early Twentieth Century

Urbanization, Industrialization and Rural Areas in Modern Aichi Prefecture

Agriculture in Aichi Prefecture underwent significant changes in the twentieth century. The first factor was the shift to commercial agriculture for vegetable and fruit crops and livestock (including poultry) due to

Table 1 Trends in Agricultural Production in Nakashima–gun

year	rice	wheat	cotton	indigo	mulberry	Japanese radish	vegetable
1887	5.862	3.247	1.095	850	—	—	—
1897	6.529	3.859	79	1.005	411	—	—
1907	6.846	4.071	13	146	455	651	—
1917	6.804	3.729	1	120	794	1.044	—
1927	5.950	2.851	2	34	998	837	2.141
1937	6.078	1.074	2	1	516	722	2.322

Source: Aichi Prefecture (1887; 1897; 1907; 1917; 1927; 1937).
1) The numbers after the decimal point are rounded off. 2) 'No description' is indicated by — 3) The unit'chou' is about the same as ha.

the need to provide food for urban consumers and factory workers. The cultivation of vegetables, such as Japanese radish, experienced a remarkable increase. For example, table 1 shows changes in crops in Nakashima-gun, a wool-producing area in Aichi Prefecture.

At the end of the nineteenth century, cotton and indigo were grown as raw materials for hand-woven cotton textiles, in addition to the main crops of rice and wheat. However, the textile industry gradually became mechanized and electrified, imported cotton was introduced, and Japanese cotton with short fibres was no longer used. Due to imports from India and the introduction of chemical dyes, domestic production of indigo gradually ceased. While cotton and indigo declined, production of vegetables, especially Japanese radish, increased as demand for vegetables increased in Aichi Prefecture and industrial areas such as Osaka and Kobe (Yuzawa 2015).

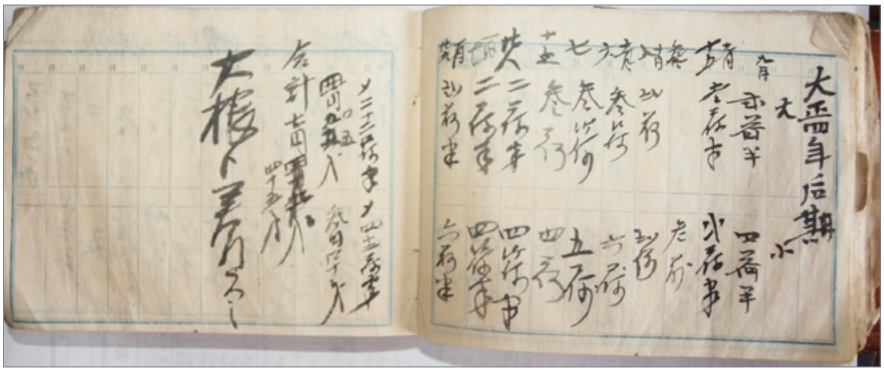

Figure 1 *Fertilizer Trading Book*, 1915
Source Takashi Suzuki, 0873.

Under these circumstances, there was a need to improve crop productivity, and fertilizer consumption in Aichi Prefecture increased year by year. It was important for farmers to use existing resources as much as possible so as not to rely on expensive purchased fertilizers. In Aichi Prefecture, poultry manure from poultry farming and human waste, which increased with urbanization, became important fertilizers in terms of self-sufficiency.

Examining the wool industry that emerged in Aichi Prefecture at the beginning of the twentieth century, the waste of workers collected from factories was sold to surrounding farming villages and returned to farmland as 'night soil'. Document 1 is a record of the trade in human waste as fertilizer from a textile factory. They traded with about ten farmers. This page is a record of transactions between a farmer and a factory in late 1915. Faeces and urine are recorded separately, and the total amount is given. Interestingly, payment was made in Japanese radish. Other pages show farmers buying night soil in exchange for in-kind payments such as straw and eggs, or daily wages for cloth factories.

The Industrial Revolution led to the creation of factories and the accumulation of workers, which increased both the demand for food and food production. In other words, a circular structure was created in which the human waste of workers was used as fertilizer for food production and workers ate the Japanese radishes supplied as payment.

In addition to these exchanges between individual factories and farmers, there were increasing discussions in Aichi Prefecture about agricultural production and fertilizers. For example, the prefectural Agricultural Experiment Station pointed out that although total fertilizer consumption in the prefecture was increasing, productivity was not, which was attributed to farmers' inadequate knowledge of fertilizers. Therefore, in 1916, the Agricultural Experiment Station published *The Story of Fertilizers*, a technical book on fertilizer use that promoted efficient farming with fertilizers (Aichi Prefectural Agricultural Experiment Station 1916).

According to the book, in the past, when the land was large and the population small, it was possible to let the land lie fallow and cultivate it for several years, and it was assumed that it would then recover. However, due to population growth, the same land was used two or three times a year to harvest crops. This increased the need to add fertilizer to the soil at each harvest and maintain its fertility.

Three components in particular, nitrogen, phosphoric acid, and potassium, are essential components of fertilizers. Nitrogen is found in com-

post, ammonium sulphate, herring meal, soybean meal, oil cake, and so on. Phosphoric acid is found in superphosphate lime, bone meal, guano, phosphorus ore, oil cake, rice bran, and so on. Potassium is found in straw ash, wood ash, soybean meal, soybean meal, cottonseed meal and so on. The text carefully introduces these formulations and fertilization methods for each crop: rice, wheat, vegetables and fruit trees.

In addition, a technical book on agriculture, *Night Soil*, was published by a general publisher in 1914, containing the composition of human waste and methods of decomposition, storage, use, odour control, and disinfection, and discussing the scientific basis for using human waste as fertilizer. The use of night soil continued, but the addition of scientific evidence and justification rather than the continuation of traditional practices was a sign that the technology had reached a new stage (Tsubame 1914).

Fertilizer Consumption Structure in Aichi Prefecture

The Aichi Prefectural Agricultural Experiment Station emphasized the need for organic matter and specifically explained the three elements of fertilizers and their composition. Human waste was therefore considered an indispensable 'organic fertilizer' for farmers.

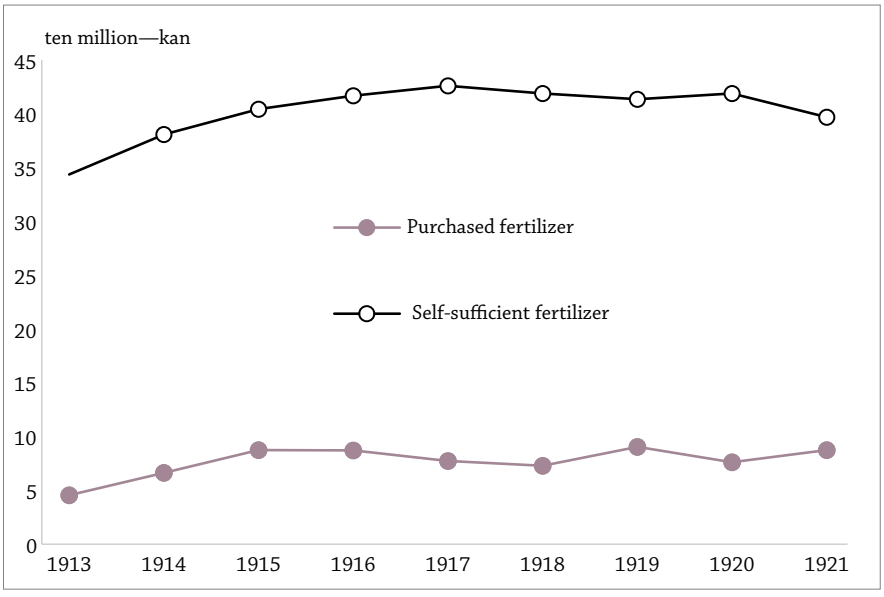

Figure 2 Trends in Fertilizer Consumption in Aichi Prefecture (Weight)
Source Aichi Prefecture Industry Department (1923, 43–6).

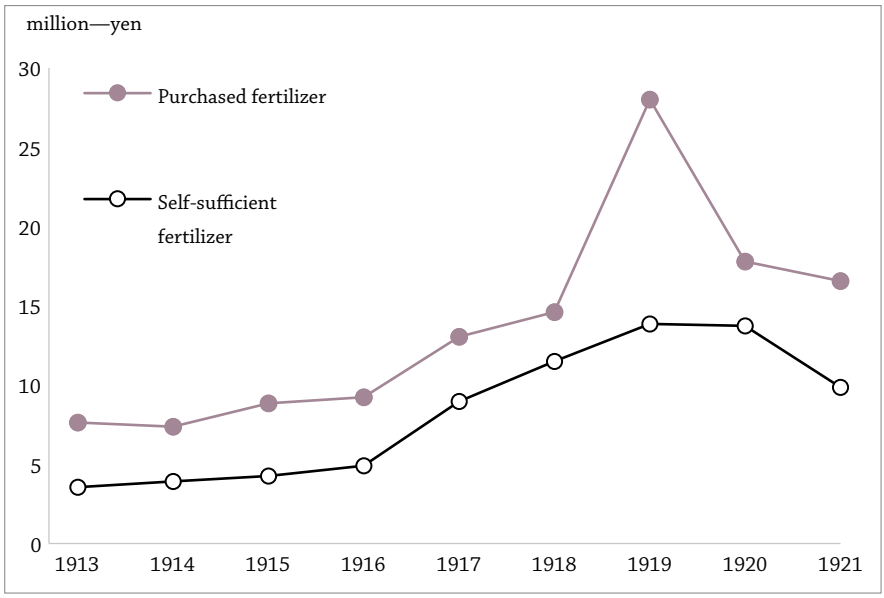

Figure 3 Trends in Fertilizer Consumption in Aichi Prefecture (Amount of Money)

Source Aichi Prefecture Industry Department (1923, 43–6).

According to the Station, population growth and improvements in living standards increased the demand for vegetables. In addition, a complete transportation system made it possible to transport vegetables out of the prefecture. As a result, vegetable cultivation developed rapidly and the production value reached high amounts; it is now the only cultivation area in Japan (Aichi Prefectural Agricultural Experiment Station 1919).

Looking at the structure of fertilizer consumption in Aichi in 1913, purchased fertilizer accounted for 13.4 percent of total consumption and self-sufficient fertilizer accounted for 86.6 percent. The proportion of self-sufficient fertilizer was significantly high, and human waste as self-sufficient fertilizer accounted for the highest proportion of total consumption, 38.4 percent. On the other hand, purchased fertilizer accounted for 67.7 percent of the total amount by value, which was significantly higher than the 32.3 percent of self-sufficient fertilizer. In other words, at that time, fertilizer consumption in Aichi Prefecture depended on a large amount of self-sufficient fertilizer, which in some cases was used alongside expensive purchased fertilizer.

This structure was maintained, but if we consider the consumption amount as an index, we find that the fluctuation increased from 1916 (figure 2 and 3).

Agriculture and Fertilizer Consumption in Suburban Rural Areas

What are the experiences of farmers in this situation? In the following, fertilizer is examined on a micro-scale using Kachigawa-cho, Higashikasugai-gun, near Nagoya.

Although Higashikasugai-gun is adjacent to Nagoya, it has a high percentage of full-time farmers and has become a suburban farming area supplying food to the cities. The number of farmers in the county is relatively high. With the development and expansion of Nagoya, the demand for vegetables increased due to population growth, and this region developed into a vegetable supply site.

Against this background, village farmers' associations tried various approaches to fertilizers. For example, they promoted the use of fertilizers for self-sufficiency against the decline in rice prices in 1915, and the following year they promoted the construction of composting houses and held compost fairs. To promote the cultivation and spread of plants that fix nitrogen, they organized the joint purchase of seeds of Chinese milk vetch.

However, as the total consumption of purchased fertilizer continued to increase, the actual management of farms relied on the use of fertilizers for self-sufficiency. For in addition to the increased tax burden, it was necessary to buy seeds and seedlings in cash.

For example, consider the business development of a farmer from the 'Farmers' Economic Survey'. This farmer was mainly engaged in rice cultivation and added sericulture and poultry farming to his combined cultivation. In order to improve the economic position of poultry farming and strengthen it, poultry manure was used to increase the productivity of various vegetables. As the improvement of agricultural management came to the fore, the trend of agricultural management costs also changed. It is obvious that the introduction of seeds, seedlings, fertilizers and feeds were essential to improve agricultural production. They consistently accounted for about 60 percent of farm management costs. The cost of purchasing fertilizer gradually increased, from 212 to 378 yen in 1923, but thereafter fertilizer costs decreased due to the success of fertilizer self-sufficiency (Aichi Agricultural Association 1923).

Now let us look more closely at changes in feed costs, fertilizer costs, livestock costs, etc. over time. The Farmers' Economic Survey distin-

guishes between 'for sale' and 'for own use' with respect to income and between 'in cash' and 'in-kind' for expenditures. The 'for sale' crops and the 'cash' expenditures are the flows directly related to the market economy. On the other hand, 'own use' crops destined for subsistence and 'in-kind' expenditures circulate in the farm economy, which is maintained by adjusting the balance between the two.

This farmer increased the amount of rice produced for his own use and specialized in raising poultry for sale. Night soil was included in the 'other' income, which is available only in the data from 1928, but all are for subsistence. Looking at farming costs, the proportion of expenditures for seeds, seedlings, feed, and chemicals purchased 'in cash' tends to be consistently high, but only fertilizer expenditures are liquid in the proportions of 'cash' and 'in-kind'. In the case of this farmer, it is noteworthy that 'cash' expenditures for fertilizer gradually declined from 1923 to 1930. In other words, by reducing the use of purchased fertilizer and increasing the proportion of self-sufficient fertilizer, he was able to reduce the burden of increased costs for seed, feed, and chemicals.

Thus, for individual farmers, increasing the ratio of self-sufficient fertilizer served as an adjustment value to maintain stable farm management.

Urbanization and Municipal Management of Human Waste in The Modern Aichi Prefecture

The Emergence of Industry and the Expansion of Nagoya

As we have seen, agricultural production became more active in modern Aichi Prefecture, and suburban farming villages developed, maintaining a balance between purchased and self-sufficient fertilizer. However, rapidly expanding cities and their growing populations became a new urban problem that went beyond tolerating the return of human waste to farmland. This section addresses the effects of urban expansion.

How did the population and urban areas of Nagoya change during this period? Below, we examine the case of Nagoya, which has the largest population growth in Aichi Prefecture.

As shown in figure 4, the population of Nagoya increased rapidly from the end of the nineteenth century to the first half of the twentieth century. In particular, there was a remarkable increase from 1920, with a constant increase of about 200,000 people per decade. This population increase was clearly related to the expansion of the Nagoya urban area.

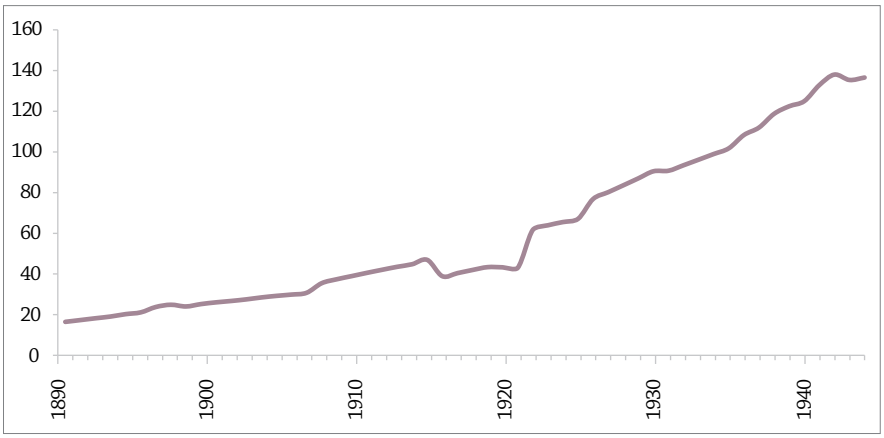

Figure 4 Population Transition of Nagoya City from Taisho Period to Early Showa Period

Source Nagoya City.

In Nagoya, in addition to the rail lines already laid in 1900, new rail lines were laid in 1923 to further surround the urban area, and by 1935 the urban area had expanded beyond the railroad.

Waste Disposal from the Urban Perspective of Cities: Municipal Involvement

As the city grew and the population increased, the volume of human sewage also increased proportionately. Nagoya was one of the first cities to address the treatment of this growing volume of sewage. In 1911, the mayor of Nagoya summarized the reasons for municipalizing waste treatment in three points: (1) the harmful effects of excrement, (2) urban sanitation, and (3) the right of citizens to dispose of waste (Himeta 1915, 11–5).

We address the negative effects of the first point: (1) collection is delayed during the peak agricultural season, and when it rains, drinking water inside and outside the house becomes impure; (2) farmers only collect the manure parts, and the remaining parts are not cleaned; (3) the human waste containers used by farmers are poorly made so that they emit odour, which is a hygiene problem; (4) some farmers use the same containers to transport vegetables; (5) there is a possibility of contagious diseases in the human waste; (6) there are many carriers of intestinal parasites in the region, which are transmitted from vegetables fertilized directly with human waste.

Table 2 Law and Policy Concerning Disposal of Human Waste

Year	Event
1900	"Dirt cleaning law" established. However, excluding human waste.
1910	Amendment of waste cleaning law. By doing this, it is decided to process waste sewage if necessary for each area.
	♦Applied to Aichi prefecture governor for the need for municipal waste management.
1911	♦The mayor responded regarding the impact of municipalizing manure disposal on citizens and farmers. Nagoya city decided to commission a company to manage sanitary disposal for the whole city.
1912	♦In Nagoya city, human waste treatment was carried out by the municipal government. This was the earliest practice nationwide.
1930	The dirt cleaning law is amended. Administrative responsibility for human waste disposal increases. It was decided that human waste was included in the waste.

Note ♦ Events related to Nagoya city.
Source Nagoya City History (2000, 133) and Hayato (1915).

As described above, the waste problem in cities became serious from the end of the Meiji era, and the established conventional methods and customs were no longer viable. In terms of hygiene and public health, the habits of the past were termed 'evil habits'. The idea that municipal revenues could be generated by treating and using sewage prompted the Nagoya Municipal Government to explore municipal management of waste treatment.

Until about 1912, human waste collection in Nagoya was handled through direct transactions between farmers and households in the city, and farmers supplied vegetables as payment for the waste. Although the Waste Cleaning Law was enacted nationwide in 1900, it excluded sewage in accordance with the practice of the time. This was a measure that recognized the use of night soil as fertilizer (table 2).

However, with the rapid increase in population, more human waste was discharged than could be used as night soil, and the old practice became unsustainable. Rural areas around Nagoya began to enact regulations for night soil and negotiate with city residents to stabilize the price of collection. In addition, farmers boycotted human waste collection and demanded lower prices for night soil. This was because prices were beginning to fall due to the oversupply of human waste. Thus, in the middle of the Meiji era, the relationship between rural and urban areas in terms of excrement extraction changed significantly.

However, due to continued population growth and associated waste, returning waste to rural areas as the only method of disposing of human waste was no longer practical, and Nagoya sought an alternative meth-

od. In 1910, the Waste Cleaning Law was revised, and the administration became actively involved in waste disposal, with the handling of human waste entrusted to prefectural governors.

In major cities such as Tokyo, Osaka, and Nagoya, the need for municipal management of sewage treatment increased since the 1900s in order to secure financial resources for water supply and sanitation. Nagoya, in particular, is said to have pushed for municipalization of wastewater treatment more out of financial necessity than for public health reasons.

According to a survey conducted by the Nagoya City Sanitation Division, in July 1921 the daily excreta volume of the entire city was about 700,000 litres, of which about 150,000 litres was excess human waste that could not be treated. In addition, as urbanization took place, land formerly used for agriculture was converted to housing or factory use, and rural areas were moved to the outskirts of the city. As cities grew, transportation costs increased, more human waste was retained in cities, and disposal became a major social problem.

Under these circumstances, it became necessary to increase government involvement in sewage treatment. In 1930, the Waste Cleaning Law was amended to include human waste, which had previously been excluded from it. This was a problem not only in Nagoya but also in other parts of Japan.

Conclusions: Stepwise Reconstruction of the Material Cycle

This study illustrates the structural changes in the material cycle of modern Japanese agriculture by focusing on the changes in fertilizer technology in Aichi Prefecture in the early twentieth century. In particular, we examined the conflict between the use of night soil and the processing of human waste from both rural and urban perspectives. With regard to the return of human waste to farmland, i.e. its use as night soil as a single material cycle, a decline has been observed in the modern era.

This study concludes that it is not a decline but a gradual reconstruction of the material cycle. This is because, as we have seen, the use of night soil continued to coexist with the processing of human waste. Subsequently, night soil continued to be used as a self-sufficient fertilizer during and after World War II due to the shortage of materials. Therefore, the use of night soil continued in Japan at least until the 1960s.

When it comes to the restructuring of the material cycle in modern times, rapid urbanization and population growth are both important events. The rapid increase in population resulted in a massive ex-

cess of human waste, although the resulting increase in food production increased the need for fertilizer. Although some of the manure was returned to farmlands and contributed to agricultural production, by the 1900s, the large amount of residue had become a social problem, causing foul odours and unsanitary conditions. This was the result of the rapid increase in the amount of material, which could no longer be handled by the existing circulation structure. Due to the excess, the price of human waste decreased and a campaign to reduce collection fees was launched. The need to dispose of the large amounts of human waste that could not be returned to agricultural land continues to increase, and Nagoya has changed its policy about every decade to address this problem.

Thus, since modern times, the circular structure of materials has been gradually reshaped, in the wake of overwhelming quantitative changes in the population. As far as this study is concerned, the material that most reflects this effect is human waste, used as night soil and processed as sewage.

As a preliminary note, it was a process in which the material cycle absorbed new materials and a new logic, transforming into a new cyclic structure closely linked to the market economy. Both the use of night soil in rural areas and the treatment of sewage in urban areas are similarly important actors.

The non-monetary world of the farm economy, that is, the material cycle of self-consumption, was generally considered a world separate from the market economy and even from the capitalist economy. However, the increase and refinement of the use of night soil through the development of vegetable cultivation for urban consumers, the improvement of the pumping and distribution system, the combination of chemical and organic fertilizers, the stabilization of the farm economy through self-sufficient fertilization, and the conflict between the use of night soil and sewage processing, as illustrated here, cannot be explained without the influence of the market economy.

In other words, the material cycle in the modern era, the transition period to the market economy and society, affected both the individual farm economy and the market economy, and consequently, the gradual structural change of the material cycle led to the fundamental support of the market economy. In addition to Aichi Prefecture, it is necessary to further explore this point through comparative analysis in other prefectures, including the relationship between rural and suburban rural areas; future studies may address this.

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Part Three

Natural Variables

9

Wet-Rice Agriculture and Economic Growth in Pre-Industrial Japan

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Staple Grain and Non-Staple Grain in the Japanese Economic Historical Context

Based on agricultural production and cultivated land data prior to modern Japan, this chapter analyses the impact of natural environment-induced differences in agricultural production conditions on regional economic growth and its trajectory. To this end, the chapter provides an overview of the agricultural production sector in Japan from pre-modern to early modern times. Agricultural production, especially rice cultivation, was the mainstay of pre-modern economic society. During this period, rice in East Asia was distinguished from other grains not only by being the staple grain but also by occupying a central position in the tax system as tribute. In the political history of Japan – at least during this period – the greatest concern of a governing organisation was how to control rice production and maintain its stable increase as tribute.

In this context, it should be noted that agricultural production, regardless of the crop, is influenced by the characteristics of the region in which it is produced. In pre-modern society, it was primarily soil and climatic conditions that determined the cultivation of crops. Although agricultural technology was developed to some degree, it could not fully control the effects of natural conditions. Given the uncertainty of natural conditions, year-to-year variations in temperature and precipitation would affect crops and sometimes create secondary obstacles, such as disasters, for the farmer, even if the crops were adapted to natural conditions.

Murayama, S., Ž. Lazarević, and A. Panjek, eds. 2024. *Changing Living Spaces: Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present*.Koper: University of Primorska Press.

This scenario suggests that in pre-modern Japan, the main areas of staple grain production, especially the rice fields adapted to the geographical and climatic conditions, developed better economically than the non-rice fields and mountainous regions unsuitable for staple grain production. The relationship between areas where staple crops are grown and economic development can be attributed to the fact that rice has been considered an important tribute since pre-modern times. During this period, the Kinai region and the coastal areas of the Seto Inland Sea were considered the most developed agricultural areas. These areas are located in western Japan, which is characterised by a natural environment suitable for rice cultivation. Moreover, this area was under the control of a centralised Japanese government.

Although the ancient Japanese government aimed at strong centralisation, it disappeared from history due to the failure of its institutional structure. The political system in mediaeval Japan was decentralised and administered by individual political powers such as court nobles, temples, and shrines in the capital city of Kyoto. They ruled over their estates (*shōen*) throughout the Japanese archipelago. At this time, rice was still an important part of the annual tribute.

The rice produced in each region was transported to Kyoto, the seat of the rulers. Kyoto thus became the centre for the collection of tribute and an economic centre of Japan. After the Warring States period (from the late fifteenth to the late sixteenth century), Japan became a feudal state comprising the Edo Shogunate and other local lords (*daimyō*). Even during this period, rice was paid as an annual tribute tax. The *daimyō* sent the rice harvested in their territories to Osaka, where it was traded and distributed throughout Japan. Thus, since rice cultivation was important for tax purposes in pre-modern Japan, economic growth may have been determined by the growth of the agricultural sector based on rice production rather than the growth of the industrial and commercial sector.

However, in the middle of the Tokugawa period – the early modern period – Japan experienced progress in rural industrialisation and the promotion of commercial crop production throughout the Japanese archipelago. Since the eastern part of Japan is characterised by dry land and mountains that are not suitable for rice cultivation, rural industries such as sericulture grew in this region. This led to economic growth and an accompanying increase in population pressure. During this period, economic growth was affected by the production of commodity crops from non-paddy cultivation and staple crops from paddy cultivation. This

Figure 1 Regional Division in Japan Sources: Saito (1983) and Kito (1996)

means that the pattern of economic growth no longer relied on the production of staple grains, which depended on the natural environment, as it did in ancient and mediaeval times.

To explore the above concerns, this paper provides a quantitative overview of arable land and agricultural production before modern Japan, from the eighth to the nineteenth century, using primary quantitative data and estimates from previous studies. However, the quantitative analysis depends on the availability of data. Data were available for certain periods before the modern period. For example, national data were available in ancient times, and extensive micro-level and village-level data were available in the Medieval period. Regional data and macro-level data were not available in antiquity or the Medieval period. Due to the limited data availability, the results of a single reference year shall be used as a representative case for a long period, including the results of the reference year. In this context, it should be noted that an overview of long-term trends may lead to reconsidering the conventional theory that rice is Japan's main crop and new historical implications may be gained.

The remainder of this chapter is organised as follows. Section 2 reviews information on agricultural production in pre-industrial Japan. Section 3 examines the differences in agriculture across the Japanese archipelago

Table 1 Available Sources of Quantitative Information on Cultivated Area and Agricultural Output

Period	Source	Type	Contents	
Ancient period	Eighth century	(Documents of *Shōsōin*)	Official document	Individual land document.
	Tenth century	*Wamyōshō*	Ancient encyclopaedia	Area of paddy field by *kuni* (province).
	Twelfth century	*Shūgaishō*	Ancient encyclopaedia	Area of paddy field by *kuni* (province).
	––	*Shōchūreki*	Ancient encyclopaedia	(Alternative version of *Wamyōshō* and *Shūgaishō*).
	––	*Irohajiruishō*	Ancient encyclopaedia	(Alternative version of *Wamyōshō* and *Shūgaishō*.)
	––	*Kaitōshokokuki*	Korean diplomatic report	(Alternative version of *Wamyōshō* and *Shūgaishō*.)
Medieval period	Eighth-sixteenth century	Individual land document	Land management document	Individual land document.
Early modern period	Seventeenth-nineteenth century	(Documents of Tokugawa shogunate)	Official document	Cultivated area (paddy and non-paddy) and agricultural output.

Source Takashima (2017).

and regions. Section 4 examines how historical and regional agricultural conditions relate to the natural environment and how they affect economic growth. Section 5 concludes the chapter.

Information on Agricultural Production in Pre-Industrial Japan: Materials and Data

Among the historical materials on pre-industrial Japan, some materials can be analysed at the regional level, but most can only be analysed from the perspective of the entire Japanese archipelago. This analysis is appropriate given the limited data on the cultivated land area of paddy fields or rice production. Quantitative data on non-paddy fields are available in a single year for a limited number of small areas and villages, and it would be difficult to use these data to analyse regional characteristics within the Japanese archipelago (figure 1). This imbalance in data availability between paddy and non-paddy fields is the reverse consequence of the overemphasis on rice production as a tax by political rulers. The term *staple grain* reflects the bias towards rice, and therefore information is limited to paddy field agricultural production. However, an analysis of the gap in regional rice production can show the difference between the production

of rice and other crops, indicating the positioning of agricultural products other than rice.

Rice cultivation in Japan should be seen in the light of the political history of the region. The ancient Japanese regime was based on a political system called *Ritsuryō* (a system of laws and codes influenced by the Chinese political system) – the first centralised government in Japan. The *Ritsuryō* regime was established in the late eighth century by transferring the *Ritsuryō* system from China to the *Yamato* Kingdom, which was originally a confederation of great kings (*daiō*) and local powerful clans (*gōzoku*). Prior to the establishment of the *Ritsuryō* regime, individual clans owned land in the Japanese archipelago. After the establishment of the *Ritsuryō* regime, all land belonged to the emperor and was therefore considered public land. Under this system, arable land was distributed to farmers based on their respective family sizes. After the death of the cultivator, the land was returned to the government and given to another farmer (*handen shūju*). The farmers cultivated their allotted paddy fields (*kubunden*) and paid rice as land tax and various head taxes to the government. To maintain this system of land allocation, the old government set up a family register to record the details of each household, and land allocations were adjusted every six years according to the size and composition of each household. Thus, there is no doubt that the *Ritsuryō* government kept records of the condition of paddy fields throughout the country. However, data on the total land area of the entire archipelago in the eighth century, when the *Ritsuryō* government was established, are lacking. The unavailability of data can also be attributed to the fact that the older the period, the less likely it is that primary documentation will be available. Since paper was a precious commodity at the time, once a written record became redundant, the blank reverse side was often reused to create another record. The renewal of official documents such as land registers and family registers, which took place every 6 years, would therefore have resulted in the destruction of individual documents so that they could be reused as recycled paper for other purposes (Sakaehara 1991).

Quantitative data on paddy fields throughout the country became available around the tenth and twelfth centuries. These rare quantitative data were recorded in encyclopaedias, not in the official government documents of the time. These two centuries are the only time when data were collected at the country level, and therefore these data represent the only information available for the ancient period. There is no information on the non-paddy fields of the country during this period.

The *Ritsuryō* regime experienced internal contradictions in its rule from the eighth century onward, due in part to its institutional limitations. There was a transition from a centralised system of land control to a decentralised system in which the royal family, nobles, and powerful temples and shrines in Kyoto administered and levied taxes on the *shōen* located in various parts of the Japanese archipelago. This situation continued for about 600 years during the mediaeval period – the period of the *Shokuhō* regime (the government of Oda Nobunaga and his military and political successor Toyotomi Hideyoshi; '*shoku*' and '*hō*' are the initial letters of their family names Oda and Toyotomi, respectively) until the time when the Tokugawa shogunate (the Japanese feudal government headed by the shogun Tokugawa) was established in the seventeenth century. In the mediaeval period, due to dispersed land control in the archipelago, there were no records to determine the agricultural area of the entire archipelago or of each region, although there may be information on the management situation of the land in individual *shōen*. Although there are countless *shōen* documents, they are only individual cases and do not represent the entire district in which the *shōen* is distributed.

Documentation improved under the Tokugawa shogunate in the early modern period. The Tokugawa government was established after a long period of decentralised rule; it was based on a feudal system of government consisting of the Tokugawa shogun and his subordinate *daimyō*. Although the *daimyō* collected annual tribute each year from the land they ruled, each *daimyō* was expected to keep records of the area of land cultivated and the amount of crops harvested each year. For this reason, there are no detailed records at the national level. In fact, information on total and regional cultivated area in the early modern period can only be captured by the records of *kuni*-level (paddy and non-paddy) fields in 1721. The public documents provide a continuous record of cultivated land by narrowing the reference year. However, as in the mediaeval period, these public documents contain data at the individual level and not at the area or archipelago level. Therefore, these documents were not included in this chapter. Data on agricultural production – expressed as *kokudaka* (crop yield expressed as rice value) – are available at the national and regional levels for the years 1598, 1645, 1697, and 1830. Because agricultural productivity increased during the Tokugawa period as agricultural technology developed, it is difficult to say whether the *daimyō* kept records of all agricultural crops produced during this period due to technological advances. It is believed that there was a surplus of 20 to 30 percent from

the recorded number, and this surplus was more than 50 percent in some regions.

The Tokugawa shogunate was overthrown by the Meiji government, which made *fukoku kyōhei* (enriching the country and strengthening the military) its prime motto. It also initiated measures to modernise government accounting in order to increase the sustainability of the administration charged with the nation's construction. Although official statistical books including agricultural production were also compiled and published, the survey method, and commodities produced were not uniform. This can be attributed to the results of trial and error in the early stages. However, data on the use of arable land can be estimated by analysing prefectural, regional, and field data. Since agriculture has not changed significantly since the Tokugawa period, it can be said to reflect the situation of cultivated land just before industrialisation.

The numerical uncertainties in the above-mentioned historical documents have often been the subject of discussions on quantitative economic history. Academically, several historians, including the author, have made efforts to estimate actual production asymptotically. Generally, however, this chapter uses the data in the primary records rather than the results of historical estimates in previous studies. This is because the available estimates of agricultural production on cultivated land are at the national and regional levels. These estimates are considered symmetric and preliminary and are therefore inappropriate for detailed discussion (Takashima 2017; Bassino et al. 2019). However, as described at the beginning of this chapter, it is important that regional data be collected, even if they are raw data. The study considers them sufficient to outline the long-term trend.

Distribution of Arable Land Before the Modern Period

Ancient Period

Despite limited data, it was possible to determine the distribution of paddy fields in ancient period. Table 2 shows the distribution of paddy fields by region in the tenth and twelfth centuries. As shown in figure 1, the Japanese archipelago is divided into fourteen different regions (excluding Ezochi and Ryukyū, which were outside the effective control of Japan before modern period). As for the beginning of the eighth century (at the beginning of the Nara period), when the first centralised state emerged, the study referred to the estimated value of the cultivated area of the

Table 2 Area of Paddy Fields, 730–1150 (in *chō*)

Region		730	950	1150
East Japan	East Tōhoku	—	51,437	45,077
	West Tōhoku	—	26,137	42,120
	East Kantō	—	103,345	101,561
	West Kantō	—	108,497	122,543
	Tōsan	—	49,769	27,692
Mid Japan	Niigata and Hokuriku	—	77,820	98,537
	Tōkai	—	50,793	59,866
West Japan	Kinai	—	56,249	47,612
	Around Kinai	—	111,289	116,818
	Sanin	—	31,210	32,322
	Sanyō	—	66,246	94,029
	Shikoku	—	42,899	44,186
	North Kyūshū	—	68,927	66,655
	South Kyūshū	—	38,382	32,012
East Japan		—	339,184	338,994
Central Japan		—	128,613	158,403
West Japan		—	415,201	433,634
West Japan (incl. Mid Japan)		—	543,814	592,037
Total		663,001	882,998	931,031

Sources and notes Takashima (2017). No regional data were found in 730; only estimates at the national level are available. Figures for 950 are taken from *Wamyōshō* and *Shūgaishō* in 1150. Since *Wamyōshō* and *Shūgaishō* have several editions with different numerical values, the average value is employed in this table.

entire Japanese archipelago, since data on individual regions were not available.

The total arable land in ancient Japan grew 1.3 times during the period from 730 to 950 and 1.1 times from 950 to 1150, for a total growth of about 1.4 times during the entire ancient period. During the first 200 years, there was a remarkable increase in the area of paddy fields. This growth was influenced by the active cultivation policies of the *Ritsuryō* government in the eighth century. The most representative of these policies was *Konden einen shizai hō* in 743 (an edict that allowed farmers who established new arable lands to own them permanently). This policy not only aimed to increase the amount of newly created land by allowing private ownership of cultivated land, but also allowed the government to control cultivated land nationwide by including land other than cultivated land in its jurisdiction (Yoshida 1983). In the sense that it allowed private ownership of land, this land policy provided a high incentive for farmers, aristocrats, temples, and shrines to develop new cultivated land. The earlier

Table 3 Area of Non-Paddy Fields, 730–1150 (in *chō*)

	730	950	1150
Japan total	141,061	507,976	534,091

Source Takashima (2017).

Sanze isshin hō of 723 (a law that allowed peasants who created new arable lands to own it for a period of three generations) also had a positive effect on strengthening the *Ritsuryō* regime. This policy aimed to expand the arable land and increase rice tax revenues. The implementation of this policy involved granting land ownership to peasants and keeping records of such land allocations (Haneda 1961). There are examples of these land development efforts continuing into the ninth century. This agricultural policy had a positive effect on the expansion of arable land.

Despite these policies, there has been a decline in the growth rate of rice paddies from 950–1150. The annual growth rate of 0.03 percent in the latter two centuries was lower than the annual growth rate of 0.13 percent in the former two centuries. Thus, the growth rate of paddy fields in the ancient period was only 0.08 percent. This statistic is compared with the statistics after the transition to non-paddy fields in the archipelago in the same period.

Table 3 shows the estimated areas of non-paddy fields in the ancient period. Similar to paddy fields, the number of non-paddy fields increased during the ancient period. However, there was a difference between the growth rates of these two types of fields. In other words, the annual growth rate of the paddy fields was 0.08 percent, while the growth rate of the non-paddy fields was much higher at 0.32 percent. The area of non-paddy fields almost quadrupled in 400 years, while the area of paddy fields grew only 1.4 times. Although the acreage statistics are estimates, the growth of acreage in ancient Japan is attributed mainly to the development of non-paddy fields. This is consistent with a study reporting that the Japanese government actively promoted cultivation on non-paddy fields, or dryland, during this period (Haneda 1961; Miyamoto 1998).

In the eighth century, land development laws and regulations provided incentives for private ownership of cultivated land. These laws ensured that development efforts shifted from large-scale development by the state or corresponding powerful temples, shrines, and nobles to small-scale development by individual farmers. However, due to limited civil engineering infrastructure, the development efforts of peasants during this period were limited to the reclamation of disturbed landforms, which re-

sulted in the development of only small-scale or low-yielding paddy fields (Kinda 1987). In other words, in the early phase of arable land development in the Japanese archipelago, development efforts focused on converting forests and uncultivated land into arable land. This development resulted in the creation of non-paddy fields as a preliminary stage, rather than the direct conversion of wilderness to cultivated land (Kimura 1992). This is consistent with the fact that the acreage of non-paddy fields was increasing at a higher rate than that of paddy fields. This is also supported by the fact that the growth rate of non-paddy fields was high from the eighth to the tenth century, when various laws and regulations on land development were issued by the government. This growth rate declined after the tenth century.

Although data on paddy fields by region are available for only two reference years (950 and 1150 in the latter half of the ancient period), these data show the area of paddy fields in eastern and western Japan. While the area of paddy fields in eastern Japan did not increase, the area of paddy fields in western Japan, including the middle region, showed an increasing trend. The difference in the development of paddy fields between eastern and western Japan is attributed to the following factors. First, it is attributed to the ruling system of the *Ritsuryō* regime in the archipelago. The *Ritsuryō* regime was originally based in the Kinai region (the five capital provinces around the ancient capitals of Nara and Kyoto). Therefore, the economic base of this regime was in western Japan. Albeit the ruling system of the *Ritsuryō* regime was instituted in the eighth century, after the mid-ninth century the rule was effectively established in eastern Japan, particularly in the Tōhoku region (the northeastern Japan farthest from Kinai). Although the *Ritsuryō* regime was able to control the archipelago institutionally, its rule was replaced by the aristocrats, temples and shrines, and an emerging samurai power in the second half of the ancient period (after the tenth century). This limited the political influence of the *Ritsuryō* regime to the Kinai region and its environs. Responsibility for developing the arable land shifted from the *Ritsuryō* regime to these new ruling forces. It seems obvious that paddy field development was driven under the latter regime as the power of temples and shrines in Kyoto, which owned the *shōen* throughout Japan, increased.

Second, the difference can be attributed to the geographical conditions of the archipelago. While there are many plains (e.g. alluvial land) suitable for rice cultivation in western Japan, there are mountainous areas and

Table 4 Percentage of Paddy Fields in the Ancient Period, 730–1150 (in %)

Region		730	950	1150
East Japan	East Tōhoku	—	1.2	1.1
	West Tōhoku	—	1.4	2.3
	East Kantō	—	10.1	9.9
	West Kantō	—	5.7	6.4
	Tōsan	—	2.5	1.4
Mid Japan	Niigata and Hokuriku	—	3.3	4.2
	Tōkai	—	2.9	3.4
West Japan	Kinai	—	8.8	7.5
	Around Kinai	—	4.7	4.9
	Sanin	—	3.3	3.4
	Sanyō	—	3.5	4.9
	Shikoku	—	2.5	2.6
	North Kyūshū	—	4.4	4.3
	South Kyūshū	—	1.7	1.4
East Japan		—	3.1	3.1
Central Japan		—	3.1	3.9
West Japan		—	3.7	3.8
West Japan (incl. Mid Japan)		—	3.5	3.8
Total		2.5	3.3	3.5

Sources and notes Takashima (2017). No regional data were available for 730; only estimates at the national level are available.

uncultivated wasteland in eastern Japan. Therefore, it is believed that the development of paddy fields in eastern Japan was difficult in ancient period when civil engineering technology was limited. Moreover, the lord of the *shōen* in Kyoto entrusted the local clans and powerful farmers with the administration of the *shōen*, and their control was dispersed throughout the archipelago. Under these circumstances, the main concern of the *shōen* ruler was to obtain a stable income, i.e. the share of the annual tribute. Therefore, their commitment to the *shōen* was low. Conversely, large-scale development of arable land, as occurred through river irrigation, required the exercise of political control over a large area; this power reached its peak in the early phase of the *Ritsuryō* regime (Kinoshita 2014).

This is also true for the ratio of paddy fields by region (table 4). Nationwide, there was an upward trend in the proportion of rice paddies during the ancient period, with the increase most pronounced in the late ancient period. In the latter half of the ancient period, the proportion of paddy fields levelled off in eastern Japan.

Early Modern Period (Tokugawa Period)

There is little data on cultivated land in the early modern period relative to data on the scale of agricultural production. The only existing documentation includes information recorded under the Tokugawa shogunate in 1721, the midpoint of the early modern period. Quantitative data on arable land at the nationwide level were not available until the beginning of the modern period, more than 150 years later. In the context of Japanese economic history, it has been pointed out that proto-industrialisation in Japan progressed from the mid-eighteenth century (Saito 1985). In this context, even these two limited benchmarks can provide sufficient evidence to understand how proto-industrialisation affected the expansion of arable land. Because data on paddy fields and non-paddy fields were collected during this period, it was possible to assess the change in cultivated land use from the mid-early modern period to the modern period (table 5).

In the second half of the Tokugawa period, cultivated land expanded for both paddy and non-paddy fields, resulting in an equal expansion of area at the national and regional levels of about 1.5-1.9 times. In the

Table 5 Arable Land from the Pre-Modern to the Early Meiji Period, 1721–1882 (in *chō*)

Region		Paddy fields		Non-paddy fields		Total	
		1721	1882	1721	1882	1721	1882
East Japan	East Tōhoku	183,648	273,927	154,102	232,315	337,750	506,242
	West Tōhoku	83,652	173,058	36,310	64,439	119,962	237,497
	East Kantō	117,202	181,956	136,315	161,437	253,517	343,393
	West Kantō	136,861	183,472	303,626	310,674	440,488	494,145
	Tōsan	76,727	91,102	94,060	118,827	170,787	209,929
Mid Japan	Niigata and Hokuriku	187,042	334,183	76,987	112,232	264,028	446,415
	Tōkai	94,436	198,798	70,358	126,064	164,793	324,862
West Japan	Kinai	82,101	110,384	36,150	34,923	118,251	145,307
	Around Kinai	187,928	286,943	83,245	78,366	271,173	365,309
	Sanin	52,060	84,367	24,616	38,049	76,676	122,416
	Sanyō	121,393	202,820	67,116	90,268	188,509	293,088
	Shikoku	84,590	142,793	61,020	115,728	145,610	258,521
	North Kyūshū	150,452	223,073	87,830	142,444	238,282	365,517
	South Kyūshū	85,724	142,518	87,036	228,470	172,761	370,988
East Japan		598,090	903,514	724,413	887,691	1,322,503	1,791,205
Central Japan		281,477	532,981	147,344	238,296	428,822	771,277
West Japan		764,248	1,192,897	447,013	728,248	1,211,261	1,921,145
West Japan (incl. Mid Japan)		1,045,725	1,725,877	594,357	966,545	1,640,082	2,692,422
Total		1,643,816	2,629,392	1,318,770	1,854,236	2,962,585	4,483,627

Source Nakamura (1968).

early modern period, which began in the seventeenth century, the population and arable land increased (Takashima 2017; Bassino et al. 2019). According to *Seiryōki*, the oldest agricultural book in Japan, said to have been written at the end of the mediaeval period, houses in rural areas in the mediaeval period were flanked at the back by mountains; these houses overlooked small valleys and households depended on river water. This means that in the pre-modern period, rice cultivation was practised in natural wetlands and development shifted from these areas to diluvial plateaus; later, from the sixteenth to seventeenth centuries, it shifted to alluvial plains. This led to a nationwide increase in arable land in the seventeenth century (Hayami and Miyamoto 1989; Saito 1989).

However, in the Kinai region, which has been an advanced agricultural region since ancient period, the growth rate of paddy fields was somewhat lower than in other regions, and the growth rate of non-paddy fields was slightly negative in the latter half of the early modern period. In the Kinai region, the alluvial plains that could be used as arable land were cultivated, which can be attributed to the progress in the development

Table 6 Increase of Arable Land from the Pre-Modern to the Early Meiji Period, 1721–1882 (in %)

Region		Paddy fields	Non-paddy fields	Total
East Japan	East Tōhoku	0.25	0.26	0.25
	West Tōhoku	0.45	0.36	0.43
	East Kantō	0.27	0.11	0.19
	West Kantō	0.18	0.01	0.07
	Tōsan	0.11	0.15	0.13
Mid Japan	Niigata and Hokuriku	0.36	0.23	0.33
	Tōkai	0.46	0.36	0.42
West Japan	Kinai	0.18	-0.02	0.13
	Around Kinai	0.26	-0.04	0.19
	Sanin	0.30	0.27	0.29
	Sanyō	0.32	0.18	0.27
	Shikoku	0.33	0.40	0.36
	North Kyūshū	0.24	0.30	0.27
	South Kyūshū	0.32	0.60	0.48
East Japan		0.26	0.13	0.19
Central Japan		0.40	0.30	0.37
West Japan		0.28	0.30	0.29
West Japan (incl. Mid Japan)		0.31	0.30	0.31
Total		0.29	0.21	0.26

Sources and notes Table 5. The figures denote the rate of increase in arable land from 1721 to 1882.

of arable land in the first half of the early modern period. Since agricultural production in the area was advanced in ancient period, the cultivable land reached its limit in the latter half of the Tokugawa period. The growth rate of paddy fields in the Tōsan region was extremely low compared to the other regions, which can be explained by the mountainous terrain of this region.

The region where there was a high growth rate of paddy fields is outside the Kinai region. The growth rate was higher in western Japan, including central Japan, than in eastern Japan. The annual growth rates were 0.19 percent, 0.37 percent, and 0.29 percent in eastern, central, and western Japan, respectively. The growth rate in central Japan was much higher than that in eastern and western Japan.

Regarding the expansion of arable land in central Japan, the expansion of paddy fields in the Niigata and Hokuriku regions and the expansion of paddy fields and non-paddy fields in the Tōkai region are plausible (table 7). Paddy fields in the Niigata and Hokuriku regions expanded approximately 1.7 times; in the Tōkai region, paddy and non-paddy fields expanded about 2.1 times and non-paddy fields expanded 1.8 times. In the Tōkai region, the expansion of non-paddy fields was more remarkable than that of paddy fields, mainly due to the expansion of non-paddy fields for commercial crops such as cotton cultivation during this period.

In Kinai, around Kinai, and in the eastern Kantō regions, the growth rate of paddy fields was low in the latter half of the Tokugawa period. However, it appears that the rate of conversion of original land into paddy fields was high in these regions, in contrast to the expansion of land development in the first half of the Tokugawa period. The proportion of non-paddy fields in the East Kantō and West Kantō regions was over 10 percent. This is due to the geography of the regions. The Kantō Plain is a stratum group of volcanic ash origin, called the Kantō loam layer, which is suitable for non-paddy cultivation.

Historical Analysis Based on Natural Environments and Political Background

Despite the temporal and regional data limitations in both the ancient and mediaeval periods, the available data clearly show that the Japanese archipelago as a whole continued to expand its arable land. Based on the available data, it can be said that the epochal phase of arable land expansion was reached in the first half of the ancient period and the latter half of the early modern period.

Table 7 Proportion of Arable Land (Paddy and Non-paddy) from the Pre-Modern to the Early Meiji Period, 1721–1882 (in %)

Region		Paddy fields		Non-paddy fields	
		1721	1882	1721	1882
East Japan	East Tōhoku	4.0	6.0	3.4	5.1
	West Tōhoku	4.2	8.6	1.8	3.2
	East Kantō	10.5	16.3	12.2	14.5
	West Kantō	6.6	8.8	14.6	14.9
	Tōsan	3.5	4.1	4.3	5.4
Mid Japan	Niigata and Hokuriku	7.4	13.2	3.0	4.4
	Tōkai	4.9	10.3	3.7	6.5
West Japan	Kinai	11.8	15.9	5.2	5.0
	Around Kinai	7.3	11.1	3.2	3.0
	Sanin	5.1	8.2	2.4	3.7
	Sanyō	5.9	9.8	3.2	4.4
	Shikoku	4.6	7.8	3.3	6.3
	North Kyūshū	8.8	13.1	5.2	8.4
	South Kyūshū	3.5	5.8	3.5	9.3
East Japan		5.0	7.5	6.0	7.4
Central Japan		6.3	11.9	3.3	5.3
West Japan		6.2	9.6	3.6	5.9
West Japan (incl. Mid Japan)		6.2	10.3	3,5	5.7
Total		5.7	9.1	4.6	6.4

Source Table 5.

This raises the question of how the expansion of cultivated land led to a long-term change in agricultural production. In the early modern period, the Tokugawa shogunate and feudal lords began to periodically measure crop yields *(kenchi*: cadastral survey) to secure their financial base. However, these data were not revised for some time after the introduction of the cadastral survey to measure the area and productivity of agricultural land. Therefore, these data do not reflect the actual increase in land productivity, i.e. the increase in cultivated area and harvested quantity due to land improvement and agricultural technology that occurred, until the next survey. Therefore, it is difficult to estimate the area cultivated and the amount harvested in a single year, even from records in primary documents at the village level. In fact, an unnatural increase is often observed in the year of the cadastral survey in which the target area is reviewed.

Given the limited availability of information in the agricultural sector, it would be more accurate to conduct a macroscopic and reference year analysis to observe the long-term trend. The reference year that can be

used in this analysis is the year for which the Tokugawa shogunate and feudal lords exist, rather than the time series data of a single year.

The rate of increase in *kokudaka* value between 1605 and 1644 was 0.09 percent, the lowest in the early modern period, although it was only a period of less than 40 years. When broken down by region, the rate of increase was generally low. This was due to the influence of the Great *Kanei* Famine (1640–1643). In particular, the national- and regional-level data obtained through large-scale land surveys by the East Tōhoku region had an extremely low growth rate of -0.48 percent. In fact, the effects of volcanic ash in Hokkaidō (Ezo) caused a poor harvest in the Tōhoku region in 1640, and the whole country experienced abnormal weather conditions such as drought and prolonged rainfall in 1641. The damage was particularly severe in eastern Japan, and the effects of this damage can be clearly seen (Kikuchi 1997). In the first half of the seventeenth century, several small and medium sized famines destroyed crops (Kitahara, Matsumura and Kimura 2012).

In the following period, from 1644 to 1697, agricultural production was relatively stable. The latter half of the seventeenth century was a period of recovery from the first half, which was marked by famine. In the latter half of the seventeenth century, Japan entered a period of social and cultural prosperity, the *Genroku* period (1688–1704). According to a popular theory of Japanese history, *Genroku* culture flourished due to the growth of urban population and industry in urban areas, which can be attributed to the development of commodity crops. This led to the growth of *Genroku* culture (Fukai 2012).

The culture was concentrated in the cities of Kyoto and Osaka in the Kinai region, which can also be explained by the geographical, economic and political context. Agricultural products such as rice as *nengu* (land tax) and local products and specialties collected in the *daimyō* area were brought to Osaka and traded from there throughout the country. As shown in table 8, agricultural production from the Kinai region accounted for only 6 percent of total production nationwide, and even if the Kinai region is included, the share would be less than 20 percent. In other words, the Kinai region functioned as a collection point for tribute, which had existed since ancient period, rather than a place of production. With the establishment of the feudal system of the shogunate and domains (*bakuhan taisei*) in the early modern period, the role of the Kinai region as the centre of the nationwide distribution network became clearer.

Table 8 Agricultural Output from the Pre-Modern to the Early Meiji Period, 1605–1873 (in *koku*)

Region		1605	1644	1697	1831	1873
East Japan	East Tōhoku	1,729,000	1,431,060	1,921,935	2,874,239	3,739,862
	West Tōhoku	870,000	965,674	1,126,249	1,295,324	2,076,048
	East Kantō	1,531,378	1,703,639	1,957,109	2,207,586	2,593,176
	West Kantō	1,963,524	2,286,892	2,699,617	2,975,388	4,747,434
	Tōsan	836,124	832,662	913,311	1,136,549	3,260,416
Mid Japan	Niigata and Hokuriku	2,428,449	2,644,431	3,008,195	3,622,489	4,231,738
	Tōkai	1,916,518	1,995,702	2,200,375	2,415,984	2,977,010
West Japan	Kinai	1,398,762	1,475,118	1,555,485	1,615,528	2,907,945
	Around Kinai	3,026,222	3,110,731	3,185,013	3,507,165	5,613,579
	Sanin	679,332	724,392	802,299	883,233	1,372,300
	Sanyō	1,537,914	1,586,478	1,807,604	2,559,582	3,617,902
	Shikoku	946,024	963,204	1,077,904	1,351,239	2,995,965
	North Kyūshū	2,125,510	2,025,973	2,186,681	2,569,636	4,157,528
	South Kyūshū	1,347,659	1,347,648	1,359,651	1,437,888	2,550,031
East Japan		6,930,026	7,219,927	8,618,221	10,489,086	16,416,936
Central Japan		4,344,967	4,640,133	5,208,570	6,038,473	7,208,748
West Japan		11,061,423	11,233,544	11,974,637	13,924,271	23,215,250
West Japan (incl. Mid Japan)		15,406,390	15,873,677	17,183,207	19,962,744	30,423,998
Total		22,336,416	23,093,604	25,801,428	30,451,830	46,840,934

Sources Figures for 1605–1831 taken from Takashima (2017); for 1873 from Nakamura (1968).

The period from 1867 to 1831, in the middle of the early modern period, marks the emergence of proto-industrialisation in Japan. Natural shocks, such as the Great *Kyōhō* Famine (1732–1733) and the *Tenmei* Famine (1782–1788), affected the entire Japanese economy. In the long run, however, agricultural production enjoyed a smooth increase nationwide. An important factor was the encouragement by local *daimyō* to produce local specialties on behalf of the eighth shogun, Tokugawa Yoshimune. The rise of the publishing culture also contributed to this growth. Several instructional books on agricultural techniques, called *nōsho* (agricultural books), were published and distributed throughout Japan. Even today, many agricultural textbooks can be found in warehouses in rural areas of Japan.

Between the two reference years, a great famine occurred. With 12,000 people starving to death in the *Kyōhō* Famine and over 300,000 starving to death in the *Tenmei* Famine, the impact of the famine on the economy and production was significant (Kikuchi 2014). In the long run, how-

Table 9 Increase in Agricultural Output from the Pre-Modern to the Early Meiji Period, 1605–1873 (in %)

Region		1605-1644	1644-1697	1697-1831	1831-1873
East Japan	East Tōhoku	-0.48	0.56	0.30	0.63
	West Tōhoku	0.27	0.29	0.10	1.13
	East Kantō	0.27	0.26	0.09	0.38
	West Kantō	0.39	0.31	0.07	1.12
	Tōsan	-0.01	0.17	0.16	2.54
Mid Japan	Niigata and Hokuriku	0.22	0.24	0.14	0.37
	Tōkai	0.10	0.18	0.07	0.50
West Japan	Kinai	0.14	0.10	0.03	1.41
	Around Kinai	0.07	0.04	0.07	1.13
	Sanin	0.16	0.19	0.07	1.05
	Sanyō	0.08	0.25	0.26	0.83
	Shikoku	0.05	0.21	0.17	1.91
	North Kyūshū	-0.12	0.14	0.12	1.15
	South Kyūshū	0.00	0.02	0.04	1.37
East Japan		0.11	0.33	0.15	1.07
Central Japan		0.17	0.22	0.11	0.42
West Japan		0.04	0.12	0.11	1.22
West Japan (incl. Mid Japan)		0.08	0.15	0.11	1.01
Total		0.09	0.21	0.12	1.03

Sources and notes Table 8. The figures denote the rate of increase in the agricultural output.

ever, it can be said that the Japanese archipelago developed a degree of resilience to shocks from the natural environment and began to grow sustainably.

The period from 1831 to 1873 is the period from the latter half of the early modern period to the beginning of the Meiji period, that is, the transitional period of industrialisation. Interestingly, the growth rate of production in all regions was much higher than in the past. In eastern Japan, production increased 1.6 times in 40 years, while in western Japan, including central Japan, it increased 1.5 times. Although the rate of increase was high in each region, it was particularly striking in the Tōsan region, where the rate was outstanding at 2.54 percent; production increased by about three times. Tōsan was a major producer of sericulture in Japan, which was an important industry in the proto-industrial period. Raw silk became Japan's most important export due to the opening of ports in this modern transitional period. It is easy to imagine that the increase in production of such commodity crops also contributed to growth in other areas.

Table 10 Japanese Historical GDP Estimates by Main Sector, 730–1874 (in *koku*)

	Primary sector	Secondary sector	Tertiary sector	Total
730	7,267	466	689	8,422
950	10,108	613	943	11,664
1150	10,919	690	1,017	12,626
1280	9,813	666	1,091	11,571
1450	16,523	1,374	2,209	20,106
1600	30,678	3,652	7,306	41,635
1721	48,808	8,434	20,361	77,603
1804	58,803	10,091	24,402	93,296
1846	67,062	11,698	28,140	106,900
1874	76,351	15,782	36,043	128,176

Sources and notes Takashima (2017) and Bassino et al. (2019). The primary sector includes agriculture, forestry, and fishery industries. The secondary sector includes the mining and manufacturing industries. The tertiary sector includes the commercial and service industries.

This result also emerges from the production estimates, including non-agricultural production. Table 10 shows the long-term estimates of total output by sector from the ancient period to the early Meiji period. This estimate of sectoral output shows that production in all sectors (which stagnated during the mediaeval period) increased over period. In particular, from the latter half of the early modern period to the beginning of the Meiji period (1846 to 1874), the growth rate was extremely high. Interestingly, the proportion of the primary sector, which accounts for the largest proportion of total output, gradually decreased, while the proportion of the secondary and tertiary sectors increased. This trend was particularly notable in the transition period from the early modern period to the Meiji period.

Surprisingly, the share of the tertiary sector seemed to be higher than that of the secondary sector after the sixteenth century, as shown by the latest estimates of the Japanese historical national accounts (Bassino et al. 2019). This trend became even more pronounced after the eighteenth century. This indicates that proto-industrialisation led to a social transition that included not only industrialisation but also the development of the trade and service sectors.

But what if we look at this in terms of cultivated land and not in terms of an increase in production? What would happen if we plot the changes in cultivated land, as shown in tables 5 through 7? Figure 3 compares changes in the cultivated areas and agricultural production in the latter half of the early modern period. The rate of increase in agricultural pro-

Figure 2 Shares of Output by Sector, 730–1874
Sources Takashima (2017) and Bassino et al. (2019).

duction is plotted on the vertical axis and the rate of increase in cultivated land is plotted on the horizontal axis. In terms of regional characteristics, the increase in production in certain groups (Tōsan, Kinai, and West Kantō) is noteworthy, despite the low rate of increase in cultivated land. Among this group, Tōsan stands out in the graph, and it is necessary to investigate whether Kinai and West Kantō belong to this different group for the same reason as Tōsan.

Figures 4 and 5 show plots of figure 2 for paddy fields and non-paddy fields. Figure 4 shows the rate of increase in cultivated area for paddy fields only. In this case, the Kinai and West Kantō regions, which belong to a separate group with the Tōsan region in figure 3, are removed, and the characteristics of the Tōsan region become clearer. In contrast, figure 5 shows the graph when the rate of increase in the cultivated area is restricted to the non-paddy fields, in which case the Kinai and West Kantō regions are again included in the separate group with the Tōsan region. The East Kantō region is also included in this group. In the Tōsan region, the increase in cultivated area was small for non-paddy fields and paddy fields. However, in the Kinai and East and West Kantō regions, the area of paddy fields increased, while this increase was not evident in non-paddy fields. These results indicate that the increase in cultivated area did not

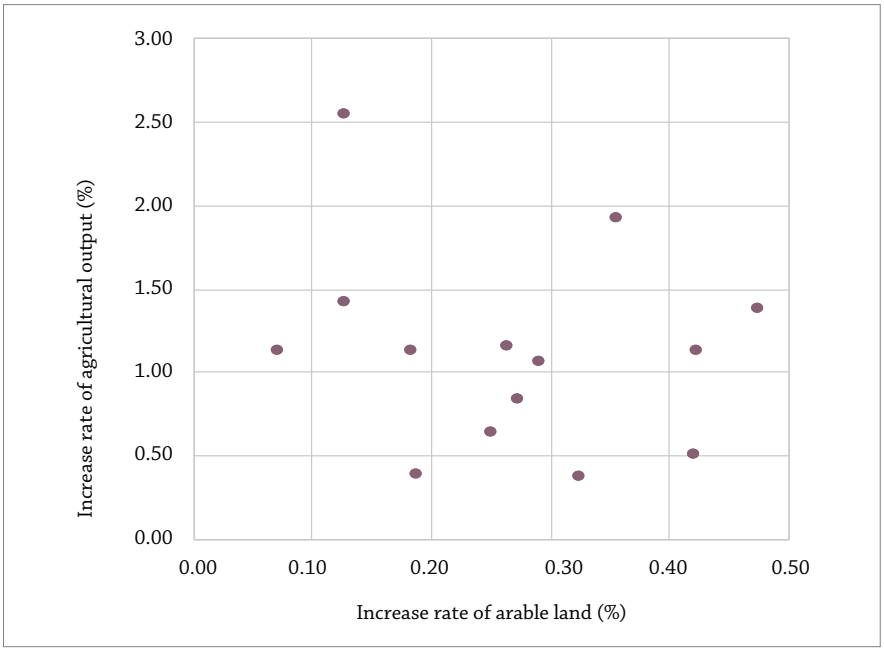

Figure 3 Increase of Agricultural Output vs Arable Land in the Latter Half of the Early Modern Period

Sources Table 8 and 9.

lead to an increase in production and that the increase in production was due to the increase in agricultural productivity, not cultivated area.

It is true that the yield of paddy fields compared to non-paddy fields is generally considered to be lower than that of land. However, the comparison with the production of main cereals and non-main cereals, such as millet, does not apply to commercial crops. It is also necessary to consider whether the cultivation area of non-paddy fields in the sericulture industry was determined on the same basis as that of the cultivation of other cereals. In fact, sericulture was very prosperous in the mountainous regions in the Tōsan and Kantō regions, which belong to this other group. The *kokudaka* value is a kind of numeraire that expresses the value of the crop produced on the land in units of rice. Therefore, the spread of commercial crop cultivation on non-paddy fields, which were originally unsuitable for growing main cereals such as grain, may have led to an increase in productivity, i.e. an increase in agricultural production.

This was a turning point in terms of the scale of paddy field agriculture in Japan since ancient period. In other words, rice remained the

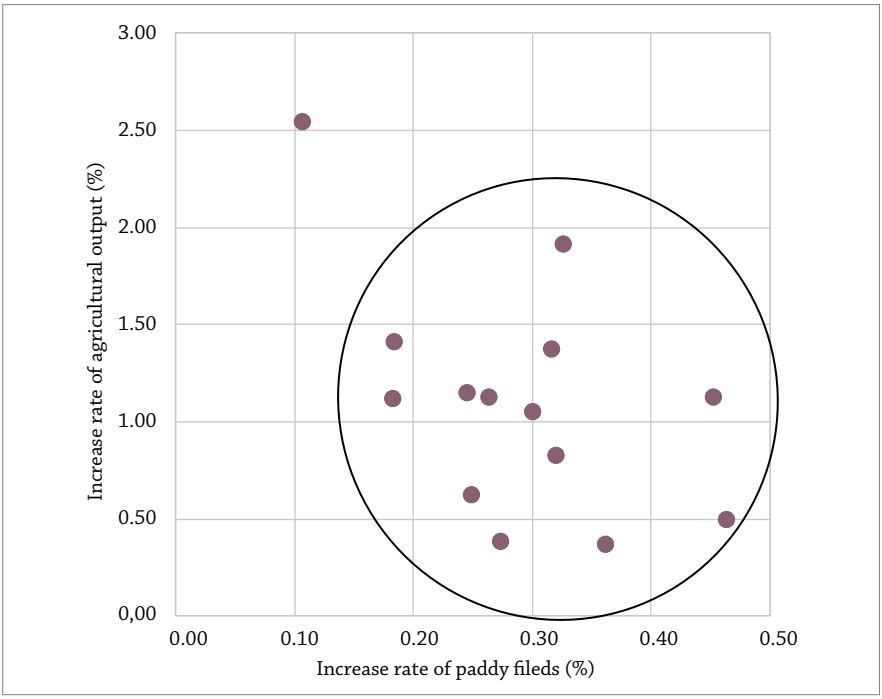

Figure 4 Increase of Agricultural Output vs Arable Land (Paddy Fields) in the Latter Half of the Early Modern Period

Sources Table 8 and 9.

predominant commodity as tribute in the middle of the Tokugawa period. However, the local *daimyō* encouraged the production of local specialties and sought to generate financial revenue by monopolising them in their domain. In local cultivation areas, some farmers produced commercial crops and purchased rice with the profits from the sale of commercial crops; they did not produce rice for self-sufficiency (Honjo 1994; Abe 1998).

Even when the Japanese archipelago is viewed from a broader perspective, the area of non-paddy fields in eastern Japan has not increased significantly. This can be interpreted in two ways. First, the sericultural industry in the mountainous areas has increased because of the high productivity of non-paddy fields. Second, there has been an increase in non-paddy fields, which are not cultivated land, in the sericulture industry. In any case, it can be said that the increase in agricultural production on non-paddy fields began in the latter half of the early modern period in the region characterised by lands unsuitable for main grain production.

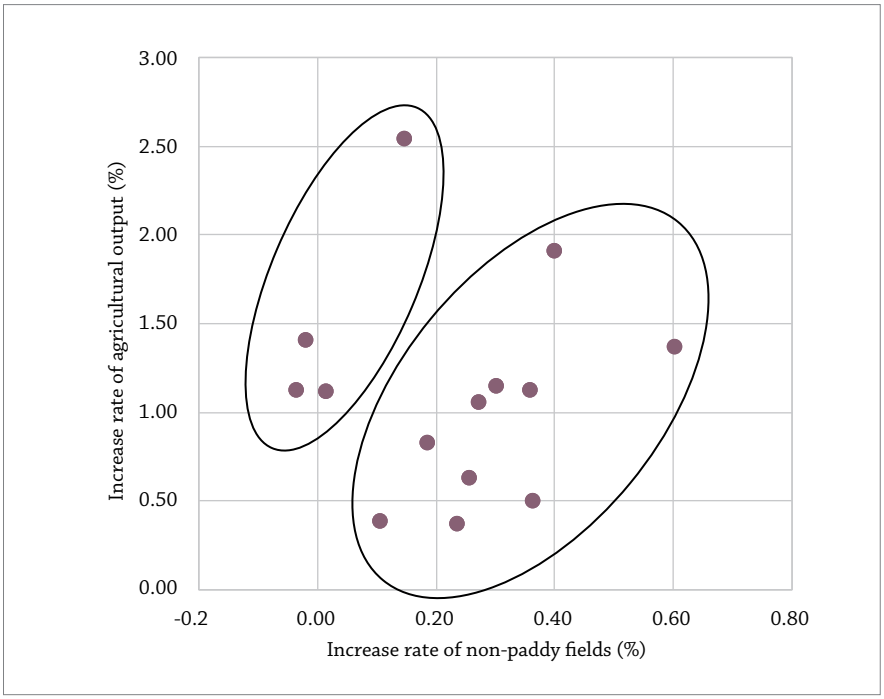

Figure 5 Increase of Agricultural Output vs Arable Land (Non-paddy Fields) in the Latter Half of the Early Modern Period

Sources Table 8 and 9.

In contrast, the rate of increase in non-paddy fields was higher in western Japan than in eastern Japan. However, this was due to the progress in commodity crop cultivation in the plains areas, especially in areas with high cotton production. In other words, the growth of agricultural production in non-paddy fields for commodity crop cultivation occurred in the latter half of the early modern period, but the distribution of this growth pattern varied from region to region, especially between the plains and mountainous areas.

This is more significant than the mere importance of the extent of non-paddy fields in terms of land use. In other words, pre-modern agriculture centred on paddy field agriculture was altered by political and commercial factors, not by changes in the natural environment.

As mentioned earlier, this is due to the political reforms under the leadership of the Shogun. In the mid-eighteenth century (*Kyōhō* Reform), Tokugawa Yoshimune encouraged the development of local specialties for each *daimyo* who ruled the Japanese archipelago. The financially poor

daimyō made an effort to develop local products. Of course, it cannot be said that all *daimyō* were successful, but in the first half of the nineteenth century it became possible to make profits by monopolising local specialties and selling them to other regions under the domain monopoly system (Yoshinaga 1996).

In other words, agriculture aimed at making profits from the commercial cultivation of crops on non-paddy fields changed the basis of the self-sufficient agricultural economy based on the hydroponic cultivation of rice, which had been dependent on the natural environment since ancient period. The use of arable land itself changed during this period, and the purpose of agricultural production changed with the large-scale introduction of commercial cultivation on non-paddy fields.

From this perspective, it is clear that the expansion of arable land in pre-modern Japan and its utilisation were greatly influenced by the taxation system of the government and local rulers of the era. Since agriculture in ancient period was highly dependent on the natural environment, hydroponic cultivation for rice produced at the optimum value was a pillar of agricultural production that was central to the tax system. Although local specialties were recorded in the government records of the period and were also supplied as tribute to the central government, they were only sufficient to satisfy the tastes of the aristocrats living in the central government. In this period, rice was the main tribute item and maintained its absolute status as a tax. In addition to rice, local specialties were also paid as tribute.

However, with the development of civil engineering and agricultural technologies, people were able to adapt the land to the natural environment, which led to the development of new cultivated areas and the expansion of production. Although there are no comprehensive quantitative data, it can be confirmed from the literature description that the cultivation of special commodities became popular in various places in the Japanese archipelago during the mediaeval period (Saito and Takashima 2017; Saito 2020). However, these commodities cannot be considered commercial crops that contributed to the tax system, as in the early modern period.

In the early modern period, the possible plains for paddy cultivation were almost developed, and the increase in land productivity led to an increase in agricultural production. Rice produced in the paddy fields was still collected as annual tribute, but feudal lords who could not enrich their financial status with rice alone sought a way out by growing commercial crops in non-paddy fields. In other words, pre-modern agriculture

at this time was changing from a tribute economy to a specialty economy. This movement is considered particularly noteworthy in non-staple grain-producing areas where paddy fields did not support the agricultural economy (Saito and Takashima 2016). Thus, the economic changes and growth in the proto-industrial period may have had a greater synergistic effect due to the intentions of the rulers.

Conclusions

This chapter reports on the changes in the area and use of arable land, and increase in production in pre-modern Japan, both at the macro and regional levels. In pre-modern Japan, the main cultivation areas for the staple grain, mainly rice paddies adapted to geographical and climatic conditions, were the first to develop economically. Historically, rice was considered an important tribute commodity since ancient period, and the natural conditions suitable for its production were the decisive factor for economic development. However, with the promotion of commercial crop cultivation, this pattern of economic growth changed. As a result, the agricultural production of commercial crops as well as the production of staple grain through the cultivation of paddy fields influenced economic growth. The reason for this was the institutional promotion of the cultivation of special products in the non-paddy fields to exchange for cash, in addition to the production in the paddy fields, which formed the basis of government taxation.

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10

Agricultural Crises Due to Flood, Drought, and Lack of Sunshine in the East Asian Monsoon Region: An Environmental History of Takahama in the Amakusa Islands, Kyushu, Japan, 1793–1818

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A New Horizon in Comparing Economic and Environmental Histories

The approach of this chapter was originally rooted in Sheilagh Ogilvie's institutional studies (Dennison and Ogilvie 2007; Ogilvie 2007, 2010) of the interrelationship between social capital and power, as well as in gender studies focused on consumer activities, especially those of women, dating back in part to Jean de Vries' discussion of the 'industrious revolution' (Murayama and Nakamura 2021). However, we present a new area of discussion: the diversity of economic development in early modern Japan. We have focused on the environmental system unique to Asian monsoon regions. For the maintenance of the early modern 'subsistence economy', especially in Japan in East Asia, the sustainability of agricultural production depends primarily on resilience to seasonal disasters.

Murayama, S., Ž. Lazarević, and A. Panjek, eds. 2024. *Changing Living Spaces: Subsistence and Sustenance in Eurasian Economies from Early Modern Times to the Present*. Koper: University of Primorska Press.

The main objective of this chapter was to show new ways of comparing Japan and pre-modern Europe by drawing on Fernand Braudel's three layers of economic life. This was done to broaden our understanding of this phenomenon and its influences on early modern societies. In Braudel's words:

I wish, in particular, to stress that material life can be divided into three levels. I see the market to be the equator. South of the equator is the southern hemisphere, that is, bartering, and it is above the equator, in the northern hemisphere, that we find capitalism. The southern hemisphere, that is, the level embracing bartering, is what is called '*economia sommersa*' (submerged economy) in Italian.[1]

Consistent with this comparative scheme, Saito Osamu (2005, 2015a; 2015b) extended comparative studies of pre-modern Europe and Japan based on similarities observed in the 'market' layer and significant differences in the lower and upper layers, or at the level of household economy and capitalism. This chapter focuses on this lower layer, which Braudel referred to as the 'underground' economy, and highlights the existence of locally oriented ecological and climatological conditions that could determine the upper layers of the market economy and capitalism in the early modern period.

European economic historians have long debated the origins of the Industrial Revolution. Jan de Vries and others attempted to explain economic development in terms of changes on the demand side (Hayami 2003; Vries 2008; Muldrew 2011; Vries 2013). Early technological development in England and the Netherlands was stimulated by market demand driven by people seeking to improve their standard of living. European economic history is also characterized by a tremendous development of 'capital', such as mercantile capital and state capital. Neither could develop in Japan because international trade did not exist due to a political decision by the Tokugawa shogunate that isolated Japan from the rest of the world, and the economy was sustained by a 'rice-oriented' local village economy. In the absence of international trade, Japan achieved a level of early modern agricultural development, including market-oriented production comparable to that of England. However, 'Japan's upper- and middle-class layers were much thinner than those of its English counterparts', and 'the "extent of the market" was smaller than in England'

1 Braudel (1986, 94) (translated from the original French text by Hiroko Nakamura).

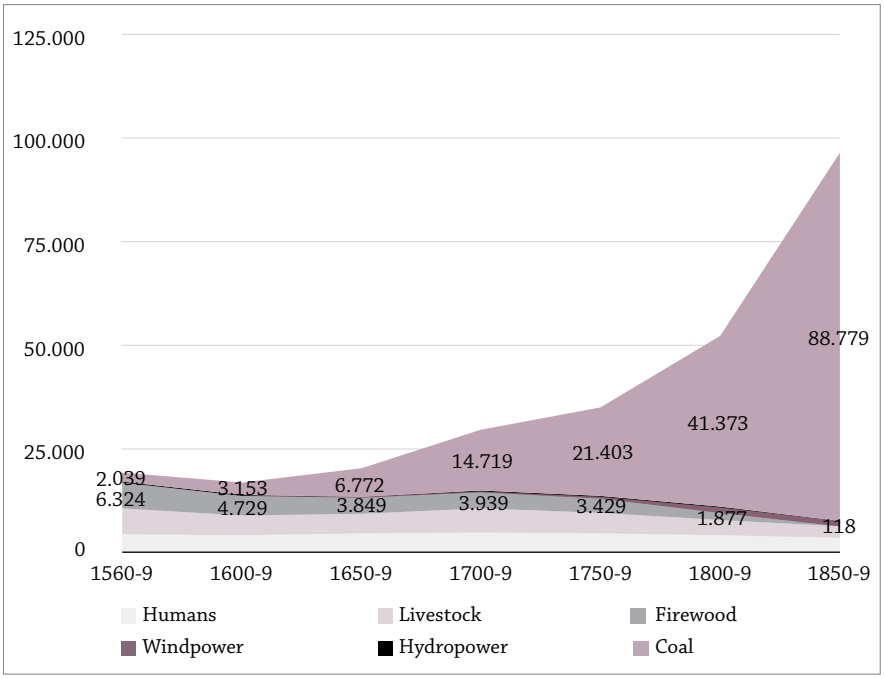

Figure 1 Annual Energy Consumption per Head in England and Wales (MJ)

Note Numerical values in figure 1 relate to coal and firewood.
Source Wrigley (2016, 34), table 3.2.

(Saito 2005, 42). This was Osamu Saito's main argument for the crucial difference between Japan and Europe in the early modern period in the context of economic development. However, the process by which the Industrial Revolution occurred was not a simple economic process, but rather a combination of segmented processes that were particularly evident in the transformation of organic economies in a geographic context (Wrigley 2016, 95–100).

Figure 1 shows that the increase in coal consumption had already begun in the sixteenth century in the United Kingdom, which was the first country to enter the Industrial Revolution. The turning point occurred in the seventeenth century (Wrigley 2016, 30–44). In the Industrial Revolution era, the amount of coal consumed actually increased rapidly. The petroleum era came soon after. On the other hand, the United Kingdom was freed from the shackles (Wrigley 2016, 204–5) of forest resources, such as firewood, which were necessary for heat supply. The use of coal marked the beginning of the move away from an organic economy,

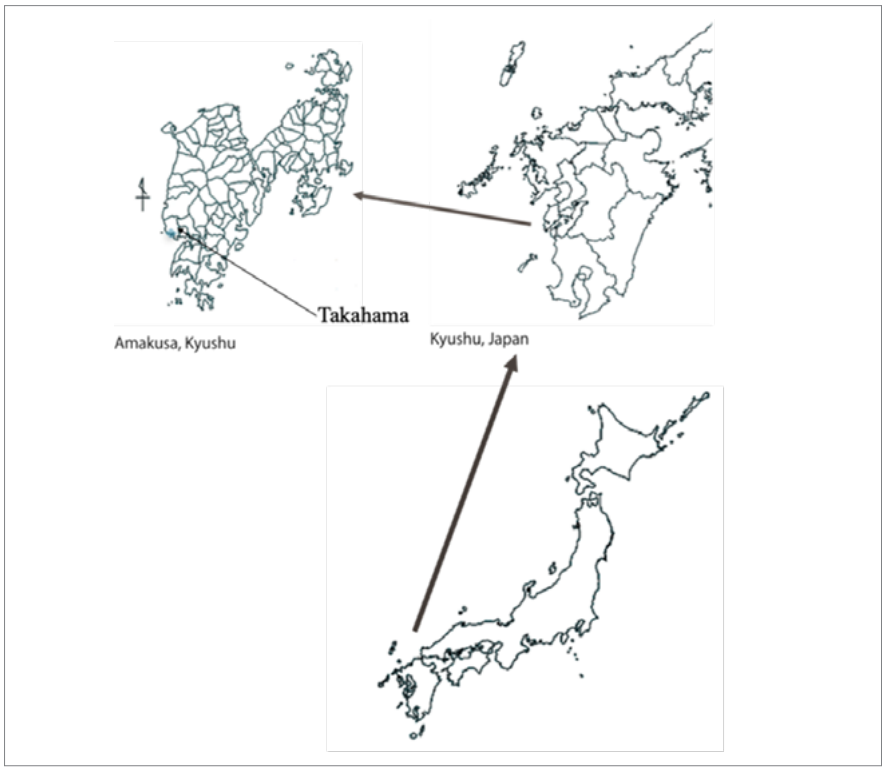

Figure 2 Amakusa in Japan and Takahama

and this fundamental change in the environmental history of Britain occurred much earlier than the Industrial Revolution. E. A. Wrigley argued that this change enabled sustainable economic growth in Britain. In other words, the liberation from natural constraints meant the end of the era of the organic economy, which was to be affected by hydro-climatic conditions and climate change.

Takahama, a village in the Amakusa Islands, Kyushu, Japan (figure 2), is located in a relatively warm region of Japan. Therefore, even in the diary of Ueda Yoshiuzu, one of the most important historical sources we used for our research (as explained later in the text), there is no mention of the use of firewood for heating, although fuel resources were needed for daily life.

The environmental history presented in this chapter focuses on the village of Takahama and covers the period from the late eighteenth to the early nineteenth century. When comparing to the local or regional history

of the United Kingdom, it was necessary to determine which time period was optimal. Using energy consumption as an indicator for periodization, the relevant period in Takahama was before the seventeenth century in the United Kingdom, which paved the way for the Industrial Revolution. As part of the Asian monsoon region, Takahama struggled with the constraints of the organic economy (figure 3). To clarify the characteristics of this Asian monsoon region and contrast the crop constraints of an organic economy in Takahama, we focused on monsoonal climate events with clear seasonal patterns that significantly affected agricultural production from spring to autumn. Large areas of South, Southeast, and East Asia are characterized by abundant annual rainfall (figure 3a).

On the other hand, monsoon systems provide a dry winter and a humid summer climate (figure 3c, d), although the geographic distribution of precipitation varies greatly and is related to topographic complexity. On the north and northwest sides of Japan, it is humid during the winter season because much moisture evaporates from the sea surface of the back-arc basins of the Japanese islands. This is also one of the results of the monsoon climate caused by the spectacular seasonal reversal of the thermal contrast between land and ocean. Monsoon systems result in dry, wet, hot, and cold periods, and their contrasting geographical and seasonal characteristics are influenced by tropical cyclones and storms (figure 3b), extreme weather conditions, and a lack of sunshine.

Population Changes in Takahama

Arthur E. Imhof, a German historical demographer, said the following:[2]

> Today it makes sense to talk about a life expectancy of—for example—seventy or eighty years, since the vast majority of us can really count on living that long. To count on any number of years—however few—would have been folly for our forebears up until but a few generations ago. On the contrary, one of the most pronounced characteristics of their time was the omnipresent danger to every human existence. Extended periods without at least one of the three scourges, 'plague, hunger and war', were unknown.

The major disasters in early modern Japan during the Tokugawa shogunate were rainstorms, floods, earthquakes, tsunamis, the spread of epidemics (especially smallpox), and fires. However, there were no mortality

2 Imhof (1990, 37). Historical demography revealed that the early modern mortality factors were chiefly epidemics, starvation and war. See also Imhof (1988, 92–102).

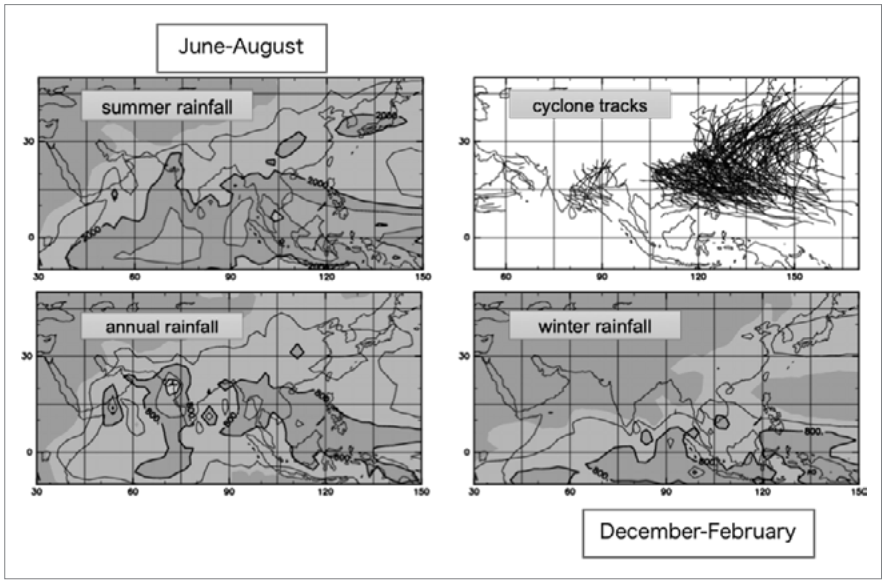

Figure 3 Rainfall in Asian Monsoon Areas

Sources and notes (a) annual, (c) summer (June to August), and (d) winter (December to February) precipitation amounts were based on the CPC Merged Analysis of Precipitation (CMAP in Xie and Arkin 1997), averaged from 2007 to 2016. Units are millimetres. (b) Tracks of tropical cyclones were based on the best track data from the Joint Typhoon Warning Center (JTWC), US Naval (Chu et al. 2002).

crises due to war during the Tokugawa period. Japan had no army during the two and a half centuries of Tokugawa rule, and this shaped the major mortality trends of traditional Japan. In stark contrast, early modern Europe experienced a population decline triggered by countless wars such as the Thirty Years' War, the Seven Years' War, the Great Northern War, the Napoleonic Wars and Wars of Independence, and the Franco-Prussian War. However, these wars were not the main cause of mortality, for even more threatening were 'the major epidemics that even small armies spread in their wake. The plague marched alongside the armies in the Thirty Years' War, together with typhus carried by lice in their clothing. More victims fell to these epidemics than to the small bands of soldiers with their primitive cut and thrust weapons, their unreliable and complicated guns, or even their actions of burning everything in sight' (Imhof 1990, 39).

Not war, but epidemics – especially smallpox – and famine were the major mortality factors in early modern Japan. Takahama in the Amakusa Islands is located directly on the sea and does not have sufficient arable

land for rice paddies. Takahama had a population of 3,413 in 1816 (Bunka 13), and the village *kokudaka* was only 611 *koku* in size, which was equivalent to 0.18 *koku* per capita.[3] The population of Takahama[4] went from a stagnant phase to a gradual growth phase, increasing from 3,086 in 1785 (Tenmei 3) to 3,470 in 1818 (Bunka 15). To examine how the disasters affected the population of the village, we need to look separately at the three periods of population decline: the first period from 1807 (Bunka 4) to 1809 (Bunka 6), when the population decreased by 63 people; the second period from 1813 (Bunka 10) to 1814 (Bunka 11), when it decreased by 41 people; and the third period from 1815 (Bunka 12) to 1816 (Bunka 13), when it decreased by 35 people (figure 4).

In contrast to Takahama, Sakitsu, a village near Takahama, suffered a dramatic loss of population as a result of three smallpox outbreaks in 1801, 1813, and 1834. As a fishing and trading port whose continued existence depended on its market network, Sakitsu experienced changes in its population: in 1690 it was 850, it rose to 2,466 in 1808, declined to 1,252 in 1864, and rose again to 1,414 in 1872 (figure 3). Studies on the effects of smallpox outbreaks shed light on the vulnerability of isolated early modern villages such as Sakitsu (Murayama and Higashi 2012), which suffered from repeated smallpox outbreaks. Isolation due to quarantine destroyed the economic interactions on which Sakitsu depended, and thus smallpox outbreaks led to rapid population decline. This observation shows that livelihoods during the Tokugawa era were primarily based on rice paddies

3 In the Tokugawa period, it was widely held that 1 *koku* (=150 kg of rice volume or capacity) was enough to feed one person for one year. According to Nakamura's calculation (1968, 168–74), the production of farm products in the benchmark year 1700 was 169 kg, exceeding the level of 150 kg (or 1 *koku*/person), and it increased over time to 201 kg in 1872. In many Japanese villages, land tax and other taxes were static or even slightly reduced, although the productivity of land was generally on the rise, and thus, an increasing amount of 'surplus' was a general phenomenon. The widely held notion that the land tax imposed during the Tokugawa period was cruelly oppressive is unsupported. While *kokudaka* did not reflect the actual productivity of a village, it served as a criterion that is commonly used within a region, and due to the ecological and climatic conditions of each village, the *kokudaka* per capita in a village differed enormously, not only regionally but even locally within neighbouring villages. According to our provisional study, the difference in village *kokudaka* per capita could have fluctuated from under 0.2 to more than 3.0 *koku*. See: Smith (1988) and also Alfani and Tullio (2019), especially regarding information on economic inequality in early modern fiscal states.

4 See the sources shown in figure 3.

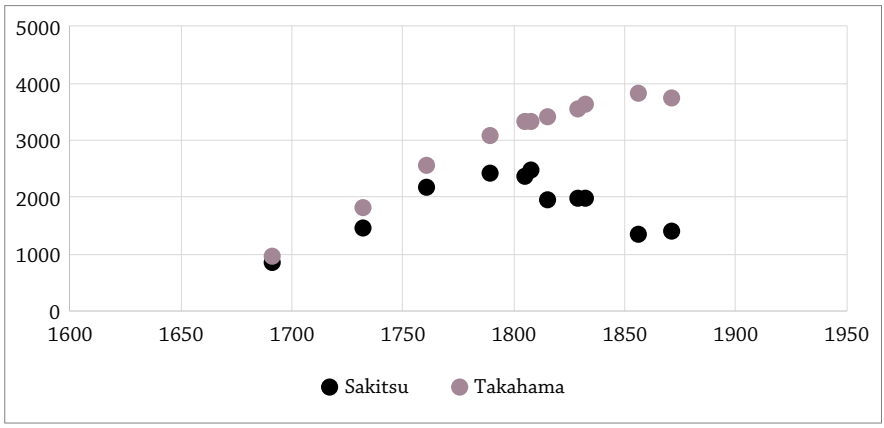

Figure 4 Population Changes in Takahama and Sakitsu, 1690–1879

Sources Amakusa Komonjyo-kai (1988–1993). II/III, 239–405; Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*; UkM, *Village Records*; UkM, *Population Register of Amakusa Islands in 1692*]; Morinaga (1986).

and fields, but were simultaneously supported by village and commercial networks (Murayama et al. 2017, 238).

In societies that suffered from frequent disasters and epidemics, mortality crises were a social premise, and therefore economic societies and individual families were doomed to be challenged by sudden failure. On the one hand, economic historians can wonder how 'markets' sustained economic growth in such societies. On the other hand, environmental historians can examine the resilience of the land and the ability of people and natural conditions to recover.

Historical Sources for the Local Analysis

The administrative diaries of a village, or *mura* in Japanese, are quite valuable historical material. The local governors of Takahama wrote diaries every year, which were carefully preserved in the depository of the Ueda House, the family of the village head (*shoya*), until the present time, more than 200 years ago. These diaries detail the disasters and important events that occurred in the area and how the people of Takahama understood and managed them.

A *shoya* was the term for a peasant in the early modern villages of Japan. However, the term also refers to the administrative representative of the village. In Japan, the village head and administrator, i.e. the *shoya*, was free to keep an administrative diary to ensure the continuity and se-

Table 1 Disasters in Takahama, 1793–1818

Year	Bad Harvest	Flooding (times)	Drought**	Water Shortage**	Severe Wind	Earth-quake	Fire	Small-pox****
1793	0	0	0	8	0	0	0	2
1794	uk*	uk	uk	uk	uk	uk	uk	uk
1795	0	0	0	0	0	0	0	1
1796	uk	uk	uk	uk	uk	uk	uk	uk
1797	0	0	2	4	0	0	0	0
1798	0	0	0	9	0	1	0	2
1799	1	0	3	11	0	0	1	0
1800	uk	uk	uk	uk	uk	uk	uk	uk
1801	1	1	0	1	0	0	1	3
1802	0	0	0	5	0	0	0	0
1803	1	2	0	0	0	0	0	3
1804	0	4	0	2	0	0	0	1
1805	0	0	0	3	0	2	0	1
1806	1	1	0	6	0	1	0	0
1807	0	1	0	0	0	0	1	83
1808	0	0	1	2	1	1	2	126
1809	1	0	1	7	0	0	1	8
1810	0	1	0	0	2	0	0	11
1811	uk	uk	uk	uk	uk	uk	uk	uk
1812	0	0	0	2	0	0	1	1
1813	uk	uk	uk	uk	uk	uk	uk	uk
1814	0	0	0	6	2	0	1	100
1815	0	0	0	3	1	2	2	1
1816	1	0	0	0	1	1	0	2
1817	0	2	1	0	1	1	0	2
1818	1	0	4	9	0	2	0	4
Total	7	12	12	78	8	11	10	351

Notes *uk= unknown; **= Number of days when drought was at issue ; ***= Number of days delegated for rain making rituals; ****= Number of smallpox patients
Source Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*.

curity of local administration. However, it is rare to find such diaries. In addition to diaries, all local historical documents such as population registers, correspondence, official letters, and village budgets from the eighteenth and nineteenth centuries are safely preserved and available today. The position of *shoya* was usually hereditary, and thus the village's historical materials were long kept in the home of the village head's family.

The village head (*shoya*) of Takahama and Imatomi kept diaries describing the administration of the village community. The archives of the

Ueda House contain 89 diaries.[5] From these diaries, we were able to examine the comments of the village head, Yoshiuzu Ueda, between 1789 and 1818. Yoshiuzu served as *shoya* of Takahama for 30 years. As part of our research project, these diaries, which total 1,849 pages and over one million characters, were digitized into book form. Thanks to this digitization, we were able to more easily evaluate Yoshiuzu's diaries, which cover 26years. These diaries are not just memories, but serve as documentation, a manual for the administration, and evidence of how the government maintained the safety and peace of the village community.

By counting the records of disasters in the diaries of the village head using 21 diaries covering 26 years between the years 1793 and 1818, we learned that during this period there were five cases of crop failure, eleven earthquakes, ten fires, including three major fires, seven floods, and eight severe wind events that were probably storms (table 1). Two special smallpox outbreaks were recorded, as mentioned earlier, from 1807 (Bunka 4) to 1808 (Bunka 5) and in 1814 (Bunka 11).

Flooding in a Small River

Until the middle of the Meiji era (1868–1912), floods occurred almost every year in Japan's alluvial plains. In the delta regions, everyday drainage perplexed the inhabitants (Okuma 2007, 12). Since the introduction of modern civil engineering technology in the last quarter of the nineteenth century, water management in Japan has changed dramatically, with disaster prevention no longer the responsibility of individuals and communities but of the state. Water management has been greatly improved by large-scale construction projects with government capital investment and by the establishment of higher research and educational institutions for hydrological civil engineering (Doboku Tosyo-kan and Doboku-shi Kenkyu 2004).

In the hundred years that have passed since Western technology was introduced for river improvement processes, habitual flooding has been almost completely prevented under state management. Riverbanks have been made higher and much more stable against flooding. Flood gates, sluices, dams in upper streams, and drain pumps have been used

5 Higashi (2016, 27, 31): Buhitsu (who was a *shoya* from 1755 to 1789) left one diary; Yoshiuzu (= Gichin) (1789–1818), left 28 diaries; Nobuchika (1819–1822), left four diaries; Sadayuki (1823–1861), left 34 diaries; Sadauzu (1861–1872), left nine diaries; and a son of Yoshiuze, a *shoya* of Imatomi (a neighbouring village of Takahama) named Teion (1804–1818), left 13 diaries.

to control the flows of rivers. This was only the beginning of the history of the 'conquest' of nature in Japan. It seems to have been a victory of modern river improvement. Flooding in Japan has become surely less frequent. However, especially sediment-related disasters are caused, recently because of climate crisis, almost every year by extreme rainfall in Japan.

Traditional technical means of controlling rivers were pursued not only through labour-intensive efforts of the inhabitants, but also through various and systematic works on the banks based on communication and cooperation between villages. However, under the Tokugawa shogunate, no regional or national control system was possible, especially for long rivers flowing from the highest mountains to the seashore, because such rivers were divided into many regional and local dominions, and a unified river improvement control system based on national capital did not yet exist (Okuma 2007, 20).

In contrast, pre-modern waterproofing technologies did exist and should be considered the result of cumulative learning from ancient times. The seventeenth-century *Hyakusho Denki*[6] (*Chronology of Farming*) shows a series of 27 instructions on river improvement and water regulation, detailing dam construction, river drainage, and flow control methods. The collections of knowledge and technology were available to all Japanese villages. Two of the most important recommendations from the *Hyakusho Denki* were that (1) the residents themselves should check the water levels in their rivers and the weather conditions on a daily basis, and (2) that they should repair water facilities and dam reinforcement instruments every year and review river control construction projects as necessary (Furushima 1997, I, 187–8). In particular, the control of small rivers seemed to be well served by these instructions.

Today, the Japanese Ministry of Land, Infrastructure, Transport and Tourism defines the types of rivers in Japan (Ministry of Land, Infrastructure, Transport and Tourism Japan, n.d.-a). First-grade rivers are regulated by the River Law and administered by this Ministry. In 2010, there were 109 first-grade river basins and 13,935 rivers belonging to such a basin. The shortest stretch of the main first-grade river is 28 km long and the longest stretch, the Shinano River, is 367 km long. The larger

6 Furushima (1997, I, 186–232). The part of the book that was written from 1680 to 1682 shows technological attainment of perfection. Explanations of the book by Furushima (1997, II, 203–07).

river extensions between 50 and 100 km include 42 river basins. There are 2,714 second-grade river basins, which include 7,081 rivers.[7]

According to the River Law, the second-grade basin system includes rivers that are of public interest like the first-grade rivers, but these rivers are administered by individual prefectures rather than by the Ministry. The Takahama River, located in Takahama, Shimo-jima, one of the Amakusa Islands in Kumamoto Prefecture, is a second-grade river located only 3.5 km from its mountainous source. The Takahama is one of 81 basin systems, including 148 rivers managed and controlled by Kumamoto Prefecture. The average length of the main rivers is 8.2 km; the longest river is about 23 km long and the shortest is 1.6 km (Kumamoto Yearbook 2011). These small but diverse river systems, which exist in areas with warmer climates in southwestern Japan, can help grow a variety of crops and diverse vegetable cultivation cycles on a small scale throughout the year (Tanaka 2010, 73).

Small-scale river management has never been thoroughly studied due to the lack of historical material. However, our examination of the village head's records for the Takahama River uncovered rich material, such as administrative diaries, pictorial maps depicting disaster damage, and other original materials.

Regarding the 1803 flood (Kyowa 3), the village head's historical sources provide detailed information on heavy rains, the onset of heavy and persistent rains that caused flooding, damage assessments, detailed pictorial maps, and records of the reconstruction processes, including the number of workers and their schedules in the two-year post-flood reconstruction projects.

Flood, Drought, and Lack of Sunshine

Figure 5 shows the number of days on which rain-making rituals occurred between 1793 and 1818 and the number of flooding events. Since there are no records for five years (marked with an asterisk), we observed 21 years of events. In only three of these 21 years were there neither rain-making rituals nor flooding events. In 15 of the 21 years studied (71.4 percent), prayer rituals for rain were performed almost every year. Water scarcity appears to have been a major concern for Takahama residents. However, water scarcity was often associated with flooding in 1801, 1804, and 1806

7 Ministry of Land, Infrastructure, Transport and Tourism Japan (n.d.-b). These data were obtained on 30 April 2012.

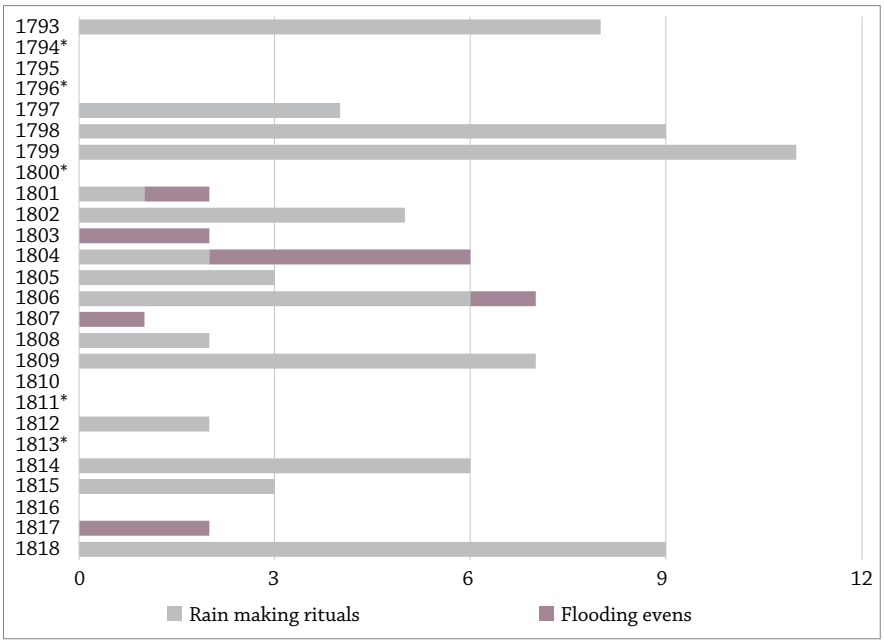

Figure 5 Annual Number of Rainmaking Ritual Days and Flooding Events, 1793–1818

Source Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*.

when these events were observed annually. Flooding also occurred when villagers and village officials were very concerned about water shortages.

The diaries also tell us about bad harvests because the villages had to pay taxes, especially on the amount of rice harvest. The first column of table 1 shows us the years in which bad harvests occurred. Within the observed 21 years, there were seven bad harvest years: 1799, 1801, 1803, 1806, 1809, 1816, and 1818. The reasons for the bad harvests were complicated. In 1799, there was a combination of drought and water shortage; in 1801, there was flooding and water shortage; in 1803, there was flooding; in 1806, there was flooding and water shortage; in 1809, there was drought and water shortage; in 1816, no explanations were given; and in 1818, there was drought and water shortage.

What we need to pay attention to here are the records from 1817. Since we have counted the number of drought days that appear in the diary, an entry stating that the 'drought could be avoided' was counted as well. This was the case in 1817. There was no bad harvest. The reason was that

even for a single village, there were drought-affected districts and other areas where irrigation could be used as usual; therefore, farmers were able to successfully adjust to the administrative policy of the village and minimize the damage. This shows that the rainfall and irrigation system affected the micro level, as they could manage the agricultural bases of the whole village in one unit, which enabled successful drought prevention. Floods also occurred in 1817.

On the other hand, drought damage also occurred in the year when prayer rituals for rain were frequent, often resulting in a bad harvest. Typical examples of this were the years 1799 and 1818. On the other hand, the year 1798 had the second highest number of days with rain rituals among the records from the observed 21 years. Despite this fear of water scarcity, there appears to have been no drought damage. This is considered a matter related to the amount of rainfall or its timing. Unfortunately, since there were no measurements of rainfall in Japan in the early modern period, we consider here the timing and frequency of rainy/cloudy or sunny, i.e. wet or dry, days.

Natural disasters such as earthquakes and storms were also noted in the diaries at the top of each day, as the village head briefly noted the day's weather after the date description, using terms such as 'fine', 'cloudy', 'rainy', 'storm', 'north wind', 'south wind', 'severe wind', and 'earthquake in the afternoon'. On 15 May 1797 (Kansei 9), for example, we find in the lunar calendar the description 'cloudy weather, southwest wind, calm wave'. Similarly, on June 19, the description was 'clear weather, northwest wind' In addition, on July 23, the description was 'sunny, easterly wind, daytime evening rain'. The description of 2 July 1803 (Kyowa 3), as mentioned above, was high waves and 'rainy, south-southward from the southeast and big wave'.

To quantify these weather statements, we assigned 2 points for rain, 1 point for clouds, 0 points for sunny days, 2.5 points for heavy rain, and 1.5 points for weak rain. Figure 5 shows a drought year in 1799, a flood year in 1803, a bad harvest year in 1816, and a normal harvest year in 1804. The difference in rainfall from May to August was determined using the monthly average points. Adequate rainfall and sunshine during these months were critical factors for rice cultivation and production. All lunar calendar data were converted to solar history data.

Figure 6 shows that the quantified, descriptive weather information from the diaries corresponds excellently with the years of the 1803 flood and the 1799 drought. It can also be seen that a normal rice harvest was

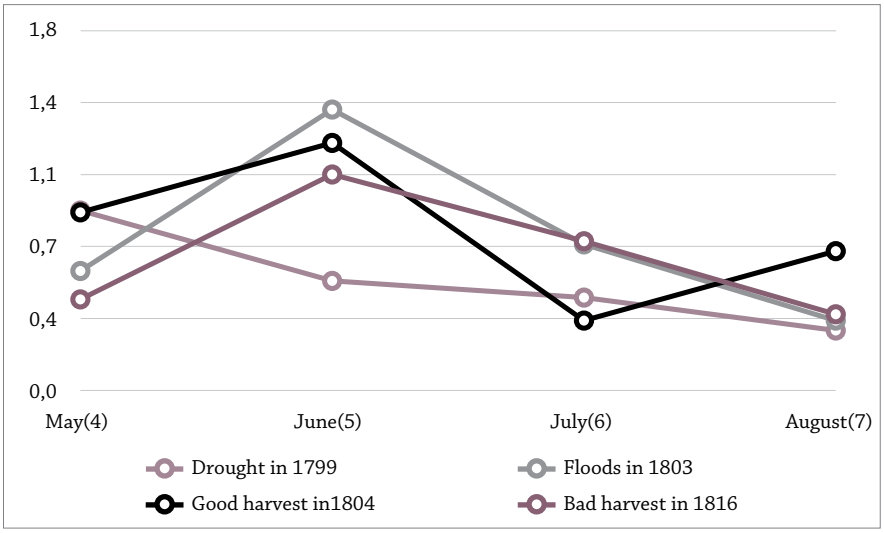

Figure 6 A Comparison of a Drought Year in 1799, a Flooding Year in 1803, a Good Harvest Year in 1804, and a Bad Harvest Year in 1816

Notes Monthly averages of weather points were drawn from the diaries' descriptive records on rainy, cloudy, and sunny days from May to August. A traditional lunar calendar was adjusted to a solar calendar. A higher index indicates a rainier month: extreme/heavy rain = 2.5, rain = 2, light rain = 1.5, cloudy = 1, and clear = 0.
Source Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, Ueda Yoshiuzu Diaries.

achieved in 1798. The crucial point was the timing of the rain. Regarding the rainy days in 1803, the number of days that rain fell was exceptional. The case of 1816 may indicate that there was not enough sunshine in July and not enough rain in August, so there was not enough mature rice for the harvest.

In summary, there was no rainy season in the drought year 1799. Second, the line plots for June (5) comparing the daily rainfall of 1799, 1803, 1804, and 1816, the 1803 curve of the flood year shows in the 1803 curve that the intense rains seems to be lasted longer than usual during the rainy season. According to the diary, the heavy rain surely continued from May 9 to 10, the fifth month of the lunar calendar (June 27–28 in the solar calendar). Then there were floods. Third, comparing the case of 1816 with that of 1804, when there was a normal harvest, figure 5 shows that the main rainy season in 1816 was not very strong. There were only a few days of fine weather in July; it is assumed that there was a lack of a sufficient amount of sunshine.

Figure 7 Monthly Averages of the Weather Index of Good Harvest Years: 1798 and 1804

Source Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*.

Comparing the average rainfall index (= average monthly rainfall points) in 1798 and 1804, when relatively good rice harvests occurred, figure 7 shows that the two curves are shaped similarly to oblique N curves. Thus, the optimal seasonal weather conditions for rice cultivation are (1) sufficient but not excessive rain in June, (2) sunny weather in July, and (3) moderate rainfall and fair weather in early August and late August and September until the harvest.

Peasants and village leaders wished for rain to improve the situation of rice cultivation. In this sense, it was possible to determine the relationship between rainy days and prayers for rain. We compared 1798, a relatively good harvest year, with 1799, a year of drought. Figure 8 shows the changes in monthly averages for both years. As shown in table 2, the number of dry days in June 1799 was much higher than in June 1798. In July, the inhabitants performed rain rituals four times. However, drought damage was recorded in the diary on July 23 (June 19 of the lunar calendar). This indicates that the possibility of buying grain for tax

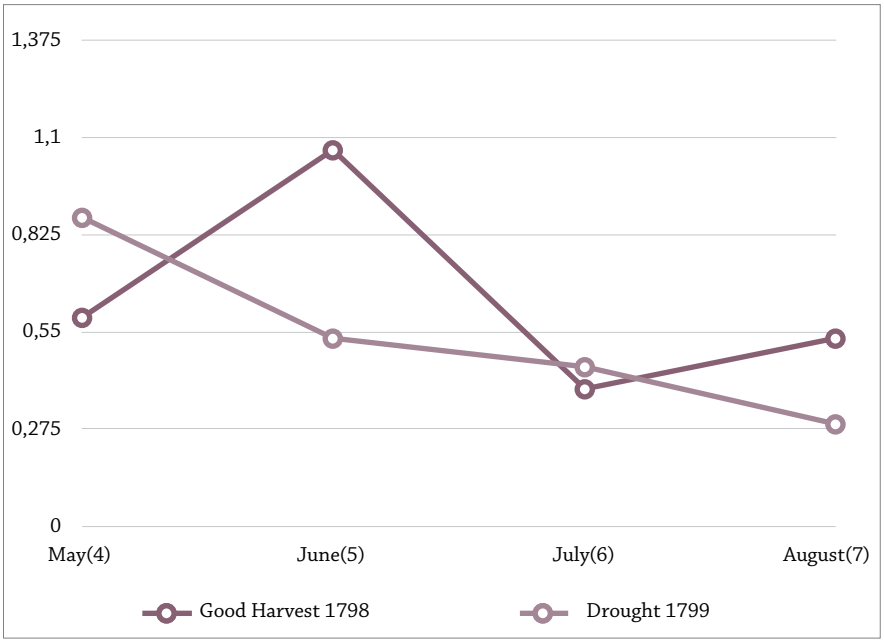

Figure 8 Average Monthly Weather Index Values of a Good Harvest Year in 1798 and a Drought Year in 1799

Source Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*.

was explored. The rainy days then continued for some time. In August, there were two weeks of sunny days. Although the rainy days began after August 23, drought damage was noted in the diary on August 23 (July 23 of the lunar calendar). This happened too late for the rice plants, which had already died.

It is clear that the timing of rainy and fair weather was crucial in avoiding agricultural crises. Drought can be avoided by having the desired amount of rainfall each year; thus, people developed various rituals to produce rain. A good harvest could be the result of a lucky combination and good timing between rain and sunshine. Even in 1798, a relatively good harvest year, two rainmaking rituals took place in August, because the rice harvest is always uncertain as it depends on weather conditions.

Flooded Paddy Fields in 1803 and a Recovery in 1804

According to the descriptions in the diaries, several episodes of heavy rains within ten days caused flooding in 1803. After heavy rains on April

Table 2 Occurrence of Dry Days and Rainmaking Rituals from June to August (Solar Calendar) for a Good Harvest Year, 1798, and a Drought Year, 1799

Solar C.	1798		1799	
	Dry days	RMR events	Dry days	RMR events
June	13		21	
July	25		21	1.Jul
				4.Jul
				8-12-Jul
		30.Jul		21-?-Jul
August	22	2-6-Aug	26	
		10-12-Aug		17.Aug

Source Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*.

29 (June 18 in the solar calendar), the diaries reported that on May 1 the river swelled and seemed to overflow its banks, damaging several parts of the banks as well. In the early morning of May 10 of the lunar calendar, a flood occurred. The water percolated from 2:00 pm to 3:00 pm. The flood damage was immediately investigated and a summary of the damage was listed in a special document dated May 11. The damage is summarized in table 3 and compared to other flood events. Residents of the cooperative village quickly and expeditiously surveyed the damaged sites and buildings. Unlike the flood of 1801, it took only a week for people to report the damage. A new image map was created in the following months to visualize the disaster.

Before mapping the damaged sites after the 1803 flood, an emergency construction project began on May 13 to stop the flow of water and prevent the spread of damage. A village official inspected each damaged site or structure, and by the end of May, broken walkways had been restored. Local government officials came to survey the damage and estimated that the damage in *kokudaka* was 130 *koku*, meaning that more than one-fifth of the village *kokudaka*, about 615 *koku*, was destroyed. On July 2, Takahama suffered further heavy damage from a large wave.

The *shoya* of Takahama submitted a request to the local government on July 5 for an estimate of the number of workers needed to repair the flood-damaged irrigation systems, including shore protection at the mouth of the river.[8] Figure 9 is a pictorial map of Takahama submitted

8 According to a description dated on July 5 in Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*.

Table 3 Damage Due to Floods in 1801 (Kansei 13), 1803 (Kyowa 3), and 1817 (Bunka 14)

Floods in Jun 13, 1801			Floods in May 11, 1803			Floods in Jun 6, 1817		
Type	Number	Scale	Type	Number	Scale and Remarks	Type	Number	Scale and Remarks
River Banks	8	234 m	River Banks	38	1411.2 m	River and Tide Banks	41	1148.4 m
			Tide Banks	2	63 m			
						River Shelves	14	8,424 m
						Mizu-Hane	4	81 m
						River Weirs	14	1,568 m
Shirasu Banks		360 m	Shirasu Banks	2	270 m			
Rice Fields		99 a*	Rice Fields	1,118.0 a	became river	Rice Fields	346.5 a	became river
			Rice Fields	1,287.0 a	flooded with water	Rice Fields	693,0 a	flooded with water
			Other Fields		sweet potatoes	Other Fields	198.0 a	land slide
			Houses	2	collapsed	Houses	4	collapsed
			Huts	1	collapsed	Huts	3	washed away
			Houses	8	walls collapsed			
						Fishing Boats	16	washed away

Note *a=100 square meter
Source Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*.

with the request. Shortly before this submission, on July 2, an additional 297.5 *a* (= 100 square meter) of rice paddies were flooded.

A new draft of an illustrated map of the village was started by Denkuro and Godayu on August 20 and completed on August 23. The composition and content differed fundamentally between this illustrated map (figure 9) and the illustrated map drawn several months later (map 3). The local government and the village official checked the site again, and Takeshiro, who was invited as a new painter, drew the details of the damaged areas from September 10 to October 9 with Sahichi's help.[9]

9 According to a description dated on October 9 in Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*.

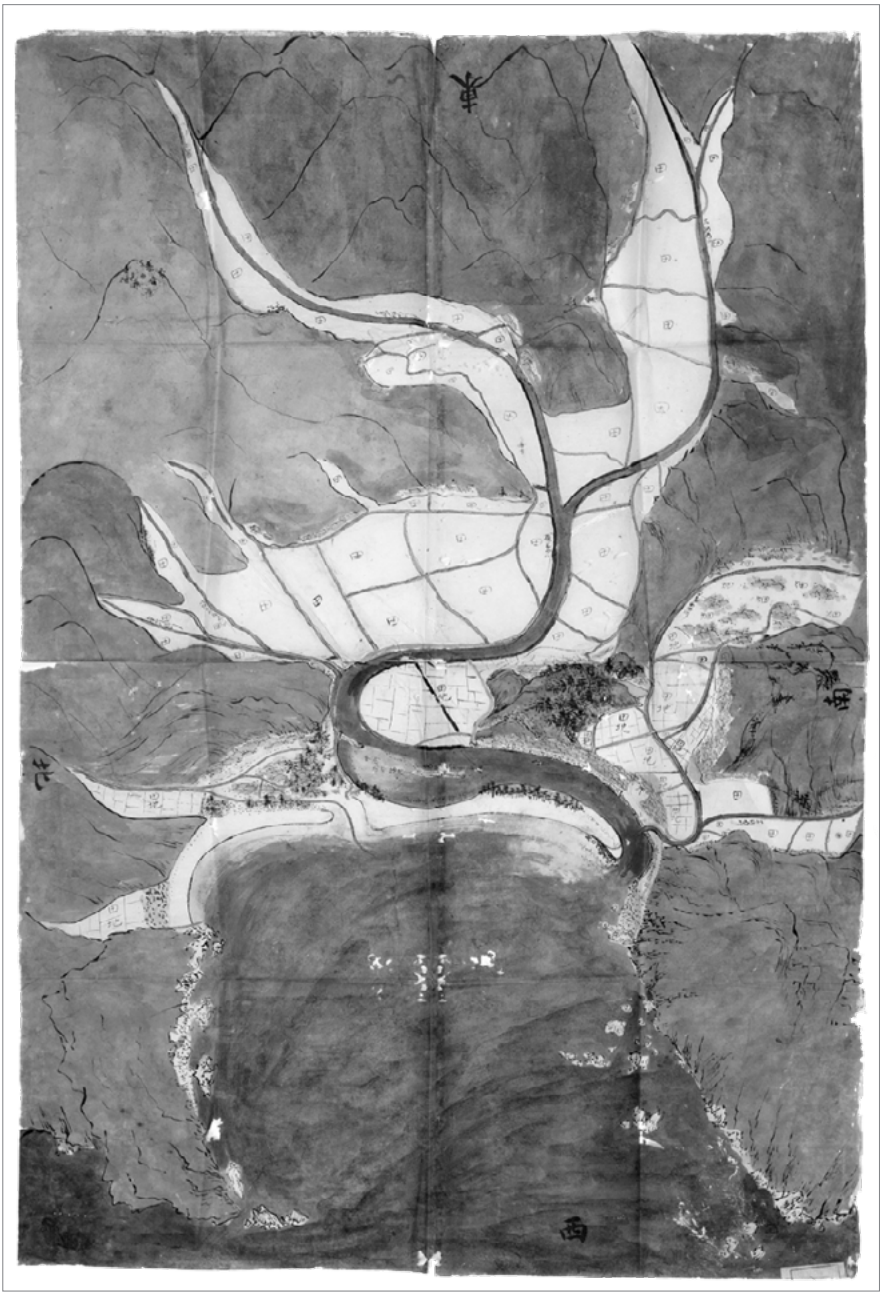

Figure 9 Map of Takahama, Drawn and Painted Before the Beginning of July 1803

Source UkM, Village Takahama Pictorial Map, 18, 2.

Figure 10 Flooded Areas that Were Caused by Floods on 9–10 May and by High Tide on 2 July 1803; These Maps Were Drawn and Painted Before 9 October 1803

Source UkM, Village Takahama Pictorial Map, 18, 3.

Collapsed banks and flooded areas were described in an accurate survey (i.e. figure 10). All communal water management sites were shown and the measured lengths of the structures were also drawn on the map in their correct locations. The shapes and locations of rivers, trails, and roads approximated their actual sizes and locations. After an accurate and rapid survey and its mapping, the village was able to secure the support of the local government. The support funds arrived on July 1 of the following year, 1804.

In June 1803, an emergency plan was put into effect to prevent the spread of damage after floods. From February of the following year, namely 1804 (Kyowa 4), the restoration of particularly damaged paddy fields and the improvement of riverbanks and river gates began. During the 27 months from June 25, 1803 (Kyowa 3) to September 10, 1805 (Bunka 2), about 11,317 person-days (figure 8) were mobilized. However, there were other challenges during and after the reconstruction process. On September 18 and October 2, 1805, Takahama was again hit by a high wave and a tidal wave, respectively. Although the mouth of the Takahama River was a port for merchant ships and thus a fairly important part of the village's infrastructure, shore protections suffered repeated damage and had to be repaired again and again. The village head's diary contains records of the reconstructions and repairs of the river mouth that took place in 1807 (Bunka 4) and 1814 (Bunka 11).

The villagers who were engaged in restoration work, especially in March 1804, were paid by the local government. This was a successful proposal of the village head, who, together with his colleagues, had calculated and mapped the flood damage in 1803. Although the villagers harvested almost nothing from the rice fields in this area in the year of the flood, they managed to successfully repair the fields the next year before sowing the rice crops. The crucial point was that after the extreme destruction caused by the freshwater and saltwater floods in 1803, they were able to harvest a normal crop in 1804.

Discussion and Concluding Remarks

Japan is located in the East Asian monsoon region (figure 3). The Amakusa Islands of Kyushu are located in southwestern Japan and belong to a relatively warmer region of Japan. They are frequently hit by typhoons and heavy rainfall. However, in terms of agricultural damage, we were able to confirm that there was no flooding during the peak typhoon season, but that heavy rain, especially during the rainy season, caused tremendous

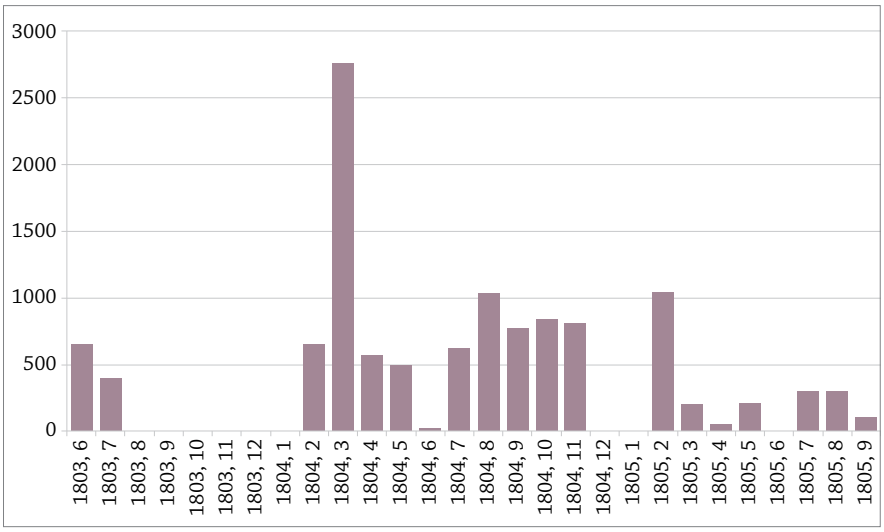

Figure 11 Number of Restoration Labourers from June 1803 to September 1805
Source Original digitised database from Amakusa-cho Kyoiku-iinkai (1985–1998); UkM, *Ueda Yoshiuzu Diaries*.

flooding damage. In addition, of course, there was constant concern that there would be insufficient rain, as suggested by the rain-seeking rituals, since such rituals were performed in more than 70 percent of the years observed. In addition, it was confirmed that sunshine was expected in July and, at the same time, prompt rains that ensured sunshine and fair weather in August. It was confirmed that the rhythm and balance of rainfall and solar radiation are important for rice growth.

Relationships with other agricultural products, such as wheat and sweet potatoes, were important in sustaining the lives of the villagers. In this chapter, we have focused only on rice, an important annual crop. However, in addition to agriculture, the livelihood of the entire village was maintained as the pottery stone industry also played an important role in the economy, although further comprehensive study of the economic situation is needed. In many ways, however, this society was heavily dependent on the organic economy, and the influences of meteorological phenomena were great. In addition, fluctuating weather conditions and even extreme weather phenomena were unavoidable conditions that led local people to produce sweet potatoes for stockpiling, take action in various village units, and develop local management strategies to discuss with regional governments.

The payment of the annual contribution was the most important task in villages like Takahama, which had a relatively large population. The *kokudaka* of Takahama village, which served as a standard for assessing tax payment, was not particularly high. However, purpose-built rice fields were set aside for the collection of annual contributions. Thus, after the flood of 1803, when the rice fields that had been specially planted for tax payment were severely damaged, the local self-government of the village immediately requested assistance from the regional government. The villagers received funds to restore the flooded fields and damaged river irrigation systems. This enabled them to restore the rice fields as early as possible the following year through their own paid labour.

On the other hand, it should be noted that all other types of damage, such as the destruction of the harbour by high waves and tides, were repaired on the village's own responsibility, and this also happened in the case of floods when the damage to the rice fields was minor. In other words, the facilities associated with the annual contribution were supported by the government in return for collecting the annual contribution, but almost everything else was left to the villagers alone. This meant that in the second layer of Braudel's composition discussed at the beginning of this chapter, the market was largely divided into two parts, one of which was the rice market, which was directly under the control of the government because of the collection of the annual tax. However, rice cultivation is also highly constrained by climatic and weather conditions such as water shortage and frequency, rainfall volume, and solar radiation. Ecological constraints should also be included in the bottom layer of Braudel's composition, along with sub-economies. In addition, other market transactions, such as participation in the Kitakyushu porcelain market by mining and transporting pottery stones, were very important in Takahama. They are the second type of market economy that involved self-responsibility, and are believed to have been dismissed to some degree.

It is true that despite being a society driven by an organic economy based on sunlight, discretionary freedom was never small. In the event of a bad harvest, a request was made to the government for a tax reduction. In some cases, they purchased items with other funds, such as those from the pottery business, and also rebuilt themselves. Villagers' self-discretion could further their future or destroy their subsistence. For example, in 1817, some plots had sufficient water while others suffered from water shortages. The only way to avoid a drought crisis was to adapt within the village.

The village, in this sense, was a form of enterprise on a small economic scale, albeit with more than 3,000 inhabitants, whose individual and economic performances were conditioned by the possibility of a communal tax payment, obtained through the harvest of rice fields, which were prone to flooding, drought and lack of sunshine. All villagers worked against natural disasters almost every year. Amakusa, an East Asian monsoon region, developed a kind of social capital that was able to mobilize 11,317 person-days from among the residents, including men and women, in the following years, so that the village's rice production soon recovered after the disastrous flood of 1803.

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ries, which were produced by the Grants-in-Aid for Scientific Research (A) (19203018) funded from April 2007 to March 2011.

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Appendix

Quantification method used to determine monthly averages of weather points and two sets of sample data for four months from May to August in 1788 and 1789

Monthly weather index averages were calculated from the diaries' descriptive records on rainy, cloudy, and sunny days from May to August. Figure 7 shows a comparison between a good harvest year in 1798 and a drought year in 1799. A traditional lunar calendar was adjusted to a solar calendar. A larger index indicated a rainier month, because the descriptive records counted extreme/heavy rain as 2.5 points, rain as 2 points, light rain as 1.5 points, cloud as 1 point, and clear weather as 0 points. This calculation, including original Japanese descriptions and English translations, is demonstrated in the following two tables.
Source: ASU *Ueda-Yoshiuzu-Nikki.*

Table A1 Weather index from May to August in 1798

Date, 1798	Lunar calendar		Weather	Wind and others	Weather point	Monthly average of weather points
5.1	3.16	三月十六日　晴天（風向きなし）	fine weather		0	0,5893
5.2	3.17	三月十七日　晴天　北風	fine weather	north wind	0	

Date, 1798	Lunar calendar		Weather	Wind and others	Weather point	Monthly average of weather points
5.3	3.18	■ 十八日　晴天　北風	fine weather	north wind	0	
5.4	3.19	三月十九日　晴天　北風	fine weather	north wind	0	
5.5	3.20	■ 廿日　晴天　北風	fine weather	north wind	0	
5.6	3.21	三月廿一日　（晴雨風向共なし）				
5.7	3.22	三月廿二日　（晴雨風向共なし）				
5.8	3.23	三月廿三日　（　〃　）				
5.9	3.24	■月廿四日　晴天　（風向きなし）	fine weather		0	
5.10	3.25	三月廿五日　晴天　（　〃　）	fine weather		0	
5.11	3.26	三月廿六日　晴天　（　〃　）	fine weather		0	
5.12	3.27	三月廿七日　晴天　北風　曇	fine weather/ cloudy	north wind	1	
5.13	3.28	三月廿八日　晴天　南風	fine weather	south wind	0	
5.14	3.29	三月廿九日　雨天　南風	rainy weather	south wind	2	
5.15	4.1	■月晦日　晴　北風	sunny	north wind	0	
5.16	4.2	四月朔日　晴天　北風	fine weather	north wind	0	
5.17	4.3	四月二日　晴天　北風	fine weather	north wind	0	
5.18	4.4	四月三日　晴天　南風	fine weather	south wind	0	
5.19	4.5	■■ 日　雨天　南風	rainy weather	south wind	2	
5.20	4.6	四月五日　曇天　北東風	cloudy weather	north-east wind	1	
5.21	4.7	四月六日　雨　西北風	rain	west-north wind	2	
5.22	4.8	■ 八日　晴　北風	sunny	north wind	0	
5.23	4.9	四月七日　雨天　北東風	rainy weather	north-east wind	2	
5.24	4.10	四月九日　晴天　北風	fine weather	north wind	0	
5.25	4.11	四月十日　雨天　西南風	rainy weather	west-south wind	2	
5.26	4.12	四月十一日　晴　南風	sunny	south wind	0	
5.27	4.13	四月十二日　雨天　北風	rainy weather	north wind	2	
5.28	4.14	四月十三日　晴　南風	sunny	south wind	0	
5.29	4.15	■■■■　晴天　南風	fine weather	south wind	0	
5.30	4.16	四月十五日　晴天　西南風	fine weather	west-south wind	0	
5.31	4.17	四月十六日　曇昼ヨリ雨夜ニ入大雨　南風	cloudy/rain from noon/ heavy rain at night	south wind	2,5	
6.1	4.18	四月十七日　晴　西北風	sunny	west-north wind	0	1,0667
6.2	4.19	■■■■　晴天　西北風	fine weather	west-north wind	0	
6.3	4.20	四月十九日　晴　南風	sunny	south wind	0	
6.4	4.21	四月廿日　晴天　南風	fine weather	south wind	0	
6.5	4.22	四月廿一日　晴　南風　平波	sunny	south wind and calm wave	0	

Date, 1798	Lunar calendar		Weather	Wind and others	Weather point	Monthly average of weather points
6.6	4.23	四月廿二日　雨天　南風	rainy weather	south wind	2	
6.7	4.24	四月廿三日　雨　東風	rain	east wind	2	
6.8	4.25	■■ 四日　晴　南風	sunny	south wind	0	
6.9	4.26	四月廿五日　雨　北東風	rain	north-east wind	2	
6.10	4.27	四月廿六日　雨　北東風	rain	north-east wind	2	
6.11	4.28	四月廿七日　晴天　北風	fine weather	north wind	0	
6.12	4.29	四月廿八日　晴　北風	sunny	north wind	0	
6.13	4.30	四月廿九日　曇天　北風	cloudy weather	north wind	1	
6.14	5.1	■ 朔日　晴天　北風	fine weather	north wind	0	
6.15	5.2	五月二日　晴天　北風	fine weather	north wind	0	
6.16	5.3	五月三日　晴天　北風	fine weather	north wind	0	
6.17	5.4	五月四日　曇　北東風　昼刂雨	cloudy/rain from noon	north-east wind	2	
6.18	5.5	五月五日　雨天　北東風	rainy weather	north-east wind	2	
6.19	5.6	五月六日　雨天　北東風	rainy weather	north-east wind	2	
6.20	5.7	五月七日　雨天　北東風	rainy weather	north-east wind	2	
6.21	5.8	五月八日　雨天　北東風	rainy weather	north-east wind	2	
6.22	5.9	五月九日　雨天　北東風	rainy weather	north-east wind	2	
6.23	5.10	五月十日　雨天　北東風	rainy weather	north-east wind	2	
6.24	5.11	五月十一日　雨　西南風　昼晴	rain/sunny from noon	north-east wind	2	
6.25	5.12	■ 十二日　晴天　西風	fine weather	west wind	0	
6.26	5.13	■ 十三日　晴天　西北風	fine weather	west-north wind	0	
6.27	5.14	五月十四日　曇天　北東風	cloudy weather	north-east wind	1	
6.28	5.15	五月十五日　雨天　東南風	rainy weather	east-south wind	2	
6.29	5.16	■ 十六日　雨天川水出　東南風昼刂西北風	rainy weather/flooding from river	east-south wind/west-north wind from noon	2	
6.30	5.17	五月十七日　雨　東南風	rain	east-south wind	2	
7.1	5.18	五月十八日　晴　西南風	sunny	west-south wind	0	0,3871
7.2	5.19	五月十九日　雨　東南風　半夏也	rain	east-south wind/*hange*: 11 days from summer solstice	2	
7.3	5.20	五月廿日　晴　西北風	sunny	west-north wind	0	
7.4	5.21	五月廿一日　晴天　西北風	fine weather	west-north wind	0	

Date, 1798	Lunar calendar		Weather	Wind and others	Weather point	Monthly average of weather points
7.5	5.22	■■■■ 曇天 東南風 昼過ヨリ雨	cloudy weather/rain from noon	east-south wind	2	
7.6	5.23	五月廿三日 曇 南風 暁頃大雨朝飯過ヨリ晴ル	cloudy/heavy rain from later night/sunny from the time of breakfast	south wind	2,5	
7.7	5.24	五月廿四日 晴天 南風	fine weather	south wind	0	
7.8	5.25	五月廿五日 晴天 南風	fine weather	south wind	0	
7.9	5.26	五月廿六日 晴天 西北風	fine weather	west-north wind	0	
7.10	5.27	■■ 七日 晴天 西北風	fine weather	west-north wind	0	
7.11	5.28	五月廿八日 晴天 北風	fine weather	north wind	0	
7.12	5.29	五月廿九日 晴天 西北風	fine weather	west-north wind	0	
7.13	5.30	五月晦日 晴天 西北風	fine weather	west-north wind	0	
7.14	6.1	■ 朔日 晴天 西北風	fine weather	west-north wind	0	
7.15	6.2	六月二日 晴天 南風	fine weather	south wind	0	
7.16	6.3	六月三日 晴天 南風 夕方雨夜半大雨	fine weather/rain from evening/heavy rain from midnight	south wind	2,5	
7.17	6.4	六月四日 曇 南風 夜雨少シ	cloudy/light rain at night	south wind	1,5	
7.18	6.5	六月五日 晴天 南風 夜雨少降	fine weather/light rain at night	south wind	1,5	
7.19	6.6	六月六日 晴天 南風	fine weather	south wind	0	
7.20	6.7	六月七日 晴天 南風	fine weather	south wind	0	
7.21	6.8	六月八日 晴天 南風	fine weather	south wind	0	
7.22	6.9	六月九日 晴天 西南風	fine weather	west-south wind	0	
7.23	6.10	六月十日 晴天 西北風	fine weather	fine weather	0	
7.24	6.11	六月十一日 晴天 西北風	fine weather	fine weather	0	
7.25	6.12	六月十二日 晴天 西北風	fine weather	fine weather	0	
7.26	6.13	■■■■ 晴天 西南風	fine weather	west-south wind	0	
7.27	6.14	六月十四日 晴天 西南風	fine weather	west-south wind	0	
7.28	6.15	六月十五日 晴 西南風	sunny	west-south wind	0	
7.29	6.16	六月十六日 晴天 西風	fine weather	west wind	0	
7.30	6.17	六月十七日 晴天 西南風	fine weather	west-south wind	0	
7.31	6.18	六月十八日 晴天 西南風	fine weather	west-south wind	0	
8.1	6.19	六月十九日 晴天 西風	fine weather	west wind	0	0,5323

Date, 1798	Lunar calendar		Weather	Wind and others	Weather point	Monthly average of weather points
8.2	6.20	六月廿日　晴天　朝東風昼西風	fine weather	east wind in the morning/ west wind from noon	0	
8.3	6.21	■■ 一日　晴天　西風	fine weather	west wind	0	
8.4	6.22	六月廿二日　晴天　西風	fine weather	fine weather	0	
8.5	6.23	六月廿三日　晴天　西風	fine weather	fine weather	0	
8.6	6.24	六月廿四日　晴天　西風	fine weather	fine weather	0	
8.7	6.25	■■ 五日　晴天　西風	fine weather	fine weather	0	
8.8	6.26	六月廿六日　晴天　西風	fine weather	fine weather	0	
8.9	6.27	六月廿七日　晴天　西北風	fine weather	west-north wind	0	
8.10	6.28	六月廿八日　晴天　西南風	fine weather	west-south wind	0	
8.11	6.29	六月廿九日　晴天　西北風夕方少雨降	fine weather/ light rain in the evening	west-north wind	1,5	
8.12	7.1	七月朔日　晴天　西南風　昼頃大雨	fine weather/ heavy rain around noon	west-south wind	2,5	
8.13	7.2	七月二日　雨　南風	rain	south wind	2	
8.14	7.3	七月三日　晴天　北風	fine weather	north wind	0	
8.15	7.4	七月四日　晴天　北東風	fine weather	north-east wind	0	
8.16	7.5	七月五日　晴天　西北風	fine weather	west-north wind	0	
8.17	7.6	七月六日　晴天　北風	fine weather	north wind	0	
8.18	7.7	七月七日　晴天　北風	fine weather	north wind	0	
8.19	7.8	七月八日　曇　西北風夕方ヨリ大雨	cloudy/heavy rain from the evening	west-north wind	2,5	
8.20	7.9	七月九日　曇　西南風　夜雨	cloudy/rain at night	west-south wind	2	
8.21	7.10	七月十日　雨天　西南風　河水出、	rainy weather/ flooding from river	west-south wind	2	
8.22	7.11	七月十一日　晴天　北風	fine weather	north wind	0	
8.23	7.12	七月十二日　晴天　西北風	fine weather	west-north wind	0	
8.24	7.13	七月十三日　晴天　西北風	fine weather	west-north wind	0	
8.25	7.14	七月十四日　雨　西南風	rain	west-south wind	2	
8.26	7.15	七月十五日　晴　南風	sunny	south wind	0	
8.27	7.16	七月十六日　晴　西南風	sunny	west-south wind	0	
8.28	7.17	七月十七日　晴曇　西南風　平波	sunny&cloudy	west-south wind and calm wave	1	
8.29	7.18	七月十八日　曇　西南風	cloudy	west-south wind	1	

Date, 1798	Lunar calendar		Weather	Wind and others	Weather point	Monthly average of weather points
8.30	7.19	七月十九日　晴天　北風	fine weather	north wind	0	
8.31	7.20	七月廿日　晴天　北東風	fine weather	north-east wind	0	

Table A2 Weather index from May to August in 1799

Date, 1799	Lunar calendar		Weather	Wind	Weather point	Monthly average of weather points
5.1	3.27	三月廿七日　雨天　南風	rainy weather	south wind	2	0,8750
5.2	3.28	三月廿八日　晴天　北風	fine weather	north wind	0	
5.3	3.29	三月廿九日　雨天　南風	rainy weather	south wind	2	
5.4	3.30	三月晦日　晴天　北風	fine weather	north wind	0	
5.5	4.1	四月朔日　晴天　南風	fine weather	north wind	0	
5.6	4.2	四月二日　雨天　南風	rainy weather	south wind	2	
5.7	4.3	四月三日　同断	rainy weather		2	
5.8	4.4	四月四日　同断　昼ヨリ晴	rainy weather/ sunny from noon		2	
5.9	4.5	四月五日　同断　南風	rainy weather/ sunny from noon	south wind	2	
5.10	4.6	四月六日　同断	rainy weather/ sunny from noon		2	
5.11	4.7	四月七日　晴　南風	sunny	south wind	0	
5.12	4.8	四月八日　晴天　北風	fine weather	north wind	0	
5.13	4.9	四月九日　晴天　北風	fine weather	north wind	0	
5.14	4.10	四月十日　晴天　北風	fine weather	north wind	0	
5.15	4.11	四月十一日　晴天　北風	fine weather	north wind	0	
5.16	4.12	四月十二日　晴　北風	sunny	north wind	0	
5.17	4.13	四月十三日　晴　北風　昼曇南風　雨	sunny/cloudy at noon/rain	north wind/ south wind from noon	2	
5.18	4.14	四月十四日　（晴雨風向共になし）				
5.19	4.15	四月十五日　（　〃　）				
5.20	4.16	四月十六日　（　〃　）				
5.21	4.17	四月十七日　（　〃　）				
5.22	4.18	四月十八日　（　〃　）				
5.23	4.19	四月十九日　（　〃　）				
5.24	4.20	四月廿日　雨天	rainy weather		2	
5.25	4.21	四月廿一日　雨天	rainy weather		2	
5.26	4.22	（四月廿二日は無し）				
5.27	4.23	四月廿三日　晴天　北風	fine weather	north wind	0	
5.28	4.24	四月廿四日　晴天　北風			0	
5.29	4.25	四月廿五日　晴天　北風			0	
5.30	4.26	四月廿六日　曇天　南風	cloudy weather	south wind	1	
5.31	4.27	四月廿七日　晴天　北風	fine weather	north wind	0	

Date, 1799	Lunar calendar		Weather	Wind	Weather point	Monthly average of weather points
6.1	4.28	四月廿八日　晴天　北風	fine weather	north wind	0	0,5333
6.2	4.29	四月廿九日　晴天　北風	fine weather	north wind	0	
6.3	4.30	四月卅日　晴天　北風	fine weather	north wind	0	
6.4	5.1	五月朔日　晴天　北風	fine weather	north wind	0	
6.5	5.2	五月二日　晴天（風向なし）	fine weather		0	
6.6	5.3	五月三日　晴天　北風	fine weather	north wind	0	
6.7	5.4	五月四日　南風　雨天	rainy weather	south wind	2	
6.8	5.5	五ノ五日　雨天　南風　昼ヨリ晴レ	rainy weather/ sunny from noon	south wind	2	
6.9	5.6	五ノ六日　晴天　北風	fine weather	north wind	0	
6.10	5.7	五ノ七日　晴天　北風	fine weather	north wind	0	
6.11	5.8	五月八日　晴天　北風	fine weather	north wind	0	
6.12	5.9	五月九日　晴天　北風	fine weather	north wind	0	
6.13	5.10	五月十日　晴天　南風	fine weather	south wind	0	
6.14	5.11	五月十一日　雨天　西南風	rainy weather	west-south wind	2	
6.15	5.12	五月十二日　晴　北風	sunny	north wind	0	
6.16	5.13	五月十三日　晴　北風	sunny	north wind	0	
6.17	5.14	五月十四日　雨　北東風	rain	north-east wind	2	
6.18	5.15	五月十五日　晴　北風	sunny	north wind	0	
6.19	5.16	五月十六日　雨天　北東風	rainy weather	north-east wind	2	
6.20	5.17	五月十七日　曇天　北風	cloudy weather	north wind	1	
6.21	5.18	五月十八日　晴　北風	sunny	north wind	0	
6.22	5.19	五月十九日　晴天　北風	fine weather	north wind	0	
6.23	5.20	五月廿日　晴天　南風	fine weather	south wind	0	
6.24	5.21	五月廿一日　雨天　南風	rainy weather	south wind	2	
6.25	5.22	五月廿二日　雨天　南風	rainy weather	south wind	2	
6.26	5.23	五月廿三日　曇天　南風	cloudy weather	south wind	1	
6.27	5.24	五月廿四日　晴天　南風	fine weather	south wind	0	
6.28	5.25	五月廿五日　晴天（風向なし）	fine weather		0	
6.29	5.26	五月廿六日　晴天（　〃　）	fine weather		0	
6.30	5.27	五月廿七日　晴天（　〃　）	fine weather		0	
7.1	5.28	五月廿八日　晴天（　〃　）	fine weather		0	0,467741935
7.2	5.29	五月廿九日　晴天（　〃　）	fine weather		0	
7.3	6.1	六月朔日　晴天　北風	fine weather	north wind	0	
7.4	6.2	六月二日　晴天　北風	fine weather	north wind	0	
7.5	6.3	六月三日　晴天　北風	fine weather	north wind	0	
7.6	6.4	六月四日　晴天　北風	fine weather	north wind	0	
7.7	6.5	六月五日　晴天　北風	fine weather	north wind	0	
7.8	6.6	六月六日　曇天　南風	cloudy	south wind	1	
7.9	6.7	六月七日　晴天　南風	fine weather	south wind	0	
7.10	6.8	六月八日　晴天　南風	fine weather	south wind	0	
7.11	6.9	六月九日　晴天　南風	fine weather	south wind	0	
7.12	6.10	六月十日　曇天　東南風	cloudy weather	east-south wind	1	

Date, 1799	Lunar calendar		Weather	Wind	Weather point	Monthly average of weather points
7.13	6.11	六月十一日　昼ヨリ大雨　東南風	heavy rain from noon	east-south wind	2,5	
7.14	6.12	六月十二日　曇天　雨止ミ南風	cloudy/rain is stop	south wind	1	
7.15	6.13	六月十三日　晴天　西南風	fine weather	west-south wind	0	
7.16	6.14	六月十四日　晴　西北風	sunny	west-north wind	0	
7.17	6.15	六月十五日　晴天　西風	fine weather	west wind	0	
7.18	6.16	六月十六日　晴天　西北風	fine weather	west-north wind	0	
7.19	6.17	六月十七日　晴天　西北風	fine weather	fine weather	0	
7.20	6.18	六月十八日　晴天　西北風	fine weather	fine weather	0	
7.21	6.19	六月十九日　晴天　西北風	fine weather	fine weather	0	
7.22	6.20	六月廿日　晴天　西北風	fine weather	fine weather	0	
7.23	6.21	六月廿一日　晴天　西北風	fine weather	fine weather	0	
7.24	6.22	六月廿二日　晴天　西北風	fine weather	fine weather	0	
7.25	6.23	六月廿三日　晴天　西北風　昼ヨリ南風夜半雨	fine weather/rain from midnight	fine weather	2	
7.26	6.24	六月廿四日　曇天少雨降　西南風	cloudy weather with light rain	west-south wind	1,5	
7.27	6.25	六月廿五日　曇天　西南風　夕方雨夜半頃大雨	cloudy weather/ rain in the evening/heavy rain at mid-night	west-south wind	2,5	
7.28	6.26	六月廿六日　曇天　西南風	cloudy weather	west-south wind	1	
7.29	6.27	六月廿七日　曇晴　西南風	cloudy&sunny	west-south wind	1	
7.30	6.28	六月廿八日　曇天　南風	cloudy weather	south wind	1	
7.31	6.29	六月廿九日　晴天　西南風	fine weather	west-south wind	0	
8.1	7.1	七月朔日　晴天　北風	fine weather	north wind	0	0,2903
8.2	7.2	七月二日　晴天　北風	fine weather	north wind	0	
8.3	7.3	七月三日　晴天　南風	fine weather	south wind	0	
8.4	7.4	七月四日　晴天　南風	fine weather	south wind	0	
8.5	7.5	七月五日　晴天　南風	fine weather	south wind	0	
8.6	7.6	七月六日　晴天　西南風	fine weather	west-south wind	0	
8.7	7.7	七月七日　晴天　北風	fine weather	north wind	0	
8.8	7.8	七月八日　晴天（風向なし）	fine weather		0	
8.9	7.9	七月九日　晴天　北風	fine weather	north wind	0	
8.10	7.10	七月十日　晴天　北風	fine weather	north wind	0	
8.11	7.11	七月十一日　晴天　朝北風昼ヨリ南風	fine weather	north wing in the morning/ south wind from noon	0	
8.12	7.12	七月十二日　晴天　右同断	fine weather	north wing in the morning/ south wind from noon	0	

Date, 1799	Lunar calendar		Weather	Wind	Weather point	Monthly average of weather points
8.13	7.13	七月十三日　晴天　西南風	fine weather	west-south wind	0	
8.14	7.14	七月十四日　晴天　南風	fine weather	south wind	0	
8.15	7.15	七月十五日　晴天　南風	fine weather	south wind	0	
8.16	7.16	七月十六日　晴曇　西南風	sunny&cloudy	west-south wind	1	
8.17	7.17	七月十七日　晴天　南風	fine weather	south wind	0	
8.18	7.18	七月十八日　晴天　南風	fine weather	south wind	0	
8.19	7.19	七月十九日　晴天　西南風	fine weather	west-south wind	0	
8.20	7.20	七月廿日　晴天　西南風	fine weather	west-south wind	0	
8.21	7.21	七月廿一日　晴天　東風	fine weather	east wind	0	
8.22	7.22	七月廿二日　晴天　東風	fine weather	east wind	0	
8.23	7.23	七月廿三日　晴天　東風　昼頃夕雨	fine weather/ shower around noon	east wind	2	
8.24	7.24	七月廿四日　晴天　東風	fine weather	east wind	0	
8.25	7.25	七月廿五日　晴天　東南風　昼過夕雨	fine weather/ shower after noon	east-south wind	2	
8.26	7.26	七月廿六日　晴天　東南風	fine weather	east-south wind	0	
8.27	7.27	七月廿七日　晴天　南風	fine weather	south wind	0	
8.28	7.28	七月廿八日　曇天　西南風　夜半過刁雨	cloudy weather/ rain after mid-night	west-south wind	2	
8.29	7.29	七月廿九日　雨　西南風	rain	west-south wind	2	
8.30	8.1	八月朔日　晴天　南風	fine weather	south wind	0	
8.31	8.1	八月二日　晴天　西北風	fine weather	west-north wind	0	

11

The Neverlake: Water and Land Management in a Dry and Soilless Place: a Micro Case in the Long Run (Classical Karst from the Seventeenth to the Twenty-First Century)

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Presentation of the Research Question and Štanjel

In recent environmental history, humans are a necessary and decisive factor, while nature is an active subject in it. This immediately raises the fundamental question of the environmental and social sustainability of the use of natural resources by human communities in the long run. In the social sciences, as well as in historiography, the question of whether collective forms of exploitation can be sustainable has been present at least since the publication of Hardin's article on the 'Tragedy of the Commons' (1968), in which he gave his well-known negative answer. Numerous researches have attempted to confirm or refute this assumption, including the famous study by Elinor Ostrom (1990), which shows that effective and sustainable methods of managing 'common pool resources' are possible, provided that adequate institutional frameworks are enacted among the direct users. Along these lines, Jesper Larsson (2016) has recently emphasized the importance of mutual control and dispute resolution among beneficiaries of the commons as important levers for ensuring the sustainability of its use. Anthropological studies also refute the assertion that peasants would be unable to manage natural resources sustainably. James Scott (1998) argues that 'vernacular knowledge of local ecosystems', based on practice and experience, can ensure even better

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environmental and social sustainability than modern forms of use. Diego Moreno (1990), combining historical, geographical and archaeological research methods, affirms that forests, especially in the Mediterranean, should not be considered simply as natural phenomena subject to human exploitation, but that historically they are 'an artefact and must be studied as such'. This does not mean that trees are just part of the scenario in the theatre of history, but rather, as Oliver Rackham (1996, 298) says, actors, and each of them has their role.

With its long history in the relationship between man and the environment, the Mediterranean region – and the Karst within it – represents an ideal observatory to address these issues, as it is a particularly fragile and sensitive environment, which at the same time represents the archetype of all Karst areas in the world (Grove and Rackham 2001). The concept 'Karst' itself, referring to all karstic phenomena, environments and landscapes in the world, is named after the Classical Karst, where our research is located.

In recent decades, both karst and the Karst have attracted more scientific attention from geographers than from historians. To underline the specificity of the anthropization forms of the karst areas, Jean Nicod (1987) proposed the concept of 'agro-karstic landscapes'. Giorgio Valussi (1965) placed the karst landscapes in the 'landscapes of effort', that is, in the environments that require continuous effort from humans to be inhabited. The landscapes of the Mediterranean and sub-Mediterranean karst areas share a number of characteristics and elements. One of them is the agricultural use of the depressions of the land where the earth accumulates. Another is the existence of particular water collection systems, necessary due to the combined effect of climatic and geomorphological conditions (Nicod 1987, 107).

The same is true for the Classical Karst. In order to be cultivated, *dolines* must be considerably adapted, which is why the dolinas converted into cultivated areas were called 'worked dolines' (Gams, Lovrenčak and Ingolič 2001, 228). There were also artificial ponds, often created within the dolines in the ground made impermeable by the overlay of stone and clay layers, and fed by rainwater (Pagnini 1966, 117, 125, 133; Moritsch 1969, 130–1; Pagnini Alberti 1972; Belingar 2007). Moreover, due to its geomorphological characteristics, the soil is particularly exposed to the erosive action of atmospheric agents (wind, rain, snow, ice), and deforestation accelerates these processes (Gams 1991a, 1–3; Gams 1991b, 9, 15–6).

The Karst represents an exceptional example of the relationship between man and the environment, as it poses particular problems and challenges to humans and their activities. It is a rather inhospitable land for humans, because there is a lack of land suitable for food production, and in addition, the surface is very rocky and surface water is lacking. Nevertheless, it has always been populated, and over the centuries and millennia humans have adapted it to the needs of agriculture, animal husbandry and viticulture. Precisely because of the special challenges it poses to humans, the Karst is an example of a completely transformed living space, where it can be said that every square metre bears the marks of human adaptation. The best known and most expressive elements of the Karst cultural landscape are man-made dry stone walls, cultivated dolines and, last but not least, ponds for collecting and storing rainwater (Panjek 2015).

In this article we deal with the topic of water resources management in the Karst, but in a somewhat unusual way, as we deal with a seemingly strange case. Our work stems from the discovery of an archival document from the seventeenth century, which testifies that a small lake near the village of Štanjel was drained by its inhabitants. Where is the logic in people draining one of the few water sources in the proverbially dry Karst? This is the main question of this paper, and the search for an answer takes us into historical and geographical waters. Our approach to this topic is inspired by Satoshi Murayama's concept of 'Living Spaces', which is in fact much more than a concept, but rather an interdisciplinary approach to taking a long-term, holistic view of human-environment relationships, linking the past to the present and possibly to the future. Based on our findings, in the concluding sections we first address the social and economic factors that influence the environmental adaptation initiative and its livelihood outcome by discussing the initiators of the revealed water management model. Finally, we address what natural and environmental factors influence the outcome in terms of sustainability and change by proposing some hypotheses on the reasons for the area's gradual deterioration.

Historically, Štanjel is a particularly interesting settlement with a strategic location, controlling one of the passages between the hinterland and the Adriatic coast. The hill on which it is located (312 m) was first settled in prehistory and then again in antiquity (a hilltop site, Roman); in the Middle Ages a tower was built on the top of the hill. It is believed that on the slope at the base of the tower a settlement gradually developed on

man-made terraces. It was mentioned for the first time in 1331. The settlement, with its characteristic long rows of houses along streets, was surrounded by walls towards the end of the fifteenth century, at the time of the Turkish invasions. Thus, in addition to its defensive hilltop location, Štanjel was further fortified. After the walls were extended in the last decades of the sixteenth century, Štanjel became 'a small fortified town with a modern Renaissance wall' (Sapač 2011, 246–9, 282; Medvešček 2019, 7–8 and 13).

The Rocks and Surfaces Around Štanjel

The Karst is a low Dinaric plateau composed of limestones and dolomites, most of which date from the Cretaceous; there are also carbonate rocks from the Paleogene. The karstified plateau, which has the characteristics of a plain in the central part, extends in a northwest-southeast Dinaric direction and covers an area of about 440 km² (Kranjc, Bijuklič, and Žalik Huzjan 1997). The Karst is surrounded on all sides by Eocene flysch rocks, except in the west, where it sinks under the Quaternary sediments of the Soča River as part of the Friulian plain.

The rock composition also varies greatly near Štanjel, where mainly limestones of different ages alternate in a small area. On the surface, Eocene transitional beds with limestones, marly limestones and marls appear. In the lower part of the slopes in the direction of the Branica River we also come across some Eocene flysch rocks which otherwise make up most of the hills in the Branica River basin. The area is cut by a very important fault in the Dinaric direction, the Raša Fault, and by the somewhat less important Lukovica Fault in the same direction (Jurkovšek, Tešović, and Kolar Jurkovšek 2013).

The surface around Štanjel does not have the characteristics of a karst plain; its shape is more reminiscent of hills. This is also reflected in the conspicuous absence of dolines, as very few can be seen in the surroundings of Štanjel. Compared to the neighbouring flysch hills of Vipavska brda in the north, the relief of the hills around Štanjel is not as dissected, due to the permeable carbonate rock. Intense fluvial-denudational geomorphological processes take place in the hills of Vipavska brda, dissecting the surface into a network of valleys and intermediate ridges. In the limestones in the Štanjel area, on the other hand, the predominant process of surface formation is corrosion, which changes the surface by dissolving the rock, forming depressions of different shapes and sizes.

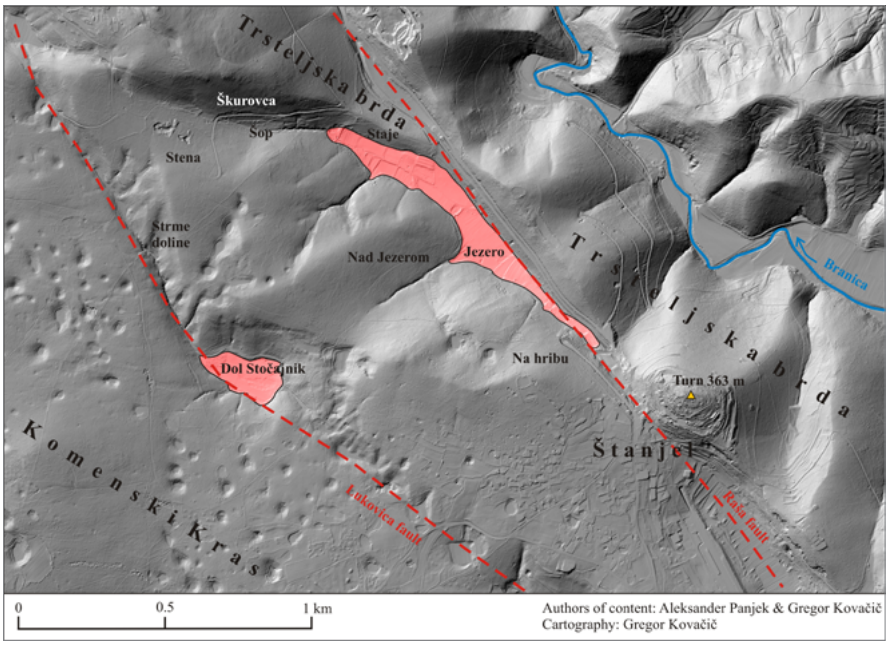

Figure 1 View of the Surface Around Štanjel Indicating the Two Dolines Jezero (Lake) and Stočajnik, and the Raša and Lukovica Faults

Author Gregor Kovačič (map and content) and Aleksander Panjek (content).

Also characteristic of the Štanjel area is the presence of smaller and somewhat larger, more rectilinear erosion gullies (ravines) on the slopes, characteristic of the entire northern edge of the Karst, which descends relatively steeply into the Branica valley and further west from Trstelj Hill (643 m) and the surrounding hills into the Vipava valley, as well as the northeastern edge of the Karst, which descends steeply into the Raša valley. A special relief feature of the Štanjel area are two somewhat longer systems of erosion gullies ending in dolines. Their bottoms are about 100 m higher than the bottom of the Branica valley in the case of the 'Neverlake' area, and 150 m higher in the case of the Dol Stočajnik area. Both systems are clearly visible in the digital elevation model (figure 1). In the present article, the discussion focuses on the 'Jezero/Neverlake' area.

This raises the question of when and how these landforms were formed and whether they are still being formed today by erosional-denudational processes, since corrosion is undoubtedly the predominant process of surface transformation.

The erosional relief forms on the slopes of the northern edge of the Karst, i.e. also in the vicinity of Štanjel, were formed in a younger geological period, probably in the last 2 million years, when the surface of the neighbouring flysch area north of the Karst lowered significantly (Radinja 1974, 21–33). This lowering is the result of the lower resistance of flysch rocks to denudation processes, which means that the surface on flysch rocks lowers much faster than the surface on carbonate rocks (limestones and dolomites). Various measurements have shown that under current climatic conditions, the surface on the Karst plateau lowers at a rate of 20-100 mm per 1000 years (Cucchi, Forti and Ulcigrai 1994, 55–62; Gams 2003), while the denudation rate on flysch rock is 400-5000 mm per 1000 years (Zorn 2008).

The above-mentioned difference in the resistance of the rocks to factors related to surface lowering has caused the valleys in the northern flysch area of the Karst to deepen and move to a lower position compared to the plateau. This caused the surface waters of the northern part of the Karst to change their course toward the lower flysch area; the fluvial erosion caused by the streams began to form erosion gullies on the northern slope of the Karst plateau. As long as the area was covered with flysch, smaller intermittent surface waters flowed from this edge towards the Branica, Raša and Vipava valleys. After the flysch was eroded in the upper part of the Trsteljska brda hills and on the northern slopes below, a series of erosional gullies emerged as inherited fluvial-denudational landforms on carbonate bedrock; in the case of the Vrpoljska brda hills in the south of the Karst, Uroš Stepišnik (2011) came to the same conclusion. The inherited landforms on the northern marginal slope of the Karst prove that there was a major flysch thrust sheet in this area, which was eroded (denudated) in the course of geological history.

'Neverlake' Near Štanjel: Physical-Geographical Aspects

The main subject of interest is the area in the immediate vicinity of Štanjel called 'Jezero' ('Lake'). It is a doline of a distinctly elongated shape, running in a northwest-southeast direction, located about 1 km northwest of Štanjel. The longer axis of the doline measures 1,160 m, while the shorter axis of the widest part of the doline measures only 161 m. Thus, the doline's shape resembles a valley, but it does not meet the geographical criteria for this relief shape, since it is a depression closed on all sides. The circumference of the doline at the edge of the relatively flat bottom with the surrounding hillslopes is about 2,600 m; its area is just under

0.1 km² (10 ha). The northwestern edge of the doline is at an elevation of about 250 m, while the southeastern edge is about 10 m higher. The deepest point of the Jezero doline is at an elevation of 219.8 m on the ponor, while the 'Neverlake' itself is about 2 m higher.

Six erosional gullies extend into the doline. The longest gully descends from an elevation of 393 m, is about 800 m long, and has a stream gradient of 17.9 percent. Where it exits the doline, it has formed an alluvial fan, i.e. a fan-shaped rubble-gravel-sand fill, on which people have created cultivable land. The erosion gully extends noticeably deeper into the slopes of Stena in the south and Škurovca in the north. The deepest part of the erosion gully is about 500 m long. As can be seen from the geological map, a minor fault (Jurkovšek, Tešović, and Kolar Jurkovšek 2013) runs along the axis of the above-mentioned gully, which certainly influenced its formation and depth. The blocks that shift along the fault planes fracture the rocks. These fractured rocks are more susceptible to erosional-denudational processes than solid rocks, which means that vertical erosion can deepen the gullies or valleys faster and that the corrosion process is stronger in the fractured carbonate rocks. The stream-gradient of the erosional gully becomes much lower as it enters the doline; at a distance of just over 500 m from the 'Neverlake' it is only 5.7 percent and toward the ponor it is even less (4.4 percent). A little further south, an erosion gully about 400 m long with a 21.2 percent slope enters the upper part of the doline; still further south is a 350 m long erosion gully with a 20 percent slope (called the 'Nad Jezerom' ('Above the Lake') area). On the basic topographic map of this area at the scale of 1 : 5,000, an intermittent watercourse is marked. Three smaller erosion gullies extend into the doline from the south.

The formation of the Jezero doline with its associated erosional gullies can be explained as the inherited remnant of a system of a larger valley and lateral erosional gullies from the pre-karst phase of the area, before the flysch thrust sheet was removed by erosion and corrosion. At that time, surface waters were still flowing from the edge of the Karst near Štanjel towards the river basin of the predecessor of today's Branica, or perhaps Raša, river. After the flysch thrust sheet was eroded, the depression of the valley in the area of today's 'Neverlake' and the associated erosion gullies lagged behind the lowering of the Branica valley, so that the valley was cut off and hung over the bottom of the Branica valley. It is likely that, at least in the early stages, a larger amount of gravel composed of carbonate and flysch remained in the depression. This gravel ac-

Figure 2 Gregor Kovačič Next to the Ponor in the Lowest Part of the Jezero doline
Author Aleksander Panjek

celerated the corrosion of the carbonate bedrock and thus influenced the deepening and widening (flattening of the bottom) of the doline. The efficient deepening of the doline was undoubtedly favoured by its location on the axis of the Raša Fault, where the carbonate rock in the bedrock is more fractured compared to the surrounding rock. Material transport in the northwestern part of the doline must have been considerable, at least in the initial phase of formation, as surface water created a well-shaped

Figure 3 View of 'Neverlake'
Author Aleksander Panjek

alluvial fan of boulders and gravel. The erosional gullies are therefore inherited forms of fluvial denudation, completely cut into the carbonate bedrock. The main ponor at the bottom of the doline is a small depression with a diameter of 4 m and a depth of 1 m (figure 2). We can only guess at the direction of subsurface drainage from the ponor, but it is likely that it flows underground to the northwest, to the Timavo River karst springs on the western edge of the Karst, just as most of the infiltrated rainwater in the Karst does.

Although today the predominant process of surface transformation in this area is corrosion, man-made structures from the past indicate periodic torrential activity. Torrents sink into sediment-covered ponors at the bottom of the doline. The water retained in the lowest part of the doline on such occasions and the resulting swampiness undoubtedly gave the doline its name – 'Jezero' ('Lake') (figure 2 and 3).

'Neverlake' Near Štanjel: Historical Accounts

The landlord of Štanjel, Johann Philipp von Cobenzl, who was also *vizedom* (representative of the Archduke) in Carniola, addressed a petition

to Archduke Ferdinand II of Habsburg in December 1606, asking that Štanjel be taken out of the dominion of Rihemberk manor, transformed into an independent manor, and granted to him. Although his petition was granted, there were complications that finally led us to the subject of this research.

When a new land register was created a few decades later, when the Rihemberk manor was sold to the noble house of Lanthieri, the Štanjel area was accidentally listed in it. The commissioners appointed by the Inner Austrian Court Chamber to estimate the revenues of the manor, who also paid attention to the increased levies compared to the past, recorded 55 gardens in Štanjel. Since this was a new development, the commissioners added a note in their appraisal stating that these 55 small gardens in the community of Štanjel had been acquired through the draining of a small lake 16 years earlier and the land had been divided among the subjects (StLA, IÖHKS, K. 90, H. 11, f. 29–33). This appraisal is dated 1624; the information it contains allows us to date the draining of the 'small lake' at Štanjel precisely to 1608. How does the draining of the lake logically fit into the description of the local agricultural and climatic conditions that Philip of Cobenzl himself had outlined two years earlier (1606) in his petition to the Archduke to acquire the dominion? Very little soil and a great deal of rocks, too much bora wind and not enough water – this image of the Karst corresponds to the widespread conception today:

A barren, wild and stony world, without any natural element apart from the gusty bora wind; where there is not an inch of land lengthwise or breadthwise on which a plough could be placed to sow a handful of grain. There are no more than two inhabitants who are able to survive on their crops for four or five months; all others, like the poor cottagers and day labourers, and very few of them I might add, are able to survive on their grain for 14 days, having to acquire the rest elsewhere. There is only one whole farm among all the people. The gardens from which the community or manor of Rihemberk receive levies are nothing but bare rock and the soil has to be brought there with great effort; the poor people grow vegetables there but rarely cultivate anything useful on account of the arid climate and strong winds. (Panjek 2015, 21)

We already published this two decades ago (Panjek 2002), but the question of how sensible it was to drain a lake in an environment where there is a proverbial lack of water sources remained unanswered until we met a resident of Štanjel, Mr Jožef Švagelj. He pointed out to us an error he had noticed in the way the functions of dry stone walls and forms of wa-

ter management in the Karst were treated in our recently published book on the history of the Karst cultural landscape (Panjek 2015). In 2016, we arranged an excursion to Štanjel; he accompanied us there and showed us the area that the locals call 'Jezero' ('Lake'), especially the remains of walls in two adjacent ravines and the traces of a stone canal and a well in the area of the valley. At that moment it became clear, or rather it was only logical, that the 'Lake' of Štanjel that Mr. Švagelj showed us was the same 'small lake' that had been drained in 1608 and converted into 55 gardens.

On this basis, we have also examined other historical and cartographic sources. First, we will present the main findings in chronological order, which we arrived at by using different types of sources. Then, in the concluding section, we will give a general explanation in which geographical methods will also be used.

The original land register of the 'community and *tabor* of Štanjel in the Karst' (*Sup und Tabor Sanct Daniel, am Carst gelegen*, acquired by Johann Kaspar von Cobenzl) from 1631 contains two separate lists of those who owned some land and those who only paid dues on hearths (houses; ASGO, AC, AD, b. 199, fasc. 511). Since the community of Štanjel also included some of the neighbouring villages, it is not possible to determine with certainty which and how many of the named householders were the heads of households in the settlement (*tabor*) of Štanjel. Considering the fact that the land register mentions a total of 154 people who were obliged to pay land and/or house dues, it is very likely that the draining and division into 55 gardens affected only members of the Štanjel settlement and not of all villages.

The next step in time takes us two centuries into the future, to the Franciscean cadastre. The maps of the cadastral community of Štanjel, made in the 1820s, show a watercourse at the exit of the ravine at the northwestern end of the 'Neverlake' *doline*, marked in blue. This is followed by a reservoir and canal that runs down the centre of the doline and ends before reaching the lower section. The only marked body of water in the lower part of the valley is a karst pond. The remaining land is farmland. These maps from the Franciscean cadastre show that at that time (1820-30), the upper part of the system (canal-reservoir-canal) was still in operation, while the canal in the lower part of the doline had already been levelled and converted into fields, leaving the reservoir in the form of a karst pond (ASTs, CF, *Mappe*, S. Daniele (Štanjel), 427b).

LiDAR images of the slope on the northwestern edge of the valley clearly show a fairly extensive system of cultural terraces (figure 7). Since they are not recorded in the Franciscean Cadastre, they must have been built and arranged at a later date, certainly after 1825.

Jožef Švagelj will take us through the changes that have taken place in the area of 'Neverlake' from the twentieth century to the present day in his own words, which vividly describe the area and its use.

> This cultural landscape, the 'Lake', has changed its appearance three times in my lifetime. Before 1960, it was about self-sufficiency. The bottom was covered by fields of corn, with beans in between; *cuke* (zucchini) were spreading onto the mowed meadow; cabbage plots were located by the karst pond. Potatoes were grown on the higher built terraces in Klanec and Staje; after they were dug up, beetroot and kale were grown there. We also had four rows of the Isabella grapevine (*smrdljivka*). We took our cows to graze on the Strma dolina commons above the 'Lake'. We watered the livestock at one of the many karst ponds. The livestock couldn't get to the cultivated land because it was enclosed by dry walls, with thorns on top. An old pine forest grew around the 'Lake' in the area called 'On the Hill'; the hill Vrhec was just forested with pines, while the slope 'Silent Side' still has the same oak forest on the sunny side.
>
> The place changed its appearance after 1960 when the young people found jobs and the old people were retiring. A new pine forest grew on Vrhec and the commons where we used to graze was occupied by self-sown pines. The fields were gone; only a patch was left here and there. The bottom of the valley changed from corn fields into a meadow that provided hay and second-cutting hay. The fodder was fed to cattle in the barns for a year; a man called Fonze continued breeding bulls the longest. The fields on the higher terraces were planted with grapevines. They were mostly cultivated by pensioners who also liked to socialize there. They were guaranteed to find company there in nice weather. At first, the vines were treated with blue vitriol using water from the newly made concrete troughs, and later on with machinery purchased with non-farming income. A man named Beber planted basket willows at the karst pond so you could see the sign 'NAŠ TITO' (OUR TITO) from the road. This new cultural landscape with vineyards was used for entertainment or socializing.

> Today, or let's say for the past twenty years, the 'Lake' is becoming an increasingly overgrown 'cultural' landscape. It's surrounded by a forest; shrubbery is penetrating the built terraces; meadows can still be seen at the bottom. Once or twice a year, larger machinery is used to mow and transport the grass to an unknown farm – all in a single day.
>
> There are no more cattle in Štanjel. There are no people in the 'Lake' during the day; perhaps at night, a hunter or two is on the lookout for game. The deer, roe deer or wild boars are its new masters. People treat nature like plunderers. The first pines were felled on Vrhec. It's only a matter of time before the forest overgrows the 'Lake'.
>
> One more thing! The dolines Jezero (Lake) and Stočajnik contain something I've never come across before in any description of the Karst. According to the stories of ancestors, the dry stone walls were there to reduce the force of torrents and prevent rocks from being deposited on fields. However, they did allow soil to be deposited on the flooded bottom of the valley. Water-induced soil erosion on the barren Karst was a major problem once. I want to show these systems for defence against water damage before I forget them, but there's no one to show them to. (Jožef Švagelj, email message to author, 1 Februar 2016)

As mentioned above, this appeal aroused our interest in the drained 'small lake' of Štanjel, which led to student research and finally to the present scientific article, in which we try to sketch in an interdisciplinary way the four-hundred-year-old relationship between humans and environment in this incredibly interesting patch of the Classical Karst.

Water Regulation System and its Results: Water and Soil

This interpretive section of this chapter draws on geographic knowledge, historical and oral sources, and the results of a detailed analysis of the LiDAR image of the 'Neverlake' area. The information obtained is synthesized into a coherent reconstruction of the construction activities associated with draining the lake, the initial reasons and results, and the subsequent changes over time. The northwestern, i.e. largest, erosion gully that opened into the Jezero doline was regulated in the lower part by enclosing its left side with an embankment made of gravel; on its right side, a dry stone wall was built, creating a canal for the running water (fig-

Figure 4 Regulation of the Erosion Gully, Northwest of the Jezero doline
Author Gregor Kovačič.

Figure 5 The Canal of the Intermittent Torrent Runs Along the Middle of the Rubbly-Gravelly Alluvial Fan
Author Gregor Kovačič.

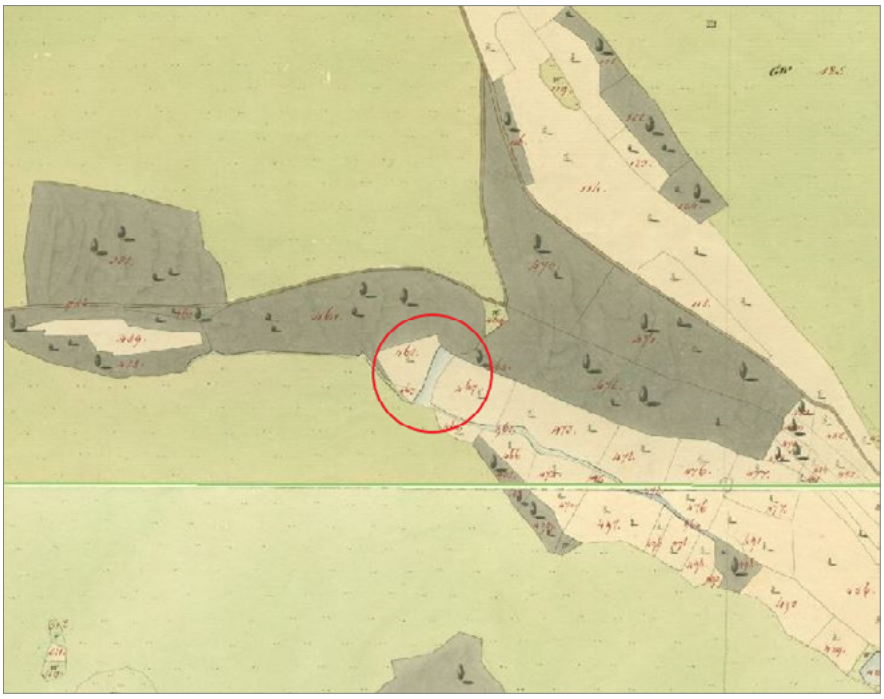

Figure 6 Anti-Erosion Barrier in the Northwest Part of the Jezero doline

Source Processed details by Gregor Kovačič of the map in the Franciscean Cadastre; ASTs, CF, *Mappe*, S. Daniele (Štanjel), 427b.

ure 4), which flowed in a controlled manner into the northwestern part of the doline bottom. At the very northwestern edge of the doline, they constructed a transverse erosion barrier to retain larger sediments that would otherwise deposit uncontrollably on the cultivable lands and reduce its fertility. The barrier is clearly visible in the shaded LiDAR relief and is also shown on the main topographic map at a scale of 1 : 5,000 (figure 8). The barrier reduced the erosive force of surface water, thereby reducing the effects of water-induced erosion of the soil that property owners occasionally faced. This barrier also acted as a more permanent reservoir, as it is clearly coloured blue in the Franciscean Cadastre (figure 6). An artificially constructed channel led off from the transverse barrier through which water drained toward the centre of the doline. The barrier did not impede the transport of fine-grained sediments, which the water washed along the canal into the lower part of the doline, increasing the fertility of the soil; the canal also served to supply water for irrigation

purposes. The canal runs through the middle of the alluvial fan (figure 5). Geomorphologically, by constructing the barrier, people have to some extent fossilized the existing alluvial fan that extends from the northwestern part of the doline towards its bottom and that was still active in earlier centuries. On the map in the Franciscean Cadastre the transverse barrier is shown as a body of water because the water was retained behind the embankment; when there was no water, the land was soggy (figure 6).

Also interesting is the regulation of the torrent that flows from the area 'Nad Jezerom' ('Above the Lake') into the doline. Here, too, the lower part of the erosion gully from the lower, downstream side was enclosed with a dry stone wall to a distance of about 160 m to prevent the water from overflowing and depositing sediments on the bottom of the doline. With the help of the dry stone wall along the riverbed, a kind of artificial levee was created, which diverted the water from the erosion gully to another reservoir, probably created in the smaller area still called 'Jezero' ('Lake'); the Franciscean Cadastre shows only one body of water in this area, namely a karstic pond without an inlet (unlike the northwestern part of the valley). The downstream bank of the lake was also artificially raised to prevent the water from overflowing into the lowest part of the doline where a ponor is still located today. The reconstruction of all the above-mentioned works is shown in figure 8 as a comprehensive regulatory system.

In this way, instead of flooding a larger area, the water was directed and dammed in a much smaller area. The area has kept the name 'Lake' until today, in memory of its predecessor. The older lake was probably much larger and occasionally flooded a larger section of the doline because it was fed by two torrents at two different ends of the doline. If this had not been the case, the use of the term 'drainage' in the seventeenth-century document would have made no sense; even less sense would have been the construction work, the remains of which can still be seen in the field four centuries later.

These construction works can be interpreted as the works to drain the lake in 1608. Their purpose and results, based on the reconstruction mentioned above, have proven to be much more complex than simply draining the lake; due to its connection with torrential tributaries and the existence of a ponor at the bottom, the lake can reasonably be classified as a seasonal flood lake. The issue was not just drainage, but regulation and management of the water and land use. Considering that the original land was occasionally flooded to varying degrees and for varying lengths of time, was more or less marshy, and that the torrents deposited larg-

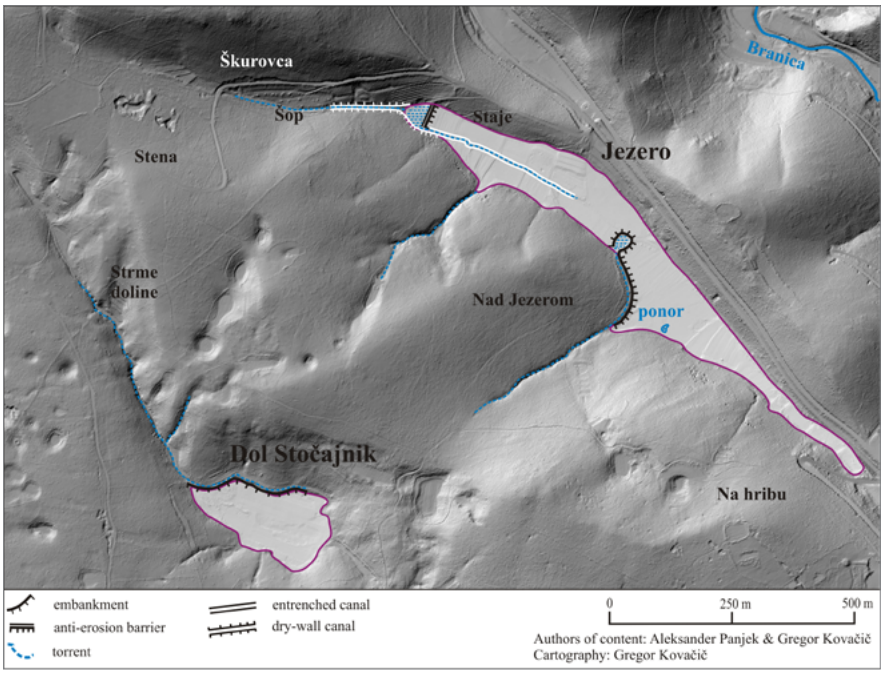

Figure 7 Reconstruction of the Water Regulation System in the Neverlake' Area of Štanjel

Source Processed LiDAR detail by Gregor Kovačič.

er gravel on it in addition to useful sediments, the use prior to regulation could only have been marginally agricultural. It is much easier to imagine the area of the 'old lake' as a place intended for grazing, mowing and watering livestock.

With the construction works, which logically combined the existing local knowledge and techniques for the construction of dry stone walls and artificial reservoirs (karst ponds), they achieved two important results at the same time. In the Karst in general, and in Štanjel in particular, there was a shortage of cultivated land and water, especially during periods of drought, which is also evident from Lord Cobenzl's vivid description. By regulating the area of the old lake and draining it, Štanjel gained new high-quality cultivable land on unusually fertile land destined for gardens, with each household in Štanjel getting its own – so it was a form of hydromelioration. On the other hand, they enriched the quantity of this resource by providing a permanent and abundant supply of higher quality water. The water was no longer swampy, muddy and seasonal,

but was stored in reservoirs throughout the year and was therefore cleaner. It was available for irrigation or watering the gardens (e.g. the canal), for watering the livestock and probably also for human consumption. So we are witnessing a very interesting case of adaptation of the karst environment through water regulation and the acquisition of new cultivated land, maintaining and improving the availability and quality of water.

As the maps of the Franciscean Cadastre show, the seventeenth-century built elements just described were only partially in use in the first decades of the nineteenth century, especially at the higher northwestern end of the doline; the canal that conducted water into the new, smaller artificial lake had apparently dried up, and the lake itself had shrunk to the size of an ordinary karstic pond. The cadastre provides us with a few other insights and conclusions. By 1820, the dried-up bottom canal had lost its function to the extent that the last section of its bed, which no longer steered the water into the small artificial lake, was converted into farmland. Three parcels of land can be seen there – one with a field, one with a meadow and one covered with a coppice of deciduous trees. The lands at the mouth of the (now former) canal were mostly meadows; fields can be seen only at the edge of this lowest part of the doline. It can be assumed that the water infrastructure at this end had decayed, the walls were breached, and the torrent began to flow out of the gully onto the land again, making cultivation impossible.

By combining the cartographic and written parts of the cadastre, we have tried to determine as accurately as possible the extent and actual location of the area we are talking about. For this purpose, based on the maps, we made a list of the plots located at the bottom of the doline. After comparing LiDAR surface images and photographs with field observations, we removed from the list any plots that were on the slope surrounding the doline, which were often crop terraces or woodlots. We did this because we felt that these plots were not part of the area of the old 1608 flood lake and drainage. In this way, we arrived at a total area of 8.1 ha, which should correspond to the largest former floodplain in the doline. The draining of the lake resulted in a somewhat smaller area, since part of the area was occupied by water infrastructure: the upper canal with a reservoir that continues into a smaller canal towards the centre of the doline; a new small artificial lake – later a karstic pond with a meadow around it, which was probably part of the lake in the past; and the area of the lower canal that roughly overlaps with three plots of land that were on the same line at the time of the Franciscean Cadastre. This water regulation infra-

Table 1 Largest Owners of Arable Land in the Area of the Drained Lake (1822)

Landowner	Number of plots	Surface area (ha)
Coronini Michele (Dominion of Štanjel)	5	1.1
Beneul Jožef	1	0.9
Brusatti Gio. Battista	4	0.8
Švagelj Ivan	3	0.5
Švagelj Jožef	2	0.4
Jerič Anton	1	0.3
Beber Marjeta	2	0.3
Jakomin Frančišek	1	0.3

Source ASTs, CF, *Elaborati*, S. Daniele (Štanjel), 659/2, Protocollo proprietary.

Table 2 Intended Purpose of Lands in the Area of the Drained Lake (1822)

Intended purpose of land	Number of plots	Surface area (ha)	Surface area %
Field with grapevines	18	4.6	60.5
Field	15	1.9	25.0
Meadow	8	0.9	11.9
Pasture	1	0.1	1.3
Coppice	1	0.1	1.3
Total	43	7.6	100.0

Source ASTs, CF, *Elaborati*, S. Daniele (Štanjel), 659/2, Protocollo particelle fondi.

structure, which served drainage purposes (minus the area of the two canals where they incised higher into the two gullies), covered just under 0.5 ha of land. Based on this calculation, the newly acquired agricultural lands covered a size of 7.6 ha (a rough estimate based on the situation at the beginning of the nineteenth century). The above values show that – given the karst conditions – it was a large floodplain (the old lake), that the infrastructure they built, including water areas, was quite extensive, and that the newly acquired area of cultivable land was quite large. This explains why, at the time of the Franciscean Cadastre, the locals called this area 'Polje' ('Field'), as shown by the place names 'Nad poljem' ('Above the Field') and 'Potok na polju' ('Stream in the Field') for the upper canal.

The list of plot owners provides us with information that complements our understanding of the drainage process. Namely, the then owner of the manor of Štanjel is mentioned as the owner of six plots of land. It is not very likely that the lord of the manor bought or sold parcels of his own manor;[1] therefore, we can assume that the situation from the early

1 Except, e.g., if a peasant repaid tax debts, in which case they would prefer to find another buyer and receive money instead.

nineteenth century reflects the drainage agreement concluded between Cobenzl, the lord of the manor, and the people of Štanjel. There were 1.2 ha of 'lordly' plots, and a total of 6.4 ha of 'peasant' plots. If we divide the area into 55 shares, as evidenced by the seventeenth century source, we find that each householder in Štanjel received 1,163.6 m² of arable land after the drainage and regulation of 1608. We also note that the share of the landlord – if our assumptions are correct – was almost exactly as large as the 10 shares of the peasants. This would mean that the drained area was actually divided into 65 shares, 10 of which belonged to the landlord and 55 to the families of the Štanjel inhabitants. Even if this were the case, the size of the individual shares is surprisingly large, especially considering that our seventeenth century source defines them as 'small gardens'. In the Karst, about a thousand square metres of arable land is quite a lot – especially if it is a garden, because that would be enough to cover the needs of an average family for garden crops.

Given the fragmentation of agricultural land, it is another small surprise that the total number of agricultural plots at the time of the Franciscean Cadastre was less than when they were first divided (43 in 1830 compared to 55 in 1608).[2] Over the course of two centuries, the number of landowners also decreased, from 56 (55 plus landlord) to only 22 (20 plus landlord, plus community). In 1822 the then Lord of Štanjel, Michele Coronini, owned the largest share of farmland; however, one of the largest owners of farmland in the area of the Lake (Jezero/Polje) was also the then Mayor of Štanjel, Jožef Švagelj (table 1).

At the time of the Franciscean Cadastre, 85.5 percent of the total area of the doline consisted of fields with or without grapevines (table 2). One wooded plot was located at the mouth of the upper canal ('Potok na polju'). All grassy plots were located in the lowest part of the doline, opposite the mouth of the lower stream, where the water regulation system deteriorated. This cannot be a coincidence and indicates that the abandoned protective walls had a negative influence on the intended use of the plots.

This state of affairs corresponds to that of the late nineteenth and early twentieth centuries, to which we can date the reports of Jožef Švagelj's 'ancestors'; according to him, in the meantime, the water infrastructure had collapsed in the western part of the valley as well. The only role that the walls seemed to play at that time was to mitigate 'the force of tor-

2 ASTs, CF, *Elaborati*, S. Daniele (Štanjel), 659/2, Protocollo particelle fondi.

rents' and to prevent 'rocks from being deposited on fields', while allowing 'soil to be deposited on the flooded bottom of the valley'. The bottom of the doline was thus flooded again and the water was merely contained, no longer directed and stored. On the other hand, quite extensive cultivated terraces had been created on one slope, testifying to another great and final effort to increase the arable land, which can be dated to the second half of the nineteenth century. Half a century later, after the Second World War, the water infrastructure was no longer operational or serving its purpose; now it is only a memory. Part of the area was used as grassland, the rest of the karst pond was planted with willows, which gradually dried it up completely. Agricultural activities were becoming less a secondary activity and more a marginal, almost leisure activity. Today, hardly any traces of cultivation can be seen; most of the area is devoted to mowing or hunting game. It could be said that this marks the end of a four-hundred-year cycle, with land use returning to its original form before the waters were regulated. The only difference is that the lake has disappeared – both the big lake and the small lake. In short, over the centuries (mostly during the last century and a half, and especially the last five decades) we have witnessed a gradual and then accelerated deterioration of the water regulation infrastructure, its purpose, and its efficiency. This has led to a parallel process of decay of a highly interesting and, according to what is known so far in the literature, original and rare cultural landscape in the Karst, which is (unfortunately) almost extinct in the present.

Although the above reconstruction is partly based on assumptions, it is nevertheless also based on quite solid documentary evidence that allows us to defend this description of human adaptation and use of the environment in the last four centuries. There are, however, some unanswered questions that we can only partially answer at the moment and that can be summarised in two groups of problems. The first group concerns the possible impact of climate change and undisputed environmental changes on the historically documented curve of the Štanjel 'Neverlake'. The second group relates to the identification of the initiator or initiators of the ingenious and efficient water regulation system in the area of the lake.

Question About the Initiators of the Regulation of 'Neverlake': The People of Štanjel or the Landlord?

In this section we will look at the social and economic factors that influenced the environmental adaptation initiative and its outcome in terms

of sustenance. All the above-mentioned regulatory works in the Jezero doline indicate that the inhabitants of Štanjel had to deal with torrential floods, the deposition of gravel and water-induced soil erosion before. These natural processes must have occurred often enough that at some point people decided to regulate the waters in order not only to reduce the negative effects of flash floods, but also to improve the quality of the soil and turn it into gardens. We assume that a lake existed in this place at least around 1600, which probably flooded the area occasionally, was fed by torrents and covered a larger or smaller part of the doline.

The question arises who took the initiative in 1608 to regulate and drain an intermittent flood lake in Štanjel. Was it the people of Štanjel or Count Johann Philipp von Cobenzl? We have proved and established that it was not a small intervention, but an extensive constructional and technical achievement, in which they protected about 8 ha of land from flooding by building about 5,000 m2 of water infrastructure with excavations, embankments and dry stone walls, which continue into the two gullies and are not included in the above figure. Since the written sources do not directly answer our question, we have to collect the scattered evidence and reconstruct the circumstances to reach some conclusions.

In whose interest was it to regulate the Štanjel lake and why? As we have learned from Cobenzl's letter to the Archduke, the inhabitants of Štanjel lacked cultivable land to such an extent that the vast majority of households in the settlement were unable to feed themselves from their own produce. This statement is confirmed by the perusal of the Štanjel land register from 1634, which does not mention the size of the lands of the individual subjects, but from which it is clear that there were only a handful of farms worthy of the name. Moreover, the regulation works were carried out towards the end of a long period of rapid demographic growth, both in the wider area and in Štanjel in particular (figure 8). Thus, the inhabitants of Štanjel would have enjoyed additional, high-quality arable land. High-quality surface water was certainly not abundant, although there was more of it than might appear at first glance. They could use the floodwater in the 'Neverlake', but its quantity fluctuated, and since it was flood-related, it could not be suitable for human consumption, although it could be suitable for livestock. In view of the above, it can be undoubtedly stated that the regulation of the floodwater, which provided up to 8 ha of additional high-quality cultivable land and a better quality and more permanent water supply, was undoubtedly in the interest of the Štanjel population. From Cobenzl's point of view, the regulation

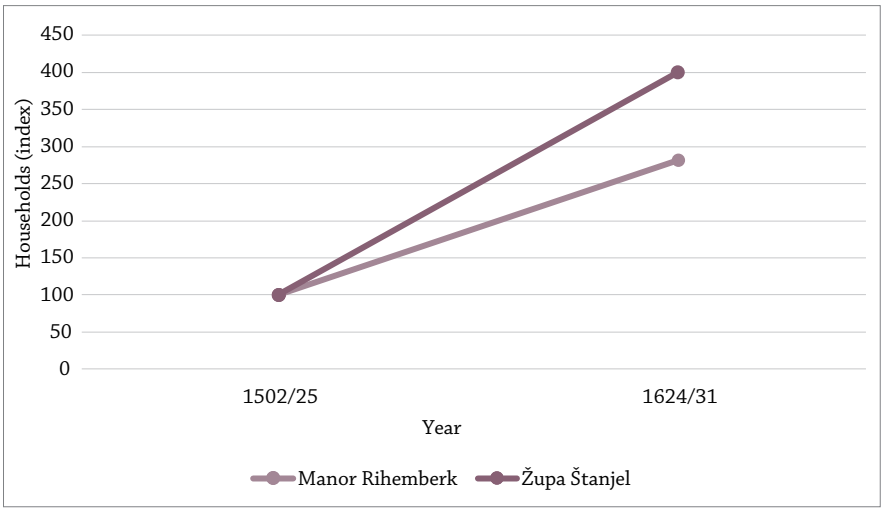

Figure 8 Demographic Growth in the Rihemberk Manor and in the Štanjel župa (index 1502 = 100)[a]

Note a) Estimates based on the number of households (hearths) and holdings in land registers. The 'župa' is a larger unit of rural self-government, which in this case includes Štanjel itself and some surrounding hamlets

Source Elaboration of data from ASGO, AC-AD, b. 199, fasc. 511; AS 1, VUK, š. 105, fasc. Lit. R XI-1; StLA, IÖHKS, K. 90, H. 11, f. 29–33

of the lake had only positive effects, as it improved the living conditions of his subjects and, at the same time, increased their taxes, as they also had to pay dues for the new gardens.

What was Johann Philipp von Cobenzl like in those days and did anything special happen in Štanjel? In the years before and after he asked Archduke Ferdinand for the lordship over the community and *tabor* of Štanjel and received the assurance that it would indeed be granted to him (1606-1607), Cobenzl showed great zeal in improving the appearance of the town, especially its most important buildings, i.e. his castle and the church. He had the family tomb in the town church renovated in 1603. At the beginning of the seventeenth century, Philipp von Cobenzl also finished the already started project of reconstruction of older buildings into a Renaissance mansion. The works were probably started in 1607. At that time, on his initiative, the Štanjel bell tower was also built; the construction works were finished in 1609. The construction of the new bell tower was led by Master Melichar Fabian, who perhaps also led the construction of the new wing of Štanjel (Premrl 2007, 13, 52–3; Sapač 2011, 255, 285–8).

All the zealous construction works that took place in Štanjel on the initiative of Philipp von Cobenzl, i.e. the family tomb (1603) and especially the renovation of the mansion (1607) and the finished construction of the bell tower (1609), thus took place around the same time and partly at the same time as the draining of the 'Lake' in Štanjel (1608).

In addition to the positive results of the works, several other circumstances support the possibility that the initiative originated within the local community. Before draining and parcelling into individual shares, the floodplain most likely had the status of collectively owned communal land, the use of which was regulated by the community of the *tabor* of Štanjel. Therefore, it can be assumed that the local community had to at least agree with the change of use, and the landlord (Cobenzl) also had to agree with this change. The construction technique of the works carried out indicates the use of the traditional Karst dry stone wall construction method, which speaks for the involvement of local knowledge and labour. However, it cannot be ruled out that more complex construction skills were used, possibly by Master Fabian, who was simultaneously building the new Štanjel bell tower.

To sum up, the draining of the intermittent flood lake benefited the landlord and the community of Štanjel; the timing of the project coincided with the demonstrated initiative and zeal of Philipp von Cobenzl in Štanjel; and the works must have been carried out in agreement and cooperation between the two sides. Whose idea it was originally, who designed the regulatory system and technically managed the project are questions that have remained unanswered so far.

Question About the Reasons for the Disintegration of the System: Climate or Anthropogenic Environmental Changes?

Last but not least, we will address the question of what natural and environmental factors influenced the outcome in terms of sustainability and change. In order to form hypotheses about the decay of the system and to assess their credibility, it would be useful to mention some other cases and the wider circumstances. The 'lake' discussed so far was not the only one of its kind in the Karst.

Near Štanjel there was another area where the water flooded the land. The area is called 'Dol Stočajnik', which can be seen in figure 7 southwest of 'Jezero' ('Lake'). The larger Štanjel farms had cultivable land there; as a document from 1606 or 1607 testifies, they were 'now being created on the communal land called Stočajnik' ('*auf der gemain von neuen gemacht*

Stattschounikh genannt'; StLA, IÖHKS, K. 90, H. 14, ff. 41–73). These farms were owned by the Špiček brothers at that time. Chronologically, this adjustment was carried out only a few years before the draining of the 'Lake'. There, too, the regulation works were carried out in the form of dry stone wall construction (figure 7). The fact that the area of Stočajnik was previously communal land is consistent with and supports the above interpretation that the area of the 'Lake' was collectively used before its draining. However, there are two notable differences. First, the goal of water regulation in Stočajnik was to create arable land for a single family, while the 'Lake' was collective property that benefited the entire community. It is difficult to say how this affected the forms of labour; however, it can be deduced that the community must have had a say in Stočajnik as well, since they had given up collective use of the area. Moreover, the successful regulation of Dol Stočajnik may have inspired a similar initiative at the 'Lake'. Second, as evidenced by the Franciscean Cadastre, there was still cultivable land in the entire regulated area in Stočajnik in the early nineteenth century.

Another similar example is the mill in the village of Rodik. The map in the Franciscean Cadastre shows a larger channel there, accompanied by the place names 'Pod Jeserom' ('Below the Lake') and 'Jeseron' ('Lake'). There is no lake visible, but the land is parcelled out in the shape of a lake, which apparently disappeared in the early nineteenth century. On the cadastral map, a reservoir is marked by the above-mentioned channel, next to which there are two building plots. One of them bears the name 'Stari mlin' (Old Mill), which means that a mill once operated there. From this we can conclude that at the time of the creation of the Franciscean Cadastre there was less water in this area than in the more remote past. We can find out what kind of watercourse it was from the list of plots, because the above-mentioned channel has its own cadastral number and belongs to the group of 'ponds and drainage channels' (*Lach und Ableitungs Gruben*). So, the channel that starts at the reservoir next to the 'old mill' is a drainage or water channel, which is definitely the result of artificial water regulation in the area once occupied by a 'lake' (figure 9). This old mill is also mentioned in the folk tradition:

The Sirk House was once called Pri Malnih [At the Mills] as the Sirk family was a family of millers. […] The Sirk family built the dam and operated the mill during heavier rainfall, when the stream Pod koriti had a stronger flow. There was no water in the summer during drought, and the mill did not operate then. That is why the people of Rodik came up with a

Figure 9 Area of the Old Mill with an Artificial Reservoir, Canal and Former Lake

Source map by Nataša Kolega – Rubin d.o.o, processed details from the Franciscean Cadastre; content by Aleksander Panjek.

teasing ditty: The Sirk mill mills little by little; when there's a drought it listens, when there's rain, it pounds. Today, all that is left of the Sirk mill is the place name Pri malnu [At the Mill]. (Peršolja 2009, 39–40)

Thus, the folk tradition confirms the existence of the mill and the construction of an artificial reservoir with a dam; however, the longer canal and the even older lake are no longer mentioned in the above account. Based on the above, it can be hypothesized that by damming the (seasonal, perhaps torrential) waters that formed the (intermittent) lake, the water was regulated to allow at least the seasonal operation of the mill and prevent the flooding of the land (a canal instead of the earlier 'lake'). In this way, the land could be cultivated without losing the water resources (the water remained in the canal; Panjek 2020). There is no information about when the mill was built; analogously, we could date it to the time when similar regulation works were carried out in Štanjel.

The first thing all these examples have in common is that regulation improved the use of rainwater and at the same time created new cultivable land – even a mill in the case of Rodik. Another commonality seems to be that there was more surface water in the Karst in the early modern period than in the first half of the nineteenth century. This is the first starting point for our hypotheses.

Is it possible that the partial disintegration of the regulatory system at the 'Lake' in Štanjel was the result of reduced interest in tillage, so that the demanding collective maintenance work was abandoned? This possibility seems highly unlikely, because the period between the eighteenth and nineteenth centuries was a time when cultivable lands were expanded due to the increasing demand for foodstuffs from the growing city of Trieste. It is true that Štanjel was cut off from the new road connections to this port city, but the survival of farmland in Dol Stočajnik proves that the local population still found tillage interesting enough. A similar case is the abandonment of the mill in Rodik at the beginning of the nineteenth century, when the building was still called 'old mill' but its owner was not categorized as a miller. This does not indicate a diminished economic interest in this activity, because in the meantime a newer mill was built on another watercourse in a neighbouring village. So the old mill was not abandoned because it was no longer needed, but rather because there was not enough water.

The last circumstance that deserves mention is related to the changes in the environment and cultural landscape in the Karst between the sixteenth and nineteenth centuries. There is an age-old question about the

history of the Karst forests, which largely coincides with the question of their degradation and their later artificial reforestation. The traditional interpretation is based on a degradationist narrative rooted in eighteenth- and nineteenth-century policies and forestry science. Particularly in nineteenth-century sources, we read that the Karst was bare and stony and that this was the result of unsustainable exploitation through deforestation and overgrazing. In contrast, the forest and pasture land use system of early modern peasants shows how the inhabitants did not destroy the forests and trees, but instead used them. Each individual tree was there for a specific purpose. Peasants determined their use based on the characteristics of the karstic terrain, climatic conditions, and their experiments with the capacity of vegetative species. They felt that a 'real forest' was not economically justified in the Classical Karst, and so only those trees necessary to meet domestic and agricultural needs were allowed to grow. Coppice was the preferred form. It has also been demonstrated that there is no real evidence that the Karst was ever covered with forests in historical times, at least not since Roman times or even earlier. Nevertheless, it can be noted that forest cover decreased and became sparser in the period from the early sixteenth to the mid-eighteenth century (Panjek 2018), when artificial reforestation began. This is also true for our case study. Although we do not have precise microlocal evidence for Štanjel, we can assume that in the period between the regulatory works on the 'Lake' (around 1600) and those on the hill above the lake in the first decades of the nineteenth century, the tree coverage decreased. Could this serve as a starting point for understanding the partial decay of the system?

In conclusion, we can put forward two hypotheses about the reasons for the disintegration of the regulatory system at the 'Lake'. First, the climatic conditions or, more simply, the precipitation regime, had changed, which means that in the early modern period there was more precipitation and it was more evenly distributed throughout the year. We know that this was not the case in the nineteenth century thanks to the Franciscean Cadastre, which speaks of heavy and short-lived seasonal rains that washed the soil away from cultivated land. The existing knowledge of the climatic history of this area does not provide sufficient basis for this hypothesis. Second, the reduction in tree density opened up more and more land that was not protected from rainfall-induced erosion, making it more exposed to erosional processes. In the first phase, this resulted in more eluvium being washed away from the slopes of the

catchment area of the torrents flowing into the 'Lake', leaving more sediment at the bottom of the doline mentioned above. Since the erosional processes in the drainage basin of the torrents were much faster than the eluvium-forming processes on the carbonate bedrock, the eluvium cover was completely removed and rainwater was able to flow freely into the underground. As a result, surface runoff decreased significantly and water did not flow into the doline as often as before. Under this scenario, it would have become increasingly difficult to contain the torrential water in phase one, and there would not have been enough water in phase two to make the system functional. Therefore, it was partially abandoned.

Both possible explanations remain unproven hypotheses for the time being. It should be added, however, that the two are not mutually exclusive.

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ASGO, AC, AD: Archivio di Stato di Gorizia, Archivio Coronini, Atti e documenti.
- AS 1, VUK: Arhiv Republike Slovenije 1, Vicedomski urad za Kranjsko.
- ASTs, CF: Archivio di Stato di Trieste, Catasto Fransceschino.
- StLA, IÖHKS: Steiermärkisches Landesarchiv, Sachabteilung der Innerösterreichischen Hofkammer.

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This book discusses the developmental phases from agricultural to industrialized and finally to post-industrial low-carbon societies in the cases of Eurasian economies, which have followed different developmental pathways towards modernity from early modern times to the present, although with the dominant presence of small landholder structures.
Based on the different economics of environment, we explored changing Living Spaces: Where have florae, faunae, and humans lived in the past? Where do they live today? Where will they live in the future?
The book presents the concept of Living Spaces and applies a comparative approach to the ecological foundations of local case studies on rural areas. Local natural resource use, economic systems, and pathways to modernization allowed us to identify traditional economic and environmental management solutions that can serve as models for future rural development policy.

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