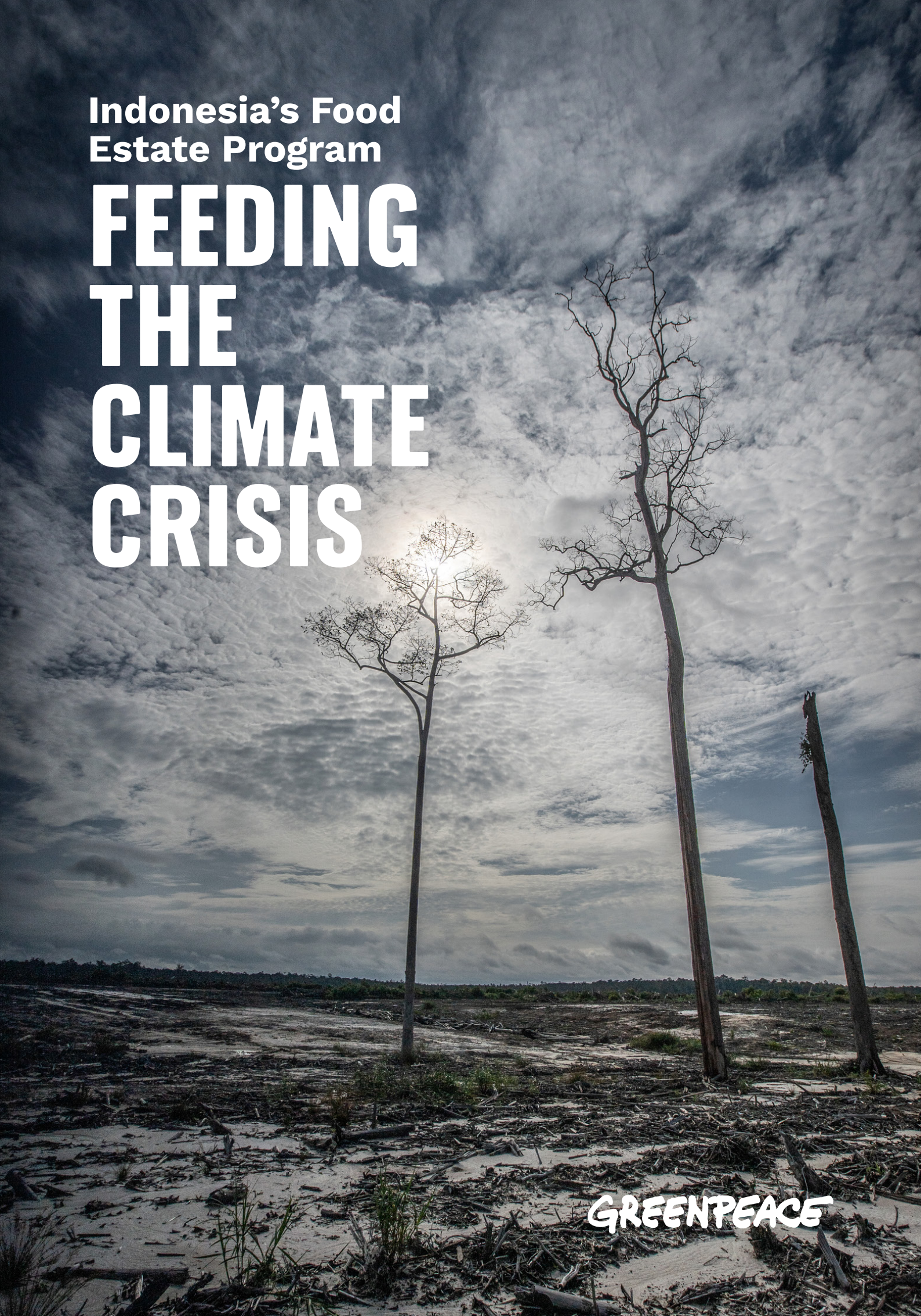


Indonesia's Food Estate Program

FEEDING THE CLIMATE CRISIS

GREENPEACE

Contents

Cover:

Forestland cleared for the Ministry of Defence's Food Estate project in Gunung Mas, Central Kalimantan seen on 10 November 2022. Activists from Greenpeace Indonesia, LBH Palangkaraya, Save Our Borneo and WALHI Central Kalimantan visited the failed, barren food estate to send a message during the COP 27 climate meeting in Sharm el-Sheikh, Egypt: that in the midst of a climate crisis causing food insecurity, the Indonesian government's food estate project will only worsen both food and climate crises.

Executive summary

This document carries with it an urgent warning regarding Indonesian President Joko Widodo's food estate program, a multi-million hectare agriculture expansion into forests and peatlands touted as a food crisis solution. It reports on the dire situation in a number of locations in which food estate expansion is currently underway and resulting in failure that can be found in forests, peatlands and Indigneous territories across Kalimantan and Papua. It also reveals how the food estate program will result in increases in both biodiversity losses and greenhouse gas emissions. Noting that the UN Food Security report identifies climate change as a driver of global food insecurity, we argue that far from improving Indonesia's double burden of malnutrition, the food estate program will actually worsen national food security.

In 2020, the UN Food and Agriculture Organisation cautioned world leaders about possible COVID-19 pandemic induced disruption to food supply chains and incomes. Citing the FAO's warning, Indonesian President Joko Widodo launched a food estate program on a massive scale: millions of hectares, much of it forested Indigenous land, was earmarked for conversion – mostly for rice fields and cassava.

Regulatory changes introduced under the umbrella of the controversial 'Omnibus' Law on Job Creation, were enacted as a part of efforts aimed at supercharging the new program – vaulting the food estate over standard land tenure checks and environmental controls. This is concerning because the proposed food estate areas encompass Indigenous land, carbon-rich peatlands and tropical forests that act as a store of irreplaceable biodiversity, including habitat for the critically endangered Bornean orangutan.

Two former army generals turned politicians, Prabowo Subianto and Luhut Binsar Pandjaitan, along with the ministers responsible for public works and agriculture, were tasked with assisting with the food estate program. Prabowo, as Minister for Defence, has enthusiastically embraced the program as a matter of national security, and is connected to a company which has been seeking investment funds in order to participate in the program through the creation of industrial cassava plantations.[1] Other companies with political connections are also associated with the program.

1 The Gecko Project. 'Rainforests Fall for Indonesia's Food Estate Programme', 14 October 2021.

Details on proposed locations and the total area covered by the program have varied across announcements that have been made by different agencies. By some accounts, planned food estates may total 2.3 million ha nationwide,[2] however, a possibly larger area is implied by an 'Area of Interest' that totals 3.2 million ha across three districts of southern Papua.[3]

This report argues that the COVID-19 pandemic was used as a pretext for rushed policymaking and to sidestep important environmental and social safeguards. Furthermore, the report shows that Indonesia's real food crisis is one of nutrition and access. In this regard, wasting, stunting and food insecurity remain a problem, alongside the growing issue of obesity.

The centrally-prescribed food estate approach replaces forests and complex food landscapes with monoculture crops and reduces opportunities for the continuation of the natural food systems of Indigenous peoples and autonomous local production by small-scale farming communities. This, along with the food estate's emphasis on starchy monocrop commodities, will undoubtedly worsen rather than improve households' secure access to a healthy, diverse diet.

We present evidence in the report gathered from a number of locations in the forest and peatlands of Kalimantan, where food estate expansion is already underway. The Ministry of Defence's plantation in hilly Gunung Mas district has not produced significant amounts of cassava, however forest clearing has been followed by erosion and flooding, which are impacting villages located downstream. Moreover, Indigenous Dayak people have lost access to their territory for traditional food gathering. Meanwhile, in the vast peatlands of the southern lowlands, the drainage system established for industrial scale food estates is both dysfunctional in terms of rice cultivation and also a cause of massive carbon releases and vulnerability to fire.

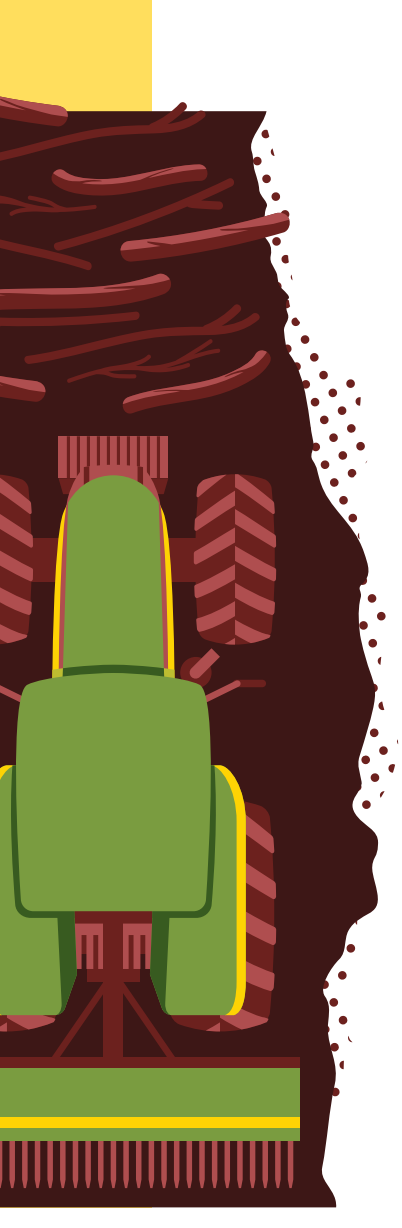
In Papua province, previous food estate plans are shown to have benefitted private investors without producing any of the promised boost to food crop production. Indigenous peoples have therefore been left with a legacy of alienation, cultural destruction and food insecurity on their own lands. The renewed food estate plans, seemingly destined to support the further transmigration of non-Indigenous Papuans and private company control over Indigenous lands, can be expected to worsen this situation. Local government officials have drawn up and shared their own smaller scale plans for food security, however, these are unfortunately likely to be cast aside in favour of schemes dreamt up by the military and central government.

In addressing the above problems, the report highlights available alternatives that are capable of nourishing Indonesian households without destroying forests, degrading diets and deepening greenhouse gas emissions. These alternatives improve not just food security but importantly, food sovereignty, boosting resilience to price and climate shocks and ensuring that producers and consumers, not corporations, control the food chain.

The aforementioned alternatives include Indonesia's many traditional sustainable agroforestry approaches, along with ecological farming that ensures fertility without the use of chemicals by increasing soil organic matter, enhancing water retention, preventing land degradation and protecting soils from erosion and waterways from pollution. Producing food in these ways will ensure diets that are not merely rich in calories, but also nutritionally diverse, healthy and culturally appropriate.

2 Tempo. 'Bencana Ekologis Food Estate Jokowi'. Tempo, 9 October 2021.
3 3,234,658 ha; See pp.33-34 of Kementerian Lingkungan Hidup dan Kehutanan 'Program Ketahanan Pangan Di Dalam Kawasan Hutan', 29 March 2021.

01. Introduction



We currently face a planetary emergency that is characterised by a number of interlinked ecological problems, headlined by the climate and biodiversity crises. The world is currently meeting to discuss both of these issues, firstly in November 2022 at the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change, followed shortly by the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity in Montreal, Canada in December.

This report, published ahead of the 'Adaptation and Agriculture' themed day planned for the 12 November, carries an urgent warning regarding Indonesian President Joko Widodo's food estate program, a multi-million hectare agriculture expansion into forests and peatlands that is being touted as a food crisis solution. It reports on the dire situation in a number of locations where food estate expansions are currently underway and failing, specifically forests, peatlands and Indigneous territories in Kalimantan (Indonesian Borneo) and Papua. It also demonstrates how the food estate program will result in increased biodiversity losses and greenhouse gas emissions.

The report concludes with a number of recommendations that encompass alternatives capable of feeding and nourishing Indonesia without destroying its forests and worsening the climate crisis. First though, we offer an explanation of how the current food policy began.

In March 2020, with the world facing a frightening new pandemic, the G20 held an extraordinary virtual summit. During this meeting, the UN Food and Agriculture Organisation issued a warning that quarantine restrictions could disrupt global food production and distribution.[4] The global media also reported fears that supply chains may ultimately be impacted and told stories of workers in the world's poverty hotspots losing their incomes, impacting the capacities of households to buy food.[5]

4 FAO. 'FAO Director-General Urges G20 to Ensure That Food Value Chains Are Not Disrupted During COVID-19 Pandemic', 26 March 2020.
5 Dahir, Abdi Latif. '"Instead of Coronavirus, the Hunger Will Kill Us." A Global Food Crisis Looms.' The New York Times, 22 April 2020.

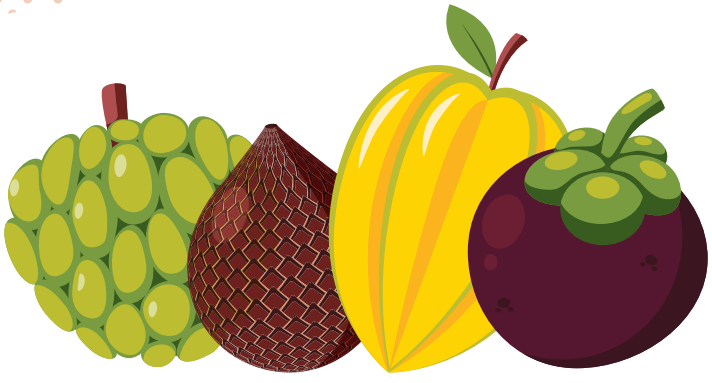
The FAO chief's initial comments and a subsequent World Food Programme report (issued 3 April 2020) did not include Indonesia among the countries particularly at risk and instead focused on Africa and the Middle East. The anticipatory actions recommended by the FAO and the WFP were cash transfers to poor households and the securing of specialised nutritious foods, with staples such as wheat and rice considered to be at the least risk.[6,7]

Nevertheless, citing the FAO's warning, on 28 April 2020 Indonesian President Widodo convened a meeting at the state palace in Jakarta, ordering his ministers and state-owned enterprises to undertake the urgent conversion of peatland for the purpose of rice production.[8] Less than six months later, the president was striding through a village in the peat landscape of Pulang Pisau district, Central Kalimantan, observing for himself that work on the food estate had begun, and urging the use of technologies such as drones and tractors to accelerate the rice field creation process.[9]

Further regions were added in order to expand the scheme as the year progressed: in September President Widodo called ministers together for a food estate meeting, announcing afterwards that the program was being extended to North Sumatra to be followed by the provinces of Papua, East Nusa Tenggara and South Sumatra. The extent of the proposed new agricultural land totalled 2.3 million hectares, roughly four times the size of the island of Bali.

By the end of 2020, the WFP reported that Indonesia was already showing 'positive signs of recovery' from the covid crisis, with rice production expected to slightly exceed 2019 levels and sufficient supplies of ten strategic food commodities available.[10] The WFP stressed that Indonesia still faced food security challenges unrelated to COVID-19 however, writing that 'a WFP and government joint study revealed that challenges remain in the supply chain in terms of nutritious but highly perishable food items, including poor post-harvest handling, limited availability and the use of cold-chain facilities, and high logistics costs.' Food assistance programs should not focus solely on providing sufficient calories via staples (such as rice, cassava or maize), but should also ensure access to a diverse diet featuring macronutrients and micronutrients, with an emphasis on micronutrient rich fruits and vegetables, the WFP wrote.

6 'COVID-19: Potential Impact on the World's Poorest People: A WFP Analysis of the Economic and Food Security Implications of the Pandemic'. World Food Programme, 3 April 2020.
7 UN News. 'COVID-19: The Global Food Supply Chain Is Holding up, for Now', 3 April 2020.
8 Ihsanuddin. 'Antisipasi Krisis Pangan, Jokowi Perintahkan BUMN Buka Lahan Baru'. Kompas, 28 April 2020.
9 Tribunnews.com. 'Presiden Jokowi Tinjau Percontohan Kawasan Food Estate Kalteng', 9 October 2020.
10 Bodamaev, Saidamon. 'COVID-19 Economic and Food Security Implications for Indonesia - 4th Edition December 2020 | World Food Programme', 18 December 2020.



The UN agencies' comments, as quoted above, draw attention to the problem of food security, while President Widodo's announcement of his food estate plan is also understood as a strategy capable of improving overall Indonesia's food security (*ketahanan pangan*).[11] But what ultimately is meant by this term? The 1996 World Food Summit defined food security as existing when all persons (at the household, national and global levels) have physical and economic access to sufficient, safe and nutritious food capable of meeting their dietary needs and food preferences.[12] A basic definition of food security was adopted in Indonesia's Food Law in 1996,[13] with the definition expanded in the 2012 version.[14] The meaning is that people need to be able to afford food, and not just that food is available to purchase, and also that diets need to contain the nutritional components necessary for a healthy and active life. Moreover, 'food preferences' means that food should be appropriate in religious, ethical and cultural terms. This last dimension is of utmost importance to minority groups in Indonesia, including Indigenous peoples in Papua, for example.

It should be noted that this definition of 'food security' is different from national 'food self-sufficiency' – the political idea held by some, including in Indonesia, that a country should aim to produce all of its needed food domestically. In fact, even if a country avoids imports and achieves food self-sufficiency, it may still fail to achieve food security if the food produced is not well distributed, affordable by all, sufficiently healthy and diverse, and culturally appropriate.[15] This has been the case in Indonesia, where food insecurity persists, despite adequate food supplies being available at the national level.[16]

11 CNN Indonesia. 'Jokowi Sebut Food Estate Bisa Perkuat Ketahanan Pangan' ('Jokowi Says Food Estate Can Strengthen Food Security'). Ekonomi, 14 August 2020.
12 'Rome Declaration on World Food Security'. FAO, 13 November 1996.
13 'UU No. 7 Tahun 1996 Tentang Pangan', 4 November 1996.
14 'UU No. 18 Tahun 2012 Tentang Pangan', 17 November 2012.
15 Pinstrup-Andersen, Per. 'Food Security: Definition and Measurement'. *Food Security* 1, no. 1 (1 February 2009): 5–7. https://doi.org/10.1007/s12571-008-0002-y.
16 Salim, Zamroni. 'Food Security Policies in Maritime Southeast Asia: The Case of Indonesia'. International Institute for Sustainable Development, 2010.

In the rhetorical language of Indonesia's political leaders, this goal of national food self-sufficiency has historically been expressed as food sovereignty (*kedaulatan pangan*[17]) and has also along the way come to be associated with the belief that the government should be in substantial control of food systems.[18] However, this use of the term food sovereignty in Indonesia is contrary to the way that it is most commonly used, including by the UN and by the international peasants movement, La Via Campesina[19] and its Indonesian affiliate, Serikat Petani Indonesia,[20] which is essentially a bottom up agrarian reform concept: food by the people, for the people.[21]

This report argues that Indonesia's policymakers should urgently address the food insecurity and malnutrition experienced by the population, which is being driven by falling dietary diversity, land dispossession and climatic chaos, among other causes. Greenpeace believes that a blind focus of increasing production with expanding food estates is not the best policy for achieving this goal. Indeed, the renewed food estate plans threaten forests, biodiversity and the land rights of local and Indigneous peoples. Moreover, efforts to support the extensification of industrial agriculture threaten the climate, which will in turn create further food insecurity, rather than improve Indonesia's situation.

Rossana Morris for the Land Workers' Alliance and La Via Campesina

17 Sometimes the term '*swasembada pangan*' is used instead, which more accurately translates as food self-sufficiency. See the term's etymology.
18 See Prabowo Subianto's 2019 presidential bid: CNN Indonesia. 'Prabowo Soroti Kedaulatan Pangan di Debat Capres Lawan Jokowi'. nasional, 12 February 2019.
19 See Ndabezinhle. 'Food Sovereignty Is the Only Solution and Way Forward : Via Campesina . Via Campesina, 16 October 2022.
20 See Serikat Petani Indonesia 'Visi Kedaulatan Pangan Indonesia Tahun 2014-2024' (n.d.)
21 Ndabezinhle. 'The 1996 Rome Food Sovereignty Declaration in Postcards : Via Campesina'. Via Campesina, 22 November 2021.

The real drivers of food insecurity and malnutrition

Situation of food insecurity and malnutrition in Indonesia

In their latest report on food security and nutrition, the top UN humanitarian agencies have sounded the alarm that overall, the world is 'moving backwards' in terms of efforts to end hunger, malnutrition and food insecurity.[22]

Stunting
(under 5 years)

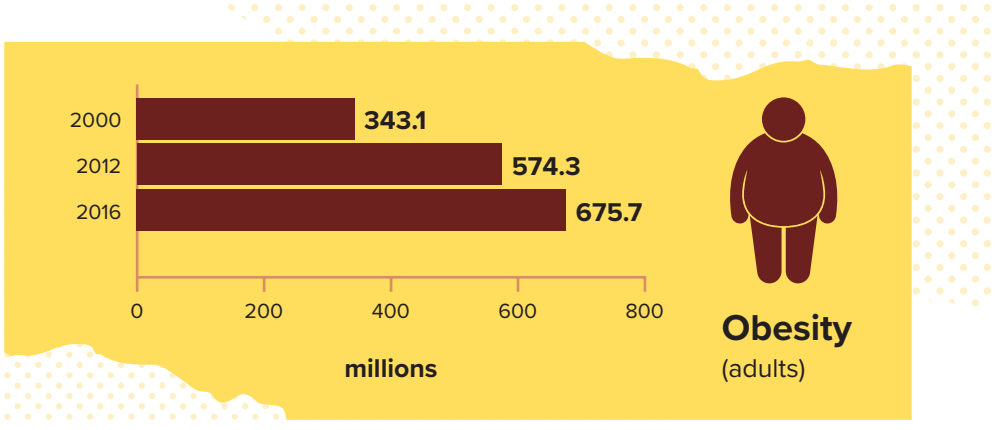
Wasting
(under 5 years)

In Indonesia specifically, the UN has reported that a high number of under five-year-olds experienced wasting (2.5 million children) and stunting (7.5 million children or 32%) in 2020. These conditions can impact a child's brain development, as evidenced in reduced IQ scores and lower school grades. It also predisposes them to certain illnesses that ironically include obesity and diabetes later in life.

In addition, 6% of Indonesians of all ages experienced 'moderate or severe food insecurity' during 2021. By this, the UN report means that 16.8 million Indonesians do not have adequate physical, social and economic access to sufficient, safe and nutritious food.[23]

However, we produce more than enough calories to feed everyone; and obesity in children (11%) and adults (7%) is rising in Indonesia, as it is elsewhere around the globe. This hints at the tragic reality that modern food insecurity is primarily the result of social injustice as opposed to insufficient food production.

22 FAO, IFAD, UNICEF, WFP and WHO. 'The State of Food Security and Nutrition in the World 2022. Repurposing Food and Agricultural Policies to Make Healthy Diets More Affordable', 2022. https://doi.org/10.4060/cc0639en.
23 FAO. 'Coming to Terms with Terminology', October 2012.



World incidence of adult obesity – graphic from UN Report 'The State of Food Security and Nutrition in the World 2022'.[24]

When both food insecurity and obesity occur at serious rates it is described as a 'double burden of malnutrition'. Moreover, in addition to the common occurrence of food insecurity among the poor and obesity among the more wealthy, data from 2013 shows that many Indonesian individuals under five years of age experience both conditions at the same time (indeed, over half of all children who were classified as overweight or obese were also stunted).[25]

Industrial agriculture, dietary diversity and biodiversity

The fact that Indonesia's under-fives face this double burden of malnutrition (obesity and stunting) is not purely the result of economic inequality, but is also partly due to an impoverishment of dietary choices. Traditional diets take advantage of a wide range of locally grown and/or wild gathered foods, which provide a broad spectrum of health-promoting components[26] – vitamins, trace minerals, phytochemicals, fibre and more. With the global rise of industrial agriculture, however, just 15 crops now provide 90% of humanity's caloric intake.[27] This is undoubtedly true in Indonesia, where a very small number of staple foods – most prominently rice – have become the most affordable choices and have taken on a dominant role in Indonesian diets, resulting in levels of dietary diversity and nutrition that are considered too low.[28] In addition, as they assume economic dominance, the monocrop fields

24 FAO, IFAD, UNICEF, WFP and WHO. 'The State of Food Security and Nutrition in the World 2022. Repurposing Food and Agricultural Policies to Make Healthy Diets More Affordable', 2022. https://doi.org/10.4060/cc0639en.

25 Rachmi, Cut Novianti, Kingsley E. Agho, Mu Li, and Louise Alison Baur. 'Stunting, Underweight and Overweight in Children Aged 2.0–4.9 Years in Indonesia: Prevalence Trends and Associated Risk Factors'. *PLOS ONE* 11, no. 5 (11 May 2016): e0154756. https://doi.org/10.1371/journal.pone.0154756.

26 Broegaard, Rikke Brandt, Laura Vang Rasmussen, Neil Dawson, Ole Mertz, Thoumthone Vongvisouk, and Kenneth Grogan. 'Wild Food Collection and Nutrition under Commercial Agriculture Expansion in Agriculture-Forest Landscapes'. *Forest Policy and Economics*, Forest, Food, and Livelihoods, 84 (1 November 2017): 92–101. https://doi.org/10.1016/j.forpol.2016.12.012.

27 Ickowitz, Amy, Stepha McMullin, Todd Rosenstock, Ian Dawson, Dominic Rowland, Bronwen Powell, Kai Mausch, et al. 'Transforming Food Systems with Trees and Forests'. *The Lancet Planetary Health* 6, no. 7 (July 2022): e632–39. https://doi.org/10.1016/S2542-5196(22)00091-2.

28 de Pee, Saskia, Ridwan Hardinsyah, Fasli Jalal, Brent F Kim, Richard D Semba, Amy Deptford, Jessica C Fanzo, et al. 'Balancing a Sustained Pursuit of Nutrition, Health, Affordability and Climate Goals: Exploring the Case of Indonesia'. *The American Journal of Clinical Nutrition* 114, no. 5 (8 November 2021): 1686–97. https://doi.org/10.1093/ajcn/nqab258.

required to grow these staples take over natural and traditional agricultural landscapes, reducing space for fruit and vegetable crops and for forest foods with their attendant levels of biodiversity.[29,30]

The result of all this is that communities everywhere including, increasingly, Indigenous peoples in Indonesia, enjoy lower levels of dietary diversity but consume an excess of starchy staples and processed foods that are rich in simple carbohydrates, fats, sugar and salt, all the while receiving fewer protective benefits from the physical activity involved in food gathering and production. Research in East Kalimantan, for example, has found that the more Punan Indigenous communities rely on their traditional forest food lifestyle and diet, the better their nutritional and physical fitness, while Punan communities living close to towns tend to be characterised by poorer levels of fitness and nutrition.[31]

Rural communities are also affected by increasing 'specialisation' in their own food production, which includes the sort of industrial agriculture promoted by the government's push for the creation of food estates. Where government policy or economic forces encourage families to abandon their previously diverse agroforestry and garden production of fruit, vegetables and legumes in favour of more profitable food commodities, families generally gain greater income. In theory this increased income can be used at markets to buy the healthy fruits and vegetables these families used to produce themselves; however, a study that was conducted in Laos revealed a tendency,[32] that is also found among Indonesian families, for this increased income to be spent instead on other goods and on foods that carry a greater risk of cardiovascular disease and obesity.[33] Meanwhile, the foods that protect against such diseases – fruit, vegetables and legumes – are being gathered, grown, bought and eaten ever less frequently by families. Overall, dietary diversity is falling and malnutrition is increasing.

29 Fitzherbert, Emily B., Matthew J. Struebig, Alexandra Morel, Finn Danielsen, Carsten A. Brühl, Paul F. Donald, and Ben Phalan. 'How Will Oil Palm Expansion Affect Biodiversity?' *Trends in Ecology & Evolution* 23, no. 10 (1 October 2008): 538–45. https://doi.org/10.1016/j.tree.2008.06.012.

30 Shin, Yunne-Jai, Almut Arneth, Rinku Roy Chowdhury, Guy F. Midgley, Elena Bukvareva, Andreas Heinimann, Andra Ioana Horcea-Milcu, et al. 'IPBES Global Assessment on Biodiversity and Ecosystem Services: Chapter 4. Plausible Futures of Nature, Its Contributions to People and Their Good Quality of Life'. Zenodo, 31 May 2019. https://doi.org/10.5281/zenodo.5656910.

31 Dounias, Edmond, Audrey Selzner, Miyako Koizumi, and Patrice Levang. 'From Sago to Rice, from Forest to Town: The Consequences of Sedentarization for the Nutritional Ecology of Punan Former Hunter-Gatherers of Borneo'. *Food and Nutrition Bulletin* 28, no. 2 (1 June 2007): S294–302. https://doi.org/10.1177/15648265070282S208.

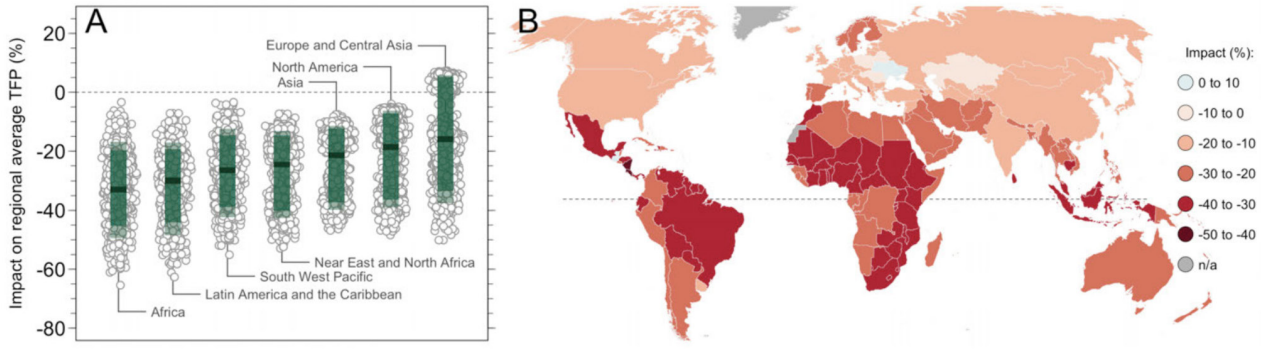
32 Broegaard, Rikke Brandt, Laura Vang Rasmussen, Neil Dawson, Ole Mertz, Thoumthone Vongvisouk, and Kenneth Grogan. 'Wild Food Collection and Nutrition under Commercial Agriculture Expansion in Agriculture-Forest Landscapes'. *Forest Policy and Economics*, Forest, Food, and Livelihoods, 84 (1 November 2017): 92–101. https://doi.org/10.1016/j.forpol.2016.12.012.

33 Mehraban, Nadjia, and Amy Ickowitz. 'Dietary Diversity of Rural Indonesian Households Declines over Time with Agricultural Production Diversity Even as Incomes Rise'. *Global Food Security* 28 (1 March 2021): 100502. https://doi.org/10.1016/j.gfs.2021.100502.

Papuan vendors sell fruits and vegetables in Sentani market, Jayapura, Papua. 01 July 2022.

Agricultural impact on climate change and other 'planetary boundaries'

The 2022 UN food security report identifies climate extremes as a major driver of global food insecurity.[34] Globally, climate change is leading to more frequent and more severe droughts, floods, and heatwaves, which can have devastating effects on food production systems. Meanwhile, a new study reports that human-induced climate change has slowed the productivity growth of global agriculture by about 21% since 1961. This impact is more severe in warmer regions, including Indonesia, where reduction in productivity is estimated at 30% - 33% – see diagram below.[35]



Regional and country-level impacts of anthropogenic climate change. (A) *Impact estimates for the baseline mode for each region. The white circles represent 2,000 estimates for each region. The green bars represent 90 and 95% confidence bands and the solid line indicates the ensemble mean.* ***(B)*** *The color corresponds to the ensemble mean impact for each country in the sample.*

In Indonesia, the year-to-year climate is strongly influenced by variations in marine and atmospheric conditions known as the Indian Ocean Dipole (IOD) and El Niño-Southern Oscillation (ENSO). Droughts and fires are likely to occur in Indonesia during 'positive' IOD and ENSO phases, especially when these phases occur simultaneously, while heavy rains usually follow negative phases. Globally, agricultural productivity and crop failures are strongly linked to these climatic variations.[36]

Worryingly, climate change is expected to result in more frequent and extreme El Niño and La Niña events, meaning increasingly catastrophic Indonesian droughts and floods respectively.[37,38] Furthermore, ancient

34 FAO, IFAD, UNICEF, WFP and WHO. 'The State of Food Security and Nutrition in the World 2022. Repurposing Food and Agricultural Policies to Make Healthy Diets More Affordable', 2022. https://doi.org/10.4060/cc0639en.

35 Ortiz-Bobea, Ariel, Toby R. Ault, Carlos M. Carrillo, Robert G. Chambers, and David B. Lobell. 'Anthropogenic Climate Change Has Slowed Global Agricultural Productivity Growth'. *Nature Climate Change* 11, no. 4 (April 2021): 306–12. https://doi.org/10.1038/s41558-021-01000-1.

36 Anderson, W. B., R. Seager, W. Baethgen, M. Cane, and L. You. 'Synchronous Crop Failures and Climate-Forced Production Variability'. *Science Advances* 5, no. 7 (5 July 2019): eaaw1976. https://doi.org/10.1126/sciadv.aaw1976.

37 Cai, Wenju, Agus Santoso, Guojian Wang, Sang-Wook Yeh, Soon-Il An, Kim M. Cobb, Mat Collins, et al. 'ENSO and Greenhouse Warming'. *Nature Climate Change* 5, no. 9 (September 2015): 849–59. https://doi.org/10.1038/nclimate2743.

38 Wang, Bin, Xiao Luo, Young-Min Yang, Weiyi Sun, Mark A. Cane, Wenju Cai, Sang-Wook Yeh, and Jian Liu. 'Historical Change of El Niño Properties Sheds Light on Future Changes of Extreme El Niño'. *Proceedings of the National Academy of Sciences* 116, no. 45 (5 November 2019): 22512–17. https://doi.org/10.1073/pnas.1911130116.

records etched into coral reefs off the Sumatran coast show that extreme positive IODs were rare before the 1960s, but have since increased. Indeed, researchers have predicted that their occurrence could triple, resulting in more frequent severe droughts in Indonesia, if we do not limit global warming to the Paris Agreement's 1.5°C target.[39]

Recent examples of the likely impact of climate chaos on Indonesian food security are evident not only in the severe droughts and fires of 2015 and 2019, but also in recent more localised harvest failures. Frost and drought destroyed crops in Papua's Lanny Jaya regency[40] during July and August 2022,[41,42] while heavy rains ravaged chilli and shallot fields in Java and Sumatra during the same period.[43] In this context, smallholders and subsistence farming communities, who produce the majority of Indonesia's food supply, and who are are often entirely dependent on rainfall patterns,[44] are especially vulnerable to the negative impacts of climate change.[45] Indeed, the Intergovernmental Panel on Climate Change has offered the following global summary: 'Observed climate change is already affecting food security through increasing temperatures, changing precipitation patterns, and greater frequency of some extreme events.'[46]

The unfortunate irony is that while human-induced climate chaos is worsening food insecurity, global food production has itself become one of the greatest drivers of climate change, with an estimated 23% of humanity's total greenhouse gas emissions (2007 - 2016) deriving from agriculture, forestry and other land use. When pre- and post-production activities relating to the global food system are included in this count, the share reaches 21% - 37% of humanity's total GHG emissions.[47] The bottom line is that under a business-as-usual scenario over the next two decades, agricultural emissions are projected to increase by 58%, with 56 million hectares more land being converted into farmland (by 2040).[48]

Climate change is only one of nine 'planetary boundaries' identified in a widely cited scientific framework[49] that identifies a 'safe operating space' for humanity to continue to flourish in conditions such as those that we currently enjoy. These boundaries, and assessments of their status in 2015, are shown in the diagram below.

39 Abram, Nerilie J., Jessica A. Hargreaves, Nicky M. Wright, Kaustubh Thirumalai, Caroline C. Ummenhofer, and Matthew H. England. 'Palaeoclimate Perspectives on the Indian Ocean Dipole'. *Quaternary Science Reviews* 237 (1 June 2020): 106302. https://doi.org/10.1016/j.quascirev.2020.106302.

40 This report uses 'district' as a translation for the word '*kabupaten*', the Indonesian administrative unit that lies below that of the province. However, when writing about *kabupaten* within Papua, the word 'regency' is used instead in order to avoid any confusion with the term '*distrik*', which is used to describe smaller areas within a given regency.

41 Ramadhan, Gilang. 'Tangani Kelaparan Di Lanny Jaya Papua, Mensos Siapkan Umbi-Umbian'. Tirto.id, 12 August 2022.

42 Arif, Ahmad. 'Kelaparan Berulang di Papua dan Kegagalan Sistem Pangan Indonesia'. kompas.id, 6 August 2022.

43 'WFP Seasonal Bulletin – Impact Monitoring of Hydrometeorological Hazards April - June 2022'. World Food Programme, 22 August 2022.

44 Suryanto, E. S. Rahayu, O. P. Astirin, and F. Susilowati. 'The Impact of Climate Change to Livelihood Vulnerability for Smallholders Farmers in Wonogiri, Indonesia'. *IOP Conference Series: Earth and Environmental Science* 986, no. 1 (February 2022): 012054. https://doi.org/10.1088/1755-1315/986/1/012054.

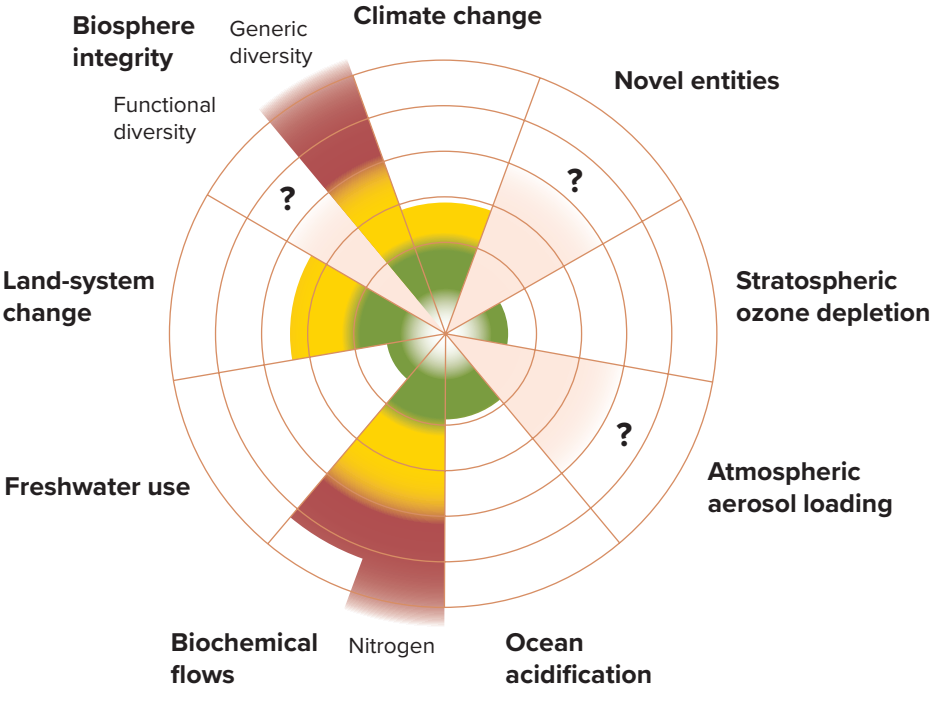
45 Morton, John F. 'The Impact of Climate Change on Smallholder and Subsistence Agriculture'. *Proceedings of the National Academy of Sciences* 104, no. 50 (11 December 2007): 19680–85. https://doi.org/10.1073/pnas.0701855104.

46 'Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems'. Intergovernmental Panel on Climate Change., 2019.

47 See pp.6-8 of 'Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems'. Intergovernmental Panel on Climate Change., 2019.

48 Gautam, Madhur, David Laborde, Abdullah Mamun, Will Martin, Valeria Pineiro, and Rob Vos. 'Repurposing Agricultural Policies and Support: Options to Transform Agriculture and Food Systems to Better Serve the Health of People, Economies, and the Planet'. Washington, DC: World Bank, 24 January 2022.

49 Rockström, Johan, Will Steffen, Kevin Noone, Åsa Persson, F. Stuart III Chapin, Eric Lambin, Timothy Lenton, et al. 'Planetary Boundaries: Exploring the Safe Operating Space for Humanity'. *Ecology and Society* 14, no. 2 (18 November 2009). https://doi.org/10.5751/ES-03180-140232.



The nine planetary boundaries; diagram from Steffen et al (2015).[50]

The above diagram was published in 2015 by a team of scientists who estimated that human activity had pushed Earth systems beyond the green 'safe' zone in terms of four of the planetary boundaries – climate change, biosphere integrity, biogeochemical flows, and land system change. More recently another two teams argued in papers published in 2017 and 2022 that human-induced changes to freshwater – the 'bloodstream of the biosphere' – have also now pushed past the 'safe' zone, meaning that five of the nine planetary boundaries are now being exceeded.[51,52]

The 2017 paper estimated that agriculture, and primarily crop production, accounts for 70% of global freshwater withdrawals. Agriculture, particularly croplands and pastures, also comprises humanity's largest type of land use, and is thereby estimated to be responsible for about 80% of the impact on two more planetary boundaries, namely land system change and genetic diversity loss.

In addition, the agricultural use of chemical fertilisers is releasing unprecedented quantities of nitrogen and phosphorus into the biosphere. In this regard, the use of nitrogen fertilisers increased by an estimated 800% between 1960 and 2000, while phosphate mining – 90% to 96% of which is undertaken in order to produce fertiliser – results in three times the amount of phosphorus releases than result from natural processes.[53] This excess of phosphorus and fixed nitrogen is polluting soil,

50 Steffen, Will, Katherine Richardson, Johan Rockström, Sarah E. Cornell, Ingo Fetzer, Elena M. Bennett, Reinette Biggs, et al. 'Planetary Boundaries: Guiding Human Development on a Changing Planet'. *Science* 347, no. 6223 (13 February 2015): 1259855. https://doi.org/10.1126/science.1259855.

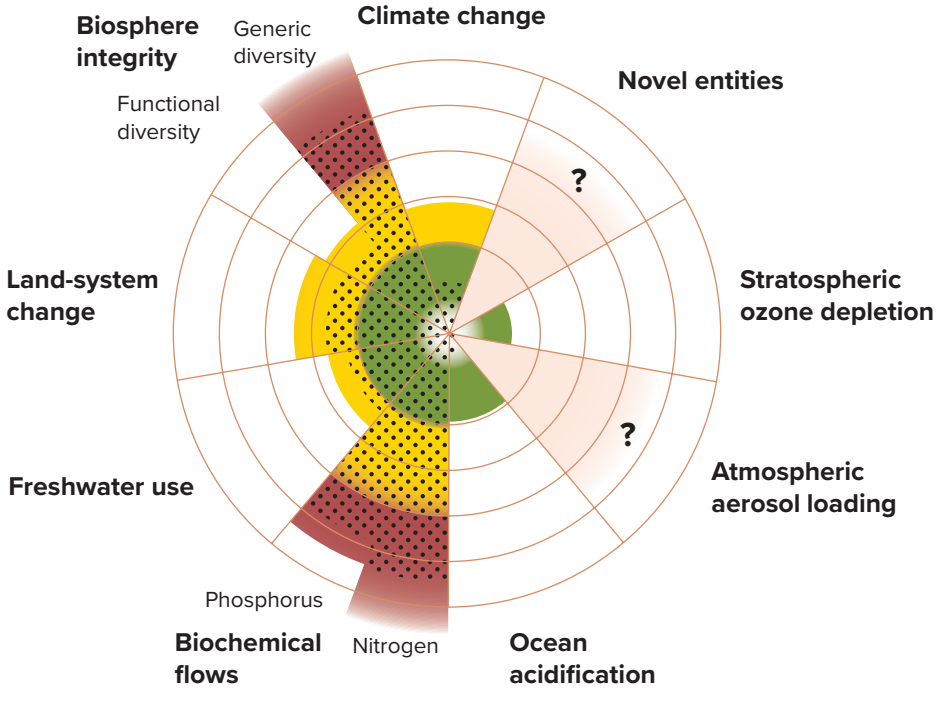
51 Campbell, Bruce, Douglas Beare, Elena Bennett, Jason Hall-Spencer, John Ingram, Fernando Jaramillo, Rodomiro Ortiz, Navin Ramankutty, Jeffrey Sayer, and Drew Shindell. 'Agriculture Production as a Major Driver of the Earth System Exceeding Planetary Boundaries'. *Ecology and Society* 22, no. 4 (12 October 2017). https://doi.org/10.5751/ES-09595-220408.

52 Wang-Erlandsson, Lan, Arne Tobian, Ruud J. van der Ent, Ingo Fetzer, Sofie te Wierik, Miina Porkka, Arie Staal, et al. 'A Planetary Boundary for Green Water'. *Nature Reviews Earth & Environment* 3, no. 6 (June 2022): 380–92. https://doi.org/10.1038/s43017-022-00287-8.

53 Campbell, Bruce, Douglas Beare, Elena Bennett, Jason Hall-Spencer, John Ingram, Fernando Jaramillo, Rodomiro Ortiz, Navin Ramankutty, Jeffrey Sayer, and Drew Shindell. 'Agriculture Production as a Major Driver of the Earth System Exceeding Planetary Boundaries'. *Ecology and Society* 22, no. 4 (12 October 2017). https://doi.org/10.5751/ES-09595-220408.

air, rivers and coastal marine waters and is leading to eutrophication – algal blooms, fish kills and aquatic dead zones. The synthetic nitrogen fertiliser supply chain (manufacture, transportation, and use) also contributes an estimated 2.1% of global greenhouse gas emissions.[54]

For these reasons agriculture is clearly the major driver behind humanity's transgression of four of the planetary boundaries, namely genetic diversity, land system change, biogeochemical flows and freshwater usage, as the revised diagram below shows with black dot shading.



Agriculture's role (shaded with black dots) in exceeding planetary boundaries; diagram from Campbell et al (2017).[55]

The black dot shading in the diagram above shows in a nutshell that the act of producing food, one of humankind's most fundamental and rewarding activities, is, through our own mismanagement, transforming from a joyous and culturally affirming practice into a planetary-scale act of self-sabotage.

54 Menegat, Stefano, Alicia Ledo, and Reyes Tirado. 'Greenhouse Gas Emissions from Global Production and Use of Nitrogen Synthetic Fertilisers in Agriculture'. *Scientific Reports* 12, no. 1 (25 August 2022): 14490. https://doi.org/10.1038/s41598-022-18773-w.

55 Campbell, Bruce, Douglas Beare, Elena Bennett, Jason Hall-Spencer, John Ingram, Fernando Jaramillo, Rodomiro Ortiz, Navin Ramankutty, Jeffrey Sayer, and Drew Shindell. 'Agriculture Production as a Major Driver of the Earth System Exceeding Planetary Boundaries'. *Ecology and Society* 22, no. 4 (12 October 2017). https://doi.org/10.5751/ES-09595-220408.

Food insecurity is not caused by sudden 'food crises'

There's no doubt that many people grapple with food insecurity and that this problem is worsening due to the damage that is being inflicted on biodiversity and the climate. In this regard, governments and big agribusiness stand to gain from drawing media attention to a regular series of so-called 'food crises' portrayed as arising from external shocks such as COVID-19 or the war in Ukraine. However, a 'food crisis' is usually related more to price than any actual shortfall in supply (as in 2007 - 2008 and 2010 - 2011), and may be a predicted crisis rather than one that has actually taken effect (as with the COVID-19 'food crisis'). It should also be noted that some of the most serious factors behind food insecurity – such as the impact of futures speculation by the finance sector[56] – are not identified in these largely false narratives.

The purported solutions to these crises are framed in ways that differ from country to country, however, overall they tend to suit agribusiness: i.e. the liberalisation of food trade and the allocation of greater amounts of land and subsidies to industrial agriculture. In Indonesia the 'food crisis' narrative has cropped up several times and is used to justify peatland conversions, land grabs and the military teaming up with agribusiness oligarchs in order to create and expand 'Food Estates'.

A tractor doing a land clearing activity at forest zone area that will be used as food plantation area for Food Estate project in Sepang, Gunung Mas, Central Kalimantan. (1°26'57.34"S 113°59'42.46"E). 06 March 2021.

56 Mukpo, Ashoka. 'Did Wall Street Play a Role in This Year's Wheat Price Crisis?' Mongabay Environmental News, 27 July 2022.

Oligarchs and politicians hijacking food and agricultural policy

Food and agricultural policies are critical to a country's nutrition and food security. Policymaking in this realm should rely as much as possible on public participation, expert advice and robust evidence, and policies must be subjected to regular and rigorous evaluations in order to ensure that food security is being achieved at the level of the individual, households, ethnic groups and nationwide.

However, policies relating to food production systems are often over-politicised and formulated in the interests of ruling elites and as a means of maintaining unofficial state control and clientelism (loyalty to politicians in exchange for goods).[57,58,59] This includes Indonesia's long-standing subsidised rice program, as well as its past food estate plans. The large-scale schemes created under previous national and district governments – MIFEE, the Mega Rice Project, Bulungan and Ketapang food estates (discussed below) – were not based on robust evidence nor subject to any rigorous evaluations. Indeed, during Merauke's MIFEE project, food estate rhetoric was used by the local political elite to enable land grabs for palm oil and timber extraction.[60] Meanwhile, in the case of Bulungan, local politicians in North Kalimantan are still hoping[61] for a private investment bonanza that has yet to materialise from the food estate scheme there.

Further land grabs via the 'Omnibus' Job Creation Law

After his re-election in 2019, President Widodo set about drafting his signature Job Creation Law in consultation with his Coordinating Minister for Maritime Affairs and Investment, Luhut Binsar Pandjaitan, as well as the Coordinating Minister for the Economy, Airlangga Hartarto, and the Minister for State-Owned Enterprises, Erick Thohir, all three of whom are linked to businesses operating within the natural resources sector.[62]

57 Thorburn, Craig. 'The Rise and Demise of Integrated Pest Management in Rice in Indonesia'. *Insects* 6, no. 2 (June 2015): 381–408. https://doi.org/10.3390/insects6020381.
58 Hidayat, Rachmat, Lukman Wijaya Baratha, Tree Setiawan Pamungkas, and Ahmad Munif Mubarok. 'Agrobiotechnology at The Nexus between Clientelism and The State's Authority : The Indonesian Case'. *E3S Web of Conferences* 142 (2020): 06003. https://doi.org/10.1051/e3sconf/202014206003.
59 For an example outside Indonesia, see Waqa, Gade, Colin Bell, Wendy Snowdon, and Marj Moodie. 'Factors Affecting Evidence-Use in Food Policy-Making Processes in Health and Agriculture in Fiji'. *BMC Public Health* 17 (9 January 2017): 51. https://doi.org/10.1186/s12889-016-3944-6.
60 'Pandemic Power-Grabs: Who Benefits from Food Estates in West Papua?'. Tapol and awasMIFEE, April 2022.
61 jurnalkaltara.com. '50.000 H Areal Food Estate Delta Kayan Di Bulungan Menunggu Investor', 5 July 2021.
62 Bersihkan Indonesia and Fraksi Rakyat Indonesia. 2021. Omnibus Law: Kitab Hukum Oligarki.

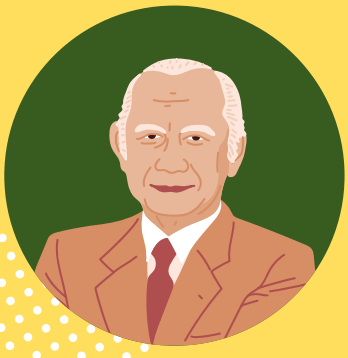
Also assisting in the drawing up of the law were the president's political allies and entrepreneurs from the Indonesian Chamber of Commerce and Industry, some of whom are linked to coal, forestry and oil palm businesses.[63] Despite an almost complete lack of transparency and public participation, and in the face of massive public street protests, the law was rammed through the House of Representatives in 2020. Notwithstanding a court ruling issued on 25 November 2021 that affirmed that the law was 'conditionally' unconstitutional, it will nevertheless remain in force for two years pending unspecified 'remedial action' by legislators.

Designed as it was with a pro-oligarchic agenda that concerned even some investors,[64] the Job Creation Law modified provisions that had originally been set out under scores of existing laws, undermining the land rights of Indigenous peoples and loosening forest protections by removing minimum forest cover requirements, whitewashing illegal palm oil plantations operating within the forest estate, and weakening environmental assessments and public participation guarantees. The law itself was followed by the issuance of numerous implementing decrees and regulations, many of which further worsened protections.

Among these regulatory changes were many that undermined food security and the livelihoods of farmers and Indigenous peoples,[65] including several that were effectively designed to enable land grabs and forest conversions for food estates. One of these was the Government Regulation on Forestry Administration that relaxed various safeguards, including the process of mapping out land rights prior to the parcelling out of forest estate land for strategic purposes, including food estates.[66] Another was an amendment that allows for land to be compulsorily acquired for food estates;[67] while yet another allows previously protected forests (*Hutan Produksi* and *Hutan Lindung*) to be cleared for food estates by designating them as 'forest estates for food security'.[68] Permissions obtained via this scheme, known as *Kawasan Hutan untuk Ketahanan Pangan* – KHKP – remain valid for 20 years but may be extended indefinitely.[69]

63 *Ibid*.
64 Thomas, Vincent F. 2020. '35 Investor Global Surati Pemerintah: RUU Ciptaker Rusak Lingkungan'. Tirto.id. 6 October 2020.
65 Komite Rakyat untuk Transformasi Sistem Pangan. 'Pasca Putusan MK 91 Terhadap Transformasi Sistem Pangan', 28 March 2022.
66 Art. 19(4)(c) and 67(3) in 'PP No. 23 Tahun 2021 Tentang Penyelenggaraan Kehutanan', 2 February 2021.
67 The Job Creation Law (UU 11/2020) amended UU No. 2 Tahun 2012 Tentang Pengadaan Tanah Bagi Pembangunan Untuk Kepentingan Umum', 14 January 2012.
68 'Permen LHK No. 24 Tahun 2020 Tentang Penyediaan Kawasan Hutan Untuk Pembangunan Food Estate'. 2 November 2020.
69 Art. 31, Permen LHK No. 24 Tahun 2020.

This KHKP regulation prompted outrage from many, including eminent economist and environmentalist, Emil Salim, who was Indonesia's first Minister of the Environment. Salim tweeted:[70]



Emil Salim

'If natural protected forests can be converted for food estates, the world will lose its only archipelagic tropical forest, the richest in the world having diverse untouched biological natural resources with potential for food and medicine. Now these ecosystems are being converted into food monocultures!'

Further regulatory moves designed to supercharge the food estate scheme – effectively vaulting it over standard checks and balances – included placing it on the official list of 'National Strategic Programs'[71] and designating it part of the government's official emergency response to the COVID-19 pandemic – i.e. the National Economic Recovery program (PEN).[72]

These numerous regulatory changes are enabling a fresh round of land grabs and are impacting Indigenous peoples and forest dwelling communities. Over 20 million ha of Indigenous lands within Indonesia have been identified by the Ancestral Domain Registration Agency (BRWA) but almost all of them have yet to gain any formal legal recognition,[73] while much Indigenous land lies within forest areas that have recently been cleared and that are currently threatened with large-scale conversions into state sponsored food estates. The package of food estate promoting regulations constitutes a violation of principles embodied under the United Nations Declaration on the Rights of Indigenous Peoples, to which Indonesia is a signatory.[74] Moreover, it is also a mistake that the UN's Special Rapporteur on the Right to Food warned governments against making in the name of promoting food security over a decade ago.[75]

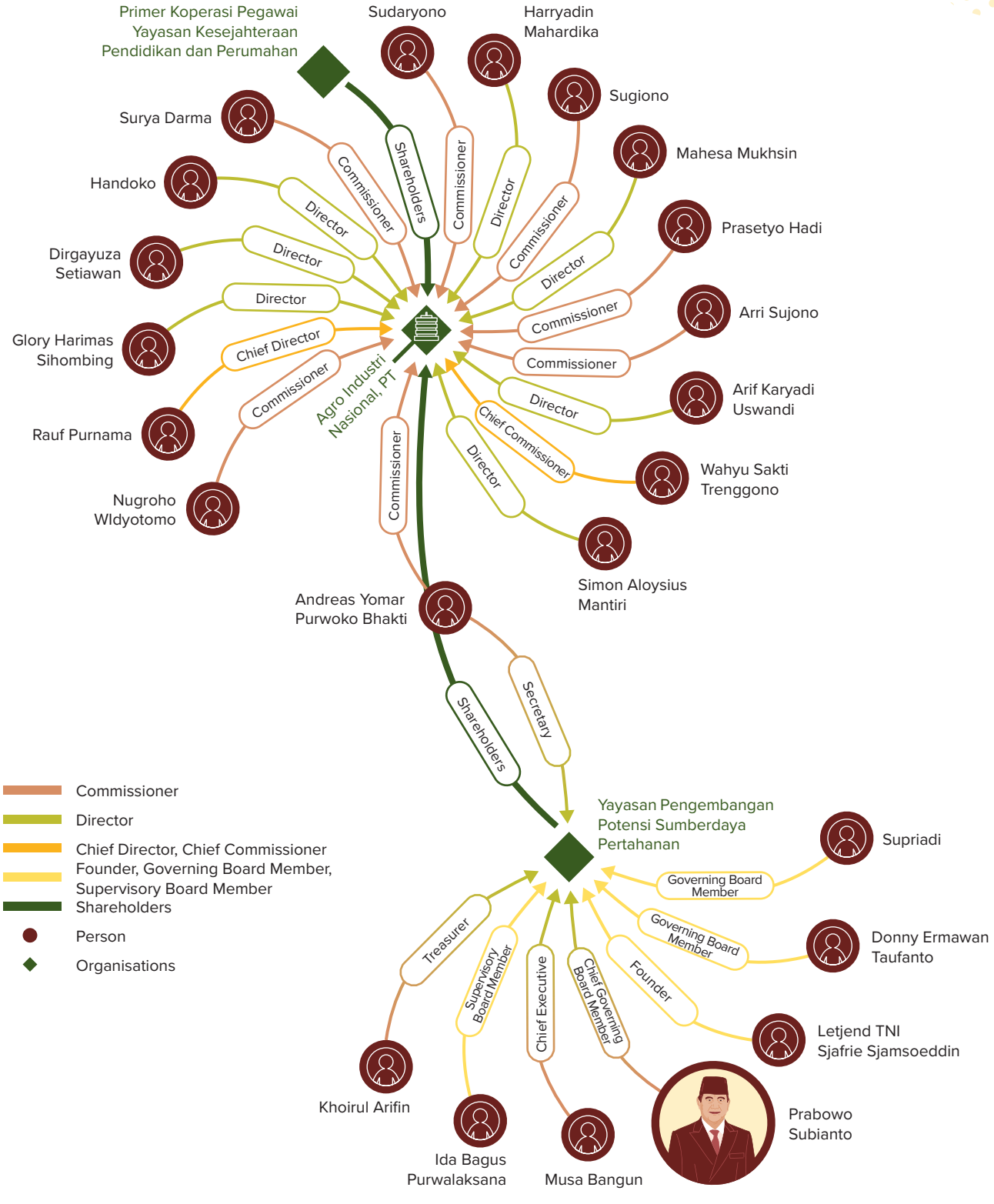
70 https://twitter.com/emilsalim2010/status/1328723963539701760 / archived.
71 Via 'PERPRES No. 109 Tahun 2020 Tentang Perubahan Ketiga Atas Peraturan Presiden Nomor 3 Tahun 2016 Tentang Percepatan Pelaksanaan Proyek Strategis Nasional', 20 November 2020.
72 'PP No. 23 Tahun 2020 Tentang Pelaksanaan Program Pemulihan Ekonomi Nasional Dalam Rangka Mendukung Kebijakan Keuangan Negara Untuk Penanganan Pandemi Corona Virus Disease 2019 (COVID-19) Dan/Atau Menghadapi Ancaman Yang Membahayakan Perekonomian Nasional Dan/Atau Stabilitas Sistem Keuangan Serta Penyelamatan Ekonomi Nasional', 11 May 2020.
73 Jong, Hans Nicholas. 'Mapping of Indigenous Lands Ramps up in Indonesia — without Official Recognition'. Mongabay Environmental News, 7 September 2022.
74 'United Nations Declaration on the Rights of Indigenous Peoples', 13 September 2007.
75 De Schutter, Olivier. 'Large-Scale Land Acquisitions and Leases: A Set of Core Principles and Measures to Address the Human Rights Challenge'. Report by the Special Rapporteur on the Right to Food (11 June), 1 January 2009.

Private sector involvement in food estates

Private companies with connections to politicians and government officials have been associated with the current round of food estate projects. In Papua province, PT Digoel Agri Jaya and PT Digoel Agri Mandiri are in the process of obtaining permits to grow corn or similar '*palawija*' food crops on forested land that has been re-zoned under the Boven Digoel district planning map to enable food estate production.[76] The two companies concerned are subsidiaries of the Digoel Agri group, itself established by Ventje Rumangkang, a founder of ex-president Susilo Bambang Yudhoyono's Democratic Party.

In another case, Tempo and The Gecko Project exposed the involvement of PT Agro Industri Nasional, known as Agrinas, in Ministry of Defence food estate cassava plantations.[77] While the Ministry of Defence denies it is working with the company in relation to its food estate activities in Gunung Mas and Merauke, local government officials have reportedly said that they understand Agrinas to be involved, and Agrinas presentation materials and staff have also claimed such involvement.[78] Agrinas is owned by a foundation controlled by Defence Minister Prabowo Subianto, and its leadership includes a number of key political operators from Prabowo's Gerindra party.[79]

76 Boven Digoel Regency Investment and One Stop Service Office letter to Greenpeace Indonesia dated 7 Jan 2022.
77 The Gecko Project. 'Rainforests Fall for Indonesia's Food Estate Programme', 14 October 2021.
78 *Ibid*.
79 *Ibid*.



PT Agrinas management and shareholders diagram. Based on official company and foundation profiles from the Ministry of Law and Human Rights, the majority (99%) shareholder of PT Agro Industri Nasional (Agrinas) on 25 September 2021 was a foundation, Yayasan Kesejahteraan Pendidikan dan Perumahan. That foundation, which has since changed its name to Yayasan Pengembangan Potensi Sumberdaya Pertahanan, has Minister of Defence Prabowo Subianto as its chief and founding board member (ketua pembina).

The association between public agencies and the private sector may involve behind-the-scenes lobbying, or may be made public in order to burnish a company's image. Cargill, the USA's second biggest private company, epitomises the modern industrial agriculture system that squeezes out Indigenous peoples and small farmers; the Indonesian arm of its business focuses on soybean imports and the production of palm oil, both commodities that have been linked to widespread deforestation, fires and land grabs in Brazil and Indonesia.[80,81] Yet the company ensured that it generated positive publicity through the funding that it contributed to a joint Indonesian Government and World Food Program project.[82,83]

Image: Cargill promotional brochure, 2018

80 Jordan, Lucy et al. 'Cargill: The Company Feeding the World by Helping Destroy the Planet'. Unearthed, 25 November 2020.
81 Greenpeace International. 'Burning down the House: How Unilever and Other Global Brands Continue to Fuel Indonesia's Fires'. 12 November 2019.
82 Cargill. 'Cargill and World Food Program', August 2018.
83 'Cargill and WFP Launched the School Children's Nutrition Program (ProGAS) in Amurang'. Cargill Indonesia, 15 November 2019.

Unhealthy subsidies and import policies

According to the UN, problems arise when government policies act to provide more support for the production and import of staples such as rice and sugar, while local production of fresh fruits and vegetables is less supported, as is the case in Indonesia. The indirect effect of such policies is to boost the ubiquity of unhealthy foods at the expense of the availability and affordability of healthy nutritious diets.[84]

Another problem arises when governments acquiesce to industry lobbying to provide subsidies to companies in order to expand their markets by turning food into fuel. In its 2015 National Medium Term Development Plan, the Government of Indonesia decried other nations' 'diversion of staple food sources such as corn, sugar cane/sugar, and wheat' for bioenergy as causing a world food crisis.[85] Yet the same plan calls for Indonesia to 'develop plantations for bioenergy in multiple locations' in order to meet biodiesel and bioethanol production targets.[86] Since 2015 the government has allocated many hundreds of millions of dollars to go to the wealthiest palm oil companies in biodiesel production subsidies; in 2017 this amounted to IDR 7.5 trillion (USD 530 million), of which half went to just one company, Wilmar.[87]

By 2022, an editorial entitled 'The coming food catastrophe' published in The Economist already warned of 'mass hunger' and lamented the fact that globally, 18% of vegetable oils are used in the production of biodiesel.[88] In addition to driving a cooking oil shortage in Indonesia, biodiesel incentives also encourage the expansion of oil palm plantations, both into forest areas but also on existing agricultural land, at the expense of food crops.

84 FAO, IFAD, UNICEF, WFP and WHO. 'The State of Food Security and Nutrition in the World 2022. Repurposing Food and Agricultural Policies to Make Healthy Diets More Affordable', 2022. https://doi.org/10.4060/cc0639en.
85 '2015-2019 National Medium Term Development Plan', 2015, p.3-8.
86 "Pembangunan perkebunan untuk bio-energi pada beberapa lokasi" 2015-2019 National Medium Term Development Plan; p.6-164
87 CNN Indonesia. 'Lima Konglomerat Sawit "Disuntik" Subsidi Mega Rp7,5 Triliun', 17 January 2018.
88 The Economist. 'The Coming Food Catastrophe', 19 May 2022.

02. Food Estates: the wrong answer

The Indonesian Government is rightly taking notice of the growing threat of food insecurity. Sadly, however, one of its most prominent answers to this problem – i.e. the launching of 'Food Estates' as a Nationally Strategic Project – risks throwing fuel on the fire, perhaps literally in many cases. Sacrificing further forests and peatlands to broadscale monocrop agriculture will worsen, not improve, Indonesia's level of food security and will increase climate-wrecking peat fires and carbon emissions. Indeed, around a third of global greenhouse gas emissions resulting from global agriculture are the result of the creation of new farmland.[89] The new Food Estates will also support the production of less-healthy staples such as rice while reducing access to diverse and healthy forest foods for local communities.

89 Gautam, Madhur, David Laborde, Abdullah Mamun, Will Martin, Valeria Pineiro, and Rob Vos. 'Repurposing Agricultural Policies and Support: Options to Transform Agriculture and Food Systems to Better Serve the Health of People, Economies, and the Planet'. Washington, DC: World Bank, 24 January 2022.

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An excavator doing a land clearing activity at forest zone area that will be used as food plantation area for Food Estate project in Sepang, Gunung Mas, Central Kalimantan. (1°26'53.57"S 113°59'22.37"E). 06 March 2021.

Ignoring insights from epic eco-failures

Food estates are nothing new to Indonesia and the country's most notorious past food estate project was instigated by President Suharto, who in 1995 signed a Decree on Peatland Development for Food Crop Production.[90] This decree established the '*Proyek Lahan Gambut Satu Juta Hektar*' (One Million Hectare Peatland Project), usually referred to in English as the Mega Rice Project (MRP), in the peatlands of Central Kalimantan.

Indigenous Dayak communities are traditional landowners in these expansive peat landscapes, which cover around 1.5 million hectares of land between several major rivers, along which many of their settlements were originally located. Their traditional methods of '*ladang*' or swidden rice cultivation were sustainable and small-scale in nature and involved the use of shallow peat found within a few hundred metres of riverbanks, while in the coastal areas of the peatlands, the '*handel*' hydrological management system was employed.[91]

Unfortunately, however, this traditional wisdom was ignored or misunderstood[92] when the central government attempted to extend hydrological management and cultivation away from the riverbanks and deep into the peat domes on a massive scale, using grids based around mega-canals. A 187 km long main canal was dug to connect the Kahayan, Kapuas and Barito rivers, along with a further 958 km of primary canals across four 'blocks', and almost 2,000 km of secondary and tertiary canals.[93]

90 Keputusan Presiden Nomor 82 Tahun 1995 tentang Pengembangan Lahan Gambut untuk Pertanian Tanaman Pangan di Kalimantan Tengah.
91 Limin Suwido, Jentha, and Yunsiska Ermiasi. 'History of the Development of Tropical Peatland in Central Kalimantan, Indonesia'. *Tropics* 16, no. 3 (2007): 291–301. https://doi.org/10.3759/tropics.16.291.
92 Suwido et al, ibid.
93 Houterman, J., and H. P. Ritzema. 'Land and Water Management in the Ex-Mega Rice Project Area in Central Kalimantan', 2009.

The natural peat swamp forest – the native habitat of the Bornean orangutan[94] and many other endemic species[95] – was cleared and wide areas were planted with rice. Canal drainage proved highly effective in drying out the deep peat, so much so that during the dry El Niño conditions of 1997-1998, massive fires struck the MRP area. Moreover, the drainage had other unintended destructive consequences – illegal loggers now had access to extract timber,[96] while the exposed peat often became difficult to rewet. The drained peat domes began to subside whilst also releasing massive amounts of stored carbon.[97] Transmigrant families trying to grow rice also discovered that the peat soil was characterised by naturally very low levels of fertility.[98]

Severe fires subsequently raged once again in the ex-MRP landscape during 2015 and not only ravaged local communities and hit remaining orangutan habitats[99] but were a major contributor to a disastrous smoke haze that afflicted Indonesia and neighbouring countries that year (see Greenpeace Southeast Asia's 'Burning Up'[100] report). Modelling estimates of the health impacts caused by exposure to this smoke range from 44,000[101] to 100,300[102] premature deaths.

An orangutan drinks river water from an item of plastic rubbish as the air is filled with smoke from forest fires at Salat island, Palangkaraya, Central Kalimantan in 2019. During that time nearly 2,000 major fires were burning across Indonesia in peatland and forest cleared for agriculture. 23 September 2019.

© Jurnasyanto Sukarno / Greenpeace

94 Vogel, Erin R., Shauhin E. Alavi, Sri Suci Utami-Atmoko, Maria A. van Noordwijk, Timothy D. Bransford, Wendy M. Erb, Astri Zulfa, Fransiska Sulistyo, Wartika Rosa Farida, and Jessica M. Rothman. 'Nutritional Ecology of Wild Bornean Orangutans (Pongo Pygmaeus Wurmbii) in a Peat Swamp Habitat: Effects of Age, Sex, and Season'. *American Journal of Primatology* 79, no. 4 (2017): e22618. https://doi.org/10.1002/ajp.22618.

95 Thornton, S.A., . Dudin, S.E. Page, C. Upton, and M.E. Harrison. 'Peatland Fish of Sebangau, Borneo: Diversity, Monitoring and Conservation'. *Mires and Peat*, no. 22 (19 October 2018): 1–25. https://doi.org/10.19189/MaP.2017.OMB.313.

96 Ritzema, Henk, Suwido Limin, Kitso Kusin, Jyrki Jauhiainen, and Henk Wösten. 'Canal Blocking Strategies for Hydrological Restoration of Degraded Tropical Peatlands in Central Kalimantan, Indonesia'. *CATENA* 114 (1 March 2014): 11–20. https://doi.org/10.1016/j.catena.2013.10.009.

97 Hooijer, A., S. Page, J. Jauhiainen, W. A. Lee, X. X. Lu, A. Idris, and G. Anshari. 'Subsidence and Carbon Loss in Drained Tropical Peatlands'. *Biogeosciences* 9, no. 3 (20 March 2012): 1053–71. https://doi.org/10.5194/bg-9-1053-2012.

98 Yuwati, Tri Wira, Dony Rachmanadi, Pratiwi, Maman Turjaman, Yonky Indrajaya, Hunggul Yudono Setio Hadi Nugroho, Muhammad Abdul Qirom, et al. 'Restoration of Degraded Tropical Peatland in Indonesia: A Review'. *Land* 10, no. 11 (November 2021): 1170. https://doi.org/10.3390/land10111170.

99 International Peatland Society. 'Impacts of the 2015 Fire Season on Peat-Swamp Forest Biodiversity in Indonesian Borneo'. Accessed 2 November 2022.

100 'Burning Up: Health Impact of Indonesia's Forest Fires and Implications for the Covid-19 Pandemic' Greenpeace Southeast Asia, 9 September, 2020.

101 Kiely, Laura, Dominick V. Spracklen, Christine Wiedinmyer, Luke A. Conibear, Carly L. Reddington, Stephen R. Arnold, Christoph Knote, et al. 'Air Quality and Health Impacts of Vegetation and Peat Fires in Equatorial Asia during 2004 – 2015'. *Environmental Research Letters*, 2020. https://doi.org/10.1088/1748-9326/ab9a6c.

102 Koplitz, S. N., Loretta J. Mickley, Miriam E. Marlier, Jonathan J. Buonocore, Patrick S. Kim, Tianjia Liu, Melissa P. Sulprizio, et al. 'Public Health Impacts of the Severe Haze in Equatorial Asia in September–October 2015: Demonstration of a New Framework for Informing Fire Management Strategies to Reduce Downwind Smoke Exposure'. *Environmental Research Letters* 11, no. 9 (September 2016): 094023. https://doi.org/10.1088/1748-9326/11/9/094023.

Academics, environmentalists and the general public afflicted by smoke haze were all critical of the MRP, while many transmigrant families voted with their feet and left the project area. The MRP scheme was officially abandoned via the introduction of a new regulation in 1999[103] and government experts later acknowledged that the project had been a failure.[104]

However, only a decade after the collapse of the MRP, the hard lessons that had been learnt about destructive food estate schemes on a grand scale had seemingly been forgotten. President Yudhoyono and Merauke Bupati, Johanes Gluba Gebze, embarked on a project that covered an even larger area within a single landscape: the Merauke Integrated Food and Energy Estate (MIFEE).[105] Various maps indicated a planned extent that ranged from 0.2 million ha to 2.8 million ha.[106] Ultimately, official plans settled on 1.2 million hectares of natural vegetation that was slated to be cleared in Papua province's Merauke regency to make way for industrial agriculture and plantations, including rice, sugar cane and palm oil.

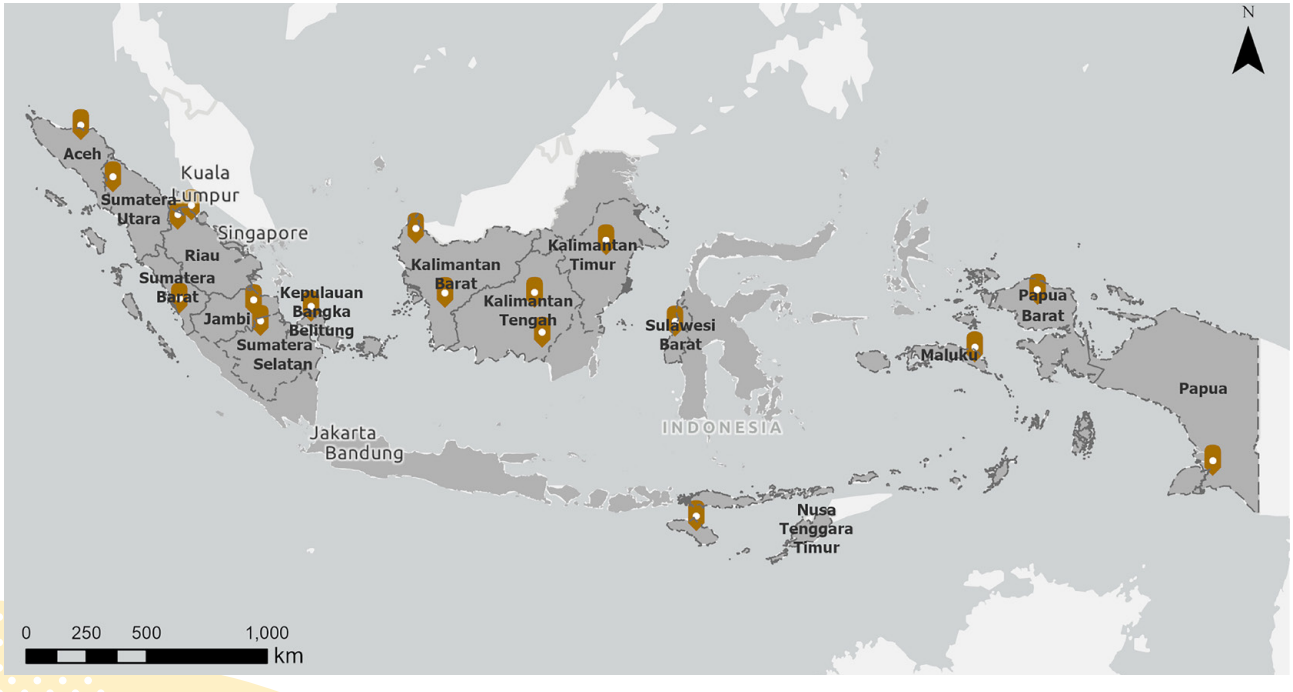
Measured against its stated goal of generating increased food supply, MIFEE failed just as badly as the MRP, as only a tiny fraction of planned food cropland eventuated. For example, only around 400 ha of rice were reported to have survived in Medco's 8,000 ha concession in 2020.[107] However, this mega project did result in the massive issuance of palm oil plantation concessions, almost 100,000 ha of which have already been cleared and planted.[108] The project has also resulted in the dislocation and dispossession of Indigenous landowners, preventing access to their means of sustenance and thus amounting to a serious violation of their human rights, including their right to food.[109]

In addition to MIFEE, President Susilo Bambang Yudhoyono also embarked on food estate programs in the Kahayan Delta of Bulungan district, North Kalimantan in 2011; and in Ketapang, West Kalimantan in 2013. The Bulungan and Ketapang food estates have also been branded failures[110,111,112] both in terms of their ability to provide work and produce rice. Only 0.1% of the 100,000 ha Ketapang project was successfully planted, and likewise in Bulungan, fewer than 100 ha of the 50,000 ha project area is reportedly producing rice.[113] Worse still, the projects actually decreased food security as a result of the environmental damage to the area that had been caused by forest clearing and peat drainage.[114,115] The Ketapang food estate was also marked by accusations of corruption at the highest levels of government, with fines and prison sentences ultimately being handed to company and government officials.[116,117,118]

103 'KEPPRES No. 80 Tahun 1999 Tentang Pedoman Umum Perencanaan Dan Pengelolaan Kawasan Pengembangan Lahan Gambut Di Kalimantan Tengah', 30 September 1999.
104 Tempo. 'Proyek Lahan Gambut Sejuta Hektar, Gagal', 8 October 2003.
105 'Pandemic Power-Grabs: Who Benefits from Food Estates in West Papua?'. Tapol and awasMIFEE, April 2022.
106 Chao, Sophie. *In the Shadow of the Palms: More-Than-Human Becomings in West Papua*. Duke University Press, 2022.
107 Sulistyowati, Retno. 'End of Journey for Kurik's Corn'. Tempo, 11 August 2020.
108 Data from Nusantara Atlas, cited in 'Pandemic Power-Grabs: Who Benefits from Food Estates in West Papua?'. Tapol and awasMIFEE, April 2022.
109 Suryani, Dini. 'Structural Violation Of Indigenous Human Rights In Indonesia: A Case Study Of Merauke Integrated Food And Energy Estate (Mifee) In Papua'. *Jurnal Masyarakat Dan Budaya* 18, no. 1 (2016): 97–109.
110 Koran Kaltara. 'Program Food Estate Di Bulungan Dinilai Gagal', 6 December 2019.
111 Republika Online. 'Food Estate Terdahulu Gagal, Bagaimana Food Estate Kalteng?', 22 October 2020.
112 dw.com. 'Rencana Pengembangan Food Estate di Kalteng Terancam Gagal?', 26 June 2020.
113 Republika Online. 'Serikat Petani: Food Estate tak Bisa Atasi Krisis Pangan', 26 October 2020.
114 Kamin, Anggalih Bayu Muh, and Reza Altamaha. 'Modernisasi Tanpa Pembangunan Dalam Proyek Food Estate Di Bulungan Dan Merauke'. BHUMI: Jurnal Agraria Dan Pertanahan 5, no. 2 (2019): 163–79. https://doi.org/10.31292/jb.v5i2.368.
115 McCarthy, John F., and Krystof Obidzinski. 'Responding to Food Security and Land Questions: Policy Principles and Policy Choices in Kalimantan, Indonesia'. BRICS Initiatives for Critical Agrarian Studies (BICAS), May 2015.
116 Tempo.co. 'Suap Kasus Cetak Sawah, Brotoseno Divonis 5 Tahun Penjara', 14 June 2017.
117 Pontianak Post. 'Miftahudin Kembalikan Kerugian Negara', 29 August 2019.
118 Ketapang news. 'Dua Terdakwa Cetak Sawah Ketapang Divonis Penjara', 19 October 2017.

The 2020 food estate plans

The new food estate scheme announced in 2020 got underway with a renewed focus on the peatlands of Central Kalimantan, a quarter century after President Suharto first turned his attention to the area for his Mega Rice Project back in 1995. This was followed by announcements of plans for North Sumatra, South Sumatra, Jambi, East Nusa Tenggara, Papua and Papua Barat provinces.



Map: Provinces where food estate Areas of Interest, both civilian and military, have been announced since 2020.

The food estate plan had an initially announced budget of IDR 1.9 trillion (USD 122 million) for the 2020 - 2021 period.[119,120] The later 2022 national work plan included food estate allocations worth IDR 4.1 trillion.[121] No fewer than twelve ministries, two statutory agencies and potentially dozens of provincial and district governments were to become involved in the new food estate push.[122]

However, the question remained as to exactly how much land the food estate would ultimately consume and where it would be located. In this regard, different arms of government announced conflicting figures at different times and with differing levels of implied certainty. In general though, the magnitude of the figures was extremely concerning. Indeed, by some accounts the area of land affected by the food estate scheme may have totalled 2.3 million hectares.[123]

119 Indonesia.go.id Portal Informasi Indonesia. 'Food Estate, Lumbung Baru di Kalimantan Tengah', 9 July 2020.
120 Kementerian Pertanian Republik Indonesia. 'Food Estate Kalteng Sulap Rawa Jadi Kawasan Buah Dan Sayur', 2020.
121 'PERPRES No. 115 Tahun 2021 Tentang Pemuthakiran Rencana Kerja Pemerintah Tahun 2022', 30 December 2021.
122 'PERPRES No. 122 Tahun 2020 Tentang Pemutakhiran Rencana Kerja Pemerintah Tahun 2021', 29 December 2020.
123 Tempo. 'Bencana Ekologis Food Estate Jokowi'. Tempo, 9 October 2021.

Ministry of Defence's proposed food estate areas

On 29 March 2021, the Minister for the Environment and Forestry made a presentation to House of Representatives Commission IV. As a part of the presented documentation, the Ministry of Environment and Forestry (MoEF) included details of food estate areas proposed by the Inspector General of the Ministry of Defence totalling 775,757 ha, as summarised in the table below.[124] The MoEF presentation noted that some Ministry of Defence request letters came without location maps or with location maps that were 'unclear'. It also stated that almost all of the Ministry of Defence's proposed areas for which maps were provided overlapped with either the Forest Moratorium Map (PIPPIB), protected peat areas or existing forestry concession areas.

Province	Proposed food estate area (ha)
Bangka Belitung	32,603
West Sumatra	43,806
Jambi	152,545
Riau	42,340
North Sumatra	11,968
Aceh	28,966
West Kalimantan	36,000
East Kalimantan	21,000
Central Kalimantan	113,827
Maluku	47,395
West Sulawesi	37,222
South Sumatra	36,069
Papua	172,016
TOTAL	**775,757**

Table: Ministry of Defence proposed food estate areas, as submitted to the MoEF and reported during the MoEF presentation to the House of Representatives.

In another document issued by the MoEF, also dated 2021, even larger figures were presented for the Ministry of Defence food estate proposals: 1,054,826 ha nationwide, over half of which would require forest estate release or 'forest estate for food security' (KHKP) status.[125]

124 See pp 87-94 in Menteri Lingkungan Hidup dan Kehutanan. Note that the presentation mentions the total as being different by around 10,000 ha, the discrepancy is presumably an error. 'Rapat Kerja Menteri Lingkungan Hidup Dan Kehutanan Dengan Komisi IV DPR RI'. 29 March 2021.

125 Ditjen Planologi Kehutanan dan Tata Lingkungan KLHK, 'Penyediaan Lahan Food Estate Provinsi Kalimantan Tengah', 1 February 2021.

What's really behind the food estate policies?

Given that previous food estate plans in Indonesia ultimately proved unsuccessful, revisiting this approach suggests an absence of 'evidence-based' policymaking. Instead, it seems to support recent findings produced in a study of Indonesian Government policymaking by the Indonesian Centre for Law and Policy Studies which affirmed that policy instruments tend to be selected first without prior analysis and tend to be more political than rational in nature.[126]

Food estate policies, while purportedly based only on rational considerations of food security, may be driven at least partially by other, less publicly stated motivations. One of these motivations appears to be security fears that are driving a push to 'occupy' areas that are perceived to be unpopulated, potentially unfriendly to the central government or in Indonesia's border areas.[127] Most of the areas chosen for food estates, both past and present, are notable for also being associated with government-sponsored transmigration centres: Central Kalimantan's peatlands, Bulungan in North Kalimantan, Keerom, Boven Digoel and Merauke – the latter four are all located at Indonesia's northern or eastern borders. The continuing choice to promote food estates in these locations appears to be partly an attempt to assist the residents of transmigration projects.[128]

Food estate policies, both past and present, were presented to the public on the premise of achieving not only '*ketahanan pangan*' (food security) for all Indonesians but also '*swasembada pangan*' (food independence or food self-sufficiency) as a security measure for the nation itself. This was a primary motivation underlying the Mega Rice Project during the Suharto regime,[129] as well as the MIFEE during Susilo Bambang Yudhoyono's presidency.[130] President Widodo, while not himself an army general as his two predecessors were, has entrusted his food estate ambitions to two former army generals turned politicians: Prabowo Subianto and Luhut Binsar Pandjaitan. During his initial announcements concerning the food estate, Widodo cited not only the need to anticipate a COVID-19 driven food crisis but also a desire to 'reduce dependence on food imports'.[131] During his own unsuccessful bid for the Indonesian presidency in 2014, Prabowo himself promised that if elected, he would convert two million hectares of 'damaged' forest to new rice fields and a further two million to biofuel production.[132]

126 Blomkamp, Emma, M Nur Sholikin, Fajri Nursyamsi, Jenny M Lewis, and Tessa Toumbourou. 'Understanding Policymaking In Indonesia: In Search Of A Policy Cycle'. *The Policy Lab (The University of Melbourne) and the Indonesian Centre for Law and Policy Studies (PSHK)*, June 2017.
127 Kamin, Anggalih Bayu Muh, and Reza Altamaha. 'Modernisasi Tanpa Pembangunan Dalam Proyek Food Estate Di Bulungan Dan Merauke'. BHUMI: Jurnal Agraria Dan Pertanahan 5, no. 2 (2019): 163–79. https://doi.org/10.31292/jb.v5i2.368.
128 See objective item no. 02.04.04.14 in 'PERPRES No. 115 Tahun 2021 Tentang Pemuthakiran Rencana Kerja Pemerintah Tahun 2022', 30 December 2021.
129 'Lahan Gambut Sejuta Nista'. Tempo, 6 April 1999.
130 Salim, Zamroni. 'Food Security Policies in Maritime Southeast Asia: The Case of Indonesia'. International Institute for Sustainable Development, 2010.
131 Sapariah Saturi, Lusia Arumingtyas, and Richardo Hariandja. 'Food Estate Melaju Di Tengah Banjir Kritik'. Mongabay.co.id, 30 September 2020.
132 Sukmana, Yoga. '2 Juta Hektar Lahan Pertanian dan Bio Etanol Dijanjikan Prabowo'. KOMPAS.com, 15 June 2014.

Often, companies end up controlling food estate areas, primarily in relation to export-oriented palm oil production. As a part of the national government's original rhetoric surrounding Papua's MIFEE project, the project area was ostensibly allocated to support a range of food cropping activities, including sugar cane and rice production. However, in the end, palm-oil companies were the area's main beneficiaries. In the case of Central Kalimantan's MRP, plantation companies were a major beneficiary of Suharto's failed food estate plan. Indeed, between 2004 and 2012, palm-oil companies were granted over half a million hectares of concessions within the peat landscape that had been drained in the name of rice production.[133] Meanwhile, in West Kalimantan, the Ketapang food estate initially involved a number of companies that reportedly cleared around 5,000 ha, of which only 100 ha are currently still planted with rice.[134]

While the Dutch colonial government began the process of replacing autonomous traditional agriculture with forced labour and prescribed crops, the post-independence political and economic order has continued this process. State-sponsored monoculture planting programs and capitalist relations can leave farmers in virtual economic slavery before their crops are even harvested, as related in the following account from Lembor, Flores:

> **'The debt cycle begins when traders give capital loans to peasants to support cultivation, including paying tractor costs, buying pesticide and fertiliser, and paying workers' wages. After harvest, peasants sell their rice to rice traders in order to cover their debts.'[135]**

If the Ministry of Agriculture's planned 'farmer corporation' (*korporasi petani*) approach[136] is imposed without careful local planning, as well as the full agreement and empowerment of participating farmers, then it risks community members' land being controlled by an incorporated body that may eventually leave them indebted, or as mere contract workers, alienated from what was once their own land.

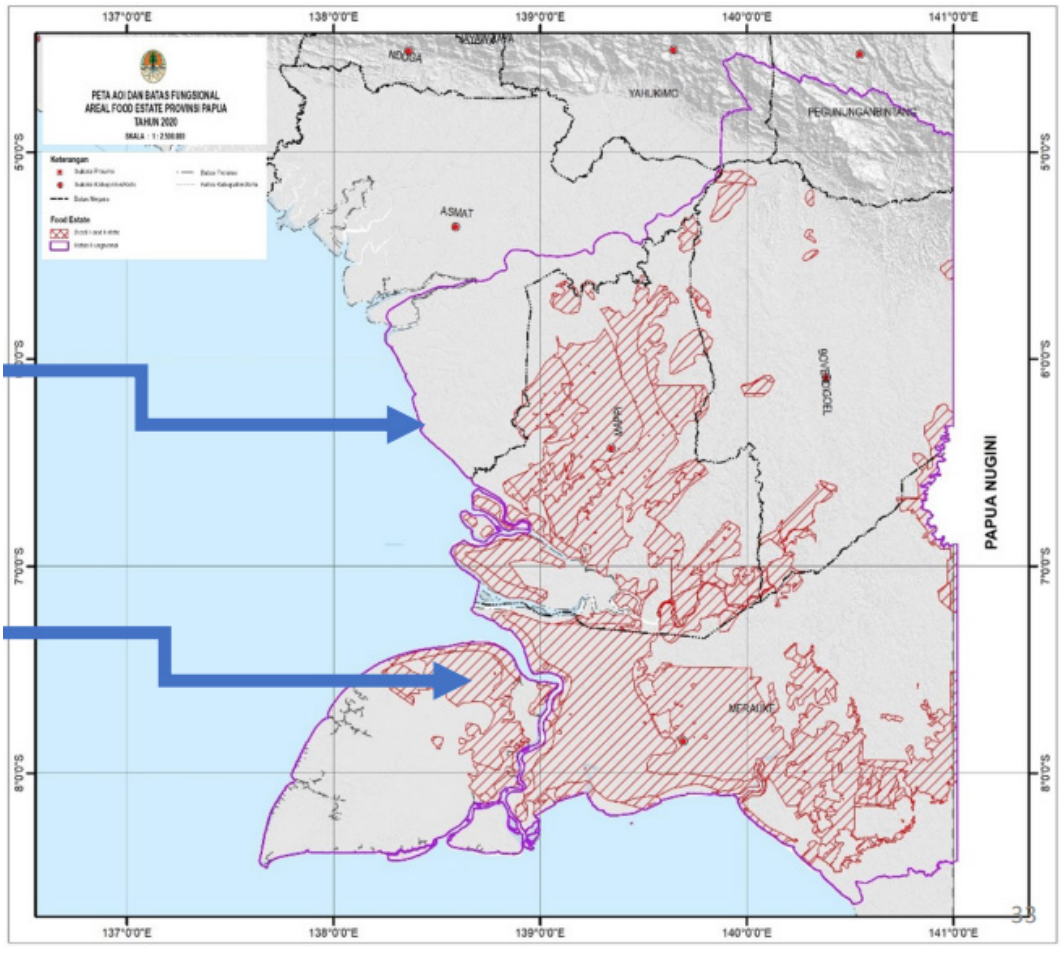
133 The total was 544,259 ha of palm oil concessions granted in the ex-MRP area between 2004 and 2012; See p.3-37 Ministry of Environment and Forestry 'Laporan Akhir Kajian Lingkungan Hidup Strategis | KLHS Cepat | Pengembangan Lahan Pangan Nasional di Kalimantan Tengah'. 17 June 2020.
134 Antara News 'Anggota DPR RI Dukung Food Estate Ketapang'. 25 March 2015.
135 Haryanto, Venansius. 'Development, Depoliticisation, and Manggaraian Peasants' Resistance in Western Flores'. *PCD Journal* 7, no. 1 (18 June 2019): 115. https://doi.org/10.22146/pcd.35195.
136 Biro Perencanaan Kementrian Pertanian. 'Grand Design Pengembangan Kawasan Food Estate Berbasis Korporasi Petani Di Lahan Rawa Kalimantan Tengah', December 2020.

03. Papua case studies

As our timeline shows, plans for 'food estates' are not new to Indonesia and stretch from the colonial era, through the New Order regime, to the current post-Reformasi era. Some have involved misguided initiatives being formulated in Jakarta in the name of food sovereignty or out of concern for food security, while others have been driven by local politicians looking for thematic justification for their desire to parcel out Indigenous forestland to investors.

In the southern Papuan regencies of Merakue, Boven Digoel and Mappi, civilian schemes administered by local government continue to be planned and developed, the locations for which, especially in Merauke, are primarily influenced by spatial planning dating from the MIFEE project. These involve the identification of Agricultural Production Centres under the broader Sustainable Food Farmland scheme. Overlaid upon this is President Widodo's announcement of renewed plans for a food estate in these three southern Papua regencies with an initial 'Area of Interest' totalling 3.2 million ha (Merauke: 1,780,000 ha; Mappi: 1,289,000 ha; and Boven Digoel: 166,000 ha.) as seen in the map below: [137]

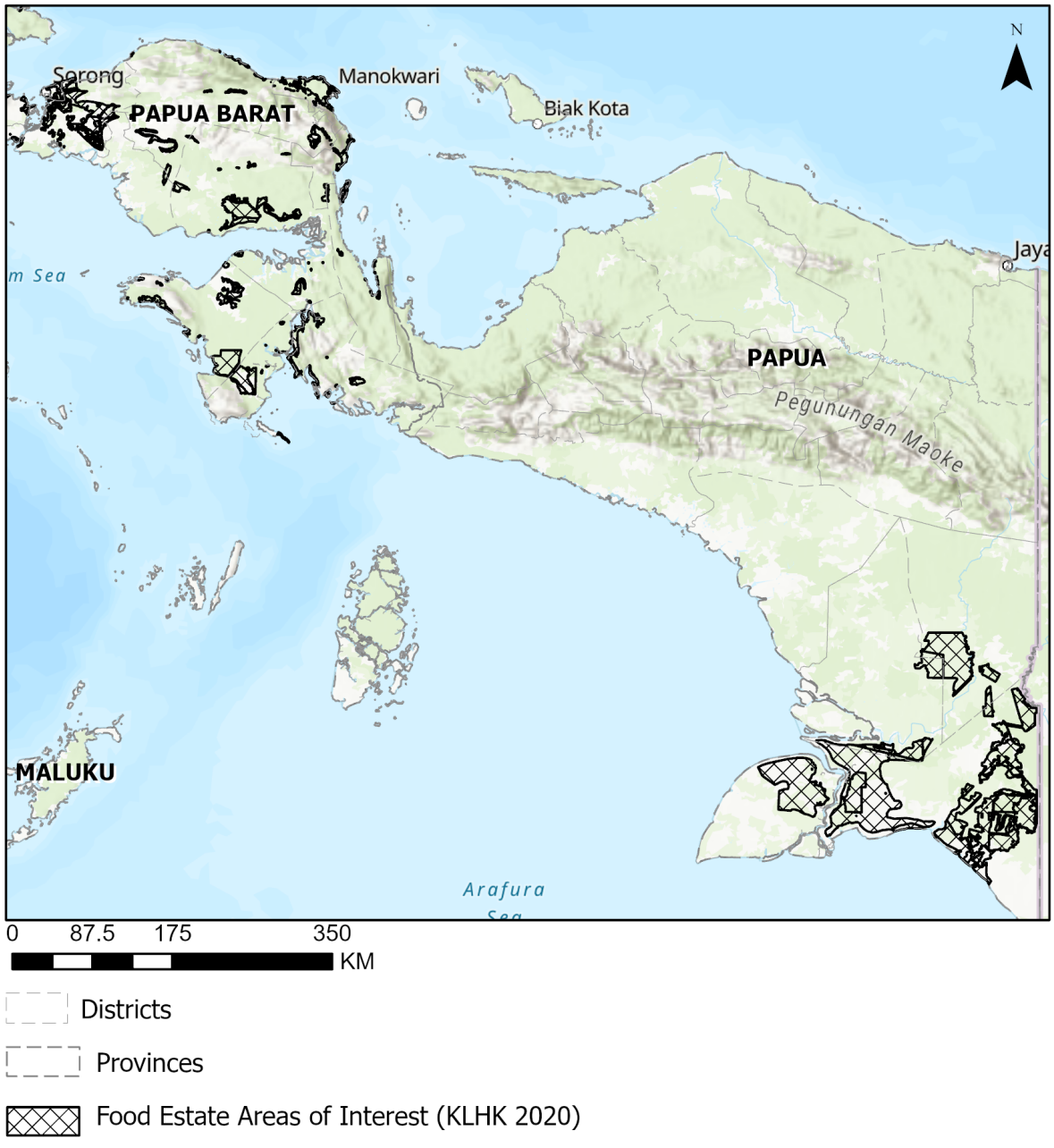
137 3,234,658 hectares; See p. 33-34 of Kementerian Lingkungan Hidup dan Kehutanan 'Program Ketahanan Pangan Di Dalam Kawasan Hutan', 29 March 2021.



Map: Excerpt from MoEF presentation to House of Representatives, showing 3.2 million ha Area of Interest for food estate (red shading) in southern Papua.[138]

Meanwhile, a military-run scheme is being implemented under the auspices of the Ministry of Defence's Strategic Logistics Reserve Agency. Further involvement of security agencies has come via a project that is being sponsored by the State Intelligence Agency (BIN) and endorsed by acting Papua Barat Governor, Paulus Waterpauw, the ex-head of national police intelligence.[139] Both types of schemes, civilian and military, are discussed in the regency case studies below. The following map shows proposed food estate locations, both civilian and military, across Papua and Papua Barat provinces as indicated in sources including a presentation by the MoEF in 2020.[140]

138 Kementerian Lingkungan Hidup dan Kehutanan 'Program Ketahanan Pangan Di Dalam Kawasan Hutan', 29 March 2021.
139 'Rombongan Papua Muda Inspiratif Dan Deputi IV Intelijen Ekonomi BIN Berjumpa Pj. Gubernur Papua Barat Dan Bupati Manokwari. Apa Yang Dibahas?' Info Papua Barat (blog), 20 August 2022.
140 Direktorat Jenderal Planologi Kehutanan Dan Tata Lingkungan, KLHK. 'Rencana Operasional Pemulihan Ekonomi Nasional Food Estate', 2020.



Map: Proposed food estate locations, both civilian and military, across Papua and Papua Barat provinces as indicated in a presentation by the MoEF in 2020.

Excavators clear Sago, the region's food staple, to make way for palm oil plantations. 08 October 2008.

Indigenous Papuans' experience of food estate plans

Environmental anthropologist, Sophie Chao, relayed an account given by the head of a Marind[141] clan of the launch of the MIFEE project at an event that was held in his homeland in Merauke on August 11, 2010:

> 'It was a hot day. There was dust everywhere, raised by the government convoys and military trucks. The dust stung our eyes and made the children cry. The government brought oil palm company bosses with them from [Jakarta]. They gave us instant noodles, pens, bottles of water. They also gave us cigarettes—the expensive kind. They talked a lot about MIFEE. MIFEE this, MIFEE that... but we didn't understand what MIFEE was. We did not know what oil palm was because oil palm does not live in our forests. Then, the government officials and the oil palm bosses left. They never returned to the village. They promised us money and jobs. They said MIFEE would provide us with food. I thought that they would plant yams, vegetables, and fruit trees. Instead, they planted oil palm. They planted oil palm everywhere they could. They turned the whole forest into oil palm. They cut down all the sago to plant oil palm. This is what happened. Since then, everything is *abu-abu* ("gray" or "uncertain")."[142]

141 This name is used most commonly in English publications, but the Marind people are also known as Malind or Malind-Anim within Indonesia – see Betaubun, Martha, and Desy Eva Laila Rokhmah. 'Marind (Malind–Anim) Language Preservation In Merauke Regency, Papua, Indonesia'. Linguistik Indonesia 39, no. 2 (16 August 2021): 205–15. https://doi.org/10.26499/li.v39i2.200.

142 Chao, Sophie. *In the Shadow of the Palms: More-Than-Human Becomings in West Papua*. Duke University Press, 2022. p3.

This account brings together much that is wrong with the government's 'food estate' approach, an approach that persists until now: a top-down plan cooked up by government and self-interested companies; no attempt at a genuine, thorough consultation and consent process with Indigenous landowners; no attention to ensuring diverse, locally appropriate food systems; forest destruction; land theft; perpetual uncertainty; military involvement; broken promises; and ultimately, no improvement in food security.

Transmigration, which has tended to go hand in hand with Indonesian food estate projects, has a disruptive and dispossessing impact on Indigenous peoples. The scale of food estate plans in Merauke will require more labour than is locally available. For example, it has been estimated that establishing a 30,000 ha food estate will require 4 million person-days of work.[143] This will lead to massive inwards migration, further overwhelming Indigneous communities and threatening to swamp their unique cultural identities. Indeed, this was a stated aim of Indonesia's early transmigration schemes, described in a retrospective account that was published by the agency responsible: 'The acknowledged aim of the Ministry of Transmigration is to contribute to the country's unity by erasing local particularisms'.[144] Accounts of transmigration-fuelled efforts to transform Merauke's lowland swamps and rainforest into rice fields claim that the area's Indigenous Marind people were initially encouraged to participate. However, by the 1990s, almost all of them had left the rice fields and 'returned to their homes in the forest'.[145]

A recent study of the links between forests and nutrition in Papua looked at transitions in diet, food sufficiency and security.[146] While the study's data was collected in Papua Barat province, it included focus group discussions with Indigenous Papuans in a relatively well-connected coastal community, as well as a more remote inland community, providing useful insights into issues in the area of the planned southern Papua food estate, which also includes varying degrees of transportation connectivity. As many Papuan NGOs have observed, the results indicate a move away from a varied traditional diet obtained from gardens and forests, towards store-bought 'processed' and 'ultra-processed' foods. In studies conducted elsewhere, this transition has been linked to increased health problems, and indeed, in Papua Barat, 25% more adults are now overweight or obese in comparison with Indonesia's national average, the study noted.

143 Nugraha, Indra. 'Pelibatan Petani Dalam Proyek Food Estate Di Kalteng Tak Jelas'. Mongabay.co.id, 24 September 2020.
144 Levang, Patrice, and Olivier Sevin. '80 Years of Transmigration in Indonesia 1905 - 1985'. Planning Bureau, Department of Transmigration, 1989.
145 Indrajaya, Dimas Wahyu. 'Sejarah Hari Ini (7 Mei 1994) - Panen Raya di Merauke', 7 May 2020.
146 Renwick, Kerry, Satoshi Yamazaki, Mulia Nurhasan, Agus Maulana, Desy Ariesta, Avita Usfar, Lucentezza Napitupulu, et al. 'Nutrition and Sustainable Diets, a Section of the Journal Frontiers in Sustainable Food Systems Toward a Sustainable Food System in West Papua, Indonesia: Exploring the Links Between Dietary Transition, Food Security, and Forests'. Frontiers in Sustainable Food Systems 5 (1 March 2022): 789186. https://doi.org/10.3389/fsufs.2021.789186

A traditional seasonally changing diet of fresh green vegetables and fruit, sago, yams, fish and 'bush' meat does not depend on family access to regular cash income, and is therefore generally more secure. Moreover, discussion group participants in the above forests and nutrition study reinforced what published ethnographic research has established beyond doubt, namely that Indigenous cultural identity is inextricably tied to peoples' local natural food systems. In this regard, the national government's imposition of 'outside' foods – such as *raskin* subsidised rice – devalues traditional Papuan foods, and by extension, Papuan culture. The impact of this phenomenon on Indigenous Peoples has been described as 'gastrocolonialism'.[147] Indigenous Marind woman and activist, Rosa Biwangko Gebze Moiwend, put the cultural threat posed by food and energy estate plans this way:

> 'Our native language is more infrequently being spoken, the reason being that language is inseparable from land, water, forests, livestock, things that are all part of an inseparable unity. Should any of these elements be lost, the language gets lost too. Stories that pass down through the generations from our ancestors (Dema) become more and more difficult to understand because the sacred borders are replaced by rice-fields, fields of maize and palm oil plantations. The identity of the Malind people is gradually lost along with the destruction of the natural features that are the symbol of each clan. The Gebze with their coconut symbol, the Mahuze with their sago symbol, the Basiks with their pig symbol, the Samkki with their kangaroo symbol, the Kaize with their Kasuari and Balagaise (falcon birds) symbol; everything will get lost. In other words, the MIFEE food project will lead to the annihilation of the Malind people.'[148]

147 Chao, Sophie. 'Gastrocolonialism: The Intersections of Race, Food, and Development in West Papua'. The International Journal of Human Rights 26, no. 5 (28 May 2022): 811–32. https://doi.org/10.1080/13642987.2021.1968378.

148 Biwangko Gebze Moiwend, Rosa. 'A Small Paradise That Will Be Annihilated: View from Merauke, West Papua', 2010.

A Papuan official working for the Boven Digoel planning agency commented in an interview for this report that 'agreeing with the food estate program would mean agreeing with genocide. Genocide not in the sense of directly killing people, but by taking the land that their lives depend on in the name of food.'[149] It seems the official shares the conclusion reached in a recent academic analysis that the MIFEE project is a force for 'ecologically induced genocide' for the Indigenous Marind people.[150]

While access to subsidised rice and other store-bought food was a welcome convenience for many participants in the Papua forests and nutrition study (above), this has been observed to reduce participation in the planting and maintenance of traditional food gardens.[151] The result is a dangerous dependence on food that has to be bought, meaning that if supply is interrupted or a family runs out of cash, then food security is impacted. In fact, this is to some extent what occurred in some markets in Papua Barat province during the height of the COVID-19 lockdowns, at which time people were reminded that locally harvested sago proves to be a reliable, resilient and nutritious staple.[152,153] Study interviewees also expressed concern over what they described as ricefield printing ('*cetak sawah*') schemes to convert forestlands. The same concern extended to large-scale conversion to other food commodities, as one participant was quoted as explaining:

> 'Actually, people, in general, are still depending on the forest, for now. So, it is impossible to implement activities that would change our nature on a large scale. For example, large-scale planting of cassava and sweet potatoes is the same as planting oil palm. They can damage the forest, too. The indigenous people still depend on their forests. Therefore, we should regulate land use, to stop the exploitation of forests on a large scale.'[154]

149 Interview, Boven Digoel, 2 June 2022.
150 McDonnell, John E. 'The Merauke Integrated Food and Energy Estate (MIFEE): An Ecologically Induced Genocide of the Malind Anim'. *Journal of Genocide Research* 23, no. 2 (3 April 2021): 257–78. https://doi.org/10.1080/14623528.2020.1799593.
151 Arif, Ahmad. 'Kelaparan Berulang di Papua dan Kegagalan Sistem Pangan Indonesia'. kompas.id, 6 August 2022
152 Sumbung, Amos. 'Menyemai Ketahanan Pangan Lewat Sagu'. Greenpeace Indonesia, 7 September 2020.
153 Katadata.co.id. 'CBFM, Solusi Kesejahteraan dan Kelestarian Alam Papua', 15 December 2020.
154 Renwick, Kerry, Satoshi Yamazaki, Mulia Nurhasan, Agus Maulana, Desy Ariesta, Avita Usfar, Lucentezza Napitupulu, et al. 'Nutrition and Sustainable Diets, a Section of the Journal Frontiers in Sustainable Food Systems Toward a Sustainable Food System in West Papua, Indonesia: Exploring the Links Between Dietary Transition, Food Security, and Forests'. Frontiers in Sustainable Food Systems 5 (1 March 2022): 789186. https://doi.org/10.3389/fsufs.2021.789186

Papuan from Kladit family working on their sago mill inside the forest among Sira village, Teminabuan, South Sorong, West Papua. 14 March 2018.

Yulianus Kmesfle and Simon Wagarefe Yosepina Sreklefat, residents from Mangroholo and Sira village of Sorong, West Papua visited the sago mill to learn how to peel a sago tree during a training in Sungai Tohor, Meranti islands, Riau. They learned how to process the sago to make it more valuable so it can help boost the economy of their villages. 26 November 2017

04.
Case study: Merauke Regency

Merauke as 'food barn': history and reality of food estates

Over a decade ago, Papua's southernmost regency became the focus of a vast industrial agriculture plan, the Merauke Integrated Food and Energy Estate (MIFEE), which was instigated by Bupati Johanes Gluba Gebze in 2006 and endorsed in 2010 by Indonesian President Susilo Bambang Yudhoyono. From an ambitious planned area extending up to 2.8 million ha, the National Spatial Utilisation Coordination Agency ultimately recommended that an area of 1,282,833 ha be allocated to the MIFEE.[155] Touted as a 'science and technology-based industrial agriculture' estate, planted commodities were to include rice, corn, soy, sorghum, wheat, fruit and vegetables, as well as rubber, sugar cane and oil palm. The plan expressly noted that palm oil was desirable for its contribution to foreign exchange earnings.[156]

155 Franky, Y. L. 'Mega Proyek MIFEE: Suku Malind Anim Dan Pelanggaran HAM'. ELSAM, 2014.
156 'PERPRES No. 32 Tahun 2011 Tentang Masterplan Percepatan Dan Perluasan Pembangunan Ekonomi Indonesia 2011-2025'. p.159.

Food Estate Sermayam 2 Village. Greenpeace 5 June 2022.

Perhaps as many as 80 MIFEE-related 'location permits' were issued to companies over the following decade including at least 20 location permits for oil palm, however, most have not yet been developed. Aside from palm oil and rice, most of the other promised food crop plantings never materialized. Merauke now has just 60,000 ha planted with rice, far short of the originally planned area. (Note that Merauke, along with Mappi, Asmat and Boven Digoel regencies, has been administratively reallocated from Papua province to the newly created province of South Papua. However, as this transition was only just getting under way at the time of writing, for reasons of clarity, this report continues to refer to the practical reality of Merauke as a part of Papua province).

Papua province, along with two others, has recorded a Gini coefficient of 0.44, the widest gap between rich and poor nationwide.[157] While Merauke does produce a nominal annual rice surplus of around 100,000 tons, this economic inequality means that the food does not necessarily reach everyone who needs it in the regency, with much being sent to other parts of Papua and as far afield as Java and other Indonesian islands.[158] As a result, Merauke ranks in the bottom 25% for food security nationwide (88th out of 398 districts according to the Food Security and Vulnerability Atlas of Indonesia).[159]

157 'Indonesia - Food Security and Vulnerability Atlas, 2015', World Food Programme and Food Security Council, 7 July 2015.
158 'Kontribusi Beras Merauke dan Peluang Pasar', Merauke Regency, 2022.
159 World Food Programme and Food Security Council, *Ibid*.

MIFEE revived: Jakarta's latest food estate plan

Merauke is one of several regencies in Papua that feature in Jakarta's current food estate plans, along with Mappi, Boven Digoel and Keerom.

Military scheme

The Ministry of Defence selected two locations in Merauke in order to investigate the feasibility of a 179,211 ha food estate plan that encompasses plantations and supporting infrastructure, including a helipad and a new upstream port on the Maro River.[160] According to a brief that contains a summary of an environmental impact analysis, the 70,000 ha area located in Ilyawab and Tubang districts to the west is to be planted with rice, while 109,211 ha to the east in Jagebob is to be planted with Cassava.[161]

An Agrinas presentation on the company's cassava plantation and processing plans dated January 2021 sets out an outline of plans for 13 plantations in eight areas across the country. The presentation states that 'Agrinas is owned by the Indonesia Ministry of Defense, with direct report to Minister Prabowo' and that the 'Cassava project is a National Strategic Project (PSN) to establish a national food reserve'. The investment pitch touts cassava flour as an alternative to wheat for making instant noodles, and for biofuel (ethanol) production.[162]

Image: Soldiers planting corn at Nggutibob village, a majority non-Papuan transmigrant community. Translation of sign: 'Planting Corn Together | Military Post 174/ATW'. Promotional photo by Military Post 174/ATW, shared with local media April 2022.

160 Kementerian Pertahanan, 'KLHS BCLS Kementerian Pertahanan RI Kabupaten Merauke Provinsi Papua' 2021
161 *Ibid.*
162 'PT. Agrinas Investor Prospectus Cassava Estate and Rice Estate Investment', January 2021.

The Agrinas pitch document continues with a location list that includes three plantations slated for Merauke, noting that 'At present, we have 13 x 30,000 ha locations across Indonesia almost ready for project development'.[163] The 109,000 ha of cassava described in the Ministry of Defence's environmental impact briefer roughly matches the round figure of 3 x 30,000 ha allocated to Merauke in the Agrinas investment pitch. An investment of IDR 4.17 trillion (USD 280 million) is required for each location, according to the pitch document. This suggests Agrinas was hoping to secure USD 838 million of investment for the Ministry of Defence's cassava plans in Merauke alone.

With a large number of Indonesian military forces stationed along the border with Papua New Guinea, the Ministry of Defence has already been able to deploy soldiers to work on the food estate. In April 2022, military post Korem 174 began an animal feed corn planting program along with the 'Millennial Farmers' group and a non-Papuan transmigrant community on the Maro River's floodplain at Nggutibob village, Tanah Miring district.[164]

Translation of sign: 'Corn Demonstration Plot; Military Post 174 with the Merauke Millennial Farmers Union' (S8° 17.320' E140° 40,886'). Greenpeace 5 June 2022.

163 *Ibid.*
164 Interview, Nggutibob Village, 5 June 2022. See also 'Tingkatkan Ketahanan Pangan Masyarakat, Danrem 174/ATW Merauke Tanam Jagung Bersama Gapoktan'. TNI AD, 24 April 2022.

Regency government scheme

Besides the Ministry of Defence food estate plans (179,211 ha) and the Ministry of Public Works/MoAg food estate area outlined by the MoEF (1,780,000 ha),[165] a purely local government scheme which essentially revives the MIFEE project is also poised for development. Merauke regency's Regional Development Planning Agency (BAPPEDA) has released figures and rough locations for eight potential Agricultural Production Centres (Kawasan Sentra Produksi Pertanian - KSPP). The proposed centres range in size from around 90,000 ha to 280,000 ha, each covering one to three districts. Across the regency as a whole , the centres total 1,219,718 ha.[166] This is almost exactly the same total area as the 2010 MIFEE scheme,[167] although distribution per district has been altered, as the table below demonstrates.

Year 2010 MIFEE Agricultural Production Centres	Area (ha)	Year 2022 Agricultural Production Centres	Area (ha)
Greater Merauke	44,239	Greater Merauke	90,020
Kalikumb	50,140	Kalikumb	115,481
Yeinan	80,717	Yeinan	110,159
Bian	52,926	Bian	160,898
Okaba	27,705	Okaba	142,509
		Ilwayab	165,265
Tubang	295,904	Tubang	150,836
Tabonji	315,142	Kimaam/Tabonji	284,550
Wanam	112,599		
Nakias	173,971		
Selil	65,280		
Total	**1,218,623**	**Total**	**1,219,718**

Table: Comparison of areas by district and totals for the original 2010 MIFEE scheme and the 2022 food estate scheme

165 Kementerian Lingkungan Hidup dan Kehutanan. 'Program Ketahanan Pangan Di Dalam Kawasan Hutan', 29 March 2021.
166 'Potensi Kawasan Merauke Food Estate Pada 8 KSPP', Merauke Regency, 2022.
167 'Peraturan Presiden No. 32 Tahun 2011 Tentang Masterplan Percepatan Dan Perluasan Pembangunan Ekonomi Indonesia 2011-2025'. Accessed 23 August 2022.

The national government is taking a keen interest in the execution of the various new food estate plans. In June 2022, staff from the Coordinating Ministry for Maritime and Investment Affairs in Jakarta led an entourage to visit Merauke and Keerom regencies with the goal of 'providing oversight, coordination and synchronisation in relation to preparations for the development of the Food Estate in Papua'.[168] The team, which included representatives from the Ministry of Public Works, the Ministry of Agriculture and the MoEF, visited the Semangga, Tanah Miring, and Jagebob districts of Merauke.

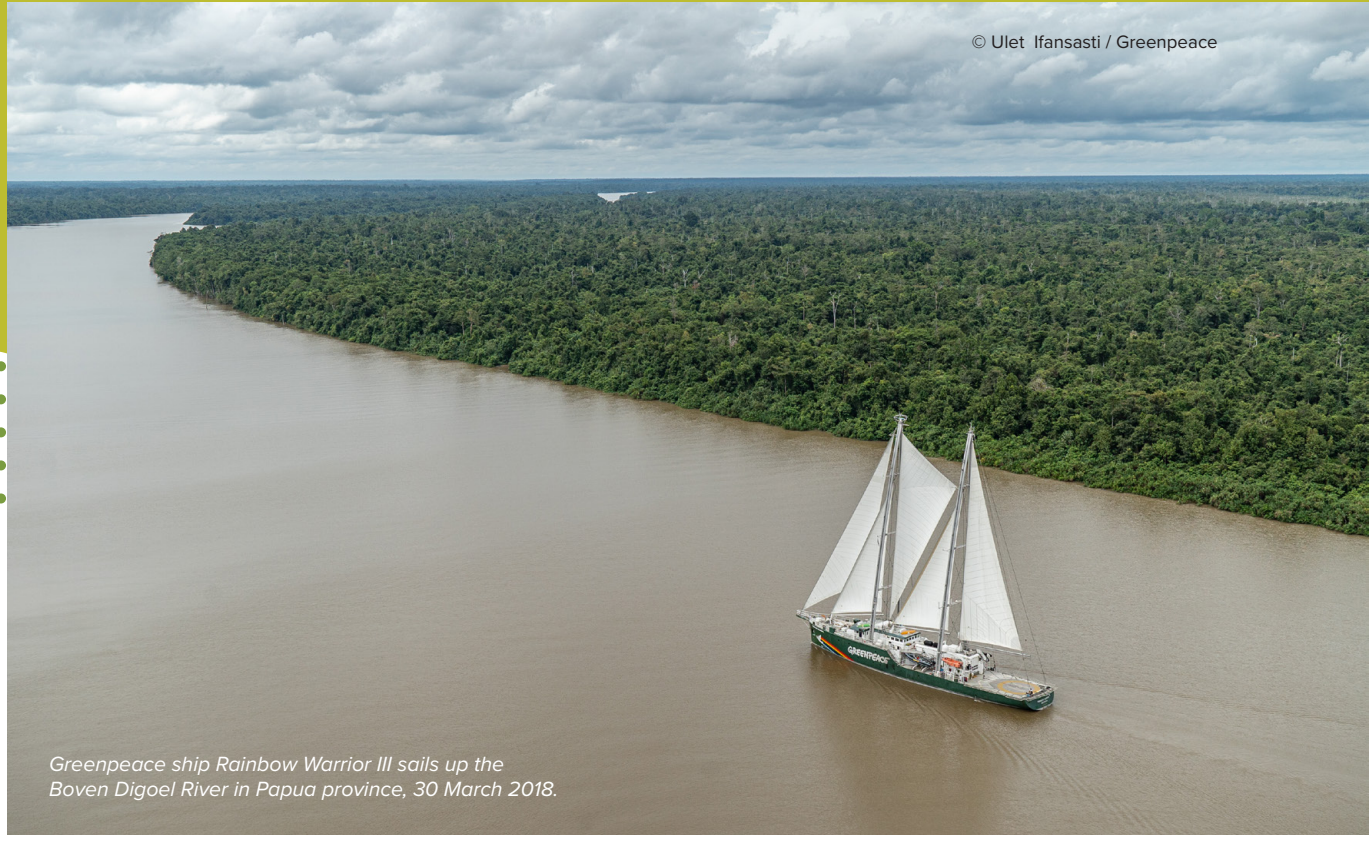
It is apparent that Jakarta's new food estate plans are not aimed at improving food security within Merauke, or even across the rest of Papua. For many of the regency's Indigenous inhabitants, food security would primarily be best served through the legal recognition of their land rights over intact natural landscapes, followed by steps to protect said landscapes from the impacts of industrial agriculture. Furthermore, none of the commodities currently being produced or planned for planting are native Papuan staples such as sago or root vegetables. Indeed, the most senior Merauke government official responsible for food security, has indicated that their agency was only minimally involved in the central government's food estate plans.[169] Instead, at a much smaller scale, Merauke regency runs a program which aims to assist families to plant small gardens in order to meet their daily fresh food requirements, which is known as the Sustainable Food Garden (Pekarangan Pangan Lokal) program.

Local government officials who work on horticulture and food security in Merauke are promoting family-managed planting instead of adopting a broadscale food estate approach. This is because they are concerned about the approximately 80 villages that they have mapped across the regency in which the residents are suffering from increasingly poor levels of nutrition.[170]

Several local government staff members interviewed for this report offered their analysis of the prevailing situation, affirming that food insecurity is not the result of any lack of availability due to insufficient national or even local production. Instead, these staff members asserted that the reasons for the current levels of food insecurity are loss of access to traditional lands for hunting and food gathering, along with difficult transportation access and community poverty leading to food becoming unaffordable. The interviewed staff members also cited other factors specific to various locations, including crop failure due to tidal flooding.[171]

168 Coordinating Ministry for Maritime and Investment Affairs. 'Kemenko Marves Tinjau Areal Rencana Pengembangan Food Estate Di Papua', 13 July 2022.
169 Interview, Merauke, 08 June 2022.
170 See p.224 in 'Strategic Environmental Assessment for the Merauke Regency Medium Term Strategic Plan 2021-2026 / Kajian Lingkungan Hidup Strategis (KLHS) RPJMD Kabupaten Merauke Tahun 2021-2026.' Merauke Regency Government, 2021.
171 Interviews, Merauke officials responsible for food security, agricultural infrastructure and livestock; 7 - 8 June 2022.

05.
Case study: Boven Digoel regency



© Ulet Ifansasti / Greenpeace

Greenpeace ship Rainbow Warrior III sails up the Boven Digoel River in Papua province, 30 March 2018.

Boven Digoel Regency is bordered by the Pegunungan Bintang Regency to the north, Merauke Regency to the south, Mappi Regency to the west, and runs along the border with Papua New Guinea to the east. Five major Indigenous Peoples inhabit the regency: the Mandobo, Muyu, Awyu, Kombay and Koroway.[172]

172 'Profil Kesehatan Kabupaten Boven Digoel tahun 2021' Dinas Kesehatan Kabupaten Boven Digoel, 2022.

The Boven Digoel landscape of largely flat or gently sloping,[173] an attribute which makes it attractive for the establishment of large-scale plantations. Plantation developers can also hope to get their hands on economically valuable merbau and matoa timber during the plantation clearing process.

The most recent 'Food Security and Vulnerability Atlas of Indonesia' produced by the World Food Programme and the MoAg's Food Security Council provides nationwide food security data at a district level.[174] The atlas maps 398 Indonesian districts into six food security priority categories based on food availability, access, distribution, nutrition and health. Papua province contains the greatest number of districts in Indonesia's lowest food security categories (Priority Groups 1 and 2). Among them is Boven Digoel, placed in the second-worst category and ranked in the bottom 20 of 398 districts nationwide.[175] The Atlas also reported that not only does Papua province have the highest poverty rate in the country at 28%, but that it also has the lowest access to healthcare facilities, with 40% of people living without any healthcare facility within a 5 km radius.[176]

Boven Digoel's own Food Security Agency has compiled village level data on food security and vulnerability, allowing it to paint a more detailed picture.[177] This is valuable because local officials have a deeper understanding of the village level situation and the various causes of food insecurity. Unfortunately, however, this local knowledge does not appear to have been given appropriate consideration during the formulation of the national government's food estate plans. Likewise, the province's own Papua 2100 Vision sustainable development pledge made by Papua Province Governor Lukas Enembe in 2018 does not appear to have been properly taken into consideration in the food estate plans. The Papua 2100 Vision calls explicitly for economic development planning involving Indigenous Papuans and the maintaining of existing environmental functions.[178] Meanwhile, the province's spatial planning regulation calls for 90% of Papua to retain its status as forest estate (*kawasan hutan*).[179] These objectives are incompatible with Jakarta's plans to create a multi-million hectare food estate within the province.

173 'Wilayah Administrasi Kabupaten Boven Digoel'. Pemerintah Kabupaten Boven Digoel, 2019.
174 'Indonesia - Food Security and Vulnerability Atlas, 2015', World Food Programme and Food Security Council, 7 July 2015.
175 *Ibid.*
176 *Ibid.*
177 'Peta Ketahanan dan Kerentanan Pangan / Food Security and Vulnerability Atlas - Kabupaten Boven Digoel' Dinas Ketahanan Pangan Boven Digoel, 2021.
178 'Visi pembangunan berkelanjutan Papua (Visi 2100 Papua)' cited in 'Papua Tegaskan Upaya Memelihara SDA Masih Jadi Prioritas', Pemerintah Provinsi Papua, 2018.
179 PERDA Prov. Papua No. 23 Tahun 2013 Tentang Rencana Tata Ruang Wilayah Provinsi Papua Tahun 2013-2033.

Food estate plans

Ministries of Defence, Agriculture and Public Works

There is still a significant lack of clarity over potentially overlapping plans for food estate creation in Boven Digoel. One of these plans is the 3.2 million ha area of interest for food estate development that was presented to the House of Representatives by the MoEF, of which 166,000 ha lie within the Boven Digoel regency.[180] The agencies responsible for the planning and implementation of this project are all national government ministries (led by the Ministry of Public Works and the MoAg).[181] Another planned project is a Ministry of Defence food estate scheme which will primarily cultivate cassava as a commodity.[182] The land for this plan, to be developed with the participation of the military, is set to be sourced from the national forest estate, and will be handled by the new National Strategic Logistics Reserve Agency (Badan Cadangan Logistik Strategis Nasional – BCLSN).[183]

A Boven Digoel Food Security Agency official has stated that there have already been a number of meetings between local government officials including the Regent, with parties from the Ministry of Defence, which included the National Strategic Logistics Reserve Agency.[184] At these meetings, the Ministry of Defence representative reportedly offered labour, money, equipment, factories and offtake markets. The Ministry of Defence also proposed that the army could be deployed to work in the food estate during its early stages, before ultimately handing the area over to community workers. A 50/50 split between private and public sectors is reportedly envisaged.

The Boven Digoel local government is said to be generally supportive of the Ministry of Defence's plan, however, due to the scale of the plans, nothing can proceed until the still-pending strategic planning map (RTRW) for Boven Digoel is ratified by Jakarta. This RTRW map ratification would appear to be all that stands between large areas of Boven Digoel's forests and the Ministry of Defence's food estate plans.

180 See pp.33-34 of Kementerian Lingkungan Hidup dan Kehutanan 'Program Ketahanan Pangan Di Dalam Kawasan Hutan', 29 March 2021.
181 See pp.83-84 in Widhya Mahendra Putra, Isyawal Djambek, Perdana Bagus Ramadhan, Sari Mahaningrum, 'Mengawal Regulasi Dan Kebijakan Pada Satu Tahun Pandemi Di Bidang Penganggaran Kementerian/Lembaga' March 2021.
182 *Ibid*.
183 Baranews. 'Menteri PPN Tanggapi Perkembangan Food Estate Sebagai Penguat Ketahanan Pangan Nasional'. 23 September 2020.
184 Interview, Food Security Agency Boven Digoel, 2 June 2022.

PT IAL Ampera Village Forest Boundary Distrik Mandobo. Greenpeace 1 June 2022.

Some of the areas proposed for conversion under the Ministry of Defence's scheme include Bomakia, Mindiptana and Firiwage, much of which are currently forested. Some of these planned areas overlap with an ongoing forestry concession (selective logging – HPH), while others overlap with largely undeveloped palm oil concessions known as the 'Menara Group' block.

The Boven Digoel Food Security Agency official stated that previous efforts at rice cultivation in the area had provided disappointing yields when compared with the extent of the land that had been cleared. The agency had first looked at cassava as an alternative to rice for food estate planting, however, after an economic study, this idea was deemed unprofitable. Sago was also under consideration, in particular, whether it would be possible to reduce the timeframe from planting to harvesting to just three or four years. However, the official mentioned an agency's finding that seemed to suggest that plantings of *Stevia rebaudiana* (sometimes known as 'candyleaf') could break even within a year, producing an income of IDR 160 million per hectare.[185] Stevia is used to produce Truvia, a sugar substitute developed jointly by Coca-Cola and Cargill.[186] It would be ironic to say the least if a crop with no calorific value came to form part of a food security project.

185 Interview, Food Security Agency Boven Digoel, 2 June 2022.
186 'Coke and Cargill's "Truvia" Sweetener Debuts in NY - Atlanta Business Chronicle', 1 August 2008.

Local government level sustainable food planning

Meanwhile, it has become apparent that in contrast to top-down national plans, key regency officials prefer a different approach, and have thus been working on their own, smaller scale food security program. A senior Boven Digoel planning official has questioned whether the Merauke Integrated Rice Estate (MIRE) and MIFEE programs were really designed to provide food security for the Papuan public, or were devised in part to justify land acquisition by private interests. The official also expressed the belief that MIFEE in particular was not aimed at food production so much as at palm oil expansion with an eye on biodiesel production as an initiative that it was believed would be able to reduce fossil fuel imports.[187]

The same official went on to offer his opinion that in its food security planning, the central government was failing to recognise Indigenous Papuans' unique and sacred connection to their traditional lands. Furthermore, he elucidated, the traditions of Indigenous Papuans in the Boven Digoel area involve subsistence food gathering, and they are therefore not accustomed to agricultural systems that involve the clearing and planting of crops. He believes that this sort of broadscale agricultural system is culturally inappropriate, and, even if adopted, would tend to fail because of the lack of familiarity of Boven Digoel's Indigenous Papuans with industrial scale cycles of planting and the need to wait months or even years for harvests.[188]

The Boven Digoel planning agency official believes that in light of the failure of the top-down 'food estates' that have been rolled out elsewhere, there is no need for another such program to be imposed by Jakarta on Boven Digoel. Instead, the official is advocating for the identification of required processing and transportation infrastructure, which could be developed on a local scale through a 'social economy' as opposed to a 'capital economy' approach.

187 Interview, Boven Digoel, 04 June 2022.
188 *Ibid*.

The regency has its own program that is aiming to use unproductive vacant land for food development – based on household yards and spare village land – so that food crops are planted to meet daily food needs under the umbrella of the national Sustainable Food Garden program.[189] The program's goal and approach is admirable, but unfortunately it does not receive as much attention and resources as the 'food estate' approach.

Meanwhile, Boven Digoel is also implementing the national Sustainable Food Agricultural Land concept, which is aiming to protect existing productive agricultural land areas and mitigate the impact of land conversions to non-agricultural uses, which are seen as a threat to local and national food security and sovereignty.

According to a senior official in Boven Digoel's Department of Food Crops, Horticulture, Livestock and Fisheries,[190] the Sustainable Food Agricultural Land approach that is being pursued in Boven Digoel district involves academics from Bogor Agricultural University (IPB), who have previously conducted a study aimed at determining suitable areas for food cropping.[191]

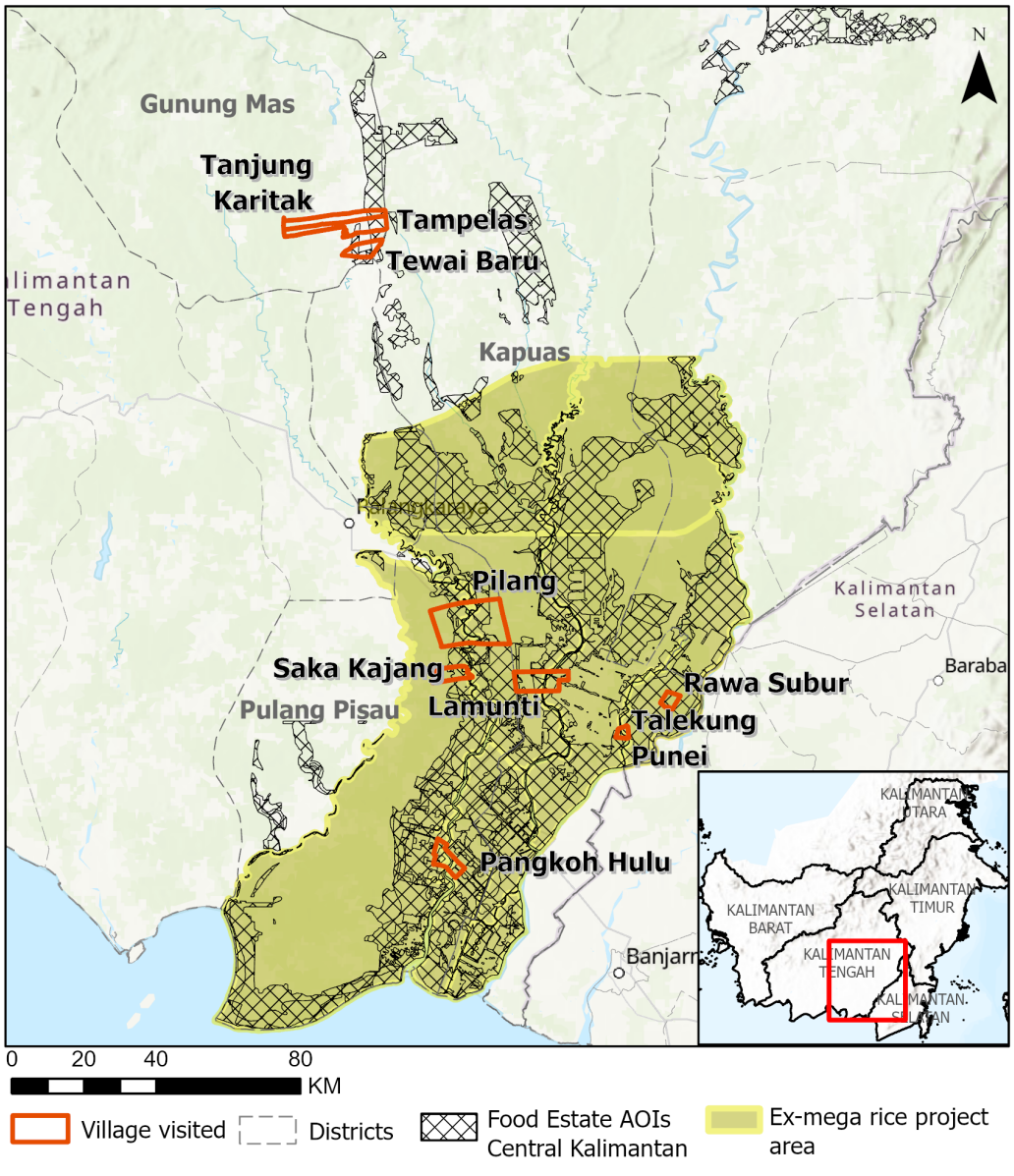
New rice field creation began in 2018 in accordance with this study across several districts, including Subur (2.5 ha), Aiwat (2.5 ha), and Asiki (45 ha). However, the program could not be said to have been a success, as at the present moment only 12 ha are reportedly still being worked, and those are all in Asiki district. The official explained that among the difficulties being faced are limited community experience in the cultivation of rice and the management of large-scale artificial landscapes. The official also said that one of the conditions holding the project up was the legal requirement for land ownership to be certified. In the absence of sufficient efforts to recognise Indigenous land ownership, it's fair to assume that this problem is likely to persist for some time to come.

189 Known as the 'Pekarangan Pangan Lestari' program – see Ministry of Agriculture 'Terus Tanam Di Pekarangan, Pangan Di Musim Kemarau Aman'. pertanian.go.id. April 22, 2021.
190 Interview, Boven Digoel, 31 May 2022.
191 'Laporan Kegiatan Penetapan Kajian Lahan Pertanian Pangan Berkelanjutan (LP2B) Kabupaten Boven Digoel' IPB University, 2019.

06.
Central Kalimantan case studies

Central Kalimantan often features prominently in the grand plans of Indonesia's leaders. Noting its location roughly in the centre of the archipelago, founding leader Sukarno considered moving the new republic's capital city there during 1957-1958.[192] The idea was more recently revived in 2019 during President Joko Widodo's search to replace Jakarta as the nation's capital. Moreover, President Suharto selected the province for his disastrous Mega Rice Project in 1995, as discussed earlier.

192 Hidayat, Rafki. 'Dari Sukarno hingga Jokowi, mengapa Palangkaraya selalu jadi primadona ibu kota baru?' BBC News Indonesia, 4 July 2017.



Map: Central Kalimantan food estate areas of interest, and location of villages discussed.

Now, two plans for new food estates are currently afoot in Central Kalimantan: The first is the Ministry of Defence's plan for 31,719 ha of cassava plantations in the Gunung Mas district (see case study below). The second is the Ministry of Agriculture's food estate project, primarily a plan to grow rice on 165,000 ha of swamp land in the Kapuas and Pulang Pisau districts, the majority of which is ex-Mega Rice Project land.[193] Less than 1% of this area (473 ha) is allocated to horticultural production, mostly oranges, durian and chillies, with just 23 ha being allocated to growing green leafy vegetables.[194] It is indeed unfortunate that dietary health recommendations have been almost completely ignored during the allocation of food estate resources.

193 Biro Perencanaan Kementerian Pertanian. 'Grand Design Pengembangan Kawasan Food Estate Berbasis Korporasi Petani Di Lahan Rawa Kalimantan Tengah', December 2020.
194 Kementerian Pertanian Republik Indonesia. 'Food Estate Kalteng Sulap Rawa Jadi Kawasan Buah Dan Sayur', 2020.

07.
Peatland rice field expansion

The peatland forests of Central Kalimantan first started to be cleared and drained on a large scale in 1995 in the pursuit of President Suharto's million-hectare Mega Rice Project (as discussed in an earlier section). The 3,000-odd kilometres of drainage canals left over from this project remain largely intact, although efforts have been made in the past to block some of these canals in order to manage water levels in an attempt to slow the process of peatland degradation.[195] Leaving these canals connected to uncontrolled flows to the rivers that drain the southern peatlands of Central Kalimantan is environmentally disastrous. This is because during the dry season, the canals lower the water table and expose the normally moist peat soil, leading to peat decomposition and resulting in subsidence and carbon emissions. This leads to a landscape at high risk of disastrous fires, and prevents attempts at restoration through peat forest vegetation.[196]

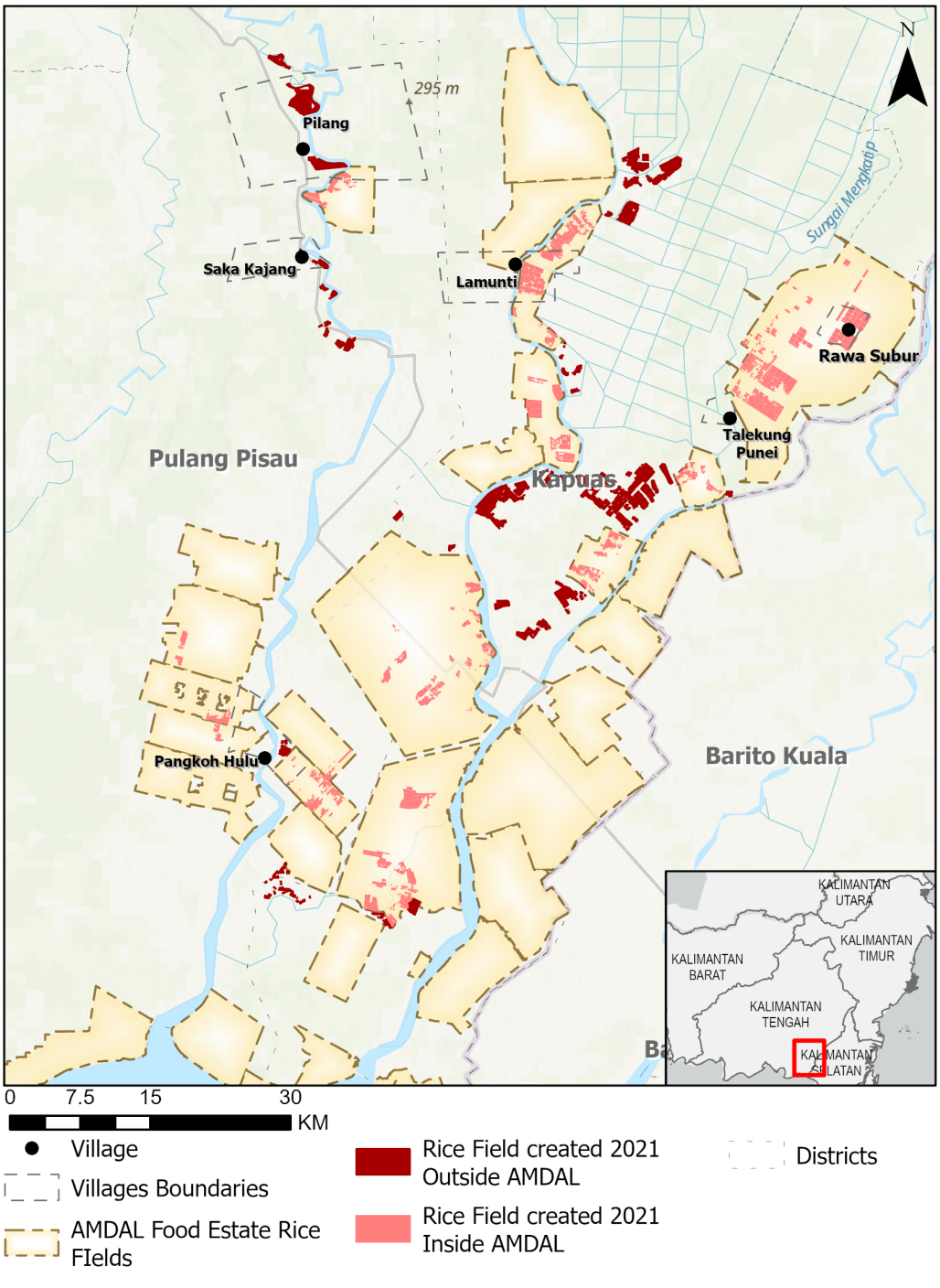
During wet periods, the canals' direct connections to the rivers lead to flooding, disrupting attempts at rice agriculture. The porosity of the peat here means that even functioning water gates will be unable to prevent flooding entirely. As residents of Talekung Punai, an ex-MRP area in Kapuas district put it:

> "For us, in this area, water cannot be kept at bay. It enters both from above [overtopping/flooding] and from below [through porous peat soil]. However, in terms of government attempts to manage the water here, it's just a waste of money unless the whole planting area is ring-fenced and equipped with large pumps capable of removing water on a massive scale".[197]

195 Ritzema, Henk, Suwido Limin, Kitso Kusin, Jyrki Jauhiainen, and Henk Wösten. 'Canal Blocking Strategies for Hydrological Restoration of Degraded Tropical Peatlands in Central Kalimantan, Indonesia'. *CATENA* 114 (1 March 2014): 11–20. https://doi.org/10.1016/j.catena.2013.10.009.
196 Evers, Stephanie, Catherine M. Yule, Rory Padfield, Patrick O'Reilly, and Helena Varkkey. 'Keep Wetlands Wet: The Myth of Sustainable Development of Tropical Peatlands – Implications for Policies and Management'. Global Change Biology 23, no. 2 (2017): 534–49. https://doi.org/10.1111/gcb.13422.
197 Interview, Talekung Punai, 29 July 2022.

A non-functional water gate at Talekong Punai, the southern end of the ex-MRP Block A. This is one of several points where main drainage canals connect to major rivers, in this case the Kapuas Murung river (2°48'05.1"S 114°38'07.1"E). Greenpeace 30 July 2022.

Analysis of the location of new rice fields which were created during 2020 and 2021 compared with maps in the food estate environmental impact study suggests that 6,369 ha (37%) of new rice fields were created outside the study area, predominantly in Kapuas regency (4,985 ha).



Map: New Central Kalimantan food estate rice fields created both inside and outside the environmental impact study (AMDAL) area.

Source data: AMDAL boundaries based on Environment and Forestry Agency of Central Kalimantan Rice field extension 2020-2021 based on University of Palangkaraya

Pulang Pisau district

Pulang Pisau is Central Kalimantan's second biggest rice growing district, producing 73,000 tons of unhulled rice in 2021.[198] Together with Kapuas (179,000 tons), these two lowland districts are responsible for two-thirds of the province's rice production. In this section, we discuss the situation in three of the district's villages, which have been included in the central government's food estate plan for the province.

Pilang village

The majority of the inhabitants of Pilang village are Indigenous Dayak Ngaju people (455 households or 88% of residents in 2018). Their land in Jabiren Raya subdistrict is located in the peat landscape between Sebangau National park and the Kahayan river, and includes areas on both sides of the river, southeast of the provincial capital Palangkaraya. The area is a natural habitat for critically endangered species such as the Sunda pangolin and Borean orangutan. This area was the subject of a participative survey that was carried out by the Peat Restoration Agency in 2018.[199]

Forest clearing and peatland drainage canals established for the MRP led to a series of increasingly severe forest fires in 2007, 2009 and 2014, ultimately culminating in devastating fires and the haze crisis of 2015.[200] The fires were damaging not only to the health of villagers but also did lasting damage to the peat ecosystem, including native flora and fauna. Villagers' rubber plantations were also extensively damaged, as were areas that were previously planted with local rice varieties. Much of these areas have since been planted with sengon trees (*Paraserianthes falcataria*) or have undergone natural secondary regrowth with shrubs and peatland tree species.[201]

According to the head of one of 17 local farmers groups registered with the food estate program, a total of 1,066 ha of Pilang village was land cleared for new rice fields under the program during 2021.[202] Fertiliser and pesticides were also distributed in February 2022. However, as of July 2022, these new fields had not been formally handed over to farmers by the local government, leaving said farmers uncertain as to whether and how they could proceed. At that time, there remained much supporting infrastructure work to be done in order to make the fields usable: in particular drainage works and water gates, to try to overcome the problem of these fields remaining prone to regular flooding.

198 'Ringkasan Eksekutif Luas Panen Dan Produksi Padi Di Provinsi Kalimantan Tengah 2021'. Badan Pusat Statistik Provinsi Kalimantan Tengah, 20 May 2022.
199 Badan Restorasi Gambut. Profil Desa *Peduli Gambut : Desa Pilang Kecamatan Jabiren Raya Kabupaten Pulang Pisang Provinsi Kalimantan Tengah*. BRG, 2018.
200 *Ibid*
201 *Ibid*
202 Interview, Pilang, 28 July 2022.

Piles of chemical fertiliser designated for use in the food estate project sit unused along the main roadside in Pilang village (2°29'1.94"S 114°11'34.2"E), Greenpeace 28 July 2022.

Since the agreed 2021 calendar year focus on the Central Kalimantan lowlands food estate was supposed to be have been Block A of the ex-MRP (PLG), then work undertaken anywhere else outside of Block A (such as Pilang village) was misdirected and potentially a misuse of public funds, as there are ultimately insufficient resources to actually begin cultivating these partially developed rice growing areas. According to calculations made by the Supreme Audit Agency (BPK), rice extensification work cost IDR 16 million/ha.[203] By this measure, the BPK concluded that works on 3,878 ha of Pulang Pisau district land outside of Block A costing IDR 62 billion were potentially wasted, as the land could not be utilised, in the short term at least.

203 See p.37 of 'LHP DTT Kepatuhan atas Perencanaan, Pelaksanaan, dan Monitoring Evaluasi Program Pembangunan Kawasan Sentra Produksi Pangan/ Food Estate TA 2020 sampai dengan Triwulan III 2021' BPK, 31 December 2021.

Saka Kajang village

Around 14 km south of Pilang village lies Saka Kajang village, also set alongside the Kahayan river and comprising traditional lands of the Indigenous Dayak Ngaju people who still make up the majority of inhabitants (92%). Traditional livelihoods in the village encompass the planting of rainfed local rice strains and agroforestry, including the sustainable selective harvesting of naturally occuring gelam trees (also known as Kayu Putih; *Melaleuca cajuputi* subsp. *cumingiana*).[204] The larger peat landscape that Saka Kajang village is located in was damaged by industrial-scale MRP drainage that eventually led to destructive peat wildfires. As a result, in recent years the government has prohibited the local Dayak Ngaju from their traditional use of small scale, carefully managed fires that they used to employ in order to prepare the land for rainfed rice plantings. This in turn has disrupted not only food security but also traditional cultural and religious practices that include placing rice harvest offerings at *tatung* shrines that are the home of the village's spirit guardians.

The village lies in the area previously designated Block C during the MRP project and was also the subject of restoration studies undertaken by the Peat Restoration Agency from 2018. Peat as deep as 4 metres covers over 2,000 ha, or around 60% of the village area, with shallow peat (less than 2 metres) and mineral soil making up the remainder.[205]

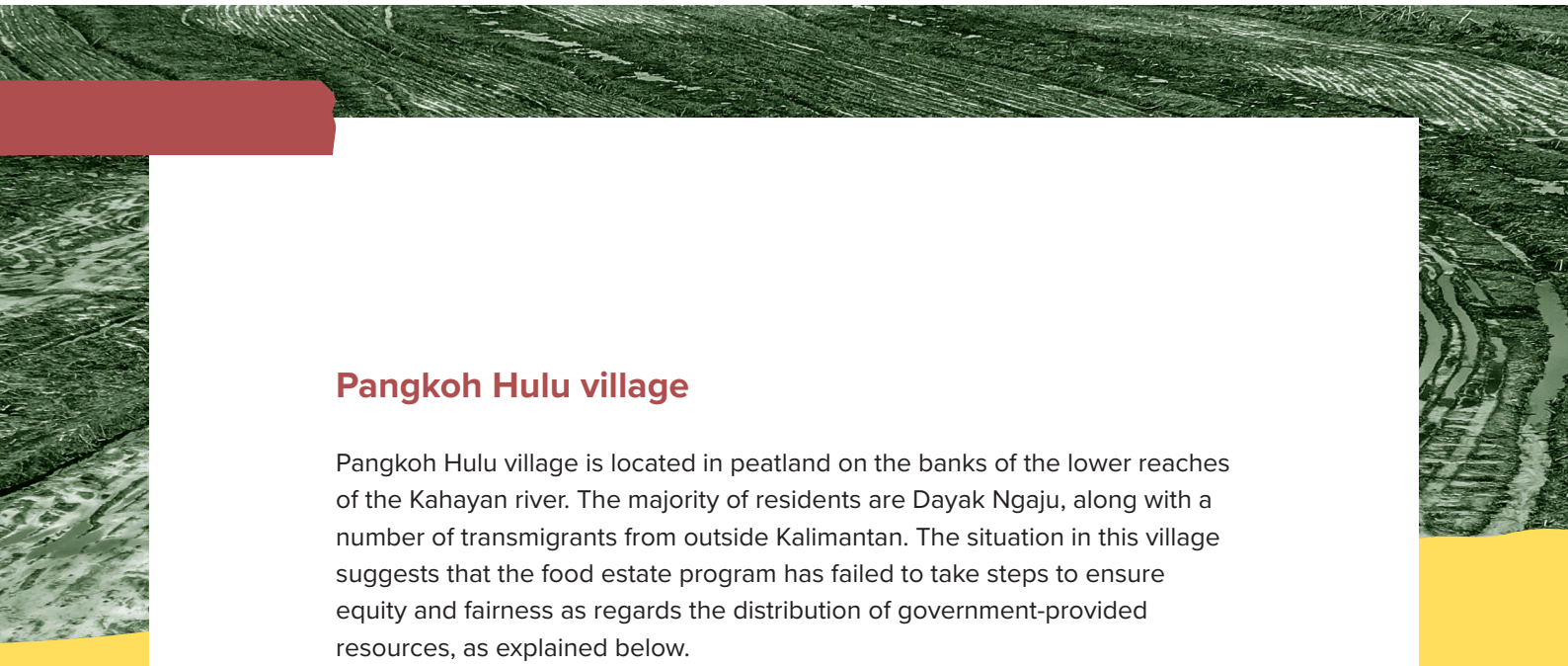
As with the other areas, farmers participating in the food estate project complain that the newly created rice fields here are prone to ongoing flooding by high tides, and have not been provided with adequate supporting infrastructure. Villagers used the phrase 'uniformed mafia project' when describing the discrepancies between project plans and execution. They were particularly unimpressed with the work of the military personnel assigned to create the new rice fields, but did not dare to criticise them openly.[206]

204 Badan Restorasi Gambut. *Profil Desa Peduli Gambut : Desa Saka Kajang Jabiren Raya Kabupaten Pulang Pisang Provinsi Kalimantan Tengah*. BRG, 2018.
205 *Ibid*.
206 Interview, Saka Kajang, 28 July 2022.

When it came to the paid contractors who began removing heavy machinery before the completion of the agreed rice extensification works, villagers took direct action by impounding three pieces of equipment for several days in order to ensure that more work was completed. Even after this action, much work was ultimately left uncompleted. Villagers also complained about broken promises that had been made by agricultural extension workers regarding seed deliveries and the fact that they had to pool their own funds in order to buy missing seed rice to plant during 2022.[207]

Shoddily constructed new food estate rice fields with areas of standing water were allowed to become overrun with weeds, Saka Kajang village. (2°35'10.14"S 114°12'31.21"E), Greenpeace 28 July 2022.

207 *Ibid*.



Pangkoh Hulu village

Pangkoh Hulu village is located in peatland on the banks of the lower reaches of the Kahayan river. The majority of residents are Dayak Ngaju, along with a number of transmigrants from outside Kalimantan. The situation in this village suggests that the food estate program has failed to take steps to ensure equity and fairness as regards the distribution of government-provided resources, as explained below.

For the purposes of the food estate project, Pangkoh Hulu residents have been organised into four farmers groups with registered memberships of 16 - 34 members each. Under the rice extensification program, regenerating peatland was cleared, eventually creating 170 ha of new rice fields in 2020 followed by a further 114 ha in 2021.[208] Central Kalimantan food estate project reporting documentation states that farmers group participants had received an equal share of the new rice fields: 1.72 ha each in 2020. However, several farmers have expressed their frustration that the land was not shared equally, with one locally influential person receiving around ten times their allocated area, while another had received three times their allocation.[209]

Participants interviewed also claimed that the food estate implementation team not only failed to monitor the land distribution fairly, but also other project resources, such as expert advice, fertilisers, pesticides and hand tractors. The farmers blame this lack of fairness for the pests and diseases that have ensured that rice harvests have to date fallen well below expectations, at approximately 1.5 tons per hectare.

208 'Ekstensifikasi SID Pulang Pisau Dan Kapuas', Lembaga Penelitian dan Pengabdian Kepada Masyarakat Universitas Palangkaraya (LPPM-UNPAR), 2021.
209 Interviews, Pangkoh Hulu, 31 July 2022.

As with other food estate locations in the Central Kalimantan peatlands, there are no water gates to prevent the free flow of river water into the newly created rice field areas. This has resulted in several instances where freshly sown rice was destroyed by flooding. The dismal prospects for success here has also led some of the newly created fields remaining unutilised.

Some of the rice extensification areas, such as this one on the banks of the Kahayan river, are going unused due to the difficulties associated with generating successful harvests. (3°3'19.60"S 114°10'27.1"E), Greenpeace 31 July 2022.

Kapuas district

Kapuas district in Central Kalimantan currently produces a rice surplus of 86,000 tons (in addition to the 45,000 tons per annum that are consumed locally) from rice fields that cover an area of 65,600 ha.[210] Traditional (non-hybrid) local varieties, known as '*pera*' rice, are widely planted in the district. This is partly due to cultural culinary preference, but also because these species are well suited to the local conditions.

The traditional local rice varieties can be harvested one or two times per year, and so are lower yielding than the commercial hybrid varieties that the government is recommending for use in the Central Kalimantan food estate project with the goal of achieving three harvests per year. In order to achieve this goal, further interventions are planned through the food estate project, including the construction of access roads and paths, irrigation channels and embankments, as well as the installation of water gates and pumps.

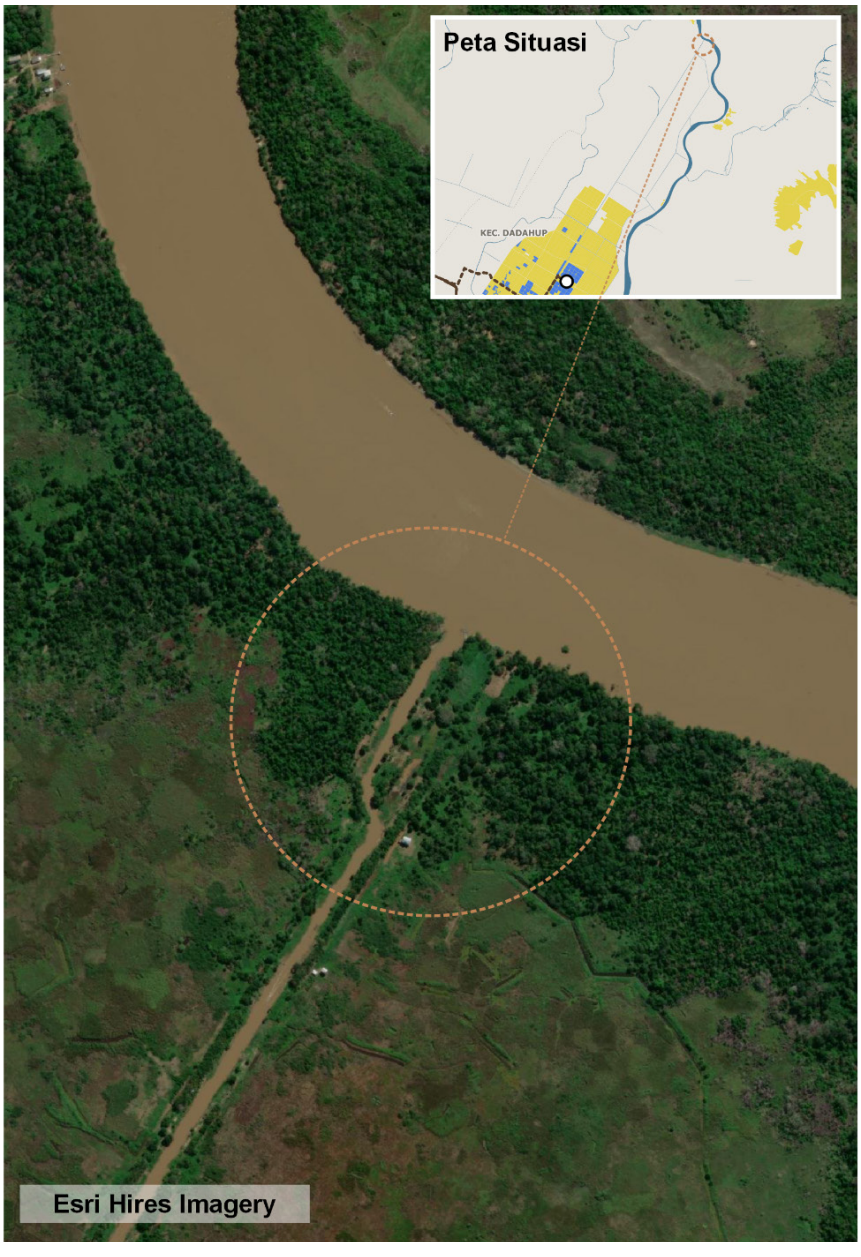
Rawa Subur village

The village of Rawa Subur (which means fertile swamp) in Dadahup subdistrict is located on peatland previously cleared for the MRP. While many transmigrants left after the failure of that project, a community remains and continues to cultivate the area, including through more diversified mixed cropping. The village is among those chosen as a model for President Widodo's food estate program, and due to its participation has already received a number of visits from government officials.

As of mid-2022, however, participants in this village who had been preparing land for the food estate program, had been waiting half a year for the rice seeds promised by the government for delivery at the start of the year. Some of the participants subsequently went ahead and obtained the required seeds themselves.

The major problems facing ricegrowers in the area mirror those that led to the failure of the MRP, including the fact that the peatlands are naturally subject to inundation as a result of variations in rainfall and the depths of the waters in the adjacent Barito and Mengkatip rivers to the east and west respectively. Peat drainage canals remain from the MRP, however, the water gates in the area have fallen into disrepair, meaning that water is free to backflow from rivers into the canals. There is a government-provided pump available, but residents claim that it is entirely unable to keep up with the inflows. With elevation above mean sea level amounting to as little as 4 - 8m, the Rawa Subur community has only been able to plant around a quarter of its land due to persistent inundation.

210 Interview with Kapuas District Agriculture Office, Head of Food Security Section, 1 August 2022.



Satellite image: Peatland drainage canals crisscross Dadahup sub-district, with no functioning water gates to regulate drainage and flooding. (2° 21' 16.54'' S, 114° 53' 11.99'' E).

Insufficient dams and water gates have been built and maintained in order to regulate water flows in the ex-MRP canals in Dadahup district. A canal is here seen in the upper part of the ex-MRP 'block A' area, where it meets the Barito river.

Talekung Punei village

Also in ex-MRP block A, Talekung Punei and Talekung Punei Lama villages are not far south of Rawa Subur, and close to the Mengkatip river. According to residents, around 8,000 ha of land around the village is included in the planned food estate rice extensification, although only initial surveying work has been undertaken to date.

Some of the families living in the Talekung Punei area fish, gather rattan and plant and tend rubber trees. Some also grow rice non-intensively with few inputs and maintenance. However, for many Talekung Punei residents, sustainable timber harvesting is the main source of cash income. Indeed, for around thirty years, gelam trees have been selectively logged here. Gelam is a pioneer species that establishes itself naturally in disturbed parts of the peat swamp, including abandoned rice fields, and near the rivers that traverse the area. Unlike many local native tree species, it recovers well after fire, and can gain height at a rapid speed of over 7 cm per month in degraded peat swamps.[211]

Gelam trees reclaim an ex-MRP area (left) opposite rice fields (right) included in the food estate rice extensification program (2°43'47.5"S 114°37'57.3"E), Greenpeace 29 July 2022.

211 Darusman, Taryono, Dwi Puji Lestari, and Desra Arriyadi. 'Management Practice and Restoration of the Peat Swamp Forest in Katingan-Mentaya, Indonesia'. In *Tropical Peatland Eco-Management*, edited by Mitsuru Osaki, Nobuyuki Tsuji, Nazir Foead, and Jack Rieley, 381–409. Singapore: Springer, 2021. https://doi.org/10.1007/978-981-33-4654-3_13.

The Talekung Punei community sell harvested gelam to middlemen, earning IDR 900 per narrow pole of young gelam saplings (<5 cm diameter), IDR 1,300 for medium diameter poles (approx 5 - 10 cm in diameter), and IDR 5,500 for larger trunks (>10 cm diameter). Community members report that a half-day spent cutting and transporting gelam can earn around IDR 200,000 (USD 13).[212] Published estimates of sustainable small scale gelam harvesting are that a small group of cutters can make USD 10 - 15 per ha during a six-month harvest period.[213]

Gelam timber is in demand not least because it has been found to last for at least four decades without deterioration in its hardness when submersed in Central Kalimantan's peatlands.[214] Local communities thus find it useful for construction in the peatland environment, for example, as pillars driven into the peat in order to support buildings, while the government has also used this type of timber as a buried underlay in order to stabilise road building projects.

Researchers have also identified that Central Kalimantan's gelam is also suitable for the manufacturing of charcoal briquettes to applicable national standards.[215] In addition, although Central Kalimantan's gelam (subsp. *cumingiana*) is unfortunately less rich in aromatics in comparison with the variety endemic to eastern Indonesia[216] (subsp. *cajuputi*), researchers at the University of Muhammadiyah Palangkaraya have shown that a good yield of essential oils is still readily achievable via steam distillation for use in soaps, aromatherapy products, etc.[217] Another economic benefit from gelam is reportedly honey production, which is capable of returning USD 200 per hive per season for families who establish hives.[218] Manuka honey, produced from a closely related Leptospermum species found outside Indonesia, fetches high prices and suggests there may be marketing opportunities for a gelam-specific honey.

212 Interview, Talekung Punei, 29 July 2022.
213 Applegate, Grahame, Blair Freeman, Benjamin Tular, Latifa Sitadevi, and Timothy C. Jessup. 'Application of Agroforestry Business Models to Tropical Peatland Restoration'. *Ambio* 51, no. 4 (1 April 2022): 863–74. https://doi.org/10.1007/s13280-021-01595-x.
214 Supriyati, Wahyu, Tibertius Agus Prayitno, Sumardi Sumardi, and Sri Nugroho Marsoem. 'KEARIFAN LOKAL PENGGUNAAN KAYU GELAM DALAM TANAH RAWA GAMBUT DI KALIMANTAN TENGAH (Local Wisdom of Utilization of Gelam Wood on Peatswamp Land of Central Kalimantan)'. *Jurnal Manusia dan Lingkungan* 22, no. 1 (31 March 2015): 94–99. https://doi.org/10.22146/jml.18729.
215 Prayitno, Tibertius A, Gentur JP Sutapa, Alpian, and Budiadi. 'Kualitas Arang Kayu Gelam (Melaleuca cajuputi) (Quality of Charcoal Made from Gelam Wood (Melaleuca cajuputi))'. *J. Ilmu dan Teknologi Kayu Tropis* 9, no. 2 (2011): 12.
216 Rimbawanto, Anto, Noor Kartikawati, and Prastyono Prastyono. *Minyak Kayuputih. Dari Tanaman Asli Indonesia Untuk Masyarakat Indonesia*, 2018.
217 Azhari, M. and Novrianti. 'Potential of Essential Oil of Galam (Melaleuca Cajuputi) Leaf Waste in Palangka Raya City'. *IOP Conference Series: Earth and Environmental Science* 724, no. 1 (April 2021): 012066. https://doi.org/10.1088/1755-1315/724/1/012066.
218 Applegate, Grahame, Blair Freeman, Benjamin Tular, Latifa Sitadevi, and Timothy C. Jessup. 'Application of Agroforestry Business Models to Tropical Peatland Restoration'. *Ambio* 51, no. 4 (1 April 2022): 863–74. https://doi.org/10.1007/s13280-021-01595-x.

These livelihood alternatives to the food estate project are both more sustainable on peatland, and potentially more economically promising, if developed with government assistance in cooperation with local communities. Unfortunately, however, local communities do not necessarily enjoy a clear legal right to manage and harvest gelam. Meanwhile, the head of the local farmers' group is concerned that the government's food estate threatens the community's selective timber harvesting business, through the removal of gelam tree cover to create new rice fields. The recent food estate survey team noted the presence of gelam trees in Talekung Punei but seemed to consider it not as a resource but only as an additional expense in terms of converting land for rice field extensification.

Many Talekung Punei residents are sceptical about the prospects for rice intensification, given the unfavourable hydrological conditions in the area and are reluctant to participate in the program. Their concern is that the government is pushing the project through at the expense of their current livelihoods:

> "The government buys gelam from us for construction, but now the gelam is being cleared and left abandoned at the edge of the new rice fields. The rice field project is still in the planning stage and isn't guaranteed to succeed. Our community hasn't been able to plant rice yet because the seeds haven't arrived. Must we cut down what is already providing a secure income to make way for something that is uncertain?"[219]

Gelam poles harvested by local residents, stacked by a main road ready for sale to buyers/traders. Greenpeace, 30 July 2022. (2°44'54.2"S 114°35'17.6"E).

219 Interview, Talekung Punei, 29 July 2022.

Lamunti village

Indigenous Dayak Ngaju families make up the majority of residents of Lamunti village, which is located on the banks of the Kapuas river to the west of the ex-MRP block B. The area is still substantially forested and the community is engaged in mixed agroforestry and traditional '*pera*' rice growing. Prior to the arrival of the new food estate project, the community here primarily planted and harvested rattan, rubber and gelam timber.

Remnant community agroforest alongside newly cleared paddy fields at Lamunti Village (2°35'23.7"S 114°24'26.2"E). Greenpeace, 30 July 2022.

The food estate rice project calls for 236 ha of fresh rice fields in the village area, of which 190 ha have recently been cleared by a government contractor brought in from East Kalimantan. On maps prepared during the food estate survey and planning stage, the 236 ha of rice fields are intended to be shared among four farmers' groups of a maximum of 20 participants each, in line with the layout illustrated below. Unfortunately, the clearing contractor laid the rice field embankments out in strips that are aligned in such a way that farmers have stated that they will find it difficult for the plan to be administered.[220]

220 Interview, Lamunti, 30 July 2022.

Lamunti village rice field planning map (left); condition of paddy fields seen via mosaic Planet imagery (centre); photo showing condition of paddy field seen from the air on 30 July 2022 (right). In contrast to the plan, contractors constructed the rice fields in an elongated shape, making it difficult for farmers to cultivate their individual plots. Greenpeace (2°35'35.2"S 114°24'26.3"E).

In addition, the contractor's machinery apparently dug far too deeply into the peat soil, leaving the planting surface deeper than the prevailing river water level. Combined with a lack of water gates in the drainage canals, the would-be rice farmers now find themselves with submerged fields that they are unable to plant, despite the seeds for the project having already been delivered. Frustration has led to some families grinding and eating the seed rice rather than see it rot under these conditions.[221]

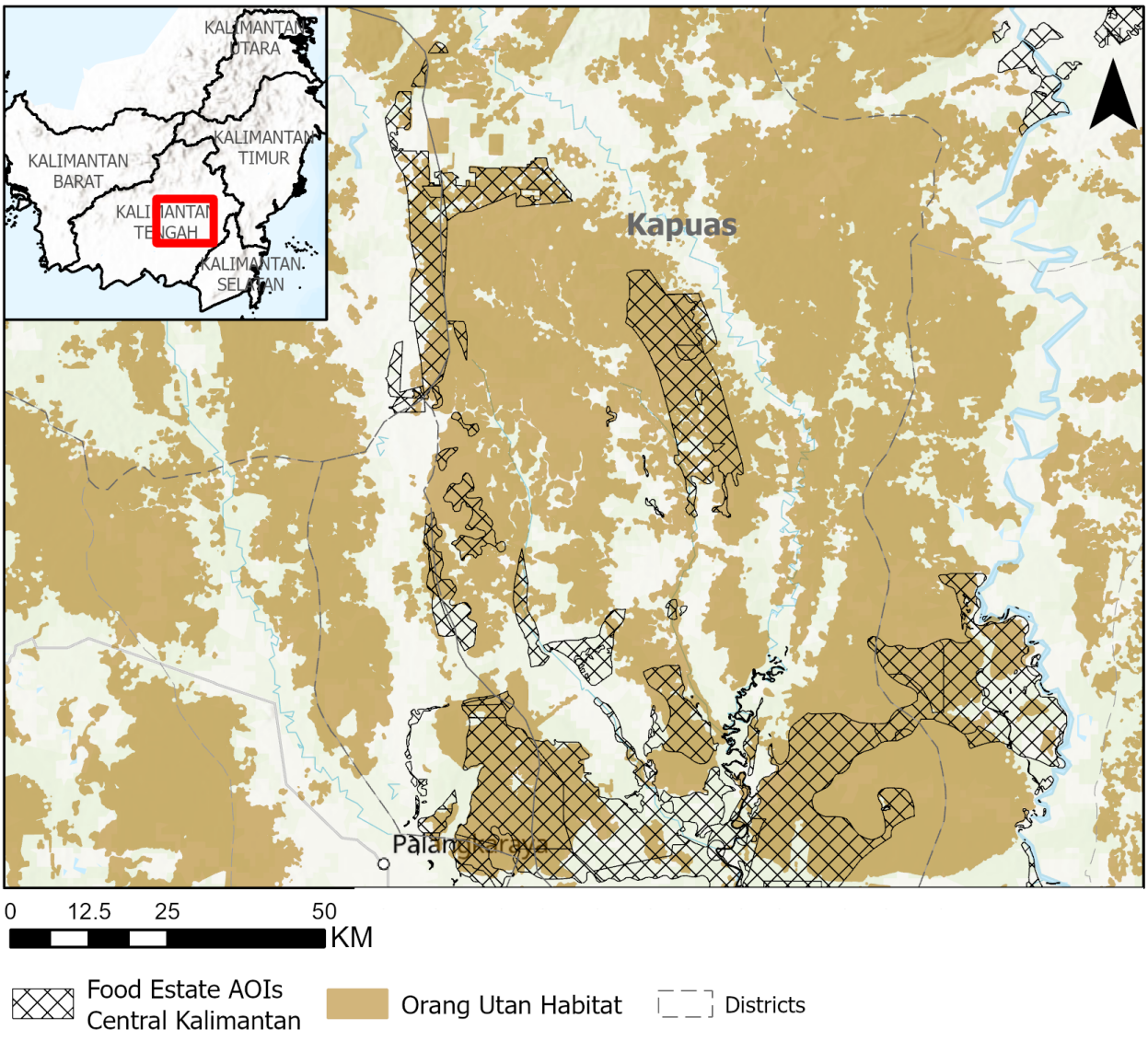
Freshly created rice fields at Lamunti village directly alongside the Kapuas river are flooded by unregulated drainage (2°35'35.2"S 114°24'26.3"E). Greenpeace, 30 July 2022.

221 Interview, Lamunti, 30 July 2022.

08.

Case study: Gunung Mas district

Richly forested Gunung Mas district stretches northwards inland from the provincial capital of Palangkaraya up to the foothills of Borneo's central mountain range. The Ministry of Defence has planned a total of 31,000 ha of food estate in the province, distributed across three regencies: 1,124 ha in Pulang Pisau, 9,617 ha in Kapuas and 23,019 ha in Gunung Mas. The forests in these areas are home to much of Borneo's world-beating biodiversity, including the iconic Bornean orangutan. Critically endangered, this species has already lost over half its habitat and numbers in recent decades, and can ill afford to lose any more.



Map: Central Kalimantan food estate Areas of Interest overlapping extensively with Orangutan habitat map from Forina (2020).

At the Ministry of Defence's request, in October 2020 the Ministry of Environment and Forestry undertook a process to release 2,000 ha from forest estate lands in Gunung Mas.[222] The area requested by the Ministry of Defence included land belonging to four settlements in Sepang subdistrict, namely the villages of Tampelas, Tewai Baru, Sepang Kota and Pematang Limau. Subsequent placement of project signs and survey stakes angered the local Indigenous Dayak community, whose permission had not been sought for the project on their land. The head of the Strategic Logistics Reserve Agency, a senior army officer, later apologised during a virtual meeting with community representatives, reportedly saying that he had not originally known that there was any community activity in the area, and had assumed that it was unencumbered by land use rights.[223] In fact, local people, many of them Indigenous Dayaks, were in possession of a variety of legal documents, and provided over 700 pages of them in order to support their claims to ownership of and/or the right to use the land in the area.[224]

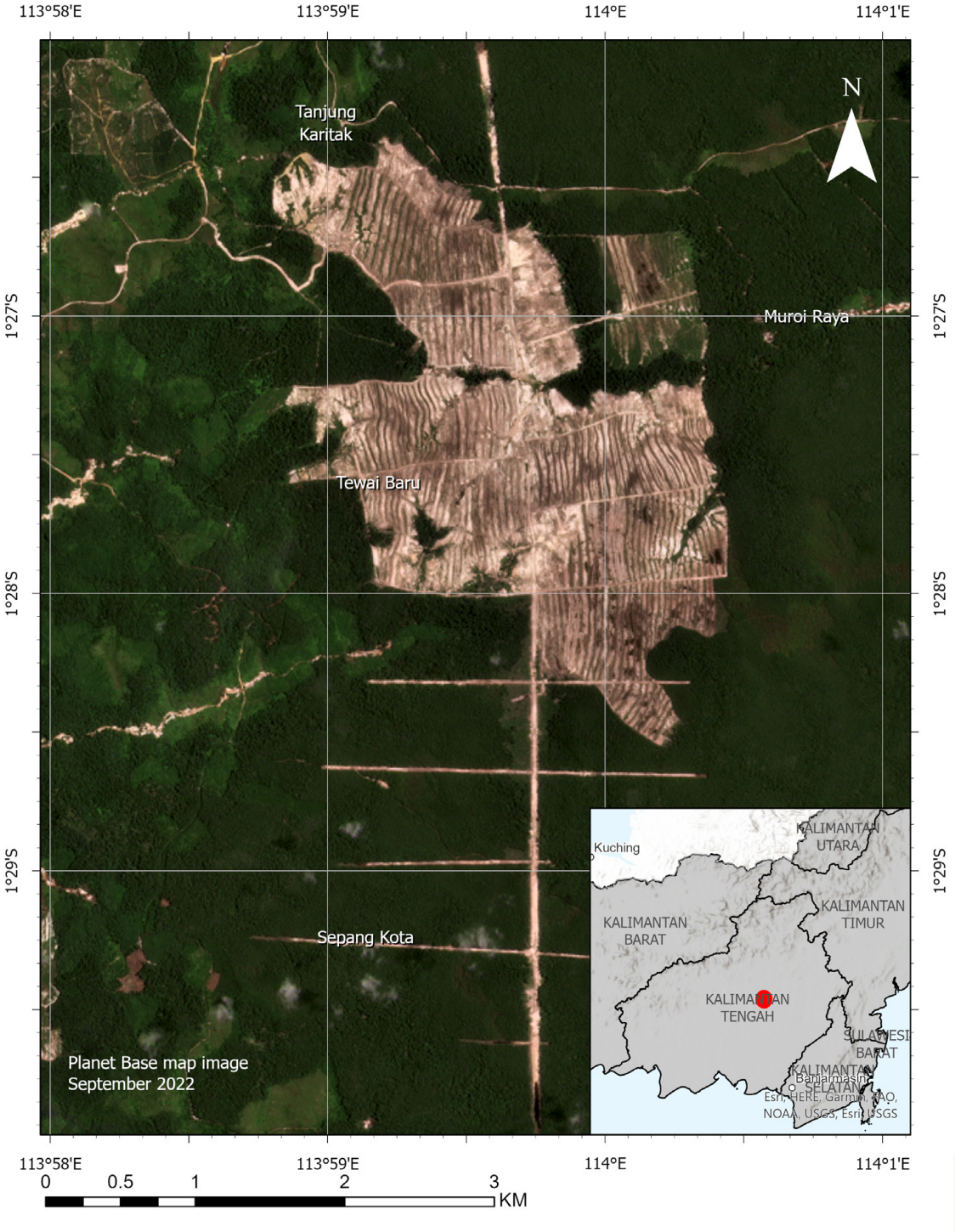
Forced to look elsewhere for land to use in order to develop its cassava plantation, the Ministry of Defence turned to the remaining 31,719 ha 'area of interest'. Under Ministry of Environment and Forestry regulations, any such proposal above a 2,000 ha threshold requires an environmental impact assessment.[225] Moreover, the problem of over half of the 31k ha area being already covered by various other land use permits, for both private use and public facilities, still remains.[226]

Despite all this, the Ministry of Defence decided to forge ahead on its own, clearing 760 ha of forest[227] commencing November 14, 2020[228] without first completing any environmental assessment. According to residents interviewed by Greenpeace, the Ministry of Defence also failed to coordinate with the District Agriculture Office.[229] It was only three months later, in February 2021, that an after-the-fact public consultation process took place as part of an environmental impact assessment, including two meetings that were held on 11 February 2021 and 12 March 2021.[230] Greenpeace sent several letters during the 2020 - 2022 period to the Ministry of Defence requesting information on its food estate plans, including a request for an environmental assessment covering the forest area that was cleared for cassava in Gunung Mas, but has to date not received any documents for its efforts.

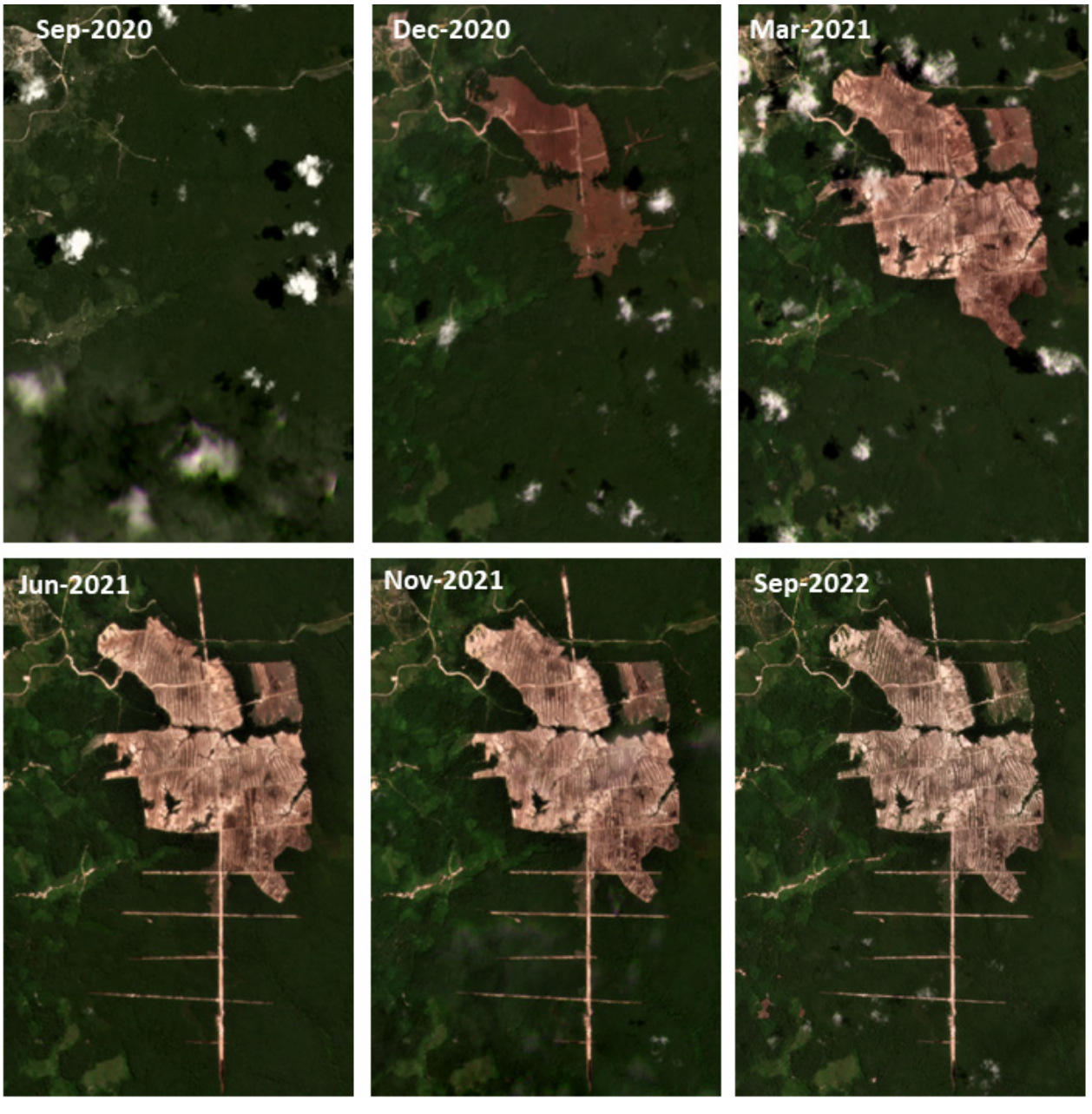
222 Ditjen Planologi Kehutanan dan Tata Lingkungan KLHK, 'Penyediaan Lahan Food Estate Provinsi Kalimantan Tengah', 1 February 2021.
223 Manurung, Jaya Wirawana. 'Kemenhan Apresiasi Teras Clearkan Polemik Lahan Warga Gumas Di Food Estate'. ANTARA News Kalimantan Tengah, 28 May 2021.
224 Ditjen Planologi Kehutanan dan Tata Lingkungan KLHK, 'Penyediaan Lahan Food Estate Provinsi Kalimantan Tengah', 1 February 2021.
225 Peraturan Menteri Lingkungan Hidup Dan Kehutanan Nomor P.38/MENLHK/SETJEN/KUM.1/7/2019 Tahun 2019 Tentang Jenis Rencana Usaha Dan/Atau Kegiatan Yang Wajib Memiliki Analisis Mengenai Dampak Lingkungan Hidup (This was in force at the time of clearing; has since been updated via Peraturan Menteri Lingkungan Hidup Dan Kehutanan Nomor 4 Tahun 2021).
226 pp. 28-30 Ditjen Planologi Kehutanan dan Tata Lingkungan KLHK, 'Penyediaan Lahan Food Estate Provinsi Kalimantan Tengah', 1 February 2021.
227 Based on Greenpeace imagery analysis.
228 Kementerian Pertahanan Republik Indonesia. 'Wamenhan Tinjau Pembukaan Lahan Kebon Singkong Untuk Cadangan Pangan Strategis Di Kalteng', 23 November 2020.
229 Interview, Tawai Baru, 4 August 2022.
230 Sekretariat Daerah Provinsi Kalimantan Tengah. 'Rapat Konsultasi Publik Penyusunan KLHS Food Estate Jaring Masukan Dan Tanggapan – BIRO ADPIM', 11 February 2021.

Cleared trees sit in a haphazard pile in the northern section of the Ministry of Defence cassava plantation. Based on the Ministry of Environment and Forestry's published methodology,[231] over 77,000 tons of carbon was lost when the Ministry of Defence cleared these 760 ha of rainforest. SOB/Greenpeace/Tempo.

231 Based on a rate of 101 tons of carbon per ha for Kalimantan secondary dryland forest ('hutan lahan kering sekunder') in p.15, table 3.2 of Tosiani, Anna. *Buku kegiatan serapan dan emisi karbon*. Kementerian Lingkungan Hidup dan Kehutanan, Direktorat Jenderal Planologi Kehutanan dan Tata Lingkungan, Direktorat Inventarisasi dan Pemantauan Sumberdaya Hutan, 2015.



Planet satellite image mosaic of the cassava project location, September 2022. This image shows forest clearing and land preparation until September. From the bare earth visible in this image, it is clear that the planted cassava plants are not developing well.



Planet satellite image time series of forest clearing for food estate program cassava plantation in Gunung Mas, Central Kalimantan.

Forest clearing blamed for erosion, flooding

Residents of Tewai Baru village, interviewed in August 2022, emphasised their belief that the forest area cleared by the Ministry of Defence is not suitable for cassava plantation because the soil is sandy and very shallow, and prone to severe erosion if its ground cover vegetation is cleared. According to a senior member of Tampelas village, only approximately 250 ha – less than half of the cleared area – had been planted with cassava as of August 2022.

Alas, the community's fears were ultimately realised – the loss of vegetation in the freshly cleared areas has caused accelerated rain runoff, scouring away the sandy topsoil, according to local villagers. The applied inorganic fertiliser also seems to have been quickly carried away into local watercourses,[232] and in any case is retained poorly by sandy soils subjected to clearing.[233] This is concerning not only in terms of soil fertility but in light of the eutrophication damage that tropical aquatic systems are known to be experiencing,[234] including in Kalimantan.[235] Meanwhile a combination of coarse sediment and woody detritus from the cleared areas is clogging nearby wetlands and watercourses. The combined result of this has led to flooding, especially in the Tambun and Tambakung rivers, tributaries of the Kahayan River, as claimed by residents of Tewai Baru, Tampelas and Tanjung Karitak villages.[236]

232 Interview, Tewai Baru, 4 August 2022.

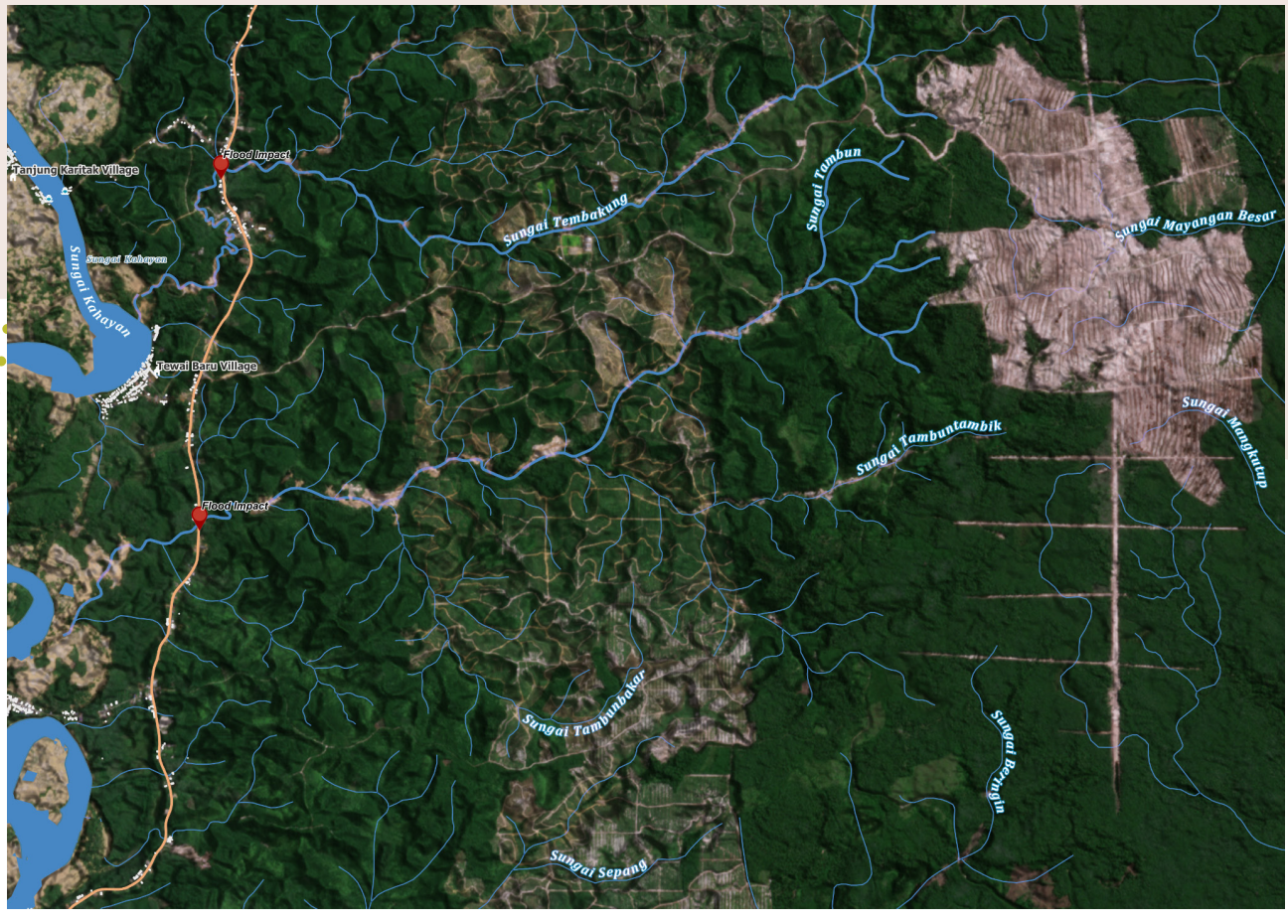
233 Ho, Soo Ying, Mohd Effendi Bin Wasli, and Mugunthan Perumal. 'Evaluation of Physicochemical Properties of Sandy-Textured Soils under Smallholder Agricultural Land Use Practices in Sarawak, East Malaysia'. *Applied and Environmental Soil Science* 2019 (6 February 2019): e7685451. https://doi.org/10.1155/2019/7685451.

234 Ziegler, Alan D., Thilde B. Bruun, Maite Guardiola-Claramonte, Thomas W. Giambelluca, Deborah Lawrence, and Nguyen Thanh Lam. 'Environmental Consequences of the Demise in Swidden Cultivation in Montane Mainland Southeast Asia: Hydrology and Geomorphology'. *Human Ecology* 37, no. 3 (1 June 2009): 361–73. https://doi.org/10.1007/s10745-009-9258-x.; Downing, J.A., M. McClain, R. Twilley, J.M. Melack, J. Elser, N.N. Rabalais, W.M. Lewis, et al. 'The Impact of Accelerating Land-Use Change on the N-Cycle of Tropical Aquatic Ecosystems: Current Conditions and Projected Changes'. *Biogeochemistry* 46, no. 1 (1 July 1999): 109–48. https://doi.org/10.1023/A:1006156213761.

235 Subagiyo, Lambang, Atin Nuryadin, Nurul Sulaeman, and Rina Widyastuti. 'Water Quality Status of Kalimantan Water Bodies Based on the Pollution Index'. *Pollution Research* 38 (3 April 2019): 536–43.; Tyas, Desi Susilaning, Tri Retnaningsih Soeprobowati, and Jumari Jumari. 'Water Quality of Gatal Lake, Kotawaringin Lama, Central Kalimantan'. *Journal of Ecological Engineering* Vol. 22, no. nr 3 (2021). https://doi.org/10.12911/22998993/132427.

236 Interviews, Tewai Baru, Tampelas and Tanjung Karitak, August 2022.

Sandy soil was exposed and rapidly eroded after clearing for a food estate cassava plantation at Gunung Mas. In many places, cleared tree trunks and other woody detritus were placed alongside and even bulldozed into water drainage lines. This material is now being carried along in nearby waterways, clogging them and leading to flooding in local villages (1°27'20.37"S 113°59'41.36"E), Greenpeace, 04 August 2022.



A portion of the forest area cleared by the Ministry of Defence drains into the Tambun and Tambakung rivers, and flooding is now more severe and frequent downstream at the points marked in red. The upper of the two red marks is the location of the flooded houses shown in the photo below. Greenpeace illustration based on Planet Imagery dated July 2022.

Their villages, which were not previously susceptible to severe flooding while the catchment upstream was still forested, now flood whenever rain hits the large, newly cleared area for the Ministry of Defence's cassava plantation. Indeed, such flooding has occurred three times since the forest was cleared by the Ministry of Defence[237] and residents' possessions, including furniture and electronic devices, have been damaged and destroyed. As a result, these residents are concerned about the danger posed by future flooding, especially if it rains heavily at night.

237 Interviews Tewai Baru, Tampelas and Tanjung Karitak August 2022; residents have provided video footage of flooding.

Flooding in Tanjung Karitak village reached to the tops of doorways of some homes during May 2021. Photos provided by a resident, May 2021 - also: Videos Link1, Link2 (1°26'59.1"S 113°55'30.2"E).

Land grabs of Indigenous Peoples' territory

In August 2022, local residents of villages located nearby the cassava plantation, the majority of them persons of Indigenous Dayak ethnicity, explained that they rely on the forests inland of the Kahayan River, in which they hunt wild deer and pigs, gather rattan and engage in agroforestry with understory food crops.[238] Now, these residents are complaining that their own agroforestry plantings have been destroyed by the clearing operation, with no compensation provided. Tewai Baru village residents also complained that they were prohibited from utilising the timber resulting from the Ministry of Defence's clearing activities. During the process of creating the cassava plantation, local residents were excluded from the previously forested area by soldiers stationed on site, who also detained and interrogated a visiting Tempo journalist team.[239]

Local residents have said that the army prohibited them from utilising timber resulting from the Ministry of Defence's forest clearing activities, even for use in public buildings. Instead, an unknown party with access to the site has benefitted from the opportunity to create sawn timber, such as that shown in the photo above, which was taken on the northern edge of the cleared area on 27 August 2021. Minutes after this photo was taken, soldiers on site detained and questioned the NGO documentation team. SOB/Greenpeace/Tempo.

238 Interviews, August 2022; also see Tempo.co 'Deforestasi Food Estate Jokowi: Hutan Rusak, Banjir Di Desa-Desa', 2021 (video).
239 Tempo.co 'Deforestasi Food Estate Jokowi: Hutan Rusak, Banjir Di Desa-Desa', 2021 (video).

Residents of local villages said they were led to understand that there was an agreement between the Ministry of Defence and the district head that community members would be allowed to cultivate the land for 300 metres either side of the access road cut into the forest. However this promise, which was apparently made on a verbal basis, has so far not been honoured.

Local Dayak Indigenous People have not been issued the Customary Land Certificates (*Surat Keterangan Tanah Adat*) that would provide legal recognition over much of their traditional lands. However, some areas around Tampelas village have been certified via the Kelompok Tani Dayak Misik farmers' group. Around 860 ha of this certified Indigenous land falls within the Ministry of Defence's planned area for further forest clearing for the food estate. While villagers say they have been promised some compensation for this use, the Ministry of Defence's legal right, if any, to compulsorily acquire Indigenous land has not been explained to them.

Some activists with experience of Central Kalimantan politics suspect that for proponents of the food estate, the success of the food estate crops, especially in newly cleared forest areas, may be a secondary consideration. Safrudin Mahendra, Executive Director of local NGO, Save Our Borneo, has stated his belief that the project is about 'dividing up and handing out land' in order to 'repay debts after President Widodo's reelection.'[240]

240 Interview in Tempo.co 'Deforestasi Food Estate Jokowi: Hutan Rusak, Banjir Di Desa-Desa', 2021.

On track for failure

The Ministry of Defence food estate project is not only destructive to Indigenous forest lands and livelihoods, but is also hastily and poorly designed and inappropriate in terms of the local conditions in the area. Indeed, when Greenpeace visited the area in August 2022, the plantation was not faring well and the cassava plant growth was clearly underwhelming, as shown in the following photos.

Weak cassava growth around a year and a half after planting commenced (1°27'20.37"S 113°59'41.36"E), Greenpeace, 04 August 2022.

Yanedi Jagau, an Indigenous Dayak Ngaju activist and executive director of the Borneo Institute, has condemned the government's failure to consult and involve Indigenous Peoples and other members of the local community in its Gunung Mas cassava food estate plans. Expert opinion and past experience has also been ignored, resulting in the project's failure:

> "Without any enthusiasm for listening and learning, this national strategic plan has led to failure. I believe there has long been no shortage of voices from academics, farmers and the wider community airing their opinions on the risks of failure facing the food estate plans. The food estate's principles and planning appear to have deliberately ignored academic perspectives."[241]

241 Tabengan Online. 'Food Estate Singkong Gagal - Yanedi: Pemerintah Sepelekan Masukan Akademisi', 5 September 2022.

Front covers of Central Kalimantan's Borneo Institute journal from Oct 2020 and Oct 2021, with the titles "Food Estate for Whom?" (left) and "2000 Hectares of Resident's Land Claimed by Food Estate" (right).

09. Beyond food security

From experience in decades past, and the initial results of the latest push, it is clear that the food estate push is failing to improve the food security or even the overall prosperity and wellbeing of rural communities and Indigenous peoples. Since this ought to be a key yardstick of success in any evaluation, the renewed food estate policy is found severely wanting. Below are some alternative policies that Indonesia could pursue, instead of those mentioned above, in the interests of public health and environmental protection.

The current definition of 'food security' (outlined in the Introduction) unfortunately still omits concerns regarding the how, who and where of obtaining food. Global industrial agriculture produces abundant cheap calories, but generally fails to produce them in ways that protect nature, respect farmers, labour, and the rights and cultures of Indigenous and local communities.

Policies promoting food staples grown from a handful of commercially sourced hybrid varieties in vast monoculture landscapes come at the expense of traditional methods of obtaining sustenance that provide dietary diversity while maintaining the genetic diversity of ancestral food plant strains and the biodiversity of the wider landscape.[242,243] At a moment when human-induced climate chaos calls for greater crop diversity to ensure food system resilience, we are instead putting all of our eggs in one basket and exposing ourselves to the risk of catastrophic harvest disruptions caused by pests,[244] diseases and climatic extremes.[245]

242 Padoch, C., and T. C. H. Sunderland. 'Managing Landscapes for Greater Food Security and Improved Livelihoods'. CIFOR, 20 January 2014.
243 Pfeiffer, Jeanine M., Sisilia Dun, Bonafantura Mulawarman, and Kevin J. Rice. 'Biocultural Diversity in Traditional Rice-Based Agroecosystems: Indigenous Research and Conservation of Mavo (Oryza Sativa L.) Upland Rice Landraces of Eastern Indonesia'. *Environment, Development and Sustainability* 8, no. 4 (1 November 2006): 609–25. https://doi.org/10.1007/s10668-006-9047-2.
244 Thorburn, Craig. 'The Rise and Demise of Integrated Pest Management in Rice in Indonesia'. *Insects* 6, no. 2 (June 2015): 381–408. https://doi.org/10.3390/insects6020381.
245 Lesk, Corey, Pedram Rowhani, and Navin Ramankutty. 'Influence of Extreme Weather Disasters on Global Crop Production'. *Nature* 529, no. 7584 (7 January 2016): 84–87. https://doi.org/10.1038/nature16467.

The Marind people are the Indigenous landowners of the lowland Bian river landscape, an area of Merauke, southern Papua which is currently undergoing a monoculture food estate transformation. Groups of Marind make regular expeditions to sago groves where they not only collect food for themselves, but also propagate palms and enhance opportunities for other species to benefit through their processing of the starchy trunks. As anthropologist Sophie Chao puts it, they are 'entangled' participants in a multi-species ecosystem:

> 'The mutual nourishment provided by sago and its other-than-human companions…multiply the sources of sustenance available to Marind in the grove. For instance, community members obtain larvae of the sago palm weevil – a delectable and important source of protein – from rotting sago stumps, lesions in living stands, heaps of waste pith, and the soft tissue of frond sheaths. Women and children gather nuts, seeds, fruit, tubers, and edible leaves in the grove. People set up fishing nets or fish traps fashioned from dry and spiny sago fronds in nearby rivers. Men hunt in bands for game, which is plentiful in the grove, and build sago frond huts near ponds, in which they wait for birds and other game to approach the water source at the break of dawn. Pigs, attracted by the smell of sago pith, become trapped in hollowed-out trunks lying around the grove.'[246]

This active sago-based agroforestry practised by Indigenous peoples of shared 'gasto-identity' in eastern Indonesia, including Papua and Maluku, is estimated to be more productive in terms of calories per hectare than rainfed rice.[247] This permits a larger proportion of the sago agroforestry landscape to remain forested, providing diverse plant and animal foods that can be gathered, and leaving more biodiversity intact. Indigenous people who cultivate sago report that it is highly resistant to pests and diseases, and unlike monoculture field crops, there is no incentive to apply fertilisers or pesticides, with their adverse effects on biodiversity, waterways and human health.[248] Sago palms can grow in comparatively acidic and saline soils, environmental conditions that can be inhospitable to the types of food estate crops proposed for southern papua.[249]

246 Chao, Sophie. *In the Shadow of the Palms: More-Than-Human Becomings in West Papua*. Duke University Press, 2022. p.131
247 Sasaoka, M, Y Laumonier, and K Sugimura. 'Influence Of Indigenous Sago-Based Agriculture On Local Forest Landscapes In Maluku, East Indonesia'. *Journal of Tropical Forest Science* 26, no. 1 (2014): 75–83.
248 *Ibid*.
249 Ehara, Hiroshi. 'Potency of Sago Palm as Carbohydrate Resource for Strengthening Food Security Program'. *Jurnal Agronomi Indonesia (Indonesian Journal of Agronomy)* 37, no. 3 (2009). https://doi.org/10.24831/jai.v37i3.1255.

Deep local knowledge of native plant food species enhances food security, nutrition and dietary diversity. Surveys undertaken in Aceh, for example, have found that villagers had knowledge of various edible tubers[250] and a total of 56 edible fruit species occurring in local forests (and many more with uses in medicine, construction materials, etc).[251] The expansion of industrial agriculture and resulting dietary change was identified as the primary threat to knowledge of, and the occurrence of, these edible plants in their natural habitats.[252] Government policies have also tended to align against traditional agricultural practices. For example, shifting cultivation or 'swidden' agriculture, as practised by Indigenous peoples in Kalimantan, Papua and elsewhere across the archipelago, is often derided as 'slash and burn' and has even been criminalised and scapegoated in terms of smoke haze.[253] Yet research into the swidden system, particularly that which leaves large trees in place and which incorporates lengthy fallow periods, has shown that it can sustain a healthy mosaic within the forest in which it is situated,[254] and when combined with other categories of land use such as customary forest, is capable of providing a diet comprising dozens, if not hundreds of edible plants for its practitioners,[255] as well as increasing access to otherwise scarce protein from animal source foods.[256]

In Manggarai, East Nusa Tenggara, intricate beliefs, songs, culinary and cultivation practices are associated with dozens of distinct and colourful heirloom upland (rainfed) rice strains, as they are in many other places in Southeast Asia.[257] However, the cultural customs and the genetic diversity embodied in these practices and strains are being replaced by monocultures of irrigated (paddy) rice of the kind promoted by government food programs. Manggarai's distinctive circular lingko and the heirloom strains that once grew within them have been largely erased by government-recommended rectangular flooded rice fields. Seeking to preserve samples of such vanishing heirloom rice strains in cryogenic seedbanks is arguably futile, as they are vastly less useful without the cultural context in which they were developed – the planting methods, timing, pest management, companion species, harvest, storage and cooking methods that are appropriate to each.

250 Suwardi, Adi Bejo, Ilman Zidni, Zidni Ilman Navia, and Indriaty Indriaty. 'Nutritional Evaluation of Some Wild Edible Tuberous Plants as an Alternative Foods'. *Innovare Journal of Food Science*, 12 August 2018.
251 Suwardi, Adi Bejo, Zidni Ilman Navia, Tisna Harmawan, SYAMSUARDI, and Erizal Mukhtar. 'Ethnobotany and Conservation of Indigenous Edible Fruit Plants in South Aceh, Indonesia'. *Biodiversitas Journal of Biological Diversity* 21, no. 5 (9 April 2020). https://doi.org/10.13057/biodiv/d210511.
252 *Ibid*.
253 Rogers, Cory. 'No Fire, No Food: Tribe Clings to Slash-and-Burn amid Haze Crackdown'. Mongabay Environmental News, 1 September 2016.
254 Rerkasem, Kanok, Deborah Lawrence, Christine Padoch, Dietrich Schmidt-Vogt, Alan D. Ziegler, and Thilde Bech Bruun. 'Consequences of Swidden Transitions for Crop and Fallow Biodiversity in Southeast Asia'. *Human Ecology* 37, no. 3 (1 June 2009): 347–60. https://doi.org/10.1007/s10745-009-9250-5.
255 Padoch, C., and T. C. H. Sunderland. 'Managing Landscapes for Greater Food Security and Improved Livelihoods'. CIFOR, 20 January 2014.
256 Ickowitz, Amy, Dominic Rowland, Bronwen Powell, Mohammad Agus Salim, and Terry Sunderland. 'Forests, Trees, and Micronutrient-Rich Food Consumption in Indonesia'. *PLOS ONE* 11, no. 5 (17 May 2016): e0154139. https://doi.org/10.1371/journal.pone.0154139.
257 Pfeiffer, Jeanine M., Sisilia Dun, Bonafantura Mulawarman, and Kevin J. Rice. 'Biocultural Diversity in Traditional Rice-Based Agroecosystems: Indigenous Research and Conservation of Mavo (Oryza Sativa L.) Upland Rice Landraces of Eastern Indonesia'. *Environment, Development and Sustainability* 8, no. 4 (1 November 2006): 609–25. https://doi.org/10.1007/s10668-006-9047-2.

Agroecology

Forest peoples such as the Marind and many more living throughout Indonesia have the right to continue to use their traditional lands in the manner of their choosing, without having to endure land grabs and pollution related to industrial agriculture. The value of their stewardship for preserving biodiversity, carbon storage and wider planetary health should also be recognised and supported. Likewise we must also support farming communities who provide surplus agricultural products on which the world's several billion urban dwellers rely. But how can this be achieved while minimising the staggering environmental impact of modern agriculture?

An answer comes from La Via Campesina, the international movement of smallholders and farmers ('peasants') that coined the term 'food sovereignty' in the 1990s. At the closing of a June 2013 La Via Campesina international conference held in Jakarta, the participants published 'The Jakarta Call' which describes their vision for agroecology:

> 'Peasant agroecology is a social and ecological system encompassing a great diversity of technologies and practices that are culturally and geographically rooted. It removes dependencies on agro-toxins, rejects confined industrial animal production, uses renewable energies, and guarantees healthy food. It enhances dignity, honours traditional knowledge and restores the health and integrity of the land. Food production in the future must be based on a growing number of people producing food in more resilient and diverse ways.
>
> Agroecology defends biodiversity, cools down the planet and protects our soils. Our agricultural model not only can feed all of humanity but is also the way to stop the advance of the climate crisis through local production in harmony with our forests and waterways, enhancing diversity and returning organic matter to natural cycles.'[258]

258 Via Campesina. 'The Jakarta Call : Via Campesina', 20 June 2013.

The science of agroecology is informed by a growing body of research and practice, including Indonesia's internationally recognised role in demonstrating Integrated Pest Management through the spectacularly successful Farmer Field Schools program (unfortunately now discontinued).[259] Agroecology is supported by movements of farmers, consumers and NGOs such as FIAN[260] that advocate for the right to adequate food and nutrition. Greenpeace has published its own report that sets out seven principles for 'ecological farming' based on agroecology (for further information, please read the complete Greenpeace International Ecological Farming report):

1. Food sovereignty: Ecological farming supports a world where producers and consumers, not corporations, control the food chain. Food sovereignty is about the way food is produced, and by whom.
2. Benefiting farmers and rural communities: Ecological farming contributes to rural development and fighting poverty and hunger, by enabling livelihoods in rural communities that are safe, healthy, and economically viable.
3. Smarter food production and yields: To increase food availability globally, and to improve livelihoods in poorer regions, we must reduce the unsustainable use of what we grow at the moment and we must reduce food waste, decrease meat consumption, and minimise the use of land for bioenergy. We must also achieve higher yields where they are needed – through ecological means.
4. Biodiversity: Ecological farming is about natural diversity – from the seed to the plate, and across the entire agricultural landscape. It is about celebrating the flavour, nutrition, and culture of the food we eat, improving diets and health.
5. Sustainable soil health and cleaner water: It is possible to increase soil fertility without the use of chemicals. Ecological farming also protects soils from erosion, pollution, and acidification. By increasing soil organic matter where necessary, we can enhance water retention, and prevent land degradation.
6. Ecological pest management: Ecological farming enables farmers to control pests and weeds – without the use of expensive chemical pesticides that can harm our soil, water and ecosystems, and the health of farmers and consumers.
7. Resilient food systems: Ecological farming creates resilience: it strengthens our agriculture, and effectively adapts our food system to changing climatic conditions and economic realities.[261]

259 Thorburn, Craig. 'The Rise and Demise of Integrated Pest Management in Rice in Indonesia'. *Insects* 6, no. 2 (June 2015): 381–408. https://doi.org/10.3390/insects6020381.
260 FIAN Indonesia
261 'Ecological Farming: The Seven Principles of a Food System That Has People at Its Heart'. Greenpeace International, 2015.

Agroforestry

Agroforestry can be understood as a combination of agriculture and forestry, and is often used as a collective name for various agricultural practices which involve the inclusion of trees.[262] Traditional approaches amounting to agroforestry have been in use across the Indonesian archipelago for millenia. Some variations of this practice are known by the following names:

- *parak* in West Sumatra;
- *pelak* in Jambi;
- *repong damar* in Lampung;
- *tembawang* in West Kalimantan;
- *simpukng* in East Kalimantan;
- *talun* and *dudukuhan* in West Java;
- *wono* and *kitren* in Central Java;
- *tenganan* in Bali; and
- *amarasi* in East Nusa Tenggara.[263]

Agroforestry can also be thought of as a category of ecological farming, in which forests and trees support agricultural production through vital ecosystem services. As a dynamic, ecologically based natural resource management system that diversifies production, this stands in stark contrast to the broadscale monoculture plantings of annual crops through the Indonesian Government's food estate schemes, or the more industrial models of agroforestry focussed on single commodities such as coffee and cocoa.

The benefits of traditional multi-tier agroforestry are numerous: trees and forests increase rainwater infiltration and reduce damaging flooding of agricultural systems caused by sudden runoff. Food systems that incorporate trees support greater biodiversity and sequester greater amounts of carbon than agriculture that relies exclusively on cleared field cropping.[264] Such systems include plants that support nitrogen-fixing microbe communities and reduce erosion, in turn reducing reliance on fertiliser. They also provide habitat for pollinators and pest-control predator species,[265] reducing reliance on pesticides.

262 See ch.1 'Agroforestry paradigms' in Van Noordwijk, Meine, ed. *Sustainable Development through Trees on Farms: Agroforestry in Its Fifth Decade*. World Agroforestry (ICRAF), 2019.
263 Herawati, Tuti, Dede Rohadi, Nugraha Firdaus, Retno Maryani, and Pipin Permadi. *National Strategy of Agroforestry Research in Indonesia 2013-2030*, 2013. https://doi.org/10.13140/2.1.5096.0160.
264 'Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems'. Intergovernmental Panel on Climate Change, 2019.
265 Ickowitz, Amy, Stepha McMullin, Todd Rosenstock, Ian Dawson, Dominic Rowland, Bronwen Powell, Kai Mausch, et al. 'Transforming Food Systems with Trees and Forests'. *The Lancet Planetary Health* 6, no. 7 (July 2022): e632–39. https://doi.org/10.1016/S2542-5196(22)00091-2.

Agroforestry is also a more heterogeneous system involving a mosaic of land use including patches of forests, providing communities with dietary diversity: studies in seven tropical countries have identified scores of tree-derived foods eaten by communities living near forests. These foods provide four times the vitamin C and nine times the vitamin A of other commonly eaten foods. This is important for children, who are especially vulnerable to micronutrient deficiencies. In this regard, vitamin A and iron intake have been found to be higher when their families have access to forest foods.[266]

A closed agroforestry canopy maintains the historically low wildfire risk of Indonesia's wet tropics,[267] and conversely, clearing forest hugely increases the risk. This has become abundantly clear from the experiences of recent decades. However, a recent modelling study looking at Central Kalimantan has investigated the mechanisms at work in this regard, as follows – forest clearing for agriculture:

- Reduces local rainfall;
- Increases landscape and vegetation drying through evapotranspiration;
- Increases local temperature; and
- Reduces local humidity;

which then leads to:

- Changed regional climatic circulation;
- Reduced cloud cover; and
- Increased wind speed.

The net result of this is an estimated fourfold increase in fire weather risk.[268]

Agroforestry's diversity also provides alternatives if one food source fails (see diagram below). Income can be generated through traditional agroforestry systems that grow products such as damar, durian, rattan, cacao,[269] and 'jungle rubber'.[270] All of these characteristics provide superior harvest and income resilience under increasingly chaotic climate conditions such as rising temperatures, floods and drought.[271]

266 Jansen, Merel, Manuel R. Guariguata, Jessica E. Raneri, Amy Ickowitz, Fidel Chiriboga-Arroyo, Julia Quaedvlieg, and Chris J. Kettle. 'Food for Thought: The Underutilized Potential of Tropical Tree-Sourced Foods for 21st Century Sustainable Food Systems'. *People and Nature* 2, no. 4 (2020): 1006–20. https://doi.org/10.1002/pan3.10159.

267 Nguyen, Chung Hoai, Christina Ani Setyaningsih, Svea Lina Jahnk, Asmadi Saad, Supiandi Sabiham, and Hermann Behling. 'Forest Dynamics and Agroforestry History since AD 200 in the Highland of Sumatra, Indonesia'. *Forests* 13, no. 9 (September 2022): 1473. https://doi.org/10.3390/f13091473.

268 Trancoso, Ralph, Jozef Syktus, Alvaro Salazar, Marcus Thatcher, Nathan Toombs, Kenneth Koon-Ho Wong, Erik Meijaard, Douglas Sheil, and Clive A. McAlpine. 'Converting Tropical Forests to Agriculture Increases Fire Risk by Fourfold'. Environmental Research Letters 17, no. 10 (September 2022): 104019. https://doi.org/10.1088/1748-9326/ac8f5c.

269 Utomo, Budi, Adi A. Prawoto, Sébastien Bonnet, Athikom Bangviwat, and Shabbir H. Gheewala. 'Environmental Performance of Cocoa Production from Monoculture and Agroforestry Systems in Indonesia'. *Journal of Cleaner Production*, Special Volume: Green and Sustainable Innovation for Cleaner Production in the Asia-Pacific Region, 134 (15 October 2016): 583–91. https://doi.org/10.1016/j.jclepro.2015.08.102.

270 Heinemann, Jack, Tsedeke Abate, Angelika Hilbeck, and D. Murray. 'Agriculture at a Crossroads: The Synthesis Report of the International Assessment of Agricultural Knowledge, Science and Technology for Development', 1 January 2009. p.178

271 Ehara, Hiroshi. 'Potency of Sago Palm as Carbohydrate Resource for Strengthening Food Security Program'. *Jurnal Agronomi Indonesia (Indonesian Journal of Agronomy)* 37, no. 3 (2009). https://doi.org/10.24831/jai.v37i3.1255.

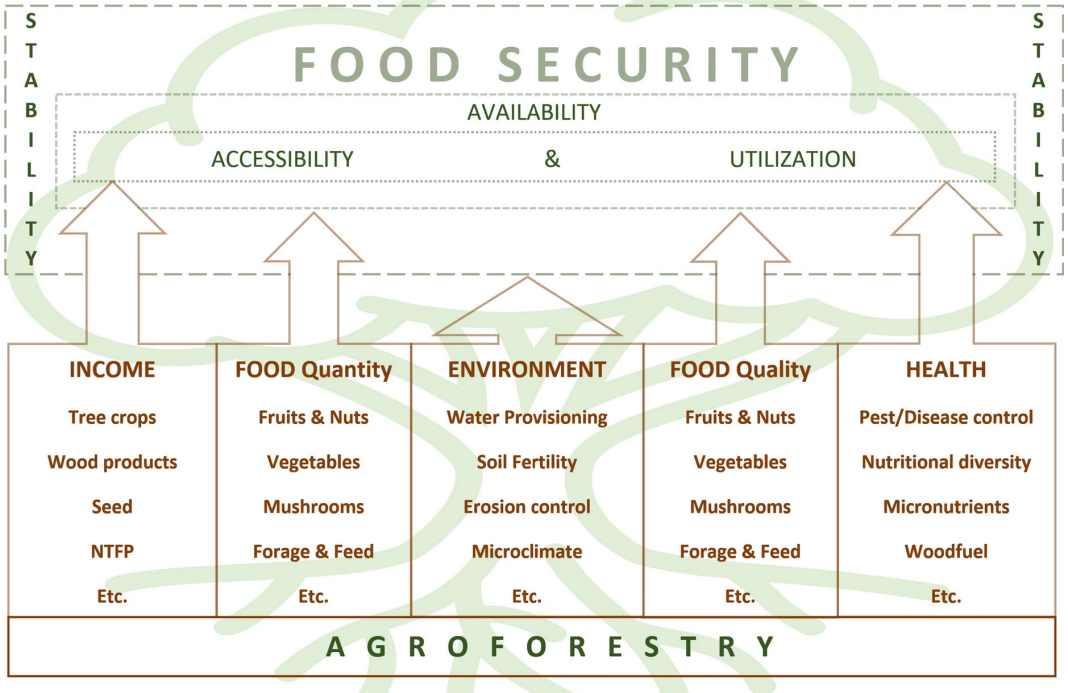


Illustration: Agroforestry contribution to food security; diagram from Duffy et al (2021)[272]

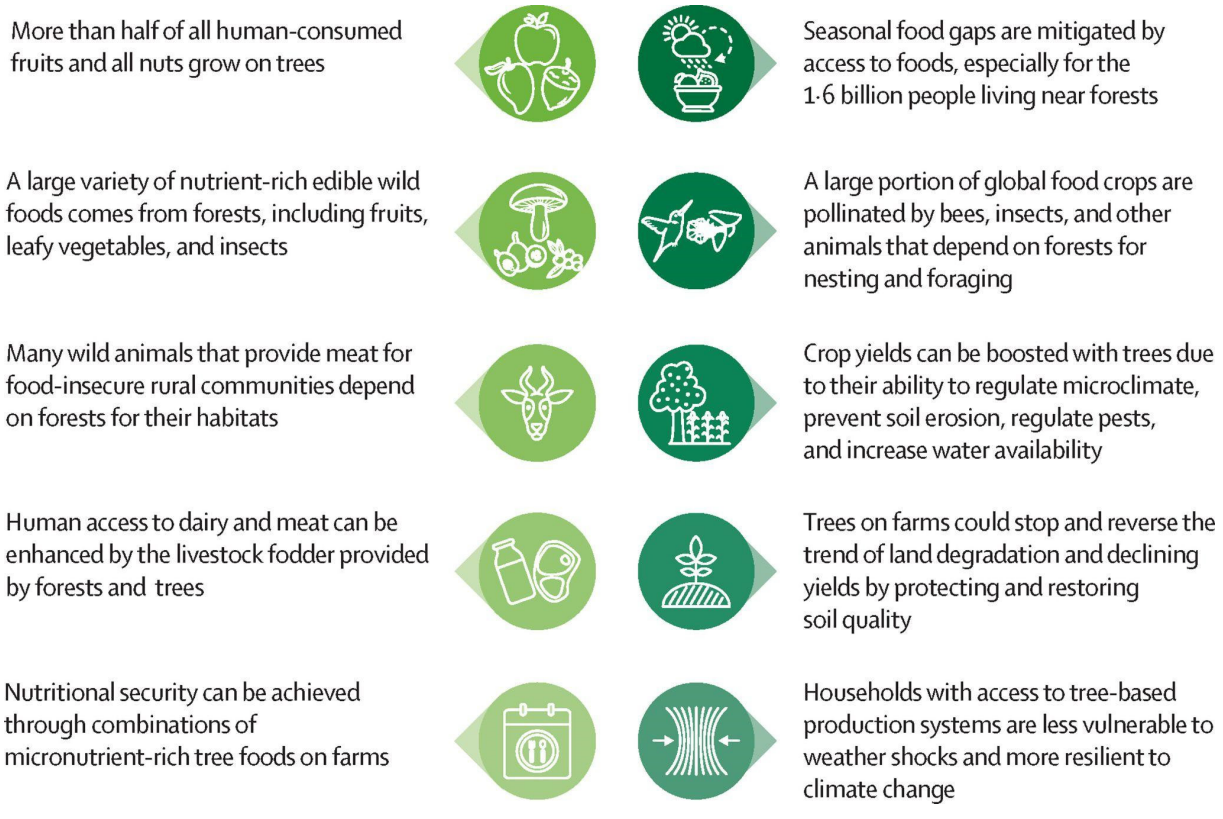
Unfortunately, Indonesia's regulatory regime has historically not been accommodative of traditional agroforestry practices, with the Ministry of Environment and Forestry (and its predecessor, the Ministry of Forestry) asserting control over the country's forest estate at the expense of local traditions and Indigneous ownership. Ironically, despite this tight control, ostensibly in the name of preserving forest function, the state has not been successful in preventing widespread deforestation, and government attempts at land restoration and reforestation have been similarly ineffectual.[273] Research is underway however on ways of transforming palm oil plantations to more diverse and productive systems by local communities using agroforestry.[274]

272 Duffy, Colm, Gregory G. Toth, Robert P. O. Hagan, Peter C. McKeown, Syed Ajijur Rahman, Yekti Widyaningsih, Terry C. H. Sunderland, and Charles Spillane. 'Agroforestry Contributions to Smallholder Farmer Food Security in Indonesia'. *Agroforestry Systems* 95, no. 6 (1 August 2021): 1109–24. https://doi.org/10.1007/s10457-021-00632-8.

273 Noordwijk, Meine van, Andre Ekadinata, Beria Leimona, Delia Catacutan, Endri Martini, Hesti L. Tata, Ingrid Öborn, et al. 'Agroforestry Options for Degraded Landscapes in Southeast Asia'. In *Agroforestry for Degraded Landscapes: Recent Advances and Emerging Challenges - Vol.1*, edited by Jagdish Chander Dagar, Sharda Rani Gupta, and Demel Teketay, 307–47. Singapore: Springer, 2020. https://doi.org/10.1007/978-981-15-4136-0_11.

274 Budiadi, Ari Susanti, Hero Marhaento, M. Ali Imron, Dwiko B. Permadi, and Hermudananto. 'Oil Palm Agroforestry: An Alternative to Enhance Farmers' Livelihood Resilience'. *IOP Conference Series: Earth and Environmental Science* 336, no. 1 (October 2019): 012001. https://doi.org/10.1088/1755-1315/336/1/012001.

Land tenure is a perennial problem for many Indonesian forest-dwelling communities, but the cultivation of tree crops can sometimes be used as evidence that serves to bolster land tenure security.[275] Recently, the government has moved to provide greater legal recognition for agroforestry,[276] which, if properly implemented, should improve land tenure security for many communities; however, the process of legal recognition of Indigenous land rights (independent of forestry law) is still lagging.



Ten reasons why trees and forests are crucial for transforming the food system; from Ickowitz et al (2022).[277]

275 Duffy, Colm, Gregory G. Toth, Robert P. O. Hagan, Peter C. McKeown, Syed Ajijur Rahman, Yekti Widyaningsih, Terry C. H. Sunderland, and Charles Spillane. 'Agroforestry Contributions to Smallholder Farmer Food Security in Indonesia'. *Agroforestry Systems* 95, no. 6 (1 August 2021): 1109–24. https://doi.org/10.1007/s10457-021-00632-8.

276 Octavia, Dona, Sri Suharti, Murniati, I. Wayan Susi Dharmawan, Hunggul Yudono Setio Hadi Nugroho, Bambang Supriyanto, Dede Rohadi, et al. 'Mainstreaming Smart Agroforestry for Social Forestry Implementation to Support Sustainable Development Goals in Indonesia: A Review'. *Sustainability* 14, no. 15 (January 2022): 9313. https://doi.org/10.3390/su14159313.

277 Ickowitz, Amy, Stepha McMullin, Todd Rosenstock, Ian Dawson, Dominic Rowland, Bronwen Powell, Kai Mausch, et al. 'Transforming Food Systems with Trees and Forests'. *The Lancet Planetary Health* 6, no. 7 (July 2022): e632–39. https://doi.org/10.1016/S2542-5196(22)00091-2.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10. Food Estates: timeline

65k-50k bce

The ancestors of today's Indigenous landowners arrive and establish cultures permitting their civilizations to flourish for millenia in the food landscapes of Sumatra, Kalimantan and Papua.

1939

Merauke, Papua: The Dutch colonial administration establishes a limited rice estate in Kumbe district and a cattle ranch in Kimaam district.[278]

1985

President Suharto visits Rome to bask in the glow of Food and Agriculture Organisation accolades for achieving rice self sufficiency.[279]

1994

Merauke: President Suharto and wife visit the Tanah Miring transmigration project area and celebrate its 'Panen Raya' great rice harvest.[280]

1995

Central Kalimantan: Attempting to regain the lost mantle of 'rice self-sufficiency', President Suharto makes plans for the Mega Rice Project, and signs the Decree on Peatland Development for Food Crop Production.[281]

1996

President Suharto signs the 1996 Food Law into effect, codifying the concept of food security.

1996-1999

Central Kalimantan: Work is undertaken on the Mega Rice Project. President Suharto's grand plan to clear and drain one million hectares of swamp forest – prime orangutan habitat in the heart of Borneo – and turn it into rice fields.

1997/1998

Disastrous fires tear through areas drained for the Mega Rice Project.

2006-2008

The Merauke Integrated Rice Estate (MIRE): With central government support, Bupati Johanes Gluba Gebze invites investors to help plant 1.6 million hectares of rice in the regency. By 2008, businesspeople said to be interested in MIRE include Medco's Arifin Panigoro, future Minister of Defence Prabowo Subianto, and the Saudi Bin Laden group.[282]

2007

China's CNOOC, Malaysia's Genting Group and Sinar Mas plan multi-billion dollar Papuan biofuel estate. Plans scrapped the following year.

2007-2008

Global food price crisis – rice and soybean prices double, the Indonesian Government takes notice as protests brew. Diversion of food resources to biofuel production is blamed as one cause.

2010

President Yudhoyono and Merauke Bupati Johanes Gluba Gebze plan the 1.2 million ha Merauke Integrated Food and Energy Estate (MIFEE)[283] for industrial agriculture and plantations, especially rice and sugarcane.

278 Manikmas, Made Oka A. 'Merauke Integrated Rice Estate (Mire): Kebangkitan Ketahanan Dan Kemandirian Pangan Dari Ufuk Timur Indonesia'. Analisis Kebijakan Pertanian 8, no. 4 (December 2010): 323–38.
279 'Lahan Gambut Sejuta Nista'. Tempo, 6 April 1999.
280 Indrajaya, Dimas Wahyu. 'Sejarah Hari Ini (7 Mei 1994) - Panen Raya di Merauke', 7 May 2020.
281 Keputusan Presiden Nomor 82 Tahun 1995 tentang Pengembangan Lahan Gambut untuk Pertanian Tanaman Pangan di Kalimantan Tengah.
282 'Merauke Mega-Project Raises Food Fears'. Down to Earth, August 2008.
283 'Pandemic Power-Grabs: Who Benefits from Food Estates in West Papua?'. Tapol and awasMIFEE, April 2022.

2011

President Yudhoyono embarks on an ultimately unsuccessful food estate program in the Kahayan Delta of Bulungan district, North Kalimantan.

2012

By 2012, MIFEE's grand food security plans had been quietly dropped, but the initial rhetoric had provided cover for Merauke's Bupati Gluba Gebze to issue at least 20 oil palm permits. Now forests were falling to make way for oil palms.

2012

President Yudhoyono enacts the new 2012 Food Law. The preamble to the new law states that the 1996 law needs replacing in order to reflect Indonesia's 'democratisation and decentralisation'; it also adds important nuance to the definition of food security.

2013

President Yudhoyono embarks on a food estate program in Ketapang, West Kalimantan. The program is subsequently branded a failure, with only 100 ha of rice fields surviving.

2015

President Widodo, along with military and police officials, visit Medco's demonstration rice fields in Merauke and declares that 1.2 million ha of new rice fields should be developed in the regency within three years.[284]

2015

A National Medium Term Development Plan is issued that sets out various food sovereignty goals[285] and designated food production locations.[286]

2018

Governors Enembe and Mandacan declare Papua and Papua Barat to be 'Conservation Provinces'[287]

April 2020

President Widodo cites an FAO warning on the risk of a COVID-19 driven food crisis and orders fresh land conversions for food production.[288]

June 2020

The Central Kalimantan Food Estate is announced.

September 2020

The Papua Food Estate is announced. In contrast to the MIRE and MIFEE plans, which were focused on Merauke, this time, the target regencies include Mappi and Boven Digoel.

284 awasMIFEE. 'Jokowi Relaunches MIFEE, Wants 1.2 Million Hectares of New Ricefields within 3 Years!', 15 May 2015.
285 '2015-2019 National Medium Term Development Plan (Rencana Pembangunan Jangka Menengah Nasional)', 2015.
286 Via SK Menteri Pertanian No. 03/kpts/pd.120/1/2015 & No. 472/Kpts/RC.040/6/2018 tentang Lokasi Kawasan Pertanian Nasional.
287 Government of Papua Province & Government of Papua Barat Province (2018) 'Manokwari Declaration'
288 Ihsanuddin. 'Antisipasi Krisis Pangan, Jokowi Perintahkan BUMN Buka Lahan Baru'. Kompas, 28 April 2020.

11. Conclusions and recommendations

- There is no immediate food crisis in Indonesia that is particularly linked to the COVID-19 pandemic or the war in Ukraine, for example, and these global events should not be used as a pretext for rushed policymaking or for sidestepping important environmental and social safeguards. Land grabs and forest clearances have irreversible impacts on people and the planet and cannot be justified in the name of any current 'crisis'.

- There is however a real problem of food security in Indonesia – specifically one of nutrition and access. Wasting, stunting and food insecurity remain a problem, alongside the growing issue of obesity – together comprising a 'double burden of malnutrition'. The fact of the matter is that healthy foods and dietary diversity are becoming ever more difficult for households to secure.

- Real crises have also emerged as a result of intensive agriculture transgressing planetary boundaries. Said crises relate to changes in land use, freshwater mismanagement, biodiversity loss and climate change, as well as to the nitrogen and phosphorus pollution that results from the extensive use of chemical fertilisers. Land grabs and the destruction of Indigenous cultures are also happening alongside agricultural expansion. All these problems are urgent, however, they are caused in large part by our present approach to agriculture and will undoubtedly be exacerbated rather than solved by the government's imposition of its food estate program.

- The food estate plans were drawn up without proper public participation, and they threaten people's land and livelihoods, as well as forests, biodiversity and food security. The government must therefore first halt and then transparently and thoroughly review these plans.

- Crises relating to food must be addressed in parallel with efforts aimed at mitigating planetary climate and biodiversity crises. A human rights-based, participative approach to ecologically sustainable food security should be adopted instead of the current approach. Meanwhile, agroecology and diverse agroforestry, in particular in their traditional forms, should be adapted by local communities to match local conditions and are the key to sustainable solutions to the above-discussed problems.

- Indigenous peoples are at the forefront of forest protection in Indonesia. Yet their rights, which are already poorly recognised in law and rarely protected in practice, are at even further risk from the 'Omnibus' Law on Job Creation and the regulations and policies that have been put into place in order to promote food estates. This is true of Indigenous land that has already been cleared for food estates in Kalimantan and Papua, and for many thousands or millions of hectares more that are set for conversion.

- The internationally recognised right to Free, Prior and Informed Consent, as enshrined in the United Nations Declaration on the Rights of Indigenous Peoples, must be upheld within the context of forest management and food security policy in Indonesia. In this regard, the government must listen to the demands that are being made by the Indigenous Peoples' Alliance of the Archipelago (*Aliansi Masyarakat Adat Nusantara*) and urgently enact the long awaited draft Law on Indigenous Peoples (*RUU Masyarakat Adat*).

- The Ministry of Defence should play no role in agricultural policy and its implementation. The involvement of the military in land issues leads to fear and acts of coercion in what should be a community domain. Moreover, the involvement of military-dominated private companies is also a mistake that should be investigated and reversed as a part of efforts aimed at obviating acts of coercion and the ever-present risk of corruption.

Food Estate Feeding Climate Crisis" is unfurled in forestland cleared for the Ministry of Defence's Food Estate project in Gunung Mas, Central Kalimantan on 10 November 2022. The activists from Greenpeace Indonesia, LBH Palangkaraya, Save Our Borneo and WALHI Central Kalimantan are sending a message during the COP 27 climate meeting in Sharm el-Sheikh, Egypt: that in the midst of a climate crisis causing food insecurity, the Indonesian government's Food Estate project will only worsen both food and climate crises.

GREENPEACE

Published 10 November 2022 by
Greenpeace Indonesia.

Unless stated otherwise, all references in this report to Greenpeace refer to Greenpeace Indonesia.

Greenpeace Indonesia
Jl. HOS. Cokroaminoto No. 19
RT 1/RW 1 Gondangdia, Menteng,
Jakarta Pusat 10350
t: 021 314 8521
e: info.id@greenpeace.org
w: www.greenpeace.or.id