ISEAS YUSOF ISHAK INSTITUTE

ISSUE: 2022 No. 93
ISSN 2335-6677

PERSPECTIVE

RESEARCHERS AT ISEAS – YUSOF ISHAK INSTITUTE ANALYSE CURRENT EVENTS

Singapore | 20 September 2022

Climate Emergency and Food-Energy Conflicts in Southeast Asia

*Prapimphan Chiengkul**

Farmers harvest rice in a paddy field in Thailand's southern province of Naratahiwat on 18 February 2021. Picture: Madaree TOHLALA/AFP.

** Prapimphan Chiengkul is Visiting Research Fellow with the Climate Change in Southeast Asia Programme at ISEAS – Yusof Ishak Institute in Singapore, Assistant Professor at Faculty of Political Science at Thammasat University in Thailand, and Honorary Research Fellow at the Centre for the Study of Globalisation and Regionalisation at the University of Warwick in the UK.*

ISSUE: 2022 No. 93
ISSN 2335-6677

EXECUTIVE SUMMARY

- Climate change influences food, water and energy security in multiple ways. The current agri-food system significantly contributes to climate change, and the adverse effects of climate change will likely lead to higher food prices in the future. Additionally, transitions to renewable energy increase competition for land and water usage, which potentially undermine agri-food production.

- High food prices and increased resource competition to meet food-energy needs have often led to social tensions and socio-environmental conflicts in Southeast Asia.

- Increased biofuel production in the future could potentially exacerbate environmental degradation, drive up food prices, intensify existing land conflicts and encourage new waves of large-scale land acquisitions.

- It is important that Southeast Asia balances the goals of food-energy security, ecological sustainability and social justice. Sovacool's (2021) '4Es' processes – enclosure, exclusion, encroachment and entrenchment – should be used to guide policy decisions.

- Moreover, policymakers should support land-use rights for poverty reduction and food security purposes, seek peaceful resolutions to land conflicts, promote sustainable farming of energy crops, and increase support for research on second- and third-generation biofuels.

ISSUE: 2022 No. 93
ISSN 2335-6677

INTRODUCTION

Scientific evidence suggests that climate change has adverse effects on food and water security, and are likely to drive up food prices in the future (IPCC 2022a, 10-14). To tackle climate change, transitions to renewable energy are necessary. However, this increases competition for land and water usage, which potentially undermines agri-food production (FAO 2021, 29). Renewable energy projects have also led to social conflicts in many countries across the globe (Sovacool 2021).

After providing an overview of the interconnections between climate change and food-water-energy security, this article discusses instances where high food prices and increased resource competition to meet food-energy needs have led to social tensions and socio-environmental conflicts in Southeast Asia. The focus of the article is on the contentious issue of biofuels, and suggests that future food-energy demands could potentially exacerbate environmental degradation, drive up food prices, intensify existing land conflicts and encourage new waves of large-scale land acquisitions in Southeast Asia. Therefore, it is important that Southeast Asia strikes a balance between food and energy production, ecological sustainability and social justice. The final section discusses some policy recommendations.

CLIMATE CHANGE AND FOOD-WATER-ENERGY CONNECTIONS

There are multiple ways in which climate change is interconnected with food, water and energy security. On the one hand, the agricultural sector, and also the production, distribution and consumption of food generally, significantly contribute to climate change. One estimate suggests that the current agri-food system is responsible for around 21-37 percent of total greenhouse gas emissions (Mbow et al. 2019, 439). Notably, the current agri-food system is very energy-intensive (Weis 2010, 321; Sage 2013, 75), roughly accounting for 30 percent of the world's energy consumption (IRENA and FAO 2021, 9). Since industrial agriculture relies significantly on fossil fuels, rising energy costs will also lead to higher food prices (for further discussion, see: Chiengkul 2017, 13) On the other hand, climate change has adverse effects on global food and water security (IPCC 2022a, 10-14; Quiggin et al. 2021, 6-9; Mbow et al. 2019, 446-447; FAO et al. 2021). Depending on actions to tackle climate change in the near future, the number of people facing hunger in 2050 is predicted to be between 8 and 80 million (IPCC 2022c, 5). If global warming reaches 2 degrees Celsius, between 800 million and 3 billion people might suffer from chronic water scarcity due to droughts (IPCC 2022c, 5). Moreover, those whose livelihoods predominantly rely on nature, such as small-scale farmers and fishermen, are highly vulnerable to the adverse effects of climate change. Other people who are especially at risk are those in areas that have poor governance structures, widespread poverty and violent conflicts (IPCC 2022a, 12).

To eradicate global hunger by 2030, 50 per cent more food, animal feed and biofuels ought to be produced by 2050 compared to levels in 2012 (FAO 2021, xi). However, this poses a serious challenge because current agricultural production has already put unsustainable pressures on

land and water resources. Globally, the agricultural sector withdraws significant amounts of freshwater, which often exacerbates water stress in many countries (FAO 2021, 16). In addition, global transitions to renewable energy, such as solar, wind, hydropower and biofuels, will increase competition for land and water usage, which potentially undermine agri-food production (FAO 2021, 29; IRENA and FAO 2021, 32; Weis 2010, 325) and fuel social conflicts (Sovacool 2021). Due to higher economic returns, more farmlands are likely to be converted for renewable energy production. Solar and wind parks in India, for example, have been linked to land dispossessions that economically harm many locals, including indigenous farmers (Chandran 2021). Examples from Southeast Asia are discussed in the next section.

FOOD CRISIS, RESOURCE COMPETITION AND SOCIO-ENVIRONMENTAL CONFLICTS IN SOUTHEAST ASIA

Climate change will increase the scale and frequency of extreme weathers and natural disasters, and it is highly likely that this will cause a reduction in food supply and lead to higher prices in South and Southeast Asia (IPCC 2022b). Drastic increases in food prices may give rise to social instability. During the 2007-2008 global food crisis, protests against high food prices occurred in many countries across the globe, including in Southeast Asian countries such as Indonesia (United Nations 2012, 62). The hikes in food prices disproportionately affected low-income consumers, and Southeast Asian countries had to implement many measures to circumvent large-scale food riots in 2008, such as export restrictions, food subsidies and limits on rice purchases in supermarkets (Fuller 2008; The Observer 2008). The Philippines also used police and military forces to distribute subsidised rice to poor populations (Fuller 2008). Slightly more than a decade later, the world is facing another global food crisis. The Food and Agriculture Organization (FAO) and the World Food Programme (WFP) have warned that, in 2022, food crises in many countries are likely to be much more severe than the 2007-2008 global food crisis (FAO-WFP 2022). Rising food and energy prices have been exacerbated by the war in Ukraine, as well as adverse effects of climate change, the COVID-19 pandemic and other conflicts around the globe (FAO-WFP 2022). Since large proportions of the populations in Southeast Asian countries, particularly in the Philippines, Indonesia and Vietnam, spend significant amounts of their incomes on food, there are concerns that inflated food prices may prompt social unrest (Ong 2022). In the Philippines, for example, almost 40 per cent of household spending was on food in 2021 (Philippine Statistics Authority 2022). Since lower-income households in Asia spend larger shares of their incomes on food compared to average households, they are likely to be more intensely affected by the current food price inflation (Elbehri et al. 2022, 19).

As discussed previously, tackling climate change requires rapid expansion of renewable energy capacities across the globe, but renewable energy and food production compete for land and water resources. There are many examples from Southeast Asia that demonstrate how such competition for resources have led to socio-environmental conflicts. Biomass plants in Thailand, for example, have increased competition for water usage and caused health concerns in local communities (see, for example: Chandran 2021). However, it is not necessarily the case that large-scale acquisitions for energy production will always cause social conflicts. In

Vietnam, for example, there had been large-scale land acquisitions for hydropower projects, and solar and wind parks had also raised concerns about food-energy trade-offs (Urban et al. 2018, 576-578). Nevertheless, some measures were put in place to mitigate negative socio-environmental consequences of the projects, including financial compensations for those who were adversely affected (Urban et al. 2018, 577). As discussed below, expansions of energy-crop plantations in Southeast Asia also have negative socio-environmental consequences that ought to be addressed.

Biofuels, land acquisitions and conflicts

Following the 2007-2008 global food crisis, there was an increase in large-scale transnational acquisitions of land across the globe (see, for example: United Nations 2010; Borras et al. 2011) for the production of multiple-purpose crops that can be used for food, feed and fuel (Borras et al. 2016, 94). Energy crops that are commonly used for biofuel production – sugarcane, oil palm, soy and maize (Borras et al. 2016, 94) – are also important crops that are grown in Southeast Asia. Farmlands in Southeast Asia have continually been converted for monocrop plantations long before the 2007-2008 food crisis, but higher profitability of energy crops further stimulated agricultural investments and expansions of energy-crop plantations. Since the early 2000s, many countries such as the US, Brazil, the EU, China, India, have substantially increased their biofuels production (Weis 2009, 152), and this global trend has repercussions in Southeast Asia. For example, due to large-scale conversions of its rapeseed oil output for biodiesel production, the European Union doubled its imports of palm oil from Southeast Asia between 2000 and 2006, significantly driving up palm oil prices (Mukherjee and Sovacool 2014, 5). Indonesia and Malaysia – the two biggest world producers of palm oil – converted large-scale forest lands into oil palm plantations in this period (Weis 2009, 152; Mukherjee and Sovacool 2014, 7-9). Indonesia, Malaysia and Thailand – now major producers of biofuels in Southeast Asia – also formed national plans to promote biofuels in early-to-mid 2000s (Kumar, Shrestha, and Abdul Salam 2013, 834; Mukherjee and Sovacool 2014, 5). Renewable energy development plans in these countries also significantly rely on biofuels (Ying, Chien, and Fan 2020, 17-19).

At present, only "first-generation" biofuels are produced at large scales. These include ethanol (often derived from maize and sugarcane) and biodiesel (often derived from soybeans, rapeseed and oil palm) (Weis 2009, 151-152; Correa et al. 2019, 251; Kumar, Shrestha, and Abdul Salam 2013, 833-834). Biodiesel production in Indonesia, Malaysia and Thailand predominantly relies on oil palm, which is used as both food and fuel (Mukherjee and Sovacool 2014, 2). Since first-generation biofuels are based on food crops, large-scale production of these biofuels could potentially raise the price of these crops and undermine food security. For example, when palm oil prices increased drastically between 2006 and 2008 due to increased global demand, this benefited palm oil producers in Southeast Asia whilst poor households in the region suffered from increased food prices (Mukherjee and Sovacool 2014, 5). Increased production of energy crops also translates to increased demands for agricultural inputs, such as land and fertilisers, which puts upward pressure on the costs of agri-food production. In Thailand, for example, many Thai and non-Thai transnational companies increased their agricultural investments after the 2007-2008 food crisis and also tried to secure farmlands for the production of cash crops and energy crops. This significantly drove up the prices and rental

ISSUE: 2022 No. 93
ISSN 2335-6677

costs of farmlands, which adversely affected the economic situations of small- and medium-scale farmers in many parts of the country (Chiengkul 2017, 40-42).

The production of energy crops is rather land-intensive, and it has also been linked to many environmental problems. These issues raise questions regarding the sustainability of first-generation biofuels. Expansion of oil palm plantations in Southeast Asia, for example, have often led to deforestation and the reduction of biodiversity (Correa et al. 2019, 251; Kumar, Shrestha, and Abdul Salam 2013, 833; Mukherjee and Sovacool 2014, 7-9). In Indonesia and Malaysia, large expansions of oil palm plantations in the 2000s involved conversions of peatlands, which are known to be important carbon sinks (Mukherjee and Sovacool 2014, 4). Additionally, the use of pesticides, herbicides and fertilisers in the monocropping of energy crops harms the environment, and there are also concerns over water depletion, soil degradation and erosion (Correa et al. 2019, 251; Mukherjee and Sovacool 2014, 4-5). Notably, other types of renewable energy technology, such as solar photovoltaic (PV) panels, currently has more land-use efficiency than biofuels derived from oil palm (Vidinopoulos, Whale, and Fuentes Hutfilter 2020, 8, 10). Moreover, if one takes into account feedstock production, as well as processing, transportation, fermentation and distillation stages of biofuels, then fossil energy used in production of biofuels tends to be higher than the amount of energy that can be obtained from biofuel outputs (Weis 2009, 152).

Expansion of farmlands for energy-crop production has often led to social conflicts. In 2012, the United Nations' Special Rapporteur on the right to food and the Special Rapporteur on the rights of indigenous peoples warned that there were notable cases of large-scale land acquisitions in Southeast Asia that lacked transparency, undermined biodiversity, and also closed off people's access to land that they previously relied on for food (OHCHR 2012). In Merauke, South Papua, Indonesia, for example, it has been noted that the conversion of around 1-2 million hectares of forest and farm lands into large-scale plantations could undermine food security for around 50,000 people (OHCHR 2012). In the South of Thailand, many conflicts erupted over the leasing of state-owned and reserved forest lands for large-scale oil palm plantations. There were many instances where violence, including assassinations, were used against land-reform activists (Chiengkul 2017, 144, 161). Similar cases have also been documented across Southeast Asia. For example, a large transnational sugar company has been sued for forcibly evicting around 700 Cambodian farmers from their land between 2008 and 2009 (Agrawal 2020). In the Philippines, conflicts over land rights broke out between a giant palm oil company and the Higaonon tribe in Misamis Oriental in 2011 (Silverio 2011). There were also some protests led by villagers in Sarawak, Malaysia, against a palm oil company the same year (Silverio 2011; see also: Mukherjee and Sovacool 2014, 9). In Indonesia, over 600 communities had conflicts with palm oil companies between 2006 and 2010 (Silverio 2011; see also: Mukherjee and Sovacool 2014, 5, 7-8), and there were also allegations of police harassment and forced evictions (Manibo 2015).

It is likely that Southeast Asia will continue to promote large-scale renewable energy, including biofuels, for the sake of energy security, for economic benefits and as part of countries' climate change mitigation strategies. As discussed above, this could potentially exacerbate environmental degradation, intensify existing land conflicts and encourage new waves of large-

ISSUE: 2022 No. 93
ISSN 2335-6677

scale land acquisitions. Policy recommendations to tackle these issues are discussed in the next section.

POLICY RECOMMENDATIONS

Aside from short-term policies to tackle the current food price crisis, such as measures to strengthen intra-regional food trade and provisions of food subsidies, Southeast Asian governments should have long-term plans to promote ecological sustainability and socially just transitions in the agricultural and energy sectors. Socio-environmental problems associated with oil palm plantations in Southeast Asia have also negatively affected the export prospects of Southeast Asian countries (see, for example: Azhar, Nobilly, et al. 2021), so there are economic reasons why countries should commit to addressing these issues. Policy recommendations specifically related to the promotion of biofuels in Southeast Asia are discussed below.

1. Policies and projects that aim to promote large-scale land acquisitions for food-fuel production should include participation from local communities. Customary/traditional land rights should be respected (De Schutter 2011, 271), and there should be peaceful resolutions to conflicting claims over land ownerships. It is important to consider that, in many cases, using land to enhance food security for the local populations is likely to have more poverty-reducing impact compared to using land to grow energy crops for biofuel production (De Schutter 2011, 249, 256). Land-use rights for landless farmers should also be supported, especially for the purpose of poverty reduction and for ensuring local food security (see, for example: Chiengkul 2017, 145-147).

2. Socio-environmental standards in many sustainable certification schemes, such as the Roundtable on Sustainable Biomaterials (RSB), should be strengthened (see discussions in, for example: Fortin and Richardson 2013). Instead of monocropping, sustainable farming techniques should be used in the production of energy crops. These techniques include, for example, the use of organic fertilisers, intercropping of energy crops with other food or perennial crops, and integrating the production of energy crops with livestock raising. (Azhar, Nobilly, et al. 2021; Mukherjee and Sovacool 2014, 10). Integrated energy-livestock production increases land-use efficiency and enhances both food and fuel production. It could also provide an alternative source of income for farmers and farm workers, as well as increase food variety in the region. Moreover, targeted grazing by livestock can be used for weed control instead of herbicides that has adverse effects on farm workers' health and the environment (Azhar, Nobilly, et al. 2021; Azhar, Tohiran, et al. 2021).

3. To balance food-energy demands in the future, Southeast Asia should step up research and innovations on the second and third generations of biofuels, specifically focusing on how to make large-scale production commercially viable. Generally speaking, second-generation biofuels use non-food crops or non-food parts of plants and agricultural residues for biofuel production, so they do not compete with agri-food

production (Correa et al. 2019, 256, 259-260; Weis 2009, 151-152). Third-generation biofuels based on microalgae is even more promising because they require less freshwater, pesticides and cultivation areas to grow. Microalgal production systems can also potentially capture carbon dioxide, as well as help with waste water remediation (Correa et al. 2019, 252-253). Indonesia, Thailand and Malaysia have implemented small-scale pilot projects to study second- and third-generation biofuels, but much higher levels of support are needed (Kumar, Shrestha, and Abdul Salam 2013, 834; Ying, Chien, and Fan 2020, 18; Mukherjee and Sovacool 2014, 7-8).

When planning and implementing renewable energy projects, governments, the private sector and other non-governmental organisations in Southeast Asia should aim to circumvent or alleviate socio-environmental conflicts. They should take into consideration the interconnected '4Es' processes – enclosure (what resources are being captured), exclusion (who are being excluded from the decision-making process), encroachment (what environmental damage will occur), and entrenchment (whether the projects will exacerbate inequalities) (adapted from: Sovacool 2018, 2021).

Fuelled by climate change, food-energy demands are likely to continue to increase in the future. To tackle this challenge, it is imperative that Southeast Asia balances food and energy production in ways that also promote ecological sustainability and social justice.

REFERENCES

Agrawal, Binit. 2020. "Smit Tit v. Mitr Phol: Ensuring Access to Remedies Against Land Grabbing by Transnational Corporations." *Global Policy Blog*, 12 August, 2020. https://www.globalpolicyjournal.com/blog/12/08/2020/smit-tit-v-mitr-phol-ensuring-access-remedies-against-land-grabbing-transnational.

Azhar, Badrul, Frisco Nobilly, Alex M. Lechner, Kamil Azmi Tohiran, Thomas M. R. Maxwell, Raja Zulkifli, Mohd Fathil Kamel, and Aslinda Oon. 2021. "Mitigating the risks of indirect land use change (ILUC) related deforestation from industrial palm oil expansion by sharing land access with displaced crop and cattle farmers." *Land Use Policy* 107. https://doi.org/10.1016/j.landusepol.2021.105498.

Azhar, Badrul, Kamil Azmi Tohiran, Frisco Nobilly, Raja Zulkifli, Muhammad Izzuddin Syakir, Zulkifli Ishak, Norhisham Razi, Aqilah Oon, Ahmad Shahdan, and Thomas M. R. Maxwell. 2021. "Time to Revisit Oil Palm-Livestock Integration in the Wake of United Nations Sustainable Development Goals (SDGs)." *Frontiers in Sustainable Food Systems* 5: 1-7. https://doi.org/10.3389/fsufs.2021.640285.

Borras, Saturnino M., Jennifer C. Franco, S. Ryan Isakson, Les Levidow, and Pietje Vervest. 2016. "The rise of flex crops and commodities: implications for research." *The Journal of Peasant Studies* 43 (1): 93-115. https://doi.org/10.1080/03066150.2015.1036417.

Borras, Saturnino M., Ruth Hall, Ian Scoones, Ben White, and Wendy Wolford. 2011. "Towards a better understanding of global land grabbing: an editorial introduction." *Journal of Peasant Studies* 38 (2): 209-216. https://doi.org/10.1080/03066150.2011.559005.

Chandran, Rina. 2021. "Indigenous people 'under threat' from Asia clean energy push." *Thomson Reuters Foundation News*, 9 February, 2021. https://news.trust.org/item/20210208235919-ggxaz/.

Chiengkul, Prapimphan. 2017. *The Political Economy of the Agri-Food System in Thailand: Hegemony, Counter-Hegemony, and Co-Optation of Oppositions*. Oxon and New York: Routledge.

Correa, Diego F., Hawthorne L. Beyer, Joseph E. Fargione, Jason D. Hill, Hugh P. Possingham, Skye R. Thomas-Hall, and Peer M. Schenk. 2019. "Towards the implementation of sustainable biofuel production systems." *Renewable and Sustainable Energy Reviews* 107: 250-263. https://doi.org/10.1016/j.rser.2019.03.005.

De Schutter, Olivier. 2011. "How not to think of land-grabbing: three critiques of large-scale investments in farmland." *Journal of Peasant Studies* 38 (2): 249-279. https://doi.org/10.1080/03066150.2011.559008.

Elbehri, A., T. Temel, F. Burcu Ceylan, S. Mittal, D. Kularatne, and D. Dawe. 2022. *COVID-19 pandemic impacts on Asia and the Pacific – A regional review of socioeconomic, agrifood and nutrition impacts and policy responses.* (Bangkok: FAO).

FAO-WFP. 2022. "FAO and WFP warn of looming widespread food crisis as hunger threatens stability in dozens of countries." 7 June, 2022. https://www.fao.org/asiapacific/news/detail-events/en/c/1538532/.

FAO. 2021. *The state of the world's land and water resources for food and agriculture – Systems at breaking point. Synthetic report 2021.* FAO (Rome: FAO). https://www.fao.org/publications/card/en/c/CB7654EN/.

FAO, IFAD, UNICEF, WFP, and WHO. 2021. *In Brief to The State of Food Security and Nutrition in the World 2021. Transforming food systems for food security, improved nutrition and affordable healthy diets for all.* (Rome: Food and Agriculture Organization (FAO)). https://www.fao.org/publications/card/fr/c/CB5409EN/.

Fortin, Elizabeth, and Ben Richardson. 2013. "Certification Schemes and the Governance of Land: Enforcing Standards or Enabling Scrutiny?" *Globalizations* 10 (1): 141-159. https://doi.org/10.1080/14747731.2013.760910.

Fuller, Thomas. 2008. "Asian food crisis has political and civil implications." *The New York Times*, 18 April, 2008. https://www.nytimes.com/2008/04/18/world/asia/18iht-food.1.12130435.html.

IPCC. 2022a. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Summary for Policymakers.* IPCC (IPCC Working Group II). https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/.

---. 2022b. *Fact Sheets - Asia.* (IPCC Working Group II). https://www.ipcc.ch/report/ar6/wg2/about/factsheets/.

---. 28 February 2022c. *Overarching Frequently Asked Questions and Answers.* (IPCC Working Group II). https://www.ipcc.ch/report/ar6/wg2/about/frequently-asked-questions/.

IRENA, and FAO. 2021. *Renewable energy for agri-food systems - Towards the Sustainable Development Goals and the Paris agreement.* (Abu Dhabi and Rome: IRENA and FAO). https://www.fao.org/documents/card/fr/c/cb7433en/.

Kumar, S., Pujan Shrestha, and P. Abdul Salam. 2013. "A review of biofuel policies in the major biofuel producing countries of ASEAN: Production, targets, policy drivers and impacts." *Renewable and Sustainable Energy Reviews* 26: 822-836. https://doi.org/10.1016/j.rser.2013.06.007.

Manibo, Medilyn. 2015. "Mounting complaints put Wilmar under scrutiny." 21 July, 2015. https://www.eco-business.com/news/mounting-complaints-put-wilmar-under-scrutiny/.

Mbow, C., C. Rosenzweig, L.G. Barioni, T.G. Benton, M. Herrero, M. Krishnapillai, E. Liwenga, P. Pradhan, M.G. Rivera-Ferre, T. Sapkota, F.N. Tubiello, and Y. Xu. 2019. *Chapter 5 Food Security in 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.* IPCC (IPCC). https://www.ipcc.ch/srccl/.

Mukherjee, Ishani, and Benjamin K. Sovacool. 2014. "Palm oil-based biofuels and sustainability in southeast Asia: A review of Indonesia, Malaysia, and Thailand." *Renewable and Sustainable Energy Reviews* 37: 1-12. https://doi.org/10.1016/j.rser.2014.05.001.

OHCHR. 2012. "South-East Asia/Agrofuel: UN rights experts raise alarm on land development mega-projects." 23 May, 2012. https://www.ohchr.org/en/press-releases/2012/05/south-east-asia-agrofuel-un-rights-experts-raise-alarm-land-development-mega.

Ong, Chelsea. 2022. "Southeast Asia may face a 'big risk' of social unrest if food prices keep surging." *CNBC*, 9 May, 2022. https://www.cnbc.com/2022/05/09/big-risk-of-unrest-in-asean-if-food-inflation-surges-says-economist.html.

Philippine Statistics Authority. 2022. "2nd Quarter 2022: Gross National Income & Gross Domestic Product." Philippine Statistics Authority,. Accessed 9 August 2022. https://psa.gov.ph/national-accounts/sector/Household%20Final%20Consumption.

Quiggin, Daniel, Kris De Meyer, Lucy Hubble-Rose, and Antony Froggatt. September 2021. *Climate change risk assessment 2021.* (London: Chatham House). https://www.chathamhouse.org/2021/09/climate-change-risk-assessment-2021.

Sage, Colin. 2013. "The interconnected challenges for food security from a food regimes perspective: Energy, climate and malconsumption." *Journal of Rural Studies* 29: 71-80. https://doi.org/10.1016/j.jrurstud.2012.02.005.

Silverio, Ina Alleco. 2011. "Land converted for biofuels, farmers in Misamis Or harassed." *Bulatlat*, 29 September, 2011. https://www.bulatlat.com/2011/09/29/another-case-against-land-conversion-for-biofuels-farmers-in-misamis-oriental-being-harassed/.

Sovacool, Benjamin K. 2018. "Advancing the international political economy of climate change adaptation: political ecology, political economy and social justice." In *Handbook of the International Political Economy of Energy and Natural Resources*, edited by Andreas Goldthau, Michael F. Keating and Caroline Kuzemko, 33-49. Edward Elgar.

---. 2021. "Who are the victims of low-carbon transitions? Towards a political ecology of climate change mitigation." *Energy Research & Social Science* 73: 1-16. https://doi.org/10.1016/j.erss.2021.101916.

The Observer. 2008. "Food riots fear after rice price hits a high." *The Guardian*, 6 April, 2008. https://www.theguardian.com/environment/2008/apr/06/food.foodanddrink.

United Nations. 2010. *Foreign land purchases for agriculture: what impact on sustainable development? Sustainable Development: Innovation Briefs, Issue 8.* https://sustainabledevelopment.un.org/content/documents/no8.pdf.

---. 2012. "The global food crises." In *Report on the World Social Situation 2011*. United Nations,.
Urban, F., G. Siciliano, L. Wallbott, M. Lederer, and A. Dang Nguyen. 2018. "Green transformations in Vietnam's energy sector." *Asia Pac Policy Stud* 5 (3): 558-582. https://doi.org/10.1002/app5.251.

Vidinopoulos, Ashley, Jonathan Whale, and Ursula Fuentes Hutfilter. 2020. "Assessing the technical potential of ASEAN countries to achieve 100% renewable energy supply." *Sustainable Energy Technologies and Assessments* 42: 1-15. https://doi.org/10.1016/j.seta.2020.100878.

Weis, Tony. 2009. "Fossil Energy and the Biophysical Roots of the Food Crisis." In *The Global Food Crisis: Governance Challenges and Opportunities*, edited by Jennifer Clapp and Marc J. Cohen, 145-159. Wilfrid Laurier University Press.

---. 2010. "The Accelerating Biophysical Contradictions of Industrial Capitalist Agriculture." *Journal of Agrarian Change* 10 (3): 315-341. https://doi.org/10.1111/j.1471-0366.2010.00273.x.

Ying, Hoo Pho, Cassendra Bong Phun Chien, and Yee Van Fan. 2020. "Operational Management Implemented in Biofuel Upstream Supply Chain and Downstream International Trading: Current Issues in Southeast Asia." *Energies* 13 (7): 1-26. https://doi.org/10.3390/en13071799.

ISEAS Perspective is published electronically by: **ISEAS - Yusof Ishak Institute** 30 Heng Mui Keng Terrace Singapore 119614 Main Tel: (65) 6778 0955 Main Fax: (65) 6778 1735 Get Involved with ISEAS. Please click here: https://www.iseas.edu.sg/support/get-involved-with-iseas/	ISEAS - Yusof Ishak Institute accepts no responsibility for facts presented and views expressed. Responsibility rests exclusively with the individual author or authors. No part of this publication may be reproduced in any form without permission. © Copyright is held by the author or authors of each article.	Editorial Chairman: Choi Shing Kwok Editorial Advisor: Tan Chin Tiong Editorial Committee: Terence Chong, Cassey Lee, Norshahril Saat, and Hoang Thi Ha. Managing Editor: Ooi Kee Beng Editors: William Choong, Lee Poh Onn, Lee Sue-Ann, and Ng Kah Meng Comments are welcome and may be sent to the author(s).