

Preferences for replanting subsidy programs among Indonesian oil palm smallholders

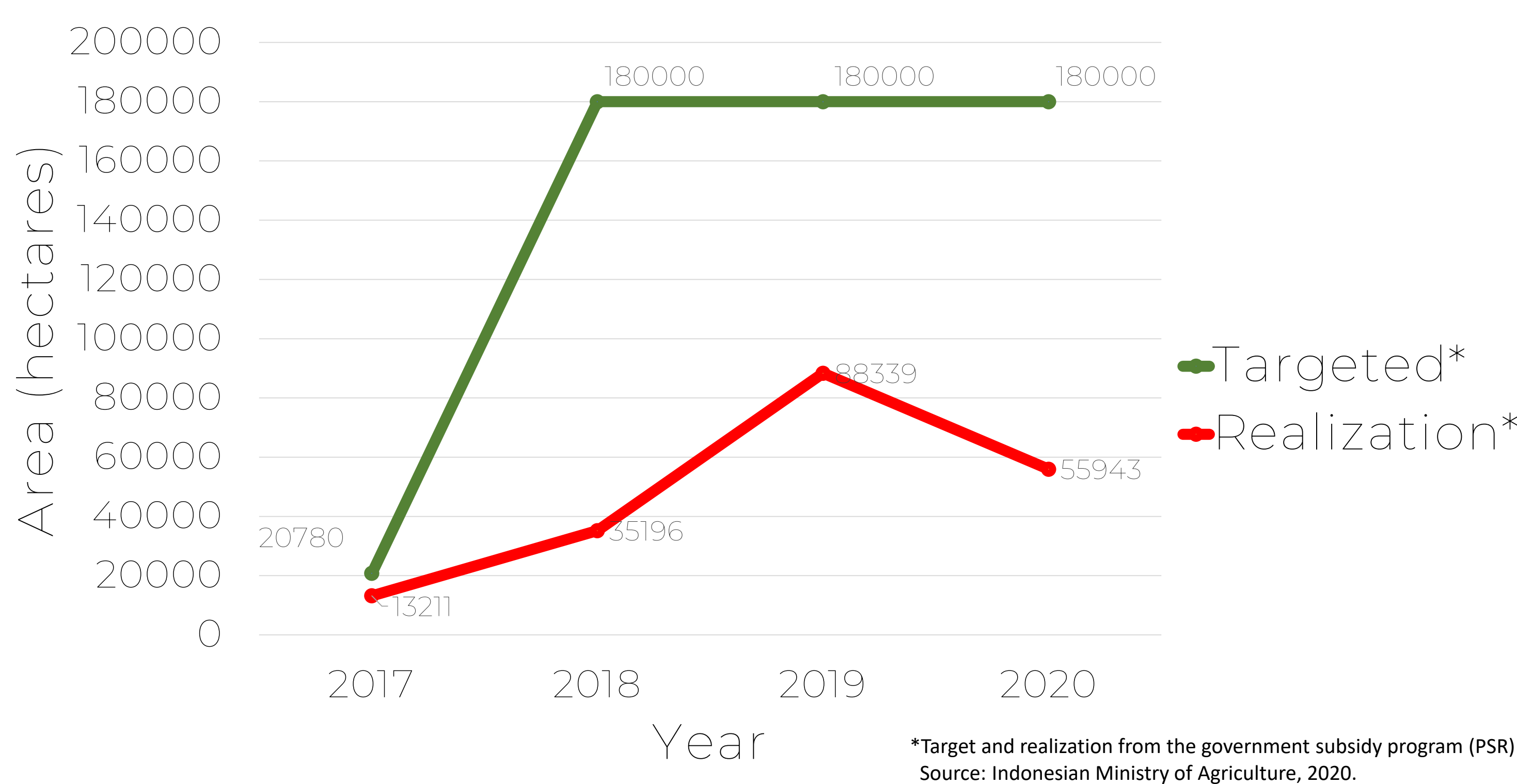
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1. Background

- Smallholders manage 41% of the oil palm plantation but only account for 33.6% of the total production.
- The decreasing production of aging smallholder oil palms created a productivity gap. Hence, replanting *-replacing old palms with new oil palm seedlings-* is required.
- For smallholders, replanting is expensive (3200€-3800€ per hectare). Furthermore, the palms only produce fruit bunches once they are 3-5 years old.
- A replanting subsidy program providing 1500€ per hectare was initiated. However, the participation remains low, and the targeted replanting area has not been reached.
- Replanting is the perfect opportunity to increase smallholders' income by introducing better quality seedlings. It reduces the risk of more forest conversion and creates prospect for plantation diversification.

Smallholder Plantation Replanting Area

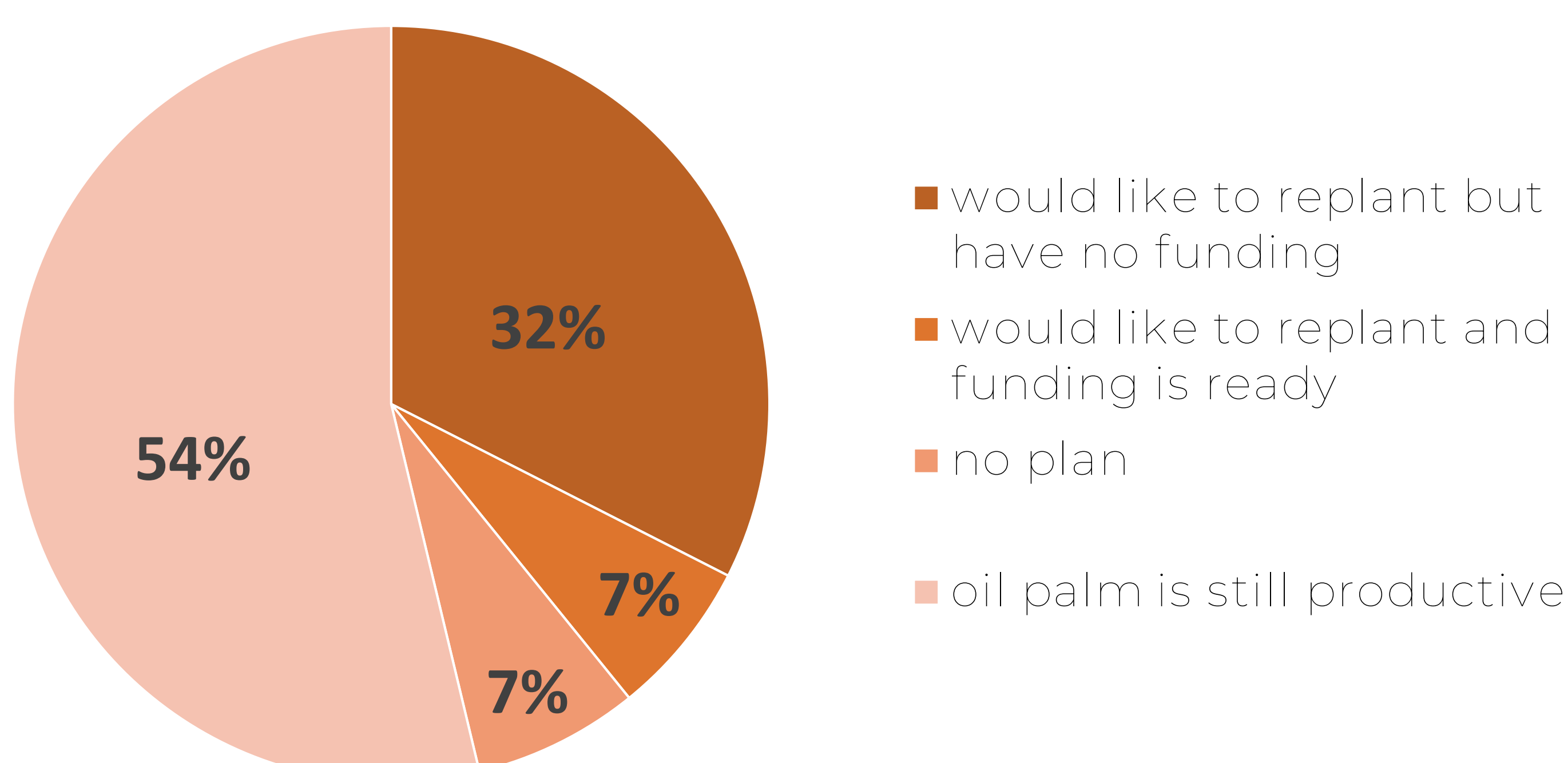


2. Research gap and objectives

Research gap: There is still no empirical evidence on how the smallholders will choose to proceed once the plantations have reached maturity and are decreasing in productivity.

- Objectives:**
1. Identify Indonesian oil palm smallholders' preferences for specific features in a subsidy program.
 2. Determine smallholders' willingness to accept a replanting subsidy program.
 3. To investigate whether smallholders are willing to diversify their oil palm plantations.

Would smallholders replant their oil palm plantation?



Notes: From a survey on 249 respondents. Question was asked before conducting the experiment

3. Methodology

- Discrete Choice Experiment (DCE) to elicit smallholders' preferences for different features of a replanting subsidy program.
- Likert-scale questions on perceptions, knowledge, and attitude towards replanting and subsidy programs. Self-assessed risk attitude and motivation.

DCE Attributes	Levels
Amount of subsidy*	25, 30, 35, 40 million IDR (1470€, 1764€, 2058€, 2352€)
Subsidy registration	Group-based Individual
Source of Funding	The government International funding Islamic Bank
Replanting method	Whole plantation Gradual
Trees that must be planted*	0, 5, 10, 15

Notes: *per hectare. 1 Euro = 17,000 Indonesian Rupiah (IDR)

Example of a choice set

	Subsidy A	Subsidy B	Opt-out
Amount of subsidy	40 million IDR	25 million IDR	
Subsidy registration	Group-based	Individual	
Source of funding	The government	International funding	
Replanting method	Whole plantation	Whole plantation	
Trees that must be planted	5	15	
I choose	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Results

Conditional logit model:

- Group-based registration is highly preferred.
- Funding from Government and Islamic banking are highly preferred.
- Smallholders are willing to accept replanting subsidy programs despite plantation diversification requirements.

Perception and attitude:

- Prerequisites for registration and clarity of information of benefits of a subsidy program are perceived as highly important.
- Smallholders perceive themselves as risk-averse (29,7%), risk-neutral (28,9%), and risk-seeking (41,4%)

5. Conclusion

- The strong preference for group-based registration reflects the importance of social networks for the practicality of decision making.
- The higher trust in subsidy schemes provided by the government or under Islamic banking schemes to funding from international agencies might reflect high cultural or social inertia.
- Replanting subsidy programs can encourage introduction of other trees within oil palm plantations.

6. Limitation and future research

- The hypothetical nature of the DCE might create a hypothetical bias. Real field experiments should be carried out to avoid this.
- Future analysis will include mixed-logit model including interaction terms with risk attitude, motivation, and financial literacy.
- As a follow-up, a latent-class analysis will be conducted to reveal typologies of smallholders and further analyse the willingness to accept the subsidy program.

References
Corley, R.H.V., Tinker, P.B.H., 2008. The Oil Palm. John Wiley & Sons.
Meijaard, E., Brooks, T.M., Carlson, K.M., Slade, E.M., Garcia-Ulloa, J., Gaveau, D.L.A., Lee, J.S.H., Santika, T., Juffe-Bignoli, D., Struwig, M.J., Wich, S.A., Ancrenaz, M., Koh, L.P., Zamira, N., Abrams, J.F., Prins, H.H.T., Sendashonga, C.N., Muryayso, D., Furumo, P.R., MacLellan, N., Hoffmann, R., Persio, M., Descals, A., Stantoi, Z., Sheil, D., 2020. The environmental impacts of palm oil in context. *Nature plants* 6 (12), 1418–1426. [10.1038/s41477-020-00813-w](https://doi.org/10.1038/s41477-020-00813-w).
Nurfatmahan, F., Ramawati, Sani, G.K., Komrudin, H., 2019. Optimization of Crude Palm Oil Fund to Support Smallholder Oil Palm Replanting in Reducing Deforestation in Indonesia. *Sustainability* 11 (8), 4914. [10.3390/su11184914](https://doi.org/10.3390/su11184914).
Qaim, M., Sibhatu, K.T., Siregar, H., Grass, I., 2020. Environmental, Economic, and Social Consequences of the Oil Palm Boom. *Annu. Rev. Resour. Econ.* 12 (1), 321–344. [10.1146/annurev-resource-110119-024922](https://doi.org/10.1146/annurev-resource-110119-024922).