

Economic evaluation of the soap-based fire-extinguish agent for peatland fire

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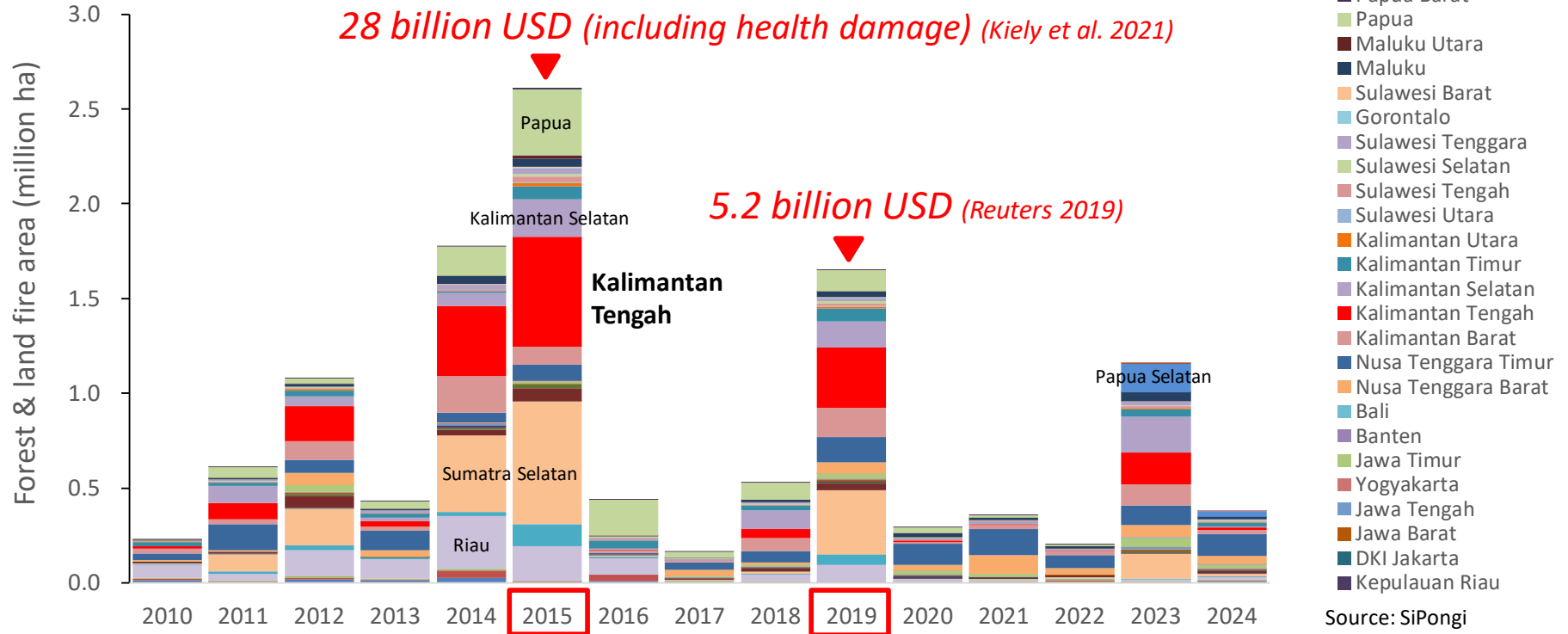
In Indonesia, forest and peatland fires during the severe dry season years have caused severe damage to its ecology and economy.



Economic damage from forest & land fire in Indonesia

16.1 billion USD (Glauber & Gunawan 2016)

28 billion USD (including health damage) (Kiely et al. 2021)





- The most cost-effective way of fire management is prevention (SiPongi, MPA, re-wetting etc.).
- However, once a fire breaks out, it is necessary to put out the fire quickly (sumber bor etc.).
- There are several challenges to extinguishing forest & land fires

Problems with current firefighting activities



Source: Questionnaire to participants in the August 2024 demonstration



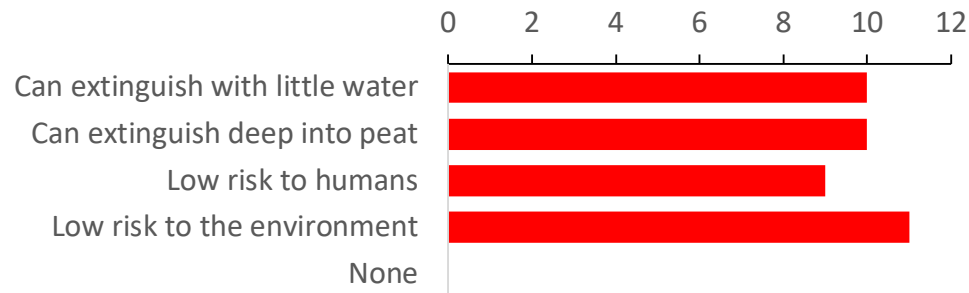
The use of high-performance fire extinguishing agents may be effective in quickly extinguishing forest and peatland fires.





Positive response from participants in the August 2024 demonstration

Advantages of the firefighting agent (n=20)



However, the product is not cheap. Is it cost-effective compared to using only water?



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Kemenhut masih andalkan water bombing kendalikan karhutla

Kamis, 21 November 2024 16:23 WIB



Pemprov Sumsel meminta tambahan helikopter untuk pemataman kebakaran lahan dari udara (water bombing). (ANTARA FOTO/Nova Wahyudi/foc)

Aerial firefighting by helicopter is the only way to fight fires in remote areas, but very expensive.

*The Ministry of Forestry notes that the rental cost of a water-bombing helicopter is around **IDR 80-200 million per hour**.*

*The total amount, referring to data from BNPB in 2019, is that the national forest and ground fire mitigation budget reaches IDR 6.7 trillion, with **70 percent** of this, or around **IDR 3.6 trillion**, used for **helicopter rental**.*

(ANTRA 21 Nov 2024)

<https://www.antaranews.com/berita/4482721/kemenhut-masih-andalkan-water-bombing-kendalikan-karhutla>

Cost effectiveness analysis of the fire-extinguishing agents in aerial firefighting using operational data in Central Kalimantan in 2023



Given parameters

- Cost of aerial firefighting: IDR 100 million / hour
- The fire-fighting agent
 - Price: IDR 3 million / 20L
 - Dilution ratio to water: 1%
 - Amount of water needed: $1/4^*$

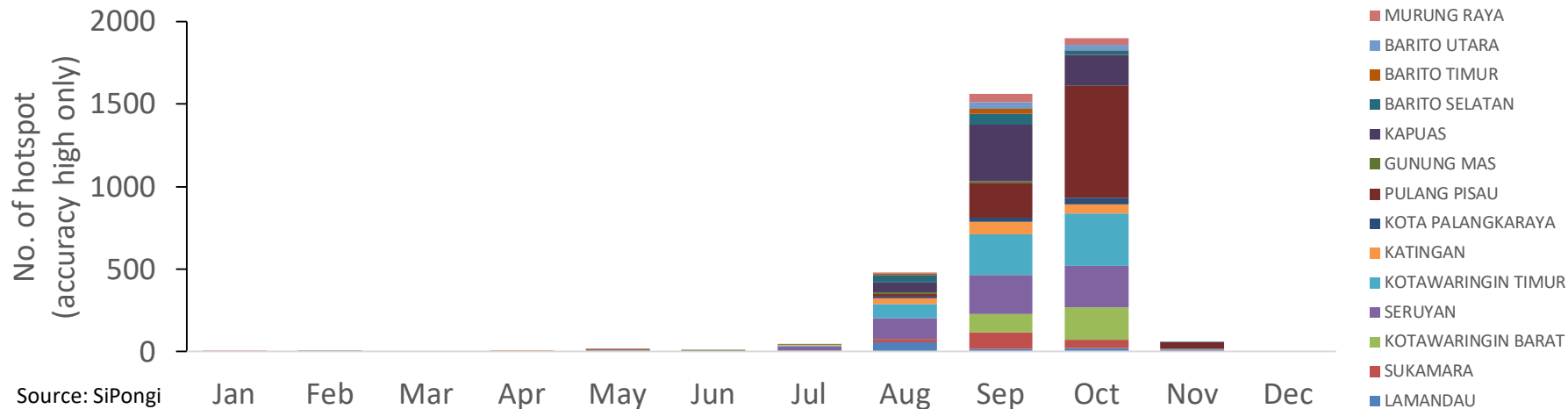
Not included to consider

- High penetration of the fire-fighting agent to peatland soil
- Additional cost for mixing fire extinguishing agents with water (e.g. special equipment) in the air.



*: Kanyama et al. 2025.

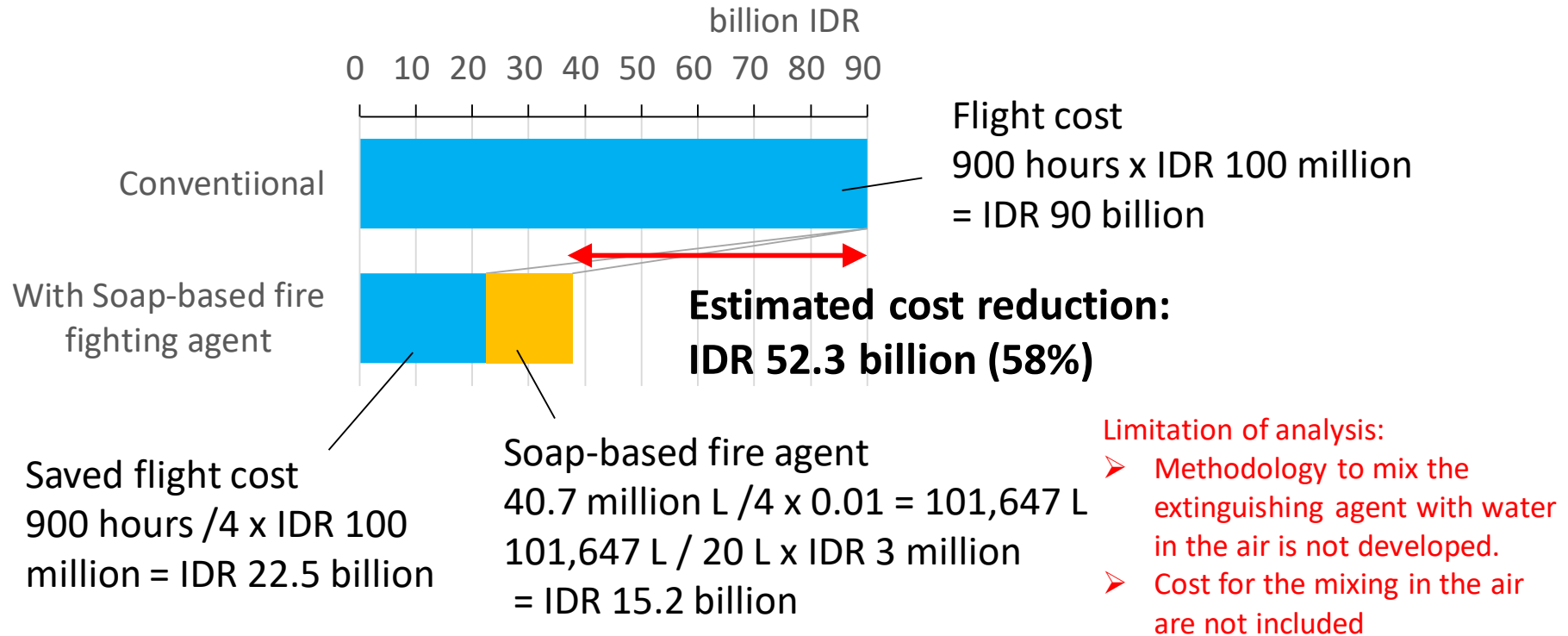
<https://www.preprints.org/frontend/manuscript/46c6b97cbf4ef5f68b4b48014cf3c44c/download_pub>



**Aerial firefighting
(water bombing)
in Central Kalimantan**
18 Aug – 16 Dec, 2023 (120 days)
Data provided by BPBD Kalteng

	AUG	SEP	OCT	NOV	Total
Work-days	9	27	25	6	67
Flight times	63	116	116	6	301
Flight duration (hrs)	159	314	405	23	900
No. of water bombing	1,773	3,614	4,797	168	10,352
Total water (,000 L)	6,061	12,899	21,028	672	40,659
Total area (ha)	302	764	1,133	130	2,330

An estimation of the cost-reduction effect of the fire extinguishing agents for aerial firefighting conducted in Central Kalimantan in 2023



Conclusion

Although the performance of firefighting agents is high, they are not always cost-effective in all situations.

However, there are cases where the cost-effectiveness is considered to be sufficiently high, such as aerial firefighting, extinguishing deep peat fires, and emergency firefighting before important events.

In order to use the firefighting agents wisely, it is important to gain more experience and data in applying them at real fire sites.



Photo by BPBD

To extinguish peat fires burning deep underground, a significant amount of water must be injected, requiring a large quantity of fuel to operate the pumps.

Thank you very much!

