Assessing Forest Fire Risk in Indonesia with the Canadian Forest Fire Weather Index System (CFFWIS)

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Abstract — **The extensive forested areas, while precious, play a role in the heightened occurrence of forest fires, resulting from a combination of human actions and natural factors. The main catalyst is frequently deliberate human activities associated with land clearance, unintentionally amplifying the vulnerability to fires. This study centers on assessing forest fire risk using the Fire Weather Index (FWI), derived from four parameters: Temperature, Humidity, Wind, and Rainfall, obtained from Indonesia's BMKG. The FWI results are analyzed in relation to real-world events, gathered from diverse sources, including news, to evaluate their efficacy. This research aims to address the challenge of forest fire management in the context of Indonesia's unique ecosystem, utilizing the FWI to enhance preparedness and response strategies.**

Keyword: Forest Fires, Fire Weather Index, Climate Data, Indonesia, BMKG

I. INTRODUCTION

Indonesia being recognized as the world's second-largest forested nation, Indonesia holds the title of the "global lung." It also stands as the second-largest generator of oxygen and possesses significant carbon sequestration potential due to its extensive land coverage. The substantial forest expanse, however, contributes to an elevated occurrence of forest fires. These fires stem from a combination of human activities and natural factors. The predominant cause of these fires is attributed to deliberate human actions, frequently linked to land clearance endeavors. Unintentional land clearance can further exacerbate the extent of forest fires, leading to uncontrollable infernos that surpass human containment efforts [1].

Human-induced factors are primarily responsible for the ignition of forest fires and the subsequent vulnerability of forested land. This can stem from deliberate acts of arson or the reckless handling of fire. These human activities are often compounded by specific circumstances that heighten the propensity for fire outbreaks. Examples of such circumstances include the presence of El Nino weather patterns, the compromised physical integrity of the forest, and the disadvantaged socio-economic status of local communities [2].

The impact of fires extends beyond human populations and encompasses the environment as well [3]. The smoke emitted by forest fires carries a substantial amount of carbon, which poses health risks to humans. Due to the greater mass of carbon particles compared to regular air, they can trigger coughing and respiratory distress. Moreover, visibility is significantly reduced when the smoke is dense. A rapid method to mitigate carbon levels in the atmosphere is through rainfall, which aids in clearing the smoke resulting from forest fires.

II. REVIEW OF THEORY

The theoretical review explores existing literature, providing a foundation for the current study's context and distinguishing features.

A. FINE FUEL MOISTURE CODE (FFMC)

Fine Fuel Moisture Code (FFMC) quantifies the moisture content of forest floor litter and fine fuels, reflecting fire ignition and propagation potential. Reduced FFMC values correspond to drier conditions and heightened fire susceptibility. Calculated from temperature, precipitation, wind speed, and humidity data, FFMC gauges fire risk [4].

B. DUFF MOISTURE CODE (DMC)

DMC assesses the moisture levels within the decomposed organic material beneath the litter layer, also known as the duff layer. It impacts the slow-burning and subterranean combustion of fuel. Elevated DMC values indicate a heightened likelihood of ground fires [5].

C. DROUGHT CODE (DC)

The Drought Code (DC) signifies the extended desiccation potential of profound organic strata like substantial logs and roots. It offers perspectives on the fuel's sustainability for prolonged burning. Elevated DC values correspond to escalated prospects of substantial and fierce fires. Unlike conventional moisture codes reliant on weight-based fuel moisture assessment, the Drought Code employs a water balance model. This model tracks stored water in an imaginary soil through the addition of daily precipitation and the deduction of actual evaporation, gauging moisture levels in millimeters [5].

D. Buildup Index (BUI)

The Buildup Index (BUI) quantifies overall flammability by combining DMC and The Drought Code (DC) carries different weights, with a notable bias towards the Duff Moisture Code (DMC). Yet, as the DMC value rises, the significance of DC also grows, possibly leading to the Buildup Index (BUI) reaching almost double the estimation of DMC, particularly in extremely dry circumstances. This pertains to the quantity of fuel that remains present on the forest floor and experiences gradual alterations over time [6].

E. Initial Spread Index (ISI)

Quantifying the projected fire spread rate numerically, The Initial Spread Index (ISI) overlooks variations in fuel volume and combines the influence of wind with the effect of the Fine Fuel Moisture Code (FFMC) on fire propagation. ISI quantifies the initial stage of fire spread during ignition, considering both wind velocity and FFMC conditions. Elevated ISI values denote swifter fire spread during weather conditions [7].

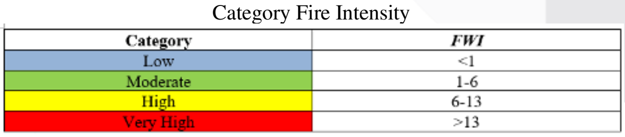
F. Fire Weather Index (FWI)

FWI assigns a numerical assessment of relative wildfire potential in a standard fuel type on level ground. Comprising six components, it collectively and individually incorporates the impact of fuel moisture and wind on fire behavior (Van Wagner, 1987).

In areas where snow cover isn't a prominent factor, computations should commence on the third consecutive day when noon temperatures reach 12°C or above. On this day, initiate calculations with the following initial code values (Turner and Lawson, 1978):

FFMC = 85
DMC = 2 times the count of days since measurable precipitation
DC = 5 times the count of days since measurable precipitation

TABLE 1
Category Fire Intensity



Category	*FWI*
Low	<1
Moderate	1-6
High	6-13
Very High	>13

TABLE 1 features a classification of fire intensity levels, sourced from entities like BMKG and pertinent scientific publications, which pertain to distinct categories of fire intensity [8].

III. RESEARCH METHOD

This research revolves around computing the risk assessment of forest fires through the Fire Weather Index, utilizing four parameters: Temperature, Humidity, Wind, and Rainfall. These parameters were sourced from Indonesia's Badan Meteorology, Climatology, and Geophysics Agency (BMKG). The BMKG handles a multitude of weather-related information using intricate methodologies that demand sophisticated artificial intelligence capabilities. These encompass tasks like forecasting earthquakes and predicting fires [9] – [10].

A. Forest Fire System

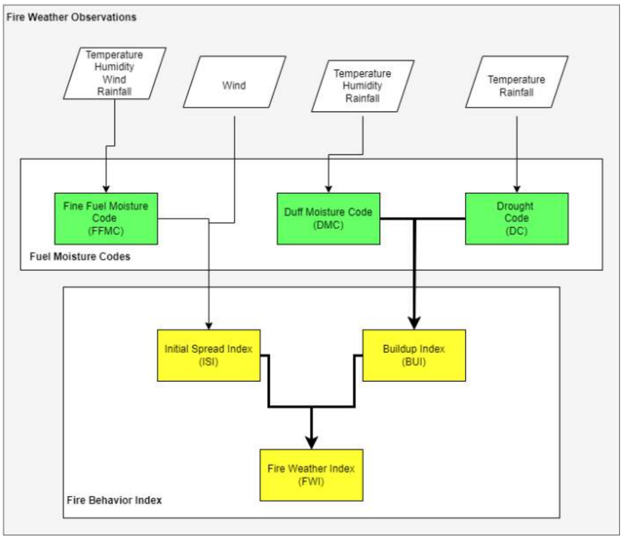
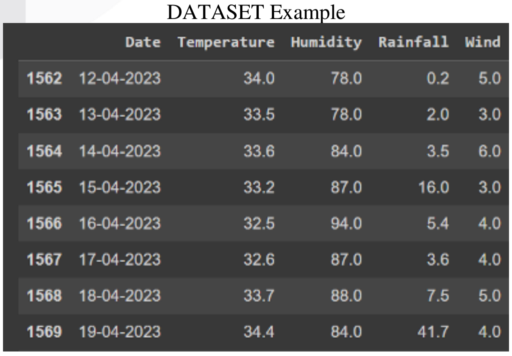


Fig. 1
CFFWIS Structure

Fig. 1 is a structure that show Canadian Forest Fire Weather Index System (CFFWIS). The Forest Fire Weather Index (FWI) offers a comprehensive method to gauge fire risk, assessing potential forest fire behavior and intensity based on meteorological elements. Crafted by the Canadian Forest Service, it integrates six components: Fine Fuel Moisture Code (FFMC), Duff Moisture Code (DMC), Drought Code (DC), Initial Spread Index (ISI), Buildup Index (BUI), and Fire Weather Index (FWI), all working together to gauge the level of fire risk. According to Fig.1, fire weather observations are dependent on four parameters: Temperature measured in Celsius (^oC), Humidity expressed as a percentage (%), Wind speed measured in kilometers per hour (*km/h*), and rainfall quantified in millimeters (*mm*).

B. DATASET

TABLE 2
DATASET Example



	Date	Temperature	Humidity	Rainfall	Wind
1562	12-04-2023	34.0	78.0	0.2	5.0
1563	13-04-2023	33.5	78.0	2.0	3.0
1564	14-04-2023	33.6	84.0	3.5	6.0
1565	15-04-2023	33.2	87.0	16.0	3.0
1566	16-04-2023	32.5	94.0	5.4	4.0
1567	17-04-2023	32.6	87.0	3.6	4.0
1568	18-04-2023	33.7	88.0	7.5	5.0
1569	19-04-2023	34.4	84.0	41.7	4.0

TABEL 2 illustrates a sample dataset sourced from BMKG, encompassing four parameters: Temperature, Humidity, Rainfall, and Wind. From all those parameters the Fire Weather Index can be calculated in the next step.

C. FFMC Calculation

During this phase, four essential parameters are required: Temperature, Humidity, Rainfall, and Wind. The initial step involves computing yesterday's Fine Fuel Moisture Code (FFMC) using the provided formula.

$$m_{t-1} = 147.2\frac{101 - FFMC_{t-1}}{59.5 + FFMC_{t-1}} \tag{1}$$

The value of M_{t-1}, which represents yesterday's Fine Fuel Moisture Code, is a prerequisite for the formula. This value is crucial for the computation. The initial code value for $FFMC_{t-1}$ is obtained from Turner and Lawson, and it's set at 85.

If there is rainfall (P > 0.5), the fine fuel moisture content of the current day (m_{rt}), which pertains to wetting phases and will subsequently replace m_{t-1}, is determined using the following calculation:

$$\begin{gathered} For\ m_{t-1} \le 150 \\ m_{rt} = m_{t-1} + 42.5 \cdot P_f \cdot \left(e^{\frac{-100}{251-m_{t-1}}}\right) \cdot \left(1 - \frac{-6.93}{P_f}\right) \end{gathered} \tag{2}$$

$$\begin{gathered} For\ m_{t-1} > 150 \\ m_{rt} = m_{t-1} + 42.5 \cdot P_f \cdot \left(e^{\frac{-100}{251-m_{t-1}}}\right) \cdot \left(1 - \frac{-6.93}{P_f}\right) \\ + 0.0015 \cdot (m_{t-1} - 150)^2 \cdot {P_f}^{0.5} \end{gathered} \tag{3}$$

Here, P_f represents effective rainfall in millimeters (mm), and its computation is as follows:

$$P_f = P - 0.5 \tag{4}$$

If the value of m_{rt} is greater than 250, it is then set to 250. Subsequently, the computation of the fine fuel moisture content for drying phases involving the calculation of E_d is conducted as follows:

$$E_d = 0.942 \cdot H^{0.679} + 11 \cdot e^{\frac{H-100}{10}} + 0.18 \cdot (21.1 - T) \cdot (1 - e^{-0.115 \cdot H}) \tag{5}$$

When E_d is smaller than m_{t-1}, the logarithmic drying rate k_d is determined using the following equations:

$$k_0 = 0.424 \cdot \left(1 - \left(\frac{H}{100}\right)^{1.7}\right) + 0.0694 \cdot U^{0.5} \cdot \left(1 - \left(\frac{H}{100}\right)^{8}\right) \tag{6}$$

$$k_d = k_0 \cdot 0.581 \cdot e^{0.0365 \cdot T} \tag{7}$$

Subsequently, the fine fuel moisture content m is calculated using the following procedure:

$$m_t = E_d + (m_{t-1} - E_d) \cdot 10^{-k_d} \tag{8}$$

If E_d is greater than m_{t-1}, the calculation shifts to determining the fine fuel equilibrium moisture content for wetting phases, denoted as E_w, using the following approach:

$$E_w = 0.618 \cdot H^{0.753} + 10 \cdot e^{\frac{H-100}{10}} + 0.18 \cdot (21.1 - T) \cdot (1 - e^{-0.115 \cdot H}) \tag{9}$$

If E_w is greater than m_{t-1}, the log wetting rate kw is determined using the provided equations. On the other hand, if E_w is less than or equal to m_{t-1} and m_{t-1} is less than or equal to E_d, then m_t is set as equal to m_{t-1}.

$$k_1 = 0.424 \cdot \left(1 - \left(\frac{100 - H}{100}\right)^{1.7}\right) + 0.0694 \cdot U^{0.5} \cdot \left(1 - \left(\frac{100 - H}{100}\right)^{8}\right) \tag{10}$$

$$k_w = k_1 \cdot 0.581 \cdot e^{0.0365 \cdot T} \tag{11}$$

Following the preceding steps, the fine fuel moisture content m can be computed using the provided procedure:

$$m_t = E_w + (E_d - m_{t-1}) \cdot 10^{-k_w} \tag{12}$$

Finally, the Fine Fuel Moisture Code (FFMC) is determined using the following calculation:

$$FFMC_t = 59.5\frac{250 - m_t}{147.2 + m_t} \tag{13}$$

D. DMC Calculation

In this stage, three crucial parameters are necessary: Temperature, Humidity, and Rainfall. The DMC value from the preceding day becomes DMC_{t-1}. If there's rainfall (P > 1.5), the subsequent method for wetting phases must be employed. And if rainfall is less than or equal to 1.5, the previously mentioned rainfall procedure should be skipped. Certainly, here is the calculation for effective rainfall P_e in millimeters (mm):

$$P_e = 0.92 \cdot P - 1.27 \tag{14}$$

In the subsequent step, the duff moisture content from the previous day, denoted as m_{t-1}, is computed:

$$m_{t-1} = 20 + e^{5.6348 - \frac{DMC_{t-1}}{43.43}} \tag{15}$$

Thirdly, the slope variable in the DMC rain effect, denoted as b, is determined:

$$b = \begin{cases} \dfrac{100}{0.5 + 0.3 \cdot DMC_{t-1}}, for\ DMC_{t-1} < 33 \\ 14 - 1.3 \cdot \ln(DMC_{t-1}), for\ 33 < DMC_{t-1} < 65 \\ 6.2 \cdot \ln(DMC_{t-1}) - 17.2, for\ DMC_{t-1} > 65 \end{cases} \quad (16)$$

Fourthly, the duff moisture content after rain, denoted as m_{rt}, is calculated:

$$m_{rt} = m_{t-1} + \frac{1000 - P_e}{48.77 + b \cdot P_e} \quad (17)$$

Lastly, the m_{rt} value is transformed into the DMC after rain, designated as DMC_{rt}, which then replaces the previous day's DMC, becoming the new DMC_{t-1}:

$$DMC_{rt} = 244.72 - 43.43 \cdot \ln(m_{rt} - 20) \quad (18)$$

$$if\ DMC_{rt} < 0, DMC_{rt} = 0$$

Subsequently, the logarithmic drying rate in DMC, referred to as K, needs to be computed:

$$K = 1.894 \cdot (T + 1.1)(100 - H) \cdot Le \cdot 10^{-6} \quad (17)$$

$$if\ T < -1.1, T = -1.1$$

Eventually, with the calculation of variable K completed, the subsequent task is to compute the Duff Moisture Code (DMC) using the provided formula.

$$DMC_t = \begin{cases} DMC_{t-1} + 100 \cdot K, & P \leq 1.5 \\ DMC_{rt} + 100 \cdot K, & P > 1.5 \end{cases} \quad (18)$$

E. DC Calculation

In this phase, two parameters are required: Temperature and Rainfall. The DC value from the previous day becomes DC_{t-1}. If there is rainfall (P > 2.8), the subsequent process for wetting phases should be applied. However, if rainfall is less than or equal to 1.5, the previously described rainfall procedure should be omitted. Here is the calculation for effective rainfall P_d in millimeters (mm):

$$P_d = 0.92 \cdot P - 1.27 \quad (19)$$

Next, the moisture equivalent of the previous day's DC, denoted as Q_{t-1}, needs to be computed:

$$Q_{t-1} = 800 \cdot e^{\frac{-DC_{t-1}}{400}} \quad (20)$$

Using the previously calculated Q_{t-1}, the moisture equivalent after rain, represented as Q_{rt}, can be determined:

$$Q_{rt} = Q_{t-1} + 3.937 \cdot P_d \quad (21)$$

Then, Q_{rt} can be converted to the DC after rain, referred to as DC_{rt}, which then replaces the previous DC value (DC_{t-1}):

$$DC_{rt} = 400 \cdot \ln\left(\frac{800}{Q_{rt}}\right) \quad (22)$$

$$if\ DC_{rt} < 0, DC_{rt} = 0$$

Next, the potential evapotranspiration V is calculated using the following formula:

$$V = 0.36 \cdot (T + 2.8) + Lf \quad (23)$$

$$if\ T < -2.8, T = -2.8$$

Finally, the Drought Code (DC) is calculated using the following formula:

$$DC_t = \begin{cases} DC_{t-1} + 100 \cdot V, & P \leq 2.8 \\ DC_{rt} + 100 \cdot V, & P > 2.8 \end{cases} \quad (24)$$

F. BUI Calculation

When DMC is less than or equal to 0.4 times DC, the Buildup Index (BUI) is calculated using the following formula (Van Wagner and Pickett, 1985):

$$For\ DMC \leq 0.4 \cdot DC$$

$$BUI = 0.8 + \frac{DMC - \mathrm{DC}}{DMC + 0.4 \cdot \mathrm{DC}} \quad (25)$$

$$For\ DMC > 0.4 \cdot DC$$

$$BUI = DMC - \left(1 - \frac{0.8 - \mathrm{DC}}{DMC + 0.4 \cdot \mathrm{DC}}\right) \cdot [0.92 + (0.0114 \cdot DMC)^{1.7}] \quad (26)$$

G. ISI Calculation

The Initial Spread Index (ISI) is the result of multiplying wind and fine fuel moisture functions. The wind function is determined through the following process (Van Wagner and Pickett, 1985):

$$f(U) = e^{0.05039 \cdot U} \quad (28)$$

U = Wind Speed (km/h)

And the fine fuel moisture function is calculated using the following approach:

$$f(F) = (91.9 \cdot e^{-0.1386 \cdot m}) \cdot \left(1 + \frac{m^{5.31}}{4.93 + 10^7}\right) \quad (29)$$

m = Fuel moisture content / FFMC value (13).

The Final Initial Spread Index (ISI) is calculated using the following equation:

$$ISI = 0.208 \cdot f(U) \cdot f(F) \quad (30)$$

H. FWI Calculation

The previous version of the Fire Weather Index (FWI) was assessed on a scale ranging from 0 to 16, referred to as the D-scale. Due to various reasons, the D-scale was deemed inadequate, leading to the development of a new scale known as the I-scale. However, the I-scale's values were considered excessively high, prompting its replacement with a modified version (square root) named the B-scale. Despite this, the B-scale still lacked optimization, culminating in the creation of the S-scale. For detailed insights into the evolution of different FWI scales, refer to Van Wagner (1987).

The Fire Weather Index (FWI) serves as a gauge for fire intensity, necessitating factors that encompass both the rate of spread and fuel consumption for its calculation. While the Initial Spread Index (ISI) signifies the rate of spread, the Buildup Index (BUI) doesn't directly correspond to it. To transform the BUI into a metric representing the weight of consumed fuel, denoted as $f(D)$, the following equation is employed (Van Wagner, 1987):

$$f(D) = \begin{cases} 0.626 \cdot BUI^{0.809} + 2 \,, BUI \ \leq 80 \\ \dfrac{1000}{25 + 108.64 \cdot e^{-0.023 \cdot BUI}} \,, BUI > 80 \end{cases} \tag{31}$$

Subsequently, the B-scale Fire Weather Index (FWI) is acquired using the following process:

$$B = 0.1 \ \cdot ISI \cdot f(D) \tag{32}$$

Finally, S-scale Fire Weather Index (FWI) is determined using the subsequent equation:

$$S = \begin{cases} e^{2.72 \cdot (0.434 \cdot \ln B)^{0.647}} \,, if \ B > 1 \\ B \,, if \ B \leq 1 \end{cases} \tag{33}$$

IV. RESULT

The integration of the FWI system enables us to accurately assess the level of forest fire intensity. The FWI system considers not only the current weather conditions but also cumulative effects, providing a comprehensive understanding of fire behavior and its potential spread. This information is invaluable for firefighting operations and resource allocation, enhancing mobility and ensuring quicker and more responsive handling.

The testing was conducted using three fire incidents that have occurred in various regions of Indonesia, with input values derived from the calculated Fire Weather Index. Additionally, the testing was extended to include a scenario from a region where no fire incident took place. The assessment was carried out by interpreting the level of potential forest fire calibrated from the Indonesian Fire Danger Rating System, utilizing the indices provided by the Canadian Forest Fire Weather Index System (CFFWIS).

A. Fire Weather Index Result

TABLE 3
FWI Result in Tuban Regency

Date	FWI	Category
23/09/2022	2.8	Moderate
24/09/2022	5.1	Moderate
25/09/2022	5	Moderate
26/09/2022	7.9	High
27/09/2022	7.6	High
28/09/2022	7.2	High
29/09/2022	7.2	High

TABLE 3 presents the forest fire weather index outcomes in Tuban Regency, East Java, spanning from September 23, 2022, to September 29, 2022. It is evident that the peak FWI value occurs on September 26, 2022, falling within the predetermined range. Furthermore, during the period from September 26, 2022, to September 29, 2022, the FWI value remains notably elevated.

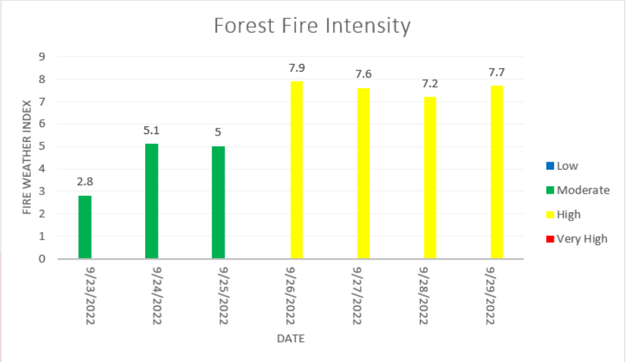


Fig. 2
Graph FWI in Tuban Regency

Fig. 2 illustrates the forest fire weather index values graph in Tuban Regency, East Java, covering the period from September 23, 2022, to September 29, 2022, in accordance with the data from TABLE 3. It can be observed that from September 23 to September 25, 2022, the situation remains in the green "moderate" state. Subsequently, there is an increase in the period from September 26, 2022, to September 29, 2022.

Pemicu Kebakaran Hutan Tuban Seluas Tiga Hektare, Petugas Damkar: Sengaja Ada yang Bakar

bloktuban.com | Tuesday, 27 September 2022 05:00

Petugas damkar Tuban sedang memadamkan api di Hutan Pakah secara manual, Senin (26/9). (Foto:Nur/blokTuban.com)

Reporter : Muhammad Nurkholis

blokTuban.com - Kawasan hutan Pakah atau alas Jalin di Kabupaten Tuban terbakar pada Senin (26/9) siang sekitar pukul 12.05 Wib. Besarnya kobaran api ditambah angin kencang, membuat kepulan asap hingga ke jalan raya Nasional Tuban-Surabaya.

Kebakaran hutan Pakah yang terletak di Desa Gesing, Kecamatan Semanding, Kabupaten Tuban diperkirakan petugas Satpol PP dan Pemadam Kebakaran Tuban seluas tiga hektare.

Fig. 3
News case of forest fires in Tuban Regency

Based on the information [11] presented in Fig. 3, which indicates a forest fire incident on September 26, 2022, it can be deduced that indeed a fire occurred on that date in alignment with the FWI results.

TABLE 4
FWI Result in Pesisir Selatan Regency

Date	FWI	Category
18/05/2023	0.5	Low
19/05/2023	3.1	Moderate
20/05/2023	5.5	Moderate
21/05/2023	5	Moderate
22/05/2023	9.8	High
23/05/2023	9.5	High
24/05/2023	10.1	High
25/05/2023	8.9	High
26/05/2023	12.5	High
27/05/2023	2.3	Moderate
28/05/2023	6.8	High
29/05/2023	1.3	Moderate
30/05/2023	1.2	Moderate
31/05/2023	1.4	Moderate
01/06/2023	5.4	Moderate
02/06/2023	7.7	High

TABLE 4 showcases the forest fire weather index outcomes in Pesisir Selatan Regency, West Sumatra, spanning from May 18, 2023, to June 2, 2023. It is evident that there is a substantial increase in the FWI value on May 19, 2023, and this elevated value persists until May 28, 2023, falling within the categories of moderate and high fire intensity.

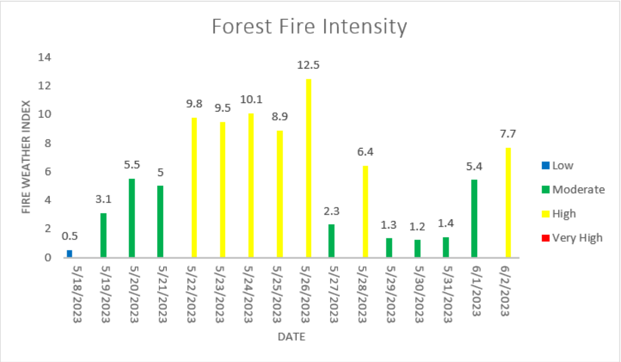
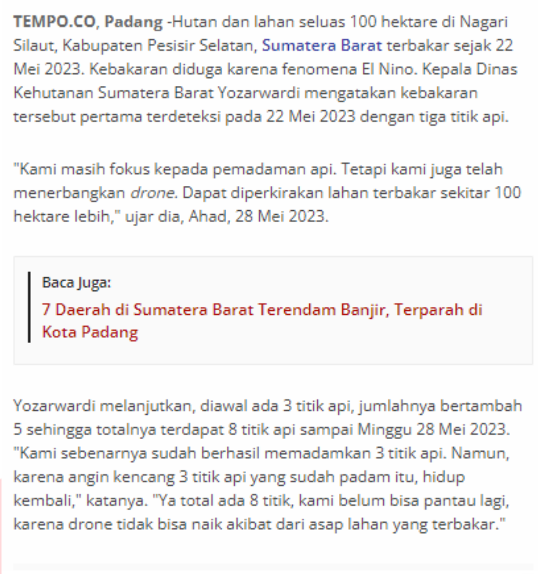


Fig. 4
Graph FWI in Pesisir Selatan Regency

Fig. 4 depicts the FWI results of forest fires in Pesisir Selatan Regency, West Sumatra, within the range of May 18, 2023, to June 2, 2023, aligned with the data from TABLE 4.



TEMPO.CO, Padang -Hutan dan lahan seluas 100 hektare di Nagari Silaut, Kabupaten Pesisir Selatan, Sumatera Barat terbakar sejak 22 Mei 2023. Kebakaran diduga karena fenomena El Nino. Kepala Dinas Kehutanan Sumatera Barat Yozarwardi mengatakan kebakaran tersebut pertama terdeteksi pada 22 Mei 2023 dengan tiga titik api.

"Kami masih fokus kepada pemadaman api. Tetapi kami juga telah menerbangkan *drone*. Dapat diperkirakan lahan terbakar sekitar 100 hektare lebih," ujar dia, Ahad, 28 Mei 2023.

Baca Juga:
7 Daerah di Sumatera Barat Terendam Banjir, Terparah di Kota Padang

Yozarwardi melanjutkan, diawal ada 3 titik api, jumlahnya bertambah 5 sehingga totalnya terdapat 8 titik api sampai Minggu 28 Mei 2023. "Kami sebenarnya sudah berhasil memadamkan 3 titik api. Namun, karena angin kencang 3 titik api yang sudah padam itu, hidup kembali," katanya. "Ya total ada 8 titik, kami belum bisa pantau lagi, karena drone tidak bisa naik akibat dari asap lahan yang terbakar."

Fig. 5 News case of forest fires in Pesisir Selatan Regency

Based on the information obtained [12] as previously presented in Fig. 5, indicating forest fire incidents between May 22, 2023, and May 30, 2023, it can be inferred that indeed fires occurred during those dates in accordance with the FWI calculations.

TABLE 5
FWI Result in Indragiri Hulu Regency

Date	FWI	Category
08/08/2022	1.9	Moderate
09/08/2022	4.3	Moderate
10/08/2022	5.4	Moderate
11/08/2022	6.3	High
12/08/2022	6	Moderate
13/08/2022	9.2	High
14/08/2022	5.2	Moderate
15/08/2022	5.6	Moderate

TABLE 5 presents the FWI values from forest fires in Indragiri Hulu Regency, Riau, covering the period from August 8, 2022, to August 15, 2022. It is evident that there is an increase in the FWI value on August 9, 2022, and subsequent days show a gradual but significant rise in FWI values, persisting until August 15, 2022.

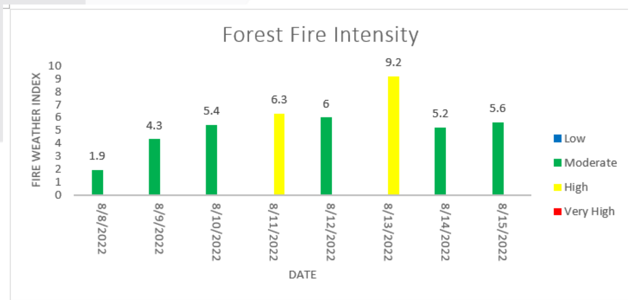


Fig. 6
Graph FWI in Indragiri Hulu Regency

Fig. 6 illustrates the FWI values resulting from forest fires in Indragiri Hulu Regency, Riau, spanning from August 8, 2022, to August 15, 2022, aligned with the data from TABLE 5. It can be observed that there are two days falling within the category of high fire intensity, namely August 11, 2022, and August 13, 2022.

PUSAT KRISIS KESEHATAN

Informasi Awal Kebakaran-Hutan-dan-Lahan di 1 Kecamatan, INDRAGIRI-HULU, RIAU | 11-08-2022

Informasi Awal Pusat Krisis Kesehatan terhadap bencana Kebakaran-Hutan-dan-Lahan yang terjadi di 1 kecamatan, yaitu Rengat, INDRAGIRI-HULU, RIAU pada tanggal 11-08-2022.

Telah terjadi kebakaran lahan di Desa Sekip Hilir, Kecamatan Rengat. Akibat kejadian ini lahan seluas 15 Ha terbakar.

Dalam data awal yang diperoleh dari dinas kesehatan setempat berkoordinasi dengan beberapa dinas terkait maka jumlah korban yang dapat diinformasikan adalah sebanyak 0 Orang, terdiri dari 0 orang meninggal, 0 orang hilang, 0 Luka Berat/Rawat Inap , 0 Luka Ringan/Rawat Jalan dan 0 Orang pengungsi.

UPAYA YANG DILAKUKAN

Fig. 7
News case of forest fires in Indragiri Hulu Regency

Based on the information [13] presented in Fig. 7, which indicates a forest fire incident on August 11, 2022, it can be inferred that indeed fires occurred on that date in line with the FWI calculations conducted.

V. CONCLUSION

Based on the FWI value testing results as discussed in Section 4, we proceed to analyze the outcomes of the testing process. To assess these results, we compare the outcomes with the calibrated Fire Weather Index (FWI) values based on countries situated along the equator, formerly derived from the Canadian Forest Fire Weather Index System (CFFWIS), this is determined by following the established benchmark or referring to the FWI Category indicated in TABLE 1, the conducted testing yields outcomes that are aligned with expectations. The analysis carried out in this testing focuses on the FWI values result in relation to real-world situations or events. These events were gathered from various sources, including news, which then serve as benchmarks to gauge the effectiveness of the outcomes.

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