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LAMPIRAN

Lampiran 1. Tahap Pengolahan Data Citra

Langkah-langkah pembuatan polygon (pewarnaan) menggunakan *Adobe Photoshop* adalah sebagai berikut:

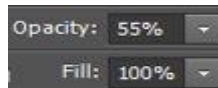
1. Masukkan gambar periode sebelumnya sebagai background



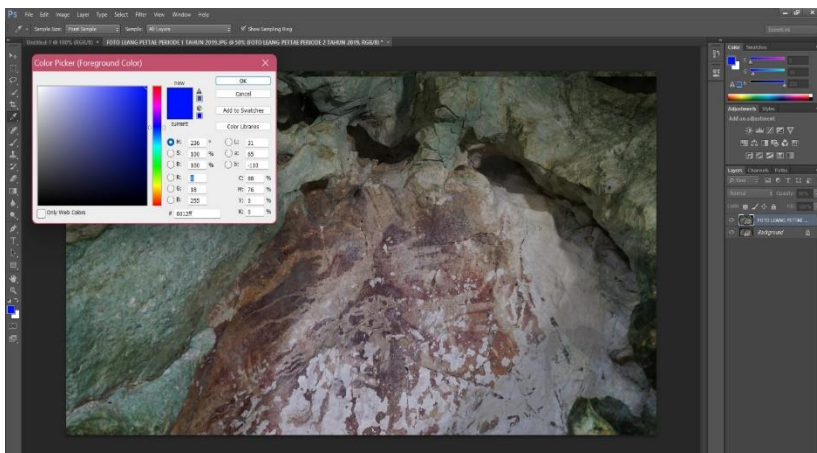
2. Masukkan gambar periode berikutnya sebagai layer

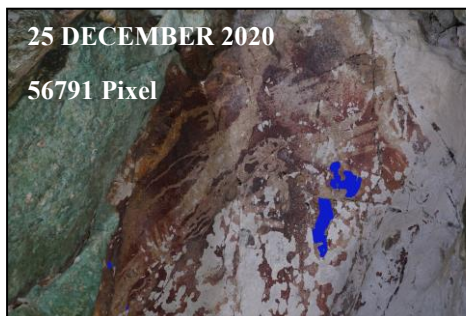
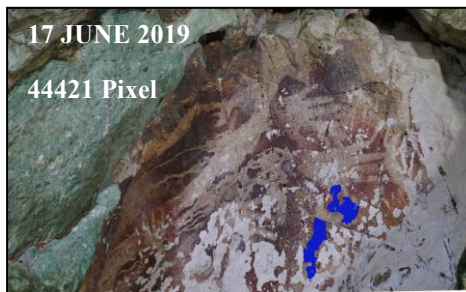


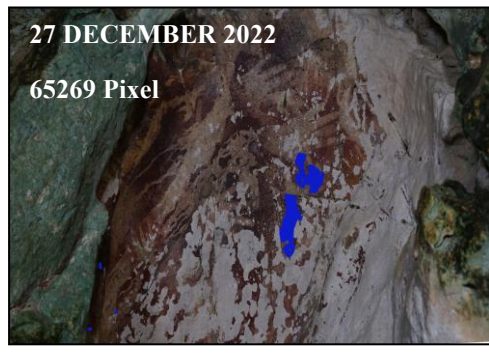
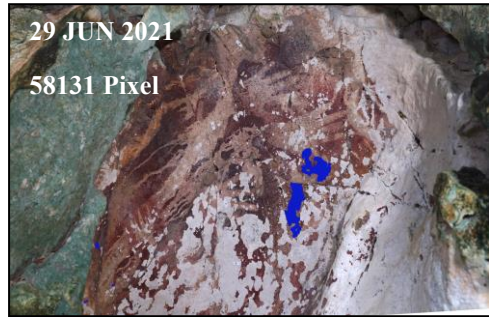
3. Kurangi *opacity* gambar periode berikutnya yang telah ditumpuk pada *background* untuk memudahkan dalam penyesuaian *layer*, lalu Atur posisi gambar hingga sama dengan background



4. Gunakan *tools brush* untuk memberi warna (biru) pada daerah yang mengalami kerusakan tekan *icon eye* pada bagian *layers* untuk melihat perubahan sebelumnya.



Lampiran 2. Gambar Monitoring Hasil Polygon (Pewarnaan)



Lampiran 3. Data Harian Leang Pettae 2019-2022

DATE	T2M	RH2M	WS50M	WD50M
19-Mar-19	27.26	69.31	4.41	301.69
17-Jun-19	26.92	76.19	4.77	127.56
05-Oct-19	28.33	65.06	4.07	128.5
14-Dec-19	28.48	75.5	2.98	314.12
25-Mar-20	27.9	77.19	1.94	222.44
30-Aug-20	27.4	73.75	5.89	113.94
04-Nov-20	28.69	72.81	3.02	107.81
25-Dec-20	26.47	83.12	3.07	281.56
23-Mar-21	27.46	82.44	2.78	295.19
29-Jun-21	27.42	79.25	3.29	117.81
04-Oct-21	27.35	78.12	3.42	203.31
26-Dec-21	27.05	84.81	6.1	294.44
28-Mar-22	26.65	82.75	3.19	278.5
28-Jun-22	27.24	81.44	2.83	153.62
23-Oct-22	28.04	82.88	3.28	261.31
27-Dec-22	26.27	88.19	6.84	292.31

Lampiran 4. Data TXT Persentase kerusakan, Laju Kerusakan dan Data Cuaca

Date	(dmg)	(rod)	T	Rh	W
19-Mar-19	0.3966	0.003449	27.26	69.31	22.4909
17-Jun-19	0.3988	0.004431	26.92	76.19	14.9497
05-Oct-19	0.4084	0.003713	28.33	65.06	0.4241
14-Dec-19	0.4274	0.006106	28.48	75.5	24.4641
25-Mar-20	0.5007	0.004909	27.9	77.19	3.1178
30-Aug-20	0.5026	0.003181	27.4	73.75	21.3300
04-Nov-20	0.5051	0.007653	28.69	72.81	9.4354
25-Dec-20	0.5089	0.009978	26.47	83.12	6.4769
23-Mar-21	0.5138	0.005839	27.46	82.44	15.7015
29-Jun-21	0.5189	0.005295	27.42	79.25	11.0871
04-Oct-21	0.536	0.005526	27.35	78.12	0.4194
26-Dec-21	0.5501	0.006628	27.05	84.81	2.8000
28-Mar-22	0.5551	0.006034	26.65	82.75	11.1244
28-Jun-22	0.5573	0.006058	27.24	81.44	26.0187
23-Oct-22	0.5659	0.004837	28.04	82.88	9.9316
27-Dec-22	0.5946	0.009148	26.27	88.19	21.3663

Lampiran 5. Script Perhitungan Kerusakan Lukisan (Persentase Kerusakan)

```
clear all;close all;clf
A=imread('2019a.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.3966
save -ascii lp12019.txt hasil
```

```
clear all;close all;clf
A=imread('2019b.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.3988
save -ascii lp22019.txt hasil
```

```
clear all;close all;clf
A=imread('2019c.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.4084
save -ascii lp32019.txt hasil
```

```
clear all;close all;clf
A=imread('2019d.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
```



```

percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.4274
save -ascii lp42019.txt hasil

```

```

clear all;close all;clf
A=imread('2020a.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.5070
save -ascii lp12020.txt hasil

```

```

clear all;close all;clf
A=imread('2020b.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.5026
save -ascii lp22020.txt hasil

```

```

clear all;close all;clf
A=imread('2020c.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.5051
save -ascii lp32020.txt hasil

```

```

clear all;close all;clf

```

```

A=imread('2020d.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.5089
save -ascii lp42020.txt hasil

```

```

clear all;close all;clf
A=imread('2021a.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.5138
save -ascii lp12021.txt hasil

```

```

clear all;close all;clf
A=imread('2021b.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.5189
save -ascii lp22021.txt hasil

```

```

clear all;close all;clf
A=imread('2021c.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel

```

```

0.5360
save -ascii lp32021.txt hasil

clear all;close all;clf
A=imread('2021d.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
0.5501
save -ascii lp42021.txt hasil

clear all;close all;clf
A=imread('2022a.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
0.5551
save -ascii lp12022.txt hasil

clear all;close all;clf
A=imread('2022b.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
0.5573
save -ascii lp22022.txt hasil

clear all;close all;clf
A=imread('2022c.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160

```

```

percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.5659
save -ascii lp32022.txt hasil

```

```

clear all;close all;clf
A=imread('2022d.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
hasil=[prw8] %%tulis hasilnya disini, misal 0.011 (dicopy dari window output)
        %utk diisikan ke file excel
        0.5946
save -ascii lp42022.txt hasil

```

Lampiran 6. Pengolahan Data Image Processing

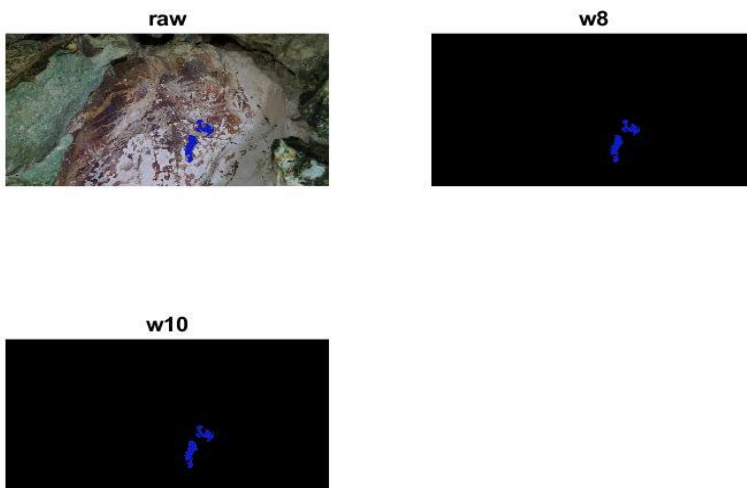
```

%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2019a.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP12019a.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)

```

```
%exitt
```

```
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off
```



```
%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
```

```
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
```

```
%Emi Asmiranda_H061201061
```

```
clear all;close all;clf
```

```
A=imread('2019b.jpg');
```

```
rgb=A;
```

```
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
```

```
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
```

```
total=size(rgb,1)*size(rgb,2) %10108160
```

```
percentw8 = 100*(sum(sum(w8Points))/(total));
```

```
percentw10 = 100*(sum(sum(w10Points))/(total));
```

```
pxw8=sum(sum(w8Points));prw8=percentw8;
```

```
pxw10=sum(sum(w10Points));prw10=percentw10;
```

```
kel=1:24;
```

```
px=[pxw8 pxw10];
```

```
pr=[prw8 prw10]; %0.42 0.41
```

```
hasil=[px' pr'];
```

```
save -ascii LPP22019b.txt hasil
```

```
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
```

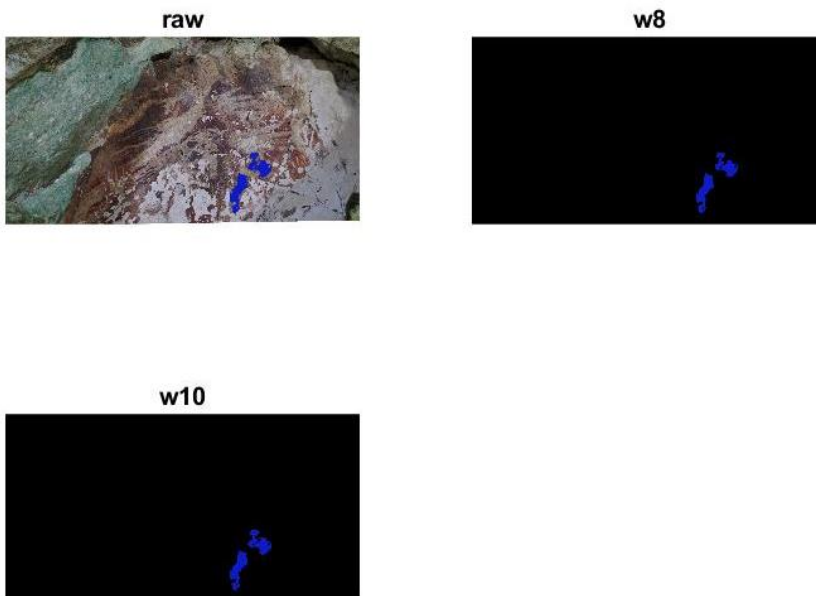
```
fprintf('Image is %.2f percent w8\n',percentw8)
```

```
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
```

```
fprintf('Image is %.2f percent w10\n',percentw10)
```

```
%exitt
```

```
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off
```



```
%Program menghitung jumlah piksel eksfoliasi Leang Pettae 2019-2022
```

```
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
```

```
%Emi Asmiranda_H061201061
```

```
clear all;close all;clf
```

```
A=imread('2019c.jpg');
```

```
rgb=A;
```

```
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
```

```
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
```

```
total=size(rgb,1)*size(rgb,2) %10108160
```

```
percentw8 = 100*(sum(sum(w8Points))/(total));
```

```
percentw10 = 100*(sum(sum(w10Points))/(total));
```

```
pxw8=sum(sum(w8Points));prw8=percentw8;
```

```
pxw10=sum(sum(w10Points));prw10=percentw10;
```

```
kel=1:24;
```

```
px=[pxw8 pxw10];
```

```
pr=[prw8 prw10]; %0.42 0.41
```

```
hasil=[px' pr'];
```

```
save -ascii LPP32019c.txt hasil
```

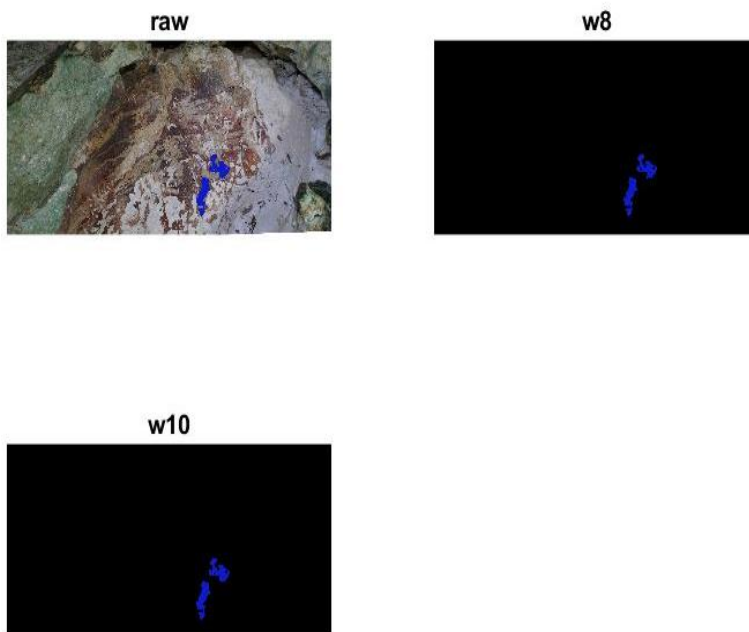
```
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
```

```
fprintf('Image is %.2f percent w8\n',percentw8)
```

```

%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```



```

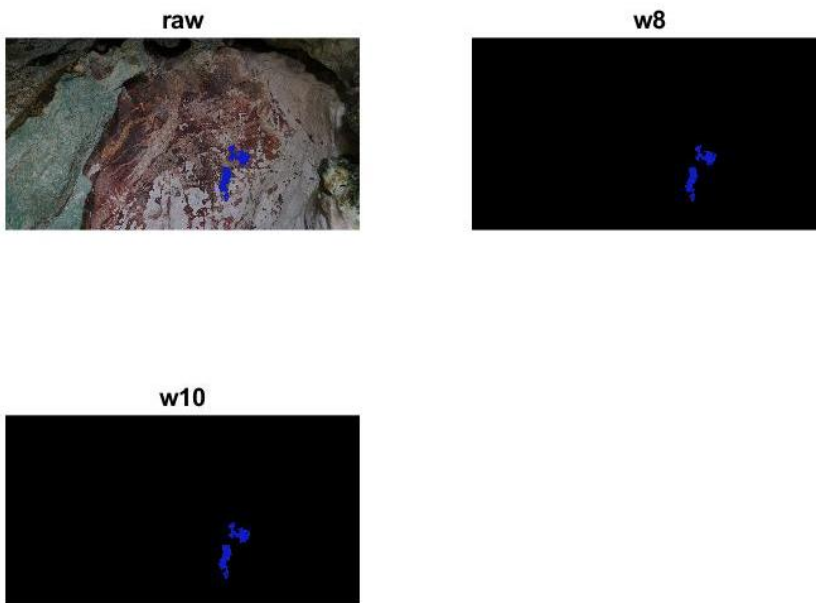
%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2019d.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;

```

```

px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr']
save -ascii LPP42019d.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```



%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022

%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas

%Emi Asmiranda_H061201061

```
clear all;close all;clf
```

```
A=imread('2020a.jpg');
```

```
rgb=A;
```

```
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
```

```
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
```

```
total=size(rgb,1)*size(rgb,2) %10108160
```

```
percentw8 = 100*(sum(sum(w8Points))/(total));
```

```
percentw10 = 100*(sum(sum(w10Points))/(total));
```

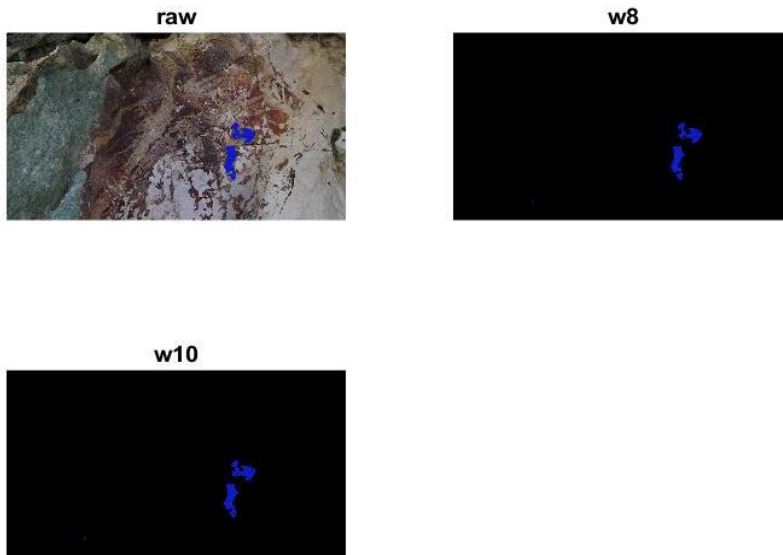
```
pxw8=sum(sum(w8Points));prw8=percentw8;
```



```

pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP12020a.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```



```

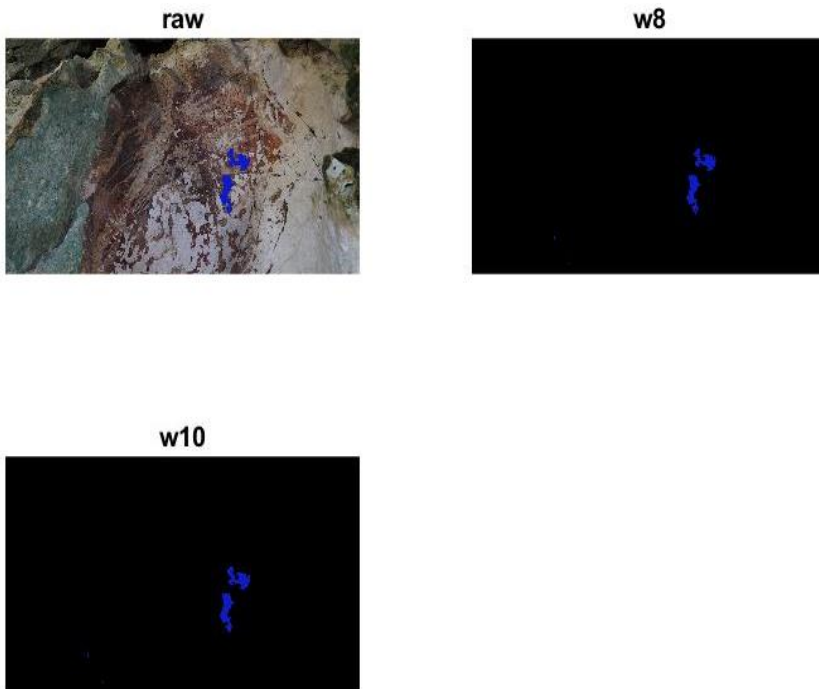
%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2020b.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));

```

```

pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP22020b.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```



```

%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf

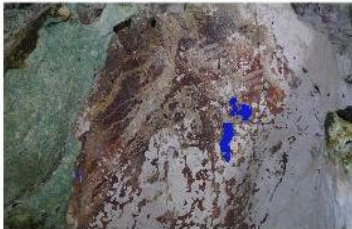
```

```

A=imread('2020c.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP32020c.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```

raw



w8



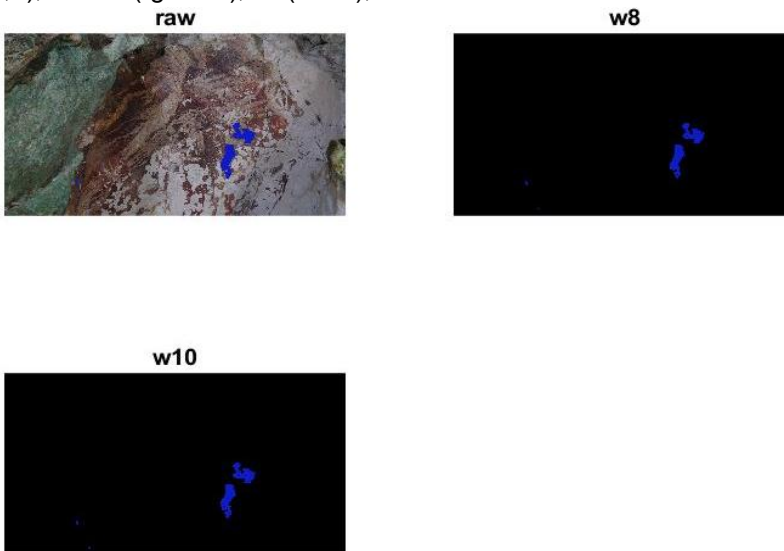
w10



```

%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2020d.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP42020d.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```



```

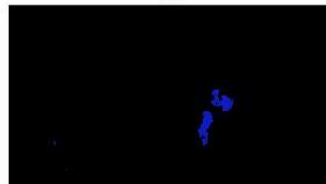
%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2021a.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP12021a.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```

raw



w8



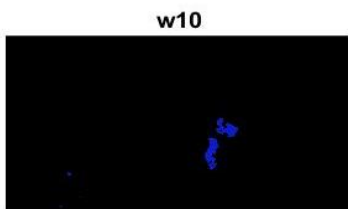
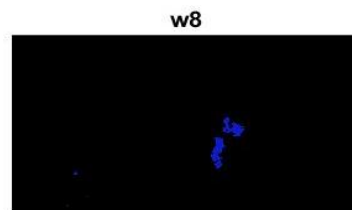
w10



```

%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2021b.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP22021b.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```



```

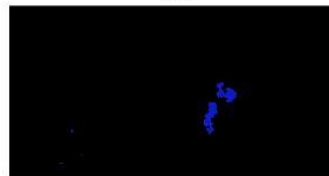
%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2021c.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP32021c.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```

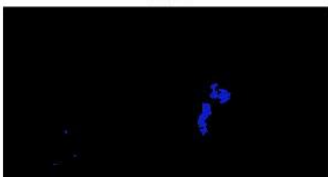
raw



w8



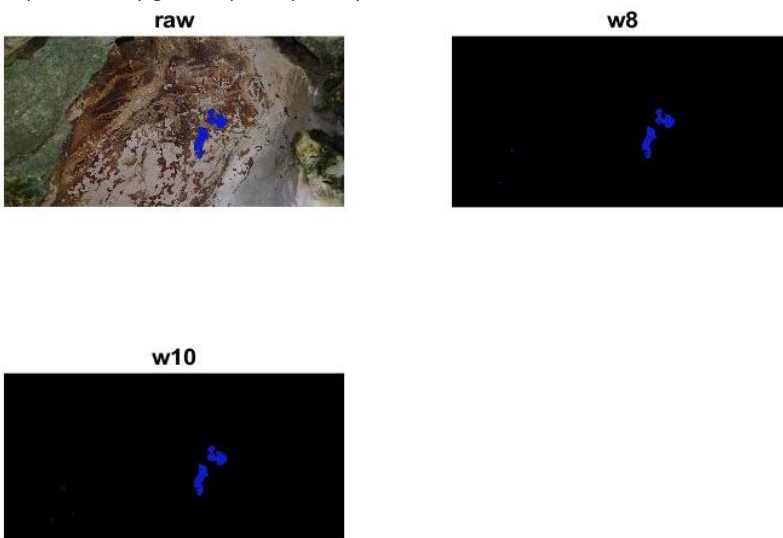
w10



```

%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2021d.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP42021d.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```




```

%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2022a.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP12022a.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```

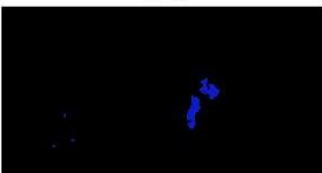
raw



w8



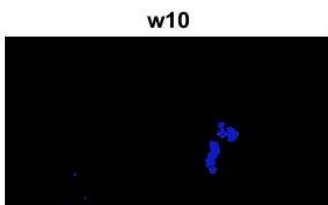
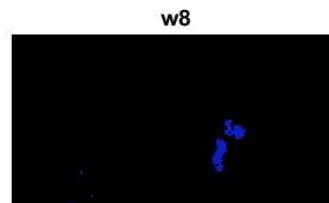
w10



```

%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2022b.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP2022b.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

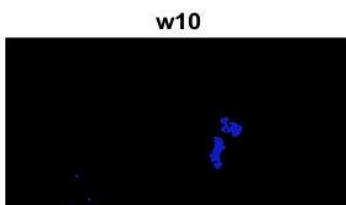
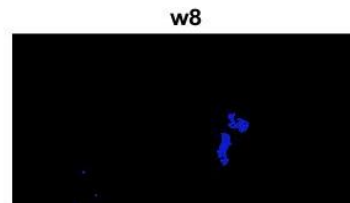
```



```

%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2022c.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP32022c.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

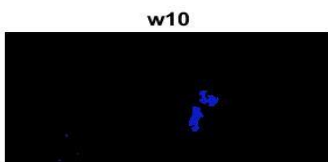
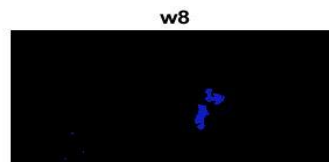
```



```

%Program menghitung jumlah piksel eksfoliasi LeangPettae 2019-2022
%Lab. Hidrometeorologi, Dept. Geofisika, FMIPA Unhas
%Emi Asmiranda_H061201061
clear all;close all;clf
A=imread('2022d.jpg');
rgb=A;
w8Points = rgb(:,:,1)<=80 & rgb(:,:,2)<=91 & rgb(:,:,3)>=166;% biru
w10Points = rgb(:,:,1)<=94 & rgb(:,:,2)<=60 & rgb(:,:,3)>=108;% biru
total=size(rgb,1)*size(rgb,2) %10108160
percentw8 = 100*(sum(sum(w8Points))/(total));
percentw10 = 100*(sum(sum(w10Points))/(total));
pxw8=sum(sum(w8Points));prw8=percentw8;
pxw10=sum(sum(w10Points));prw10=percentw10;
kel=1:24;
px=[pxw8 pxw10];
pr=[prw8 prw10]; %0.42 0.41
hasil=[px' pr'];
save -ascii LPP42022d.txt hasil
%fprintf('Image has %d w8 pixels\n',sum(sum(w8Points)))
fprintf('Image is %.2f percent w8\n',percentw8)
%fprintf('Image has %d w10 pixels\n',sum(sum(w10Points)))
fprintf('Image is %.2f percent w10\n',percentw10)
%exitt
rgbw8 = uint8(cat(3,w8Points,w8Points,w8Points)).*rgb;
rgbw10 = uint8(cat(3,w10Points,w10Points,w10Points)).*rgb;
subplot(2,2,1),imshow(rgb),title('raw');hold on
subplot(2,2,2),imshow(rgbw8),title('w8');hold off
subplot(2,2,3),imshow(rgbw10),title('w10');hold off

```



Lampiran 7. Model Data Harian Kerusakan Lukisan Leang Pettae 2019-2022

```

%Kalkulasi persentase kebenaran model stepwise kasus kerusakan lukisan
%purbakala di Leang Pettae
%Prof. Dr. Halmar Halide M. Sc, hydrometeorology, geophysics dept. fmipa unhas
%data Harian Leang Pettae
%Tugas Akhir: Emi Asmiranda_H06120106
clear;
clf;
clc;
% Load the input data
data = load('DATAHARIAN.txt'); % Load the data
[m, n] = size(data); % Get the size of the loaded data
% Extract the damage data and weather factors
factors = data(:, 2:4);
damage = data(:, 1); % Assumes the damage data is in the last column
% Perform multiple regression using the Stepwise method for each data
mdl = stepwiselm (factors, damage, 'PEnter', 0.05);
mdl =
Linear regression model:
    y ~ 1 + x2
% Significance of predictors
intercept = -0.15191;
slope_x2 = 0.0083578;
x2 = factors(:, 2);
x2z = x2 - mean(x2) ./ std(x2);
damage_pred_1 = intercept + slope_x2 .* x2;
damage_all = intercept + (slope_x2 .* x2);
Estimated Coefficients:
                Estimate    SE    tStat    pValue
-----
(Intercept) -0.15191    0.12615   -1.2042   0.24846
      x2    0.0083578    0.0016065    5.2024   0.000134

Number of observations: 16, Error degrees of freedom: 14
Root Mean Squared Error: 0.0378
R-squared: 0.659, Adjusted R-Squared: 0.635
F-statistic vs. constant model: 27.1, p-value = 0.000134
%Menghitung Nilai Korelasi, Skor, RMSE, dan eRMSE
hasil=pearmse1(damage,damage_all);
r_all=hasil(1,1);
r2_all=r_all.*r_all;
delta_r2_all=r_all.*sqrt(2).*hasil(1,2);

```

```

time=1:m;
hasil =
    0.8118  0.0880  0.0353  0.0062
% Calculate RMSE
RMSE = sqrt(mean((damage - damage_all).^ 2));
% Calculate the Standard Beta Coefficient Value
Y = damage;
X = [x2z];
[B, BINT] = regress(Y, X);
B =
    0.0077
BINT =
    0.0074  0.0080
% Plot the temperatur change, humidity change, and wind change in separate
subplots
figure(1);
subplot(3, 1, 1);
plot(1:m, data(:, 2), 'LineWidth', 2);
xlabel('Monitoring day');
ylabel('Temp change [°C]');
title('Temperatur');
grid on;
subplot(3, 1, 2);
plot(1:m, data(:, 3), 'LineWidth', 2);
xlabel('Monitoring day');
ylabel('Rh change [%]');
title('Kelembaban');
grid on;
subplot(3, 1, 3);
plot(1:m, data(:, 4), 'LineWidth', 2);
xlabel('Monitoring day');
ylabel('Wind change [%]');
title('Angin');
grid on;
% Plot the damage and RMSE in a separate figure
figure(2);
plot(time, damage, '-o', time, damage_all, '-*')
title('Leang Pettae 2019-2022');
set(gca,'xtick', time, 'xticklabel', {'Mar-2019','Jun-2019','Oct-2019','Dec-2019','Mar-
2020','Aug-2020','Nov-2020','Dec-2020','Mar-2021','Jun-2021','Oct-2021','Dec-
2021','Mar-2022','Jun-2022','Oct-2022','Dec-2022'});
% Add the value of R and RMSE to the figure
str = {sprintf('R = %.4f', r_all), sprintf('RMSE = %.4f%%', RMSE)};
text(15, 0.30, str, 'FontSize', 12); % Set the font size to 12

```

```

xlabel('Monitoring day');
ylabel('Damage [%]');
legend('Observation', 'Modeled', 'Location', 'SouthWest', 'Orientation', 'horizontal');
legend boxoff;

```

Figure 1

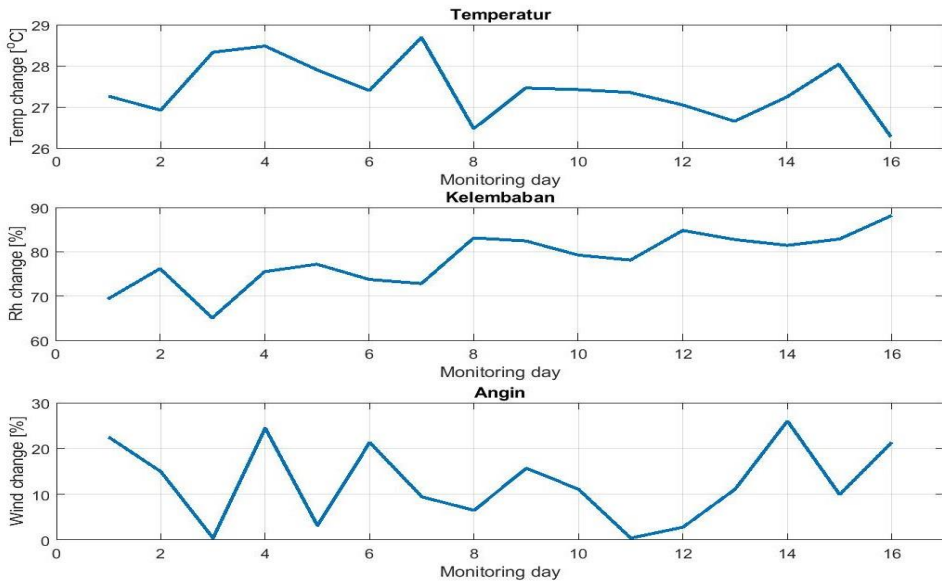
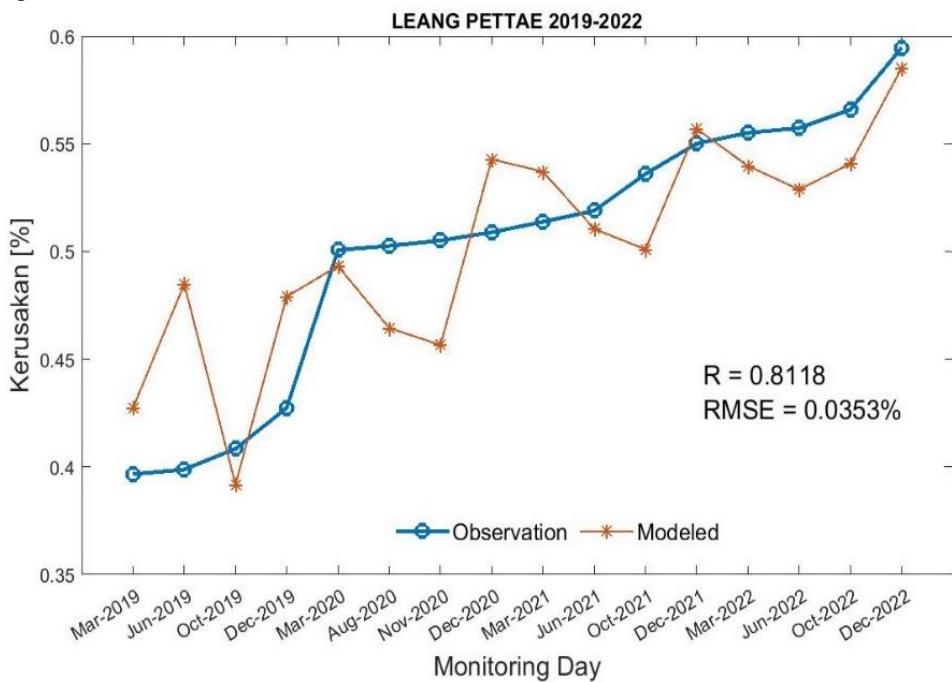


Figure 2



Lampiran 8. Dokumentasi Penelitian



