Exercise 3-3: Creating a prescription map (P₂O₅)

Mapping objectives:

• Create a P₂O₅ prescription map based on the variability of the soil P/AI ratio

Data folder: Dataset3

Part 1: Add the interpolated soil P/AI ratio map to QGIS

- 1. Open the project set3.qgs
- 2. In the Browser Panel, double click **P_AL.sdat** to add this layer into the Layers Panel



Part 2: Create a P₂O₅ prescription map according to the soil P/AI ratio

1. The formula used to determine P₂O₅ (kg/ha) prescription rate

$$P_2O_5 = \begin{cases} 0 & \text{, if } r_{P/AI} \ge 20\\ (20 - r_{P/AI}) \cdot 4 & \text{, if } r_{P/AI} < 20\\ r_{P/AI} = \frac{P}{AI} \cdot 112 \end{cases}$$

where $r_{P/AI}$ is the ratio of phosphorus to aluminum, P is the soil phosphorus content (ppm) and AI is the soil aluminum content (ppm).

- Creating a P2O5 raster layer using the above formula. In Main Menu, go to Raster > Raster Calculator
 - a. Double click P_AL@1 to add this layer to the expression area
 - b. Form the expression as: (20 -"P_AI@1") * 4 * ("P_AI@1" < 20)

(In this expression, ("P_AI@1" < 20) means all cell value small than 20 will be set to 1 and the rest will be set to 0) c. Output layer = **P2O5** d. Click OK

K@1 P_AL@1				Output la Output fo	iyer ormat	23_QGIS_F26_Tutorial/Data/dataset3/P2O5			
				Current	layer extent				
				X min	582900.1063	1	XMax	583305.10631	\$
				Ymin	5029568.627	34	Y max	5030003.62734	\$
				Columns	81	•	Rows	87	\$
Oncentour			*********	Output C	RS esult to project	Selected CRS (EP	PSG:32618, WGS 8	4 / UTM zone 18 🔻	
+	*	sqrt	COS	sin	tan	log 10	(
-	1	^	acos	asin	atan	In)		
<	>	=	!=	<=	>=	AND	OR		
aster calcul	ator expressio	in							
00 "D AL @1	l")*4*("P_AL	L@1" < 20)							
20 - P_AL@1									
20 - P_AL@J									



Clipping the raster data to the field boundary. In Main Menu, go to Raster > Extraction > Clipper

- a. Input layer = **P2O5** ? × b. Output file = **P2O5** c Ø Clipper c. Clipping mode = Mask layer Input file (raster) P2O5 • Select... d. Mask layer = F26_Boundary_UTM Output file _Tutorial/Data/dataset3/P2O5_c.tif Select... e. Check Keep -No data value 0 resolution of input **Clipping mode** raster Click OK Extent Mask layer Mask layer F26_Boundary_UTM Ŧ Select... Create an output alpha band Crop the extent of the target dataset to the extent of the cutline Keep resolution of input raster 📀 Set output file resolution X Load into canvas when finished gdalwarp -q -cutline "D:/Google Drive/Research/Ongoing_tasks/180123_QGIS_F26_Tutorial/Data/ dataset3/F26_Boundary_UTM.shp" -tr 5.0 5.0 -of GTiff "D:/Google Drive/Research/Ongoing_tasks/180123_QGIS_F26_Tutorial/Data/ · X P205 dataset3/P2O5.tif" "D:/Google Drive/Desearch/Oppoing tasks/180123 OCTS E26 Tutorial/Date 0 24.3655 OK Close Help
- 4. Viewing the raster layer in categorized color. In the Layer Panel, right click *P2O5_c* layer and click Properties
 - a. Style = Singleband pseudocolor
 - b. Load min/max values Interpolation = discrete Color = RdPu Value < = 0 5
 - 10 15 20 Inf Classes = 5

Click OK

QGIS Tutorial for Variable Rate Application

Hsin-Hui Huang, Marie-Christine Marmette, Hadi Husaini & Viacheslav I. Adamchuk | 2020

×.		Layer Prop	erties - P2	O5_c Sty	le		?	x	
🤀 General	 Band rende 	ring							
😻 Style	Render type Singleband pseudocolor 💌								
Transparency	Band 1 (Gray)								
📥 Pyramids	Min 0 Max 24.3655								
Histogram	Load min/max values								
	Interpolation	Discrete					-		
Metadata	Color	RdP	u 🔻		Edit	Invert			
- Legend	Label unit suffix								
	Min / max origin: Es	stimated cumula	ative cut of fu	l extent.					
	Value <=	Color	Label						
	5		<= 0 0 - 5 5 - 10						
	15		10 - 15						
	i inf		> 20						
				NO					
				2					
	Mode Equal inte	erval 🔻				Classes	6 Ţ		
	Classify	+	2						
	Clip out of ra	nge values							
	Color rende	rina	ſ					. 💌	
	Style 🔻		l	ОК	Cancel	Apply	Help		
	1.64								
	_								
-	P	L	1 ×	F26	_Boundary	_UTM			
				P20	0 5_c				
	1.0		7	0 - 5	5				

- Part 3: Produce a P_2O_5 layout map 1 In the Layers Panel rename **P2O5** c as **P**2
 - 1. In the Layers Panel, rename P2O5_c as P2O5 (kg/ha)
 - 2. Create a P2O5 prescription layout map following the same steps as described in exercise 3-1.



3. Save the project