



**INSPIRE a digital Europe: Thinking out of the box** *Sustainable management of natural resources and natural capital* 

# Mayenne's soil cartography within everyone's reach with geomayenne.fr !

Jean-Luc GAUQUELIN

Ingrid BRUGIONI

Director of Environment

GIS Manager

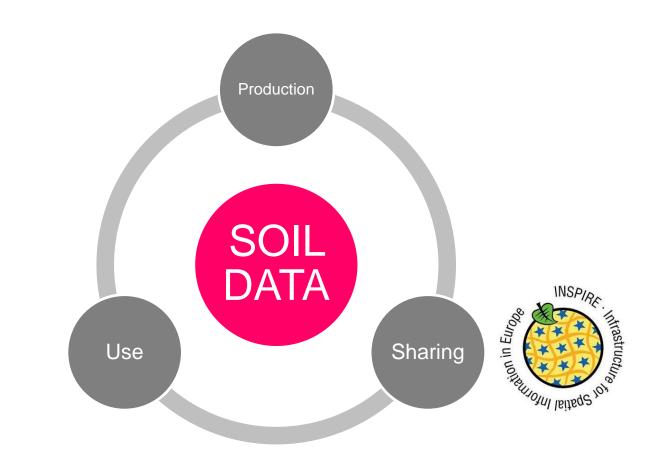
Departmental Council of Mayenne - France



Strasbourg - Wednesday, September 6, 2017



The effects of the INSPIRE Directive on the use of soil data in the department of Mayenne



Introduction 1. Background

2. Soil data sharing

3. Use of soil data Conclusion

Strasbourg 06/09/2017





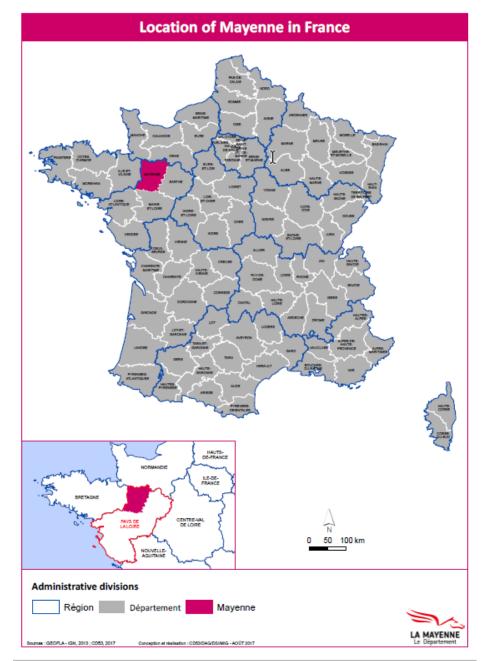
- 1. Background
- Soil data sharing
  Use of soil data
  Conclusion

Strasbourg 06/09/2017

3/28



### 1. Background



#### Mayenne: a department in northwestern France and part of the region of Pays de la Loire



### 1. Background

Mayenne: a rural territory, with 76% of land used for agriculture

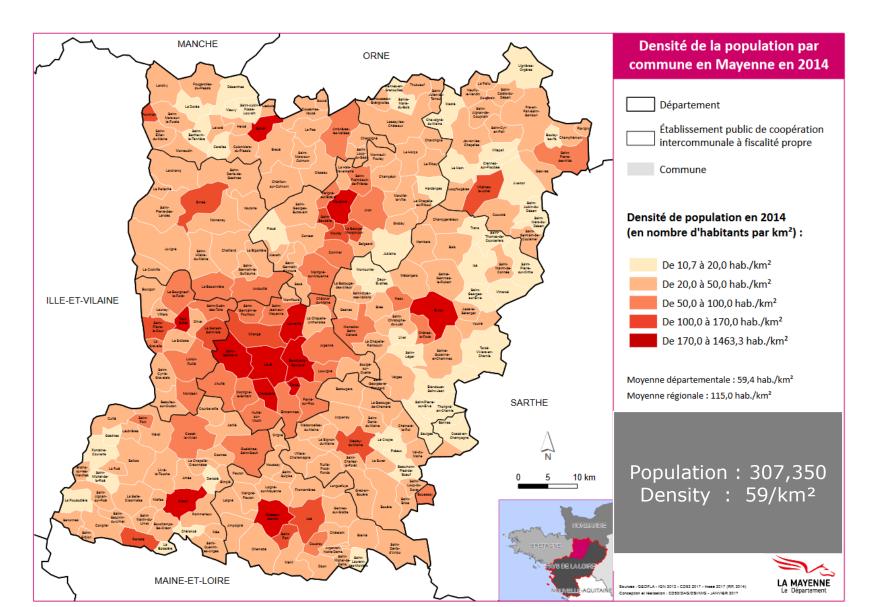


- 1. Background
- Soil data sharing
  Use of soil data

Conclusion

Strasbourg 06/09/2017







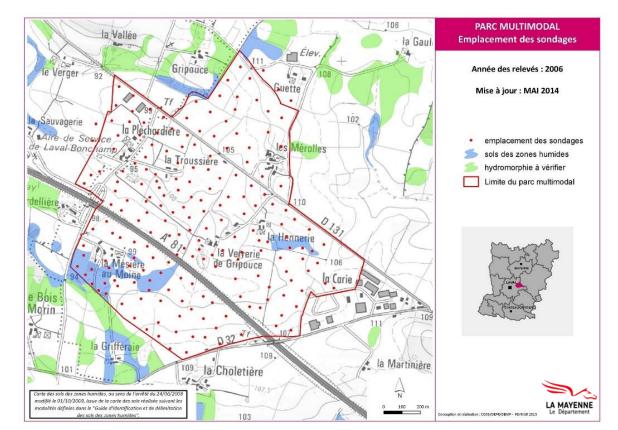
- 1. Background
- Soil data sharing
  Use of soil data
  Conclusion

1. Background

Soils : a key factor for both agriculture and environmental management

An ambitious soil survey program at 1:10,000 scale for all the communes of Mayenne !

- 1980 : launch of the soil mapping program by the Departmental Council of Mayenne
- 1987 : digitization of maps
- 2016 : full coverage achieved for all the communes of Mayenne (261 maps)



Intensive field observations : 1/ha

Strasbourg 06/09/2017





1. Background

Soil data sharing
 Use of soil data

Conclusion

#### Strasbourg 06/09/2017

6/28



#### Example of a soil map



PARC LOGISTIQUE MULTIMODAL LAVAL-MAYENNE

#### Carte des sols

#### LÉGENDE

Quatre symboles rendent compte du cortenu des unités de sols

d'horizons

r ranker

b : sol brun

a : sol peu différencié

c : sol brun calcique

I : sol brun lessivé

I'hydromorphie

0 : sain

4

250

Échelle : 1/10 000

f : sol brun faiblement lessivé

2 : taches au-delà de 50 cm 3 : nombreuses taches au-delà de 30 cm

Critères complémentaires

x : cailloux de quartz abondants

p : galets de quartz

y : cailloux de rhyolite

3) Une lettre minuscule pour la succession

4) Un chiffre pour la profondeur d'apparition de

1 : quelques taches au-delà de 70 cm

quelques taches dès la surface

6 : matrice de l'horizon de surface réduite

5 : nombreuses taches dès la surface

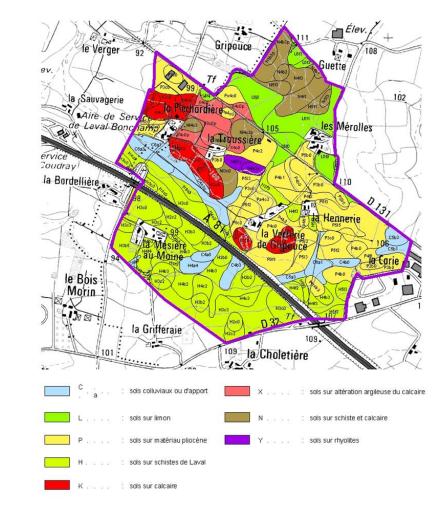
1) Une lettre majuscule pour la roche-mère	
C : Colluvions	

L : Limon

- P : Pliocène
- Pa: pliocène argileux Ps: pliocène sableux
- Pg: pliocène graveleux
- H : Schistes de Laval
- K : Calcaire
- X : Altération argileuse du calcaire
- N : Schiste et calcaire NI : altération argileuse
- Y : Rhyolite

#### 2) Un chiffre pour la profondeur d'apparition de l'horizon d'altération

- 0 : affleurements
- 1 : horizon C apparaissant à moins de 20 cm
- 2 : horizon C apparaissant entre 20 et 40 cm 3 : horizon C apparaissant entre 40 et 60 cm
- a : norizon C apparaissant entre 40 et 60 cm
  4 : horizon C apparaissant entre 60 et 90 cm
- 5 : horizon C apparaissant entre 90 et 120 cm
- 6 : horizon C apparaissant à plus de 120 cm



Sources : IGN © - SCAN 2006 - CG53 2014 Direction de l'environnement et de la prévention des risques Direction eau, milieux et paysages - FEVRIER 2014



Conclusion

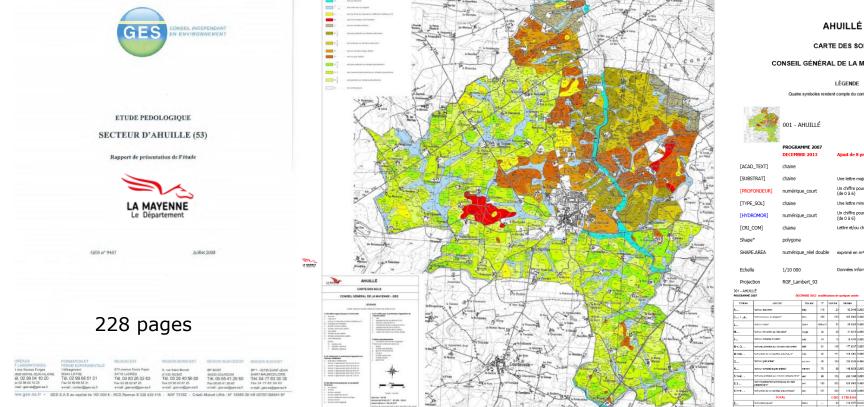
1. Background

Soil data sharing
 Use of soil data

## 2. Soil data sharing

#### From paper...

Printed documents (i.e. maps and reports) led to significant workload and costs





Strasbourg 06/09/2017





> Strasbourg 06/09/2017

> > 8/28

geomay**Enne**.fr

# 2. Soil data sharing

... to digital files on geomay enne.fr

https://www.geomayenne.fr/portail/

All documents available online to all stakeholders (private, state agencies, communes, consultants, etc.) since 2015



Maps and reports in the map library

 Headconnelse:

 Heine damage and gene damage a

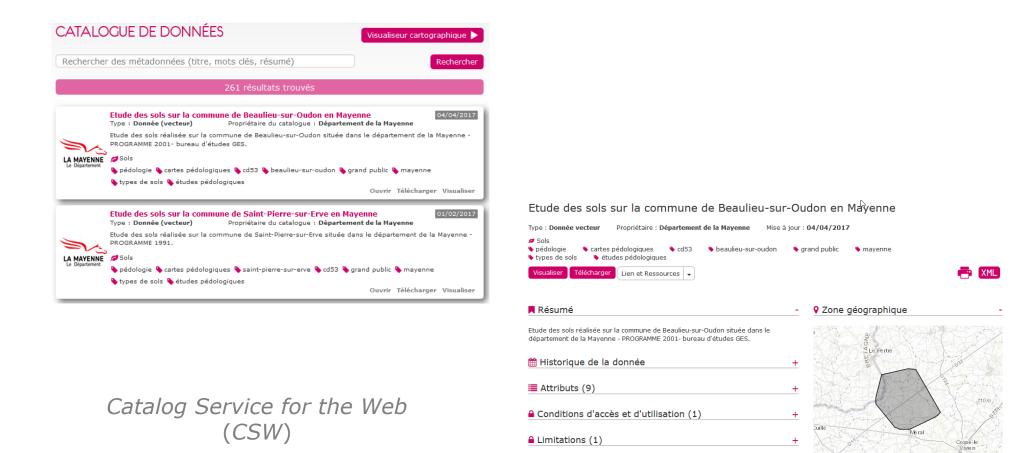
Spatial database of soil properties registered in the catalogue



#### 2. Soil data sharing

... in accordance with the INSPIRE Directive

#### **Discovery** Services



Informations techniques

🥊 Qualité (1)

Contacts (1)

Strasbourg 06/09/2017



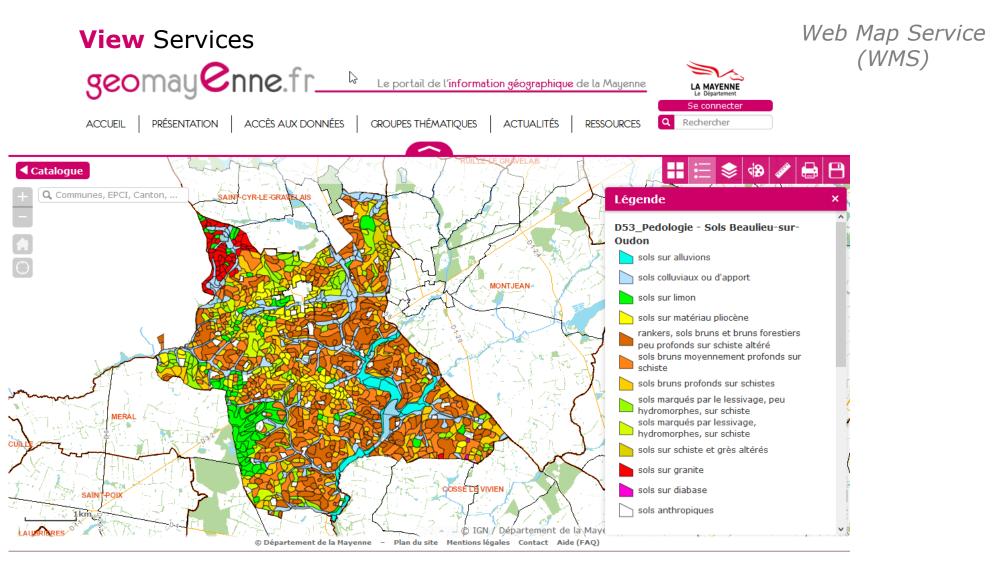


> Strasbourg 06/09/2017

> > 10/28

## 2. Soil data sharing

... in accordance with the INSPIRE Directive







- A			
Int	<b>700</b>	ucti	n
	00	auti	

1. Background

2. Soil data sharing

3. Use of soil data

Conclusion

Strasbourg 06/09/2017

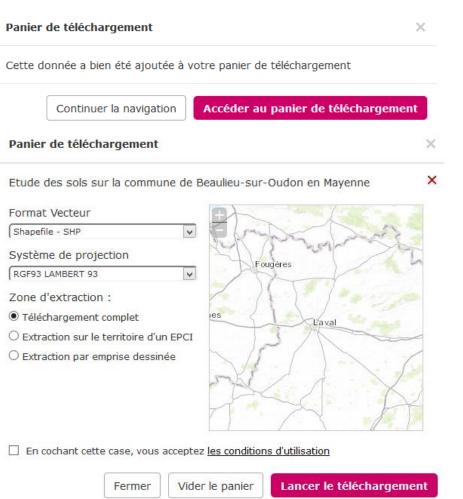
11/28



### 2. Soil data sharing

... in accordance with the INSPIRE Directive

#### **Download** Services



Web Feature Service (WFS)



1. Background

2. Soil data sharing

3. Use of soil data

Conclusion

Strasbourg 06/09/2017

12/28



# 3. Use of soil data (1)

Increasing the use of soil data

Over time, the use of soil data has been diversified and intensified due to the strengthening of French environmental regulation.

<u>geomayenne.fr</u> enhances a better knowledge of Mayenne's soils properties to address the increasing environmental issues :

- drainage
- irrigation
- fertilization
- water quality
- application of organic effluents
- species choice for reforestation
- wetlands
- urban planning
- land development...



- 1. Background
- 2. Soil data sharing
- 3. Use of soil data Conclusion

# 3. Use of soil data (2)

For agriculture

Useful information for:

- The settlement of young farmers (e.g.: control of soil performance and potential, redrawing of plots, facilitating crop management sequence...)
- The control of agricultural practices and fertilization (e.g.: knowledge of ability to store nutrients, water-holding capacity, depth, etc.)

Strasbourg 06/09/2017





> Strasbourg 06/09/2017

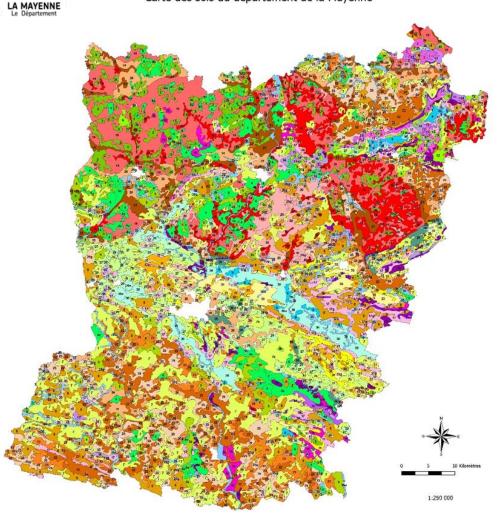
> > 14/28



Consell général de la Mayenne Direction de l'environnement et de la santé publique Direction eau, milieux et paysages

#### Simplified soil map of Mayenne

Carte des sols du département de la Mayenne



	-	12	11 M M / 11	Networkspace	Swinksten	f an an a second to the second	1.6.2		() + #34 m E	Stellunese synthetic Stellunese (anne)	Senter Senter Norm
_			1.1.1.1		4	*5 4410*		****	11 + #34 h C	P. 65.48	
	14.5	12	recore pre	Britister Britister ganzante	XIGRA	E. W. Branner and E. Berlin valle stiffen House and an an	*****		Design and the second s	Distance Procession Distance States S	and beginned
-				Der verleicher und mit der gester Verleicherten Frei ung wich verleicherten	Aller and a	Bender of Energy and Annual State of Energy and Energy		Section 10	n p Ouargerig, an Drack - k af e e Ps to	** ****	******
		1.2	a 10 M / 10	Thurmon care	Sea Lots from	Discillations					
		· · ·			Summer and	Service + except			Course And a dec	hourse	
				аландана рыланы, арта Катратала Катратала Катраталар	A	Non-Algentin and		Summit	Danapenza) Danapenza)	балан Колан. Барын Картана Колары туруулуу Балары туруулуу	Serie and an and a series of the series of t
		10	5.4-41 5.6-8	planet for the strength	XI Dre	Statistics in pro-		Contra and a		Rates on's Ratesgee	Trial or allow that a
•	01125	- 16 -		Brisister of the	Statuta fea	State of the second	-	Scoreches In punts A	Design	the ware	n af cime aginti
	2811-242 272.9754					Balanderen Berensenen Gunderen De entre der					
1	villa entition	-	pieres marchitere	presentation of the second sec	X123.w	Net constant a color Performante a color de Performante a colorador Sectilita a colorador a filo practic			0.0.9		Dire .
		+27		plaintain (1) and	Schelefellen X FEDow	Prozenije ko Snite iku planaja od naroda Rođi iku pristi od se		********	Dia unge	berings scales	A
-	4.03		arga esta como	Pair na sin 1844	507 101	fain		544 4449 7M		14 14 1 1	****
	2+95 V246		Brate-Hitles	Tak ar vate "Ber	101.0	Pr. 10" 8 11 Hold:				10.00.0	10.14
		-5	e' alle s	der unseinerugt no geseitt no Path vor inter falleren		Noracian an cikina natsima	We are plotted as				Sentrate a
			Providente Providente Recting	da turinti a fuga wa		antes in the General Automotive Additionation			the sector of th	******	
	6-63 1X+05	1		poskos Esta ante est ar a sector E esta esta a colo a co karação		Annual Construction of the set of		Station ce	falle and a second s	** *** * ***	See.
•	**** ****	50	<b>Pa</b> .144	the solution as a second secon	normalies Kalifica	in the Private strategy and the second	# 10(W)	5m) #	This (a)	-	253.2384
	V. (# 1 /111/6		***	Non-park suga		Frei ander and der in Andere ander andere er an Breiter Andere andere andere er an Breiter			Residence Forcials		
-	5×+0)		****	bristenreiser brefitzen einen	ExiE ex	Enter Raharapina) menja	-	1.000	11: 1 p	Roll experi	*rearrow and an
-	4514120 12(+12)	•	farmer raciner		• • • •	Exercise and exercise Exercise and exercises Exercised - one and data is the Exercised - one and data is the Exercised one and Backglobacces - one:	Management	*****	11 m p	Stears of the grant	ar 19 6au
1	-	:	Processors American Element American American American American American American	faile I		Territori Periodi de constante de la const			· · · · ·		~*
	C C. Farba	12	collors.	Rectore and Design of Kales		Tarra al constructions Falls Press al construction of the section		Sector	·		·
-	¥2.	10	Bernetari		X HEDrar	An and Press. Real Read Barrier Automotion and State and		222	Records on	10-10 (10-10-10-10-10-10-10-10-10-10-10-10-10-1	216.9 Travel
•		10	Rest Control Control Control Control Control Control Control	80 0 g = 1.0 g	ENTE en	Table and a second of the second Party of the second of the second of the second second of the second of the secon	ren		81.04 54 5 4 6 5 5 5 5 5 5 5 5	ne a militage e e l' but a a b	Search to
		•	Parson .	n an an a' de an Na agus 17 de Maria adas a agu Na agus 20 a	** ***	Provide State of State Provide State		*****	Design of anomalous of	Sala su se o congress	
-	4054594 5 X + 25	1		Range and Storp		Charles a family on a manager Charles a Phone & a mathematic	400000		a.,	10 1.0 m	Saturneala
	0 capt.	12	Pa = 4	bears. Freedoment	* 116.99	Dear & Dearborne	341	100	******	\$45,781534	0.00000
	14:53		n an	kanan Parakan Kandan Kandan Kandan Kandan	ultur Missianus	fðiðir	54.1		Benderstrigen	pu) cirili	20 data 1 Milar Ma
•	DITE		rajik.r Kopanov opiskazi	-terminenter	etX en	An and the state pro- state of the state of the state to state of the	*		·····	the second s	1.04 a.+ 48 h
	42125					An entropy to a subject to the sub- station of the subject to the		*********	Charge Sale and a state of the		
-	-N V VE			******	Arthw.	Brand a const Brand Brand Bran	Ferri		Course	Statement .	+ ++ + + + + + +
•	22104		****	Abrenten;	3/4	Eine bestehnten eine Berten berten ber berten ber			ранр влагине Салана страна Рамр	birepeszytek	
•	-018+ 7. 19-1		****	Second Se	*****	Construction of the second	1.474		The Anti-Art	Collecture (or one grave grave as	Art che
	40.428		****	Warman and a	Autoreau Autoreau	Exercise a disease and a series of the seri	**		4 g #	24 *** * ******************************	· • • • • •
	ACADA LOIZY		Denes Maria	Part for g - borrow resolution - borrow resolution	* ****	An and a second and a second and a second a seco	-	harmon	transpi kryster	Selection and the reactions of the selection of the selec	2 de arien
	Sec. 10			And a Present		Dear Bar and: Care products and Press of the America			54444444444444	Solo (automotive da Conserva-	
-		2		Search (Search) Search (Search) Search	6 +15 au	Transport of the second second of the second of the second of the second of the second		faire a		ALC: N. C.	2 atus nan
2	403126 143. V + V - 19414		18/10/00 (MA) 14	the contract the contract	X+0-4	Providing the Sector Sector P Sector Sector P Construction Construct	100	-	1	the send services and exclution due	
	0312%	12	Partes	An dag or a	*****	Energy of the end of the former of the forme			Driveja Troja antaŭ d	Shakabaratan Kanalar yang sa	* ef
	40405	•	******	And the second second		Terre and terre	10.70			ferbrei Die beite beiten er er	
	22104	-	e 0130		11.4	The second sector second		Sea year ye	********		
÷.	Children -	1.9	Bern en jake, n	Anno Barray, any an Anno Barray, any an Anno Barray, ang ang ang ang Anno Barray, ang ang ang ang Anno Barray, ang ang ang ang Anno Barray, ang ang ang ang ang Anno Barray, ang ang ang ang ang ang Anno Barray, ang	6 111 44	**** w. sent ter 100 mile	8 (B( X)		******	***	
		13	n a na Olar Salar Colar Roman Colar Roman Salar	Several (a) for a series Report of the second secon		Procession and the second			•••	The second secon	n et al el
			Par		THE CO				ir a p irpate	takan kuta taki ku kuta o taki kuta taki ta	
•	AULES.		e chill'a m		AT AT	Constant and	1011		trader Station as safety	*******	
**	42104			Contract of the second	(m) +						
	421405			34/798	ExiKee	Early photocol straight Constant is said a Straight			********		
-	423404		North Colored		Estification			And and a	Ed a bard Guetta Karlov Ed Karlov Ed Karlov Handberg Market Start Handberg	Distances and us	No. 4 - 4 Cabirat

1001001 10120 10-10

11.73

With the second

ALC: NO.

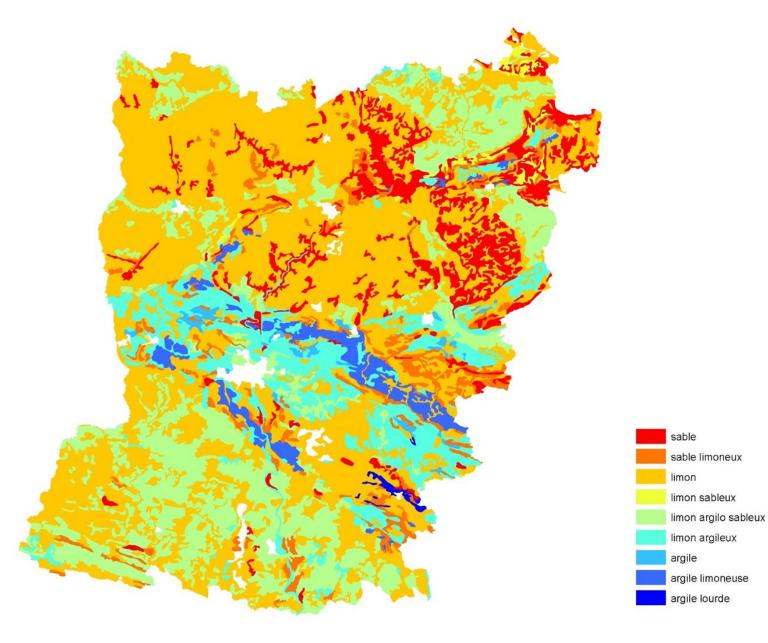


Strasbourg 06/09/2017

15/28



#### Soil texture



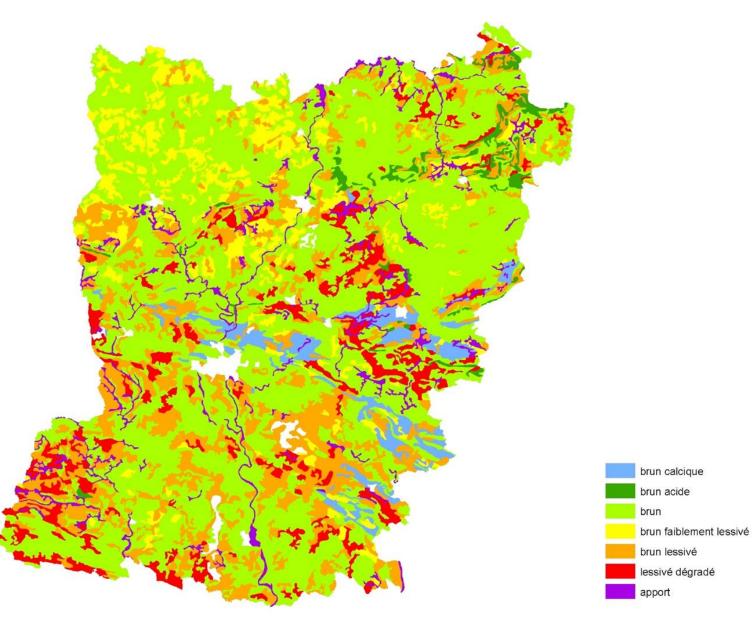


> Strasbourg 06/09/2017

> > 16/28



#### Soil types



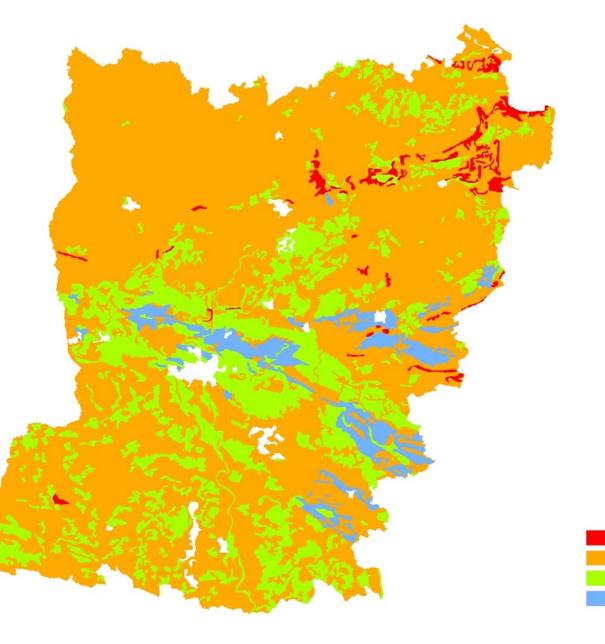


Strasbourg 06/09/2017

17/28



#### Soil pH



inférieur à 5

compris entre 5 et 6

compris entre 6 et 7 supérieur à 7

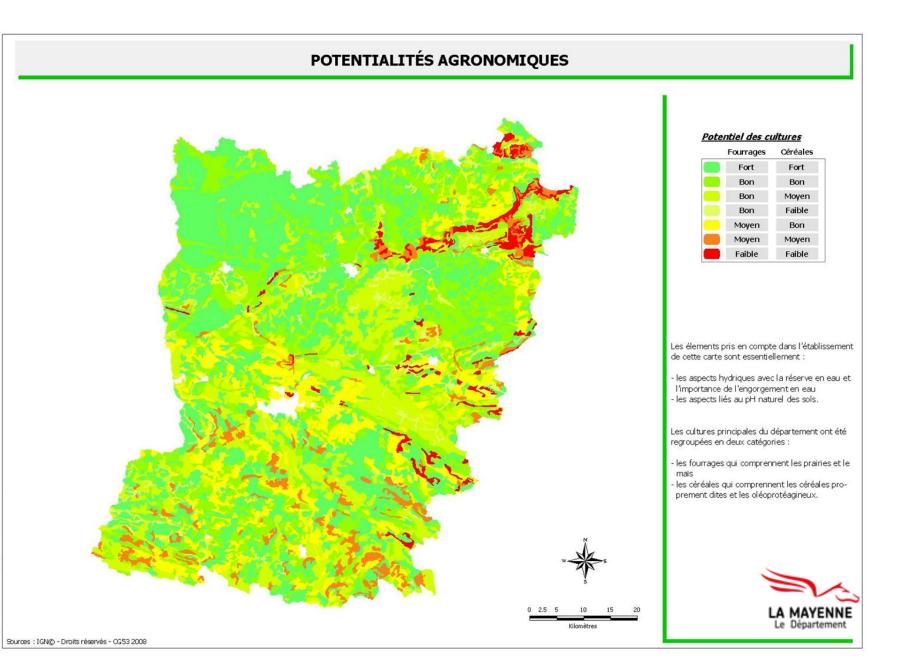


> Strasbourg 06/09/2017

> > 18/28



#### Agricultural potential





1. Background

Soil data sharing
 Use of soil data

Conclusion

# 3. Use of soil data (3)

For the management of effluent application

Useful information for:

- Meeting regulatory requirements for effluent application in agriculture
- Protecting water resources from pollutant transfer

Strasbourg 06/09/2017



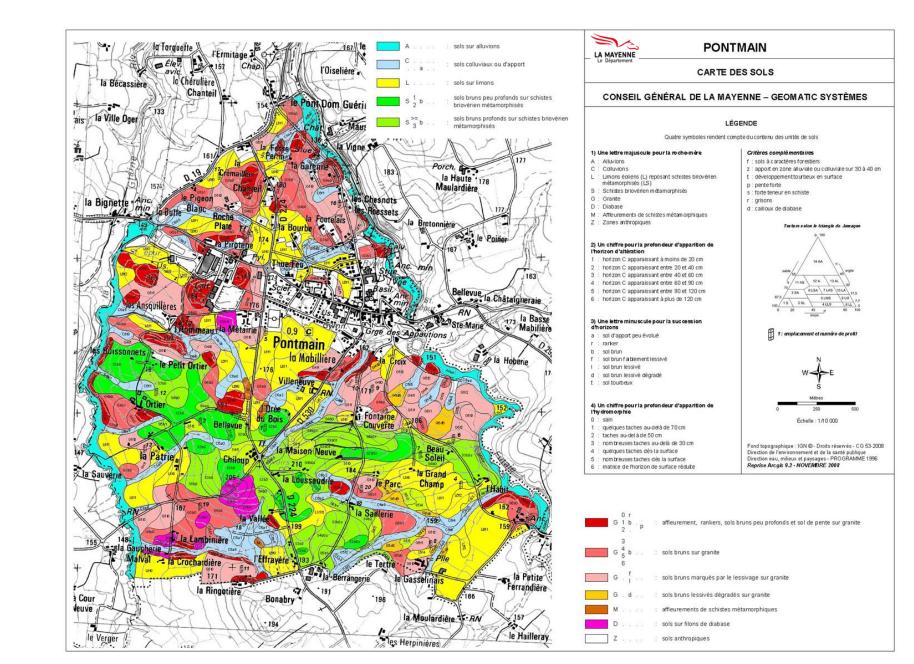


> Strasbourg 06/09/2017

> > 20/28



#### Soil map





1. Background

2. Soil data sharing

3. Use of soil data

Conclusion

Strasbourg 06/09/2017

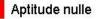
21/28



#### Effluent management

PONTMAIN Aptitude des sols à l'épandage d'effluents

Seul le critère sol est utilisé pour l'établissement de cette carte. Les aspects règlementaires (R.S.D., I.C., Directive nitrate, etc...) doivent être pris en compte pour connaître les possibilités réelles d'épandage.



Le Département

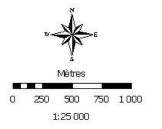
#### Aptitude médiocre

Épandage possible en période de déficit hydrique et en automne sur prairie après drainage

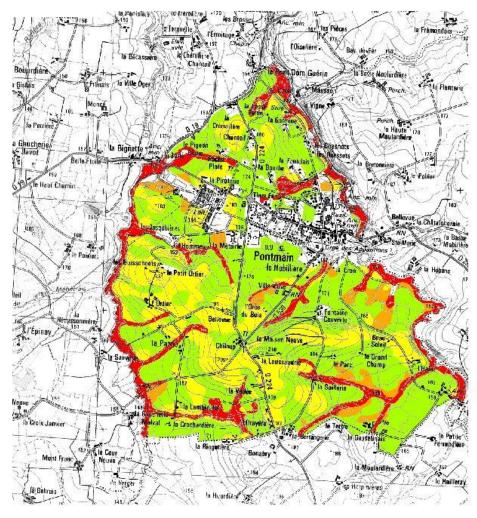
Aptitude moyenne Épandage possible sur prairie et en

période de déficit hydrique sur culture

Bonne aptitude



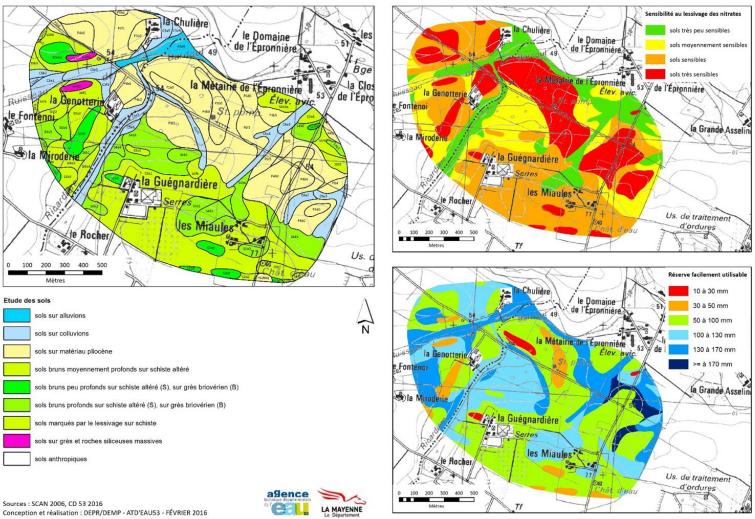
Fond topographique : IGN © - Droits réservés - CG 53-2008 Direction de l'environnement et de la santé publique Direction eau, milieux et paysages - PROGRAMME 1996 **Reprise Arcgis 9.2 - NOVEMBRE 2008** 





Drinking water source area

Captage de l'Épronnière - SIAEP de LIVRÉ-LA-TOUCHE



## Sensitivity to nitrate leaching

### Readily available water capacity

Strasbourg 06/09/2017





- 1. Background
- 2. Soil data sharing
- 3. Use of soil data
- Conclusion

Strasbourg 06/09/2017

23/28

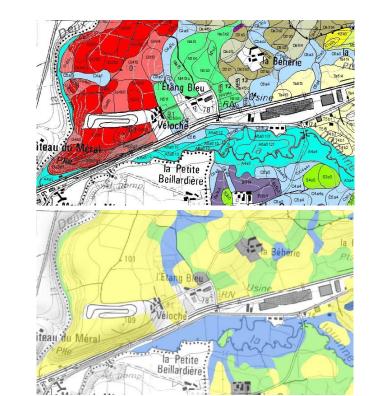


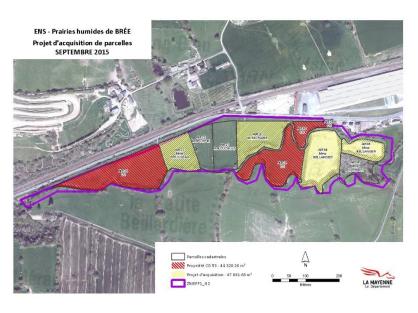
# 3. Use of soil data (4)

#### For land development

Useful information for:

- Choosing reference parcels for land classification (e.g.: high-speed rail project, road construction,...)
- Locating and adapting compensatory measures.







1. Background

2. Soil data sharing

3. Use of soil data

Conclusion

Strasbourg 06/09/2017

24/28



# 3. Use of soil data (5)

For the identification of wetlands areas Useful information for:

- Identification of wetlands within the framework of the French Water Framework Law of 2006
- Zoning in urban planning for the local governments
- Environmental assessment for spatial planning or land management

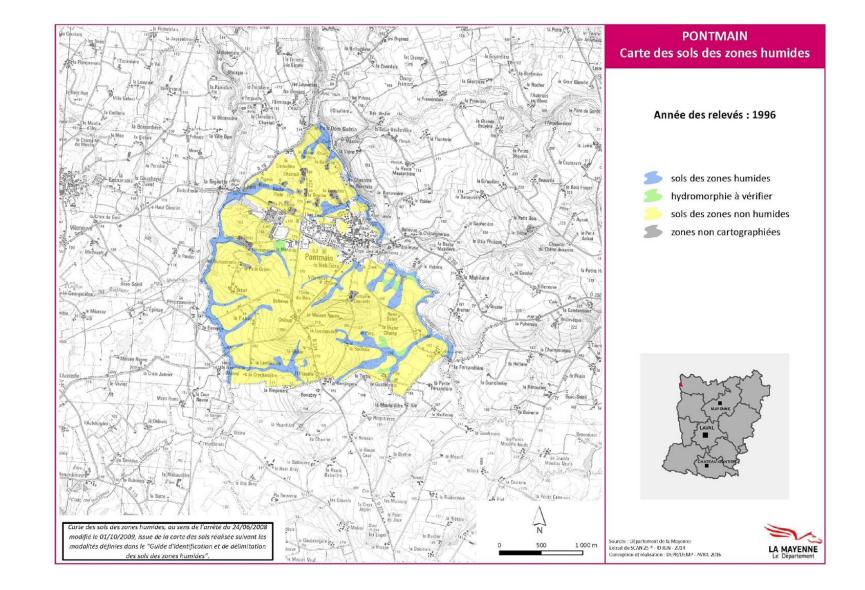


Identifier les zones humides et les prendre en compte dans les documents d'urbanisme

Classification de l'hydromorphie des cartes pédologiques du Conseil Général	Correspondance avec l'arrêté du 24 juin 2008 modifié
0 - pas de traces d'hydromorphie 1 - traces d'hydromorphie peu intense 2 - traces d'hydromorphie d'intensité moyenne 3 - traces d'hydromorphie d'intensité moyenne à forte	Zone non humide
4 - traces d'hydromorphie de forte intensité	Secteur à expertiser
5 - hydromorphie marquée dès la surface mais la réduction n'affecte pas 50% de la matrice 6 - hydromorphie marquée dès la surface et la réduction affecte plus de 50% de la matrice	Zone humide



#### Wetland soils



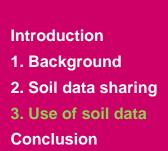
Introduction 1. Background 2. Soil data sharing 3. Use of soil data Conclusion

> Strasbourg 06/09/2017



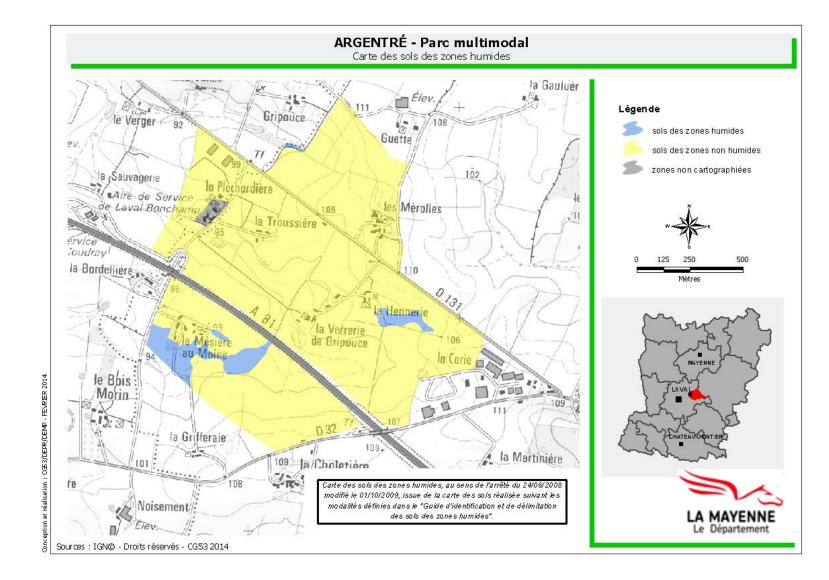


#### Wetland soils



Strasbourg 06/09/2017

26/28



geomay**enne**.fr



1. Background

Soil data sharing
 Use of soil data

Conclusion

Strasbourg 06/09/2017

27/28



#### Conclusion

Soil is an essential element of sustainable development, considering all the services it renders to us:

- food or energy production
- regulation
- storage of water or carbon
- water purification
- reservoir of biodiversity

Soil data also provides important information to address increasing environmental issues.

Soil misuse leads to unavoidable disorders and costs for the coming generations.

Public dissemination of soil data therefore makes sense to promote the **environmental protection** !

However, the use and interpretation of soil data may require technical expertise for complex analysis.



https://www.geomayenne.fr/portail/



# Thank you for your attention...

Any question ?

Strasbourg 06/09/2017

