



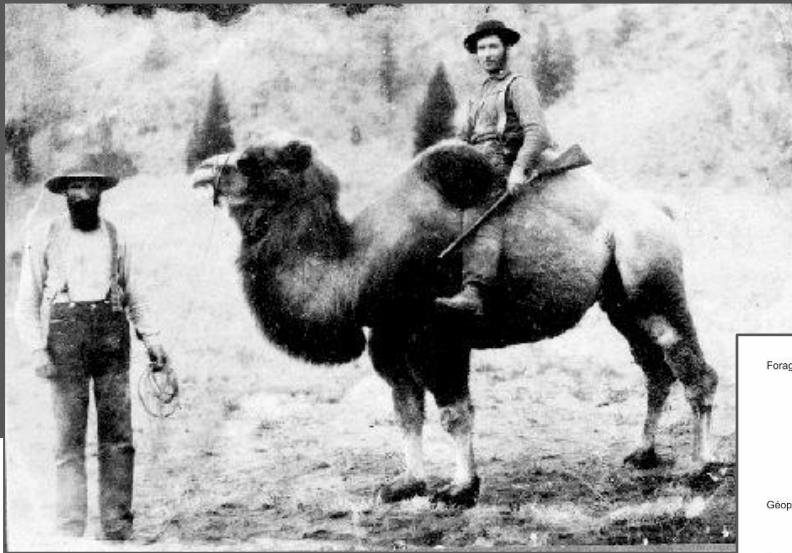
Département de la mobilité, du territoire et de l'environnement
Departement für Mobilität, Raum und Umwelt

CANTON DU VALAIS
KANTON WALLIS

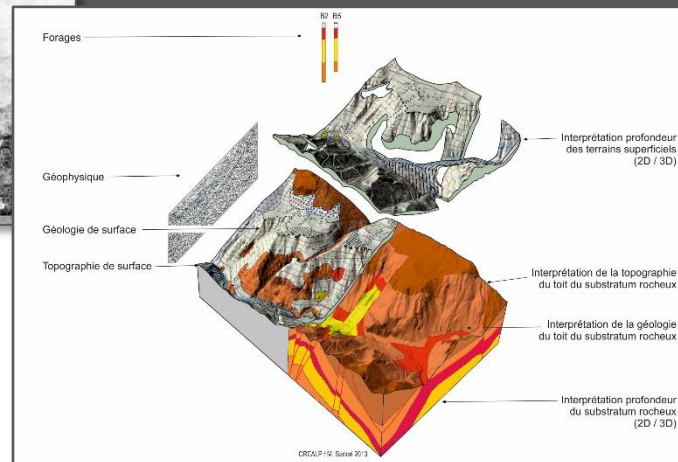
« 3D Modelling of the Rhone valley » – How?

Dr Pierre Christe, CHGEOL^{cert}
Service of the Environment
Head Groundwater group

Visp, 22. June 2017



Cariboo camels, Gold rush, BC, 1862

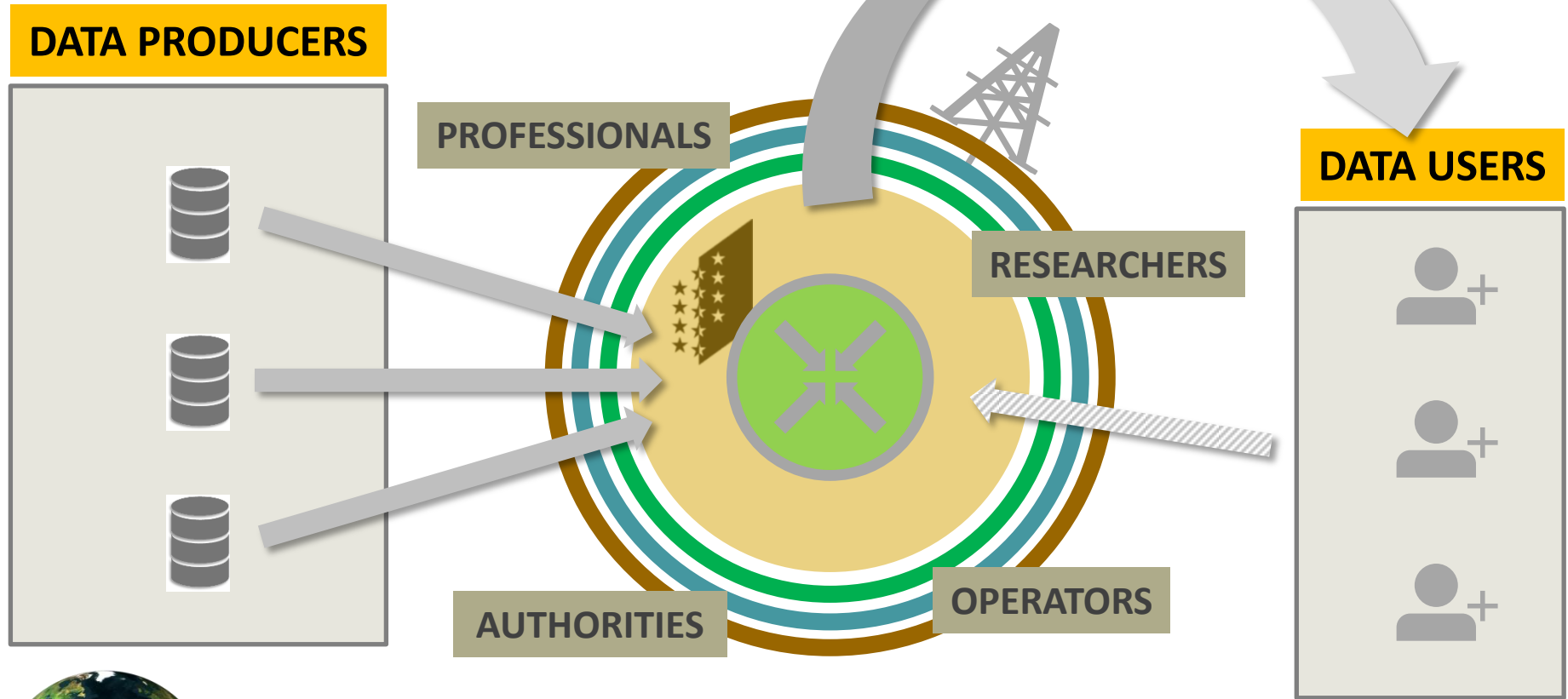


Sartori, CREALP, 2013



CANTON DU VALAIS
KANTON WALLIS

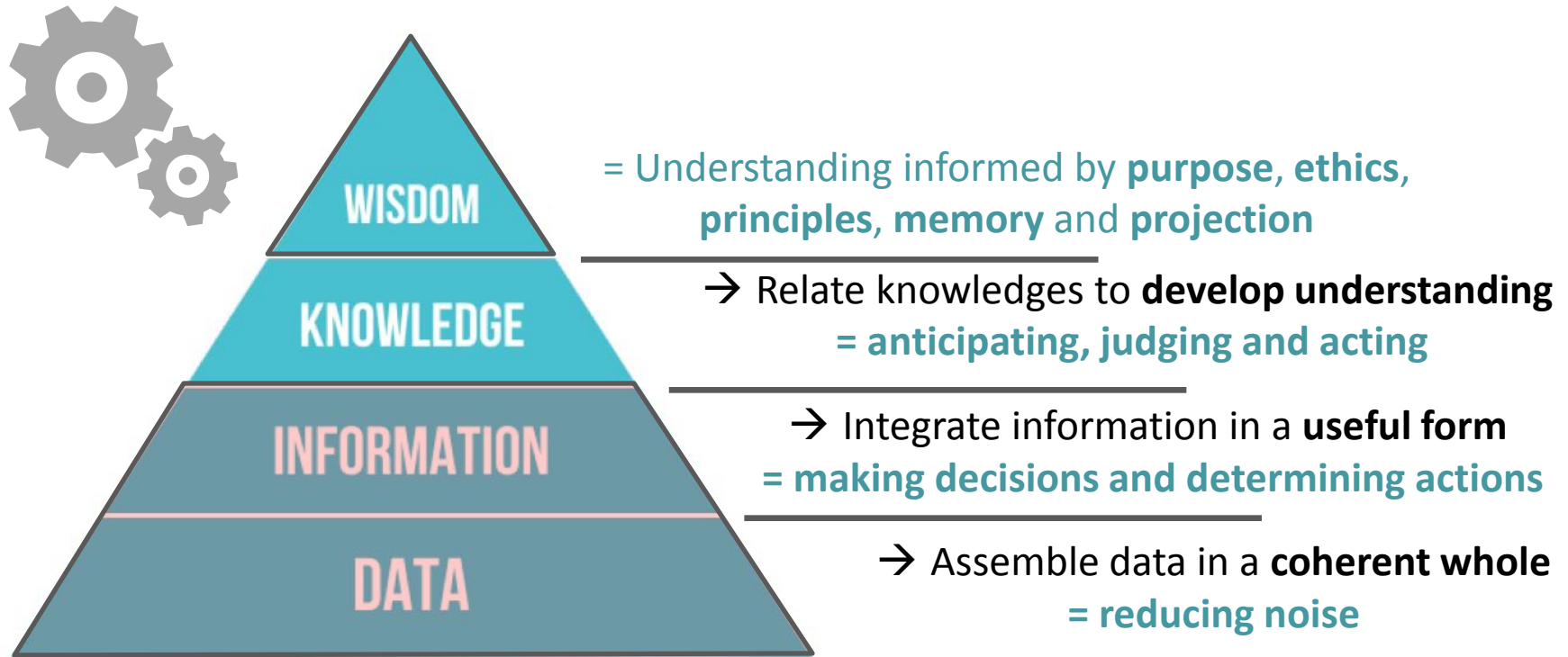
Access to basic geological data?



Centralised access allow to significantly reduce time of data query, ensure standardised data formats, avoid data loss (resp. graveyard), and contribute to stimulate innovation.



"If you can not measure it, you can not improve it."

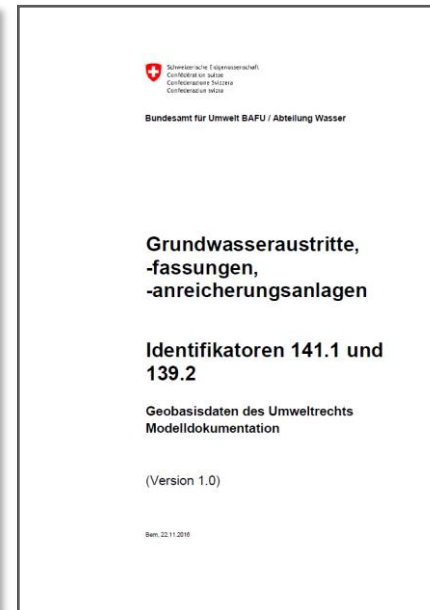
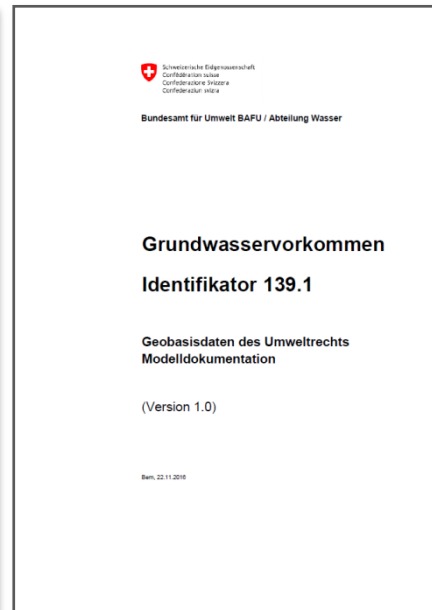
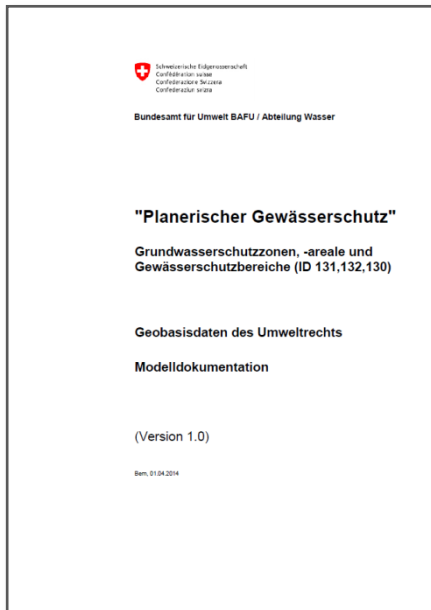


The "DIKW Pyramid". Longlivetheux. From Wikimedia Commons

Typically ***information*** is defined in terms of ***data***, ***knowledge*** in terms of ***information***, and ***wisdom*** in terms of ***knowledge***.

Assembling data & information into knowledge...

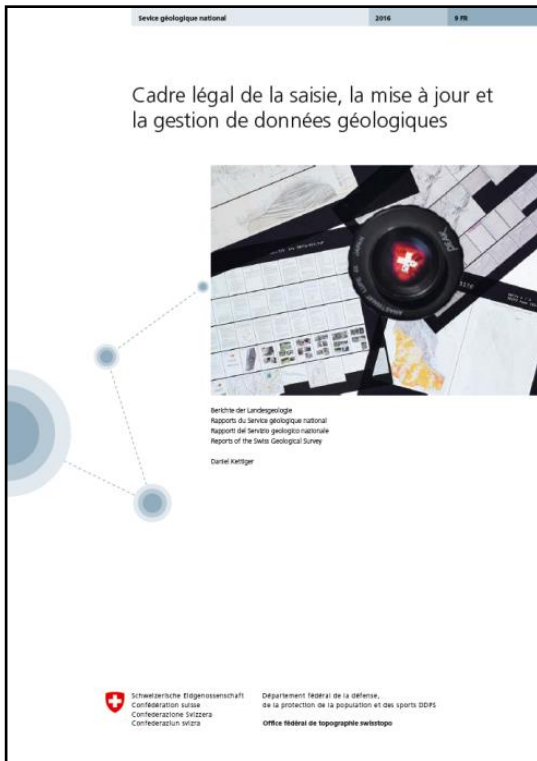
- New digital scheme of environment law from the Geoinformation Act (GeolG) and its implementing ordinances.
- Definition of “**minimum geodata models**” for official geodata under federal legislation.
- A data model consists of a **written description of the modelled reality** (semantics), a **catalogue of objects** and a **conceptual data model** (with a graphical and textual description).



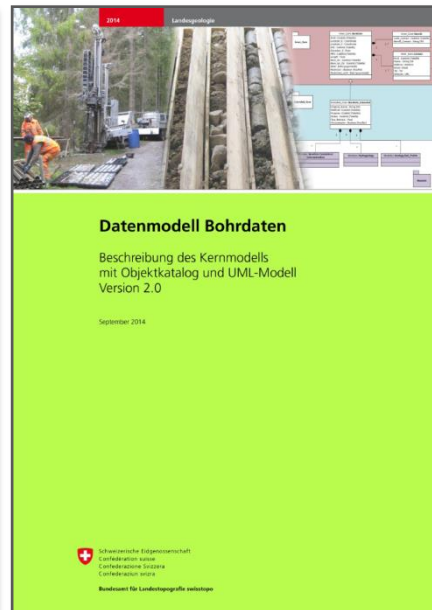
www.bafu.admin.ch/geodatenmodelle

Assembling data & information into knowledge...

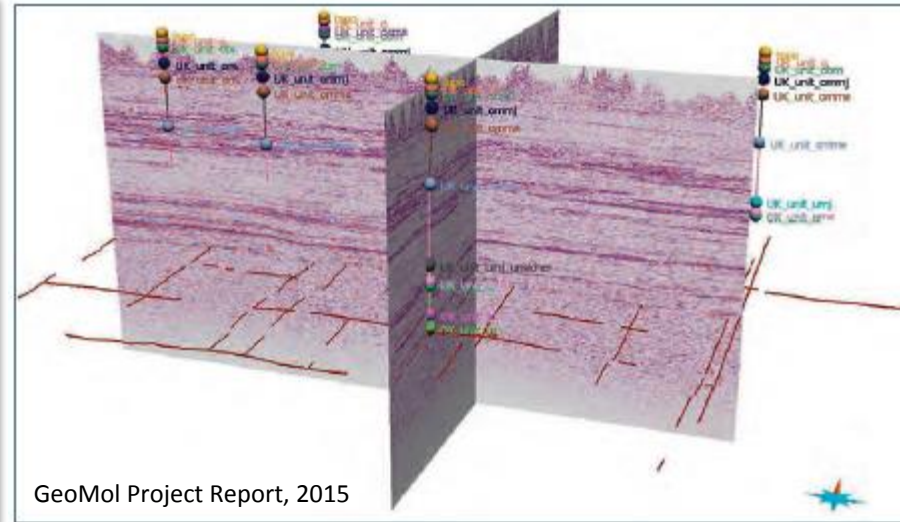
- **Basic geological data** = input for carrying out **modern geological analyses** and **exploring** the underground.
- Essential basis for the development of **comprehensive geological datasets** and **models** in the domains of *natural hazards*, *geo-energy* and *raw materials*, as well as for dealing with issues relating to the *environment*.



Kettiger, 2016



<https://www.geologieportal.ch/de/wissen/lookup/datenmodelle/datenmodell-bohrdaten.html>



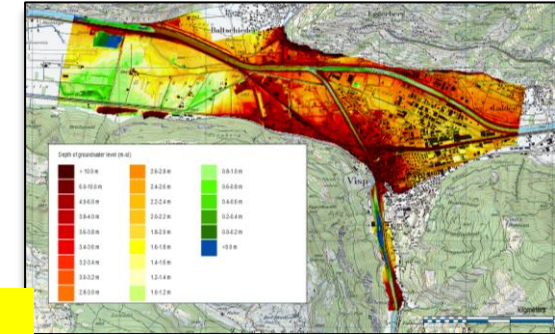
www.swisstopo.admin.ch/geologie

1. Raw geological data
2. Processed geological data
3. Interpreted geological data

1

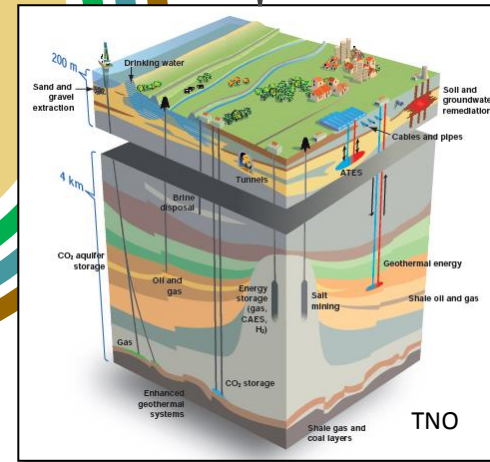
1. Simulation
2. Post-processing
3. Publication of results

4



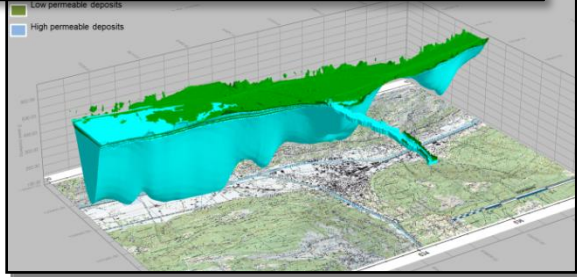
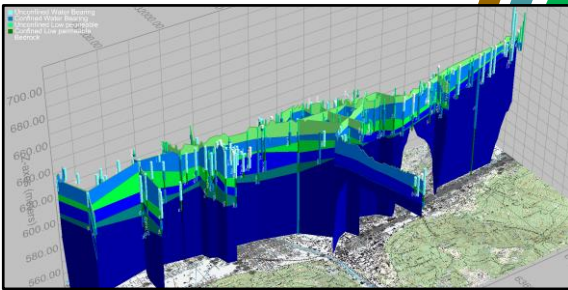
**Optimization
(iterative process)**

5



**Conceptualisation
(space / resources)**

3



2D / 3D interpretation

2

Advantages of a harmonised Rhone valley 3D model

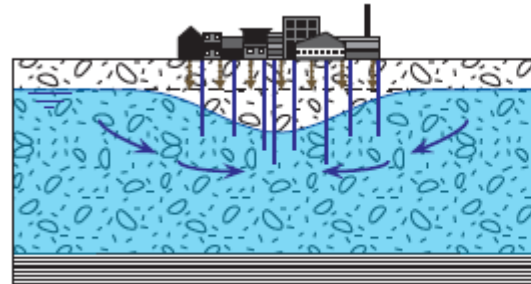
Typical model outputs

- Seismic microzonation maps ;
- Groundwater maps and flow models ;
- Geochemical maps ;
- Bedrock maps ;
- Maps of soil quality classes ;
- Maps of geopotentials ;
- Borehole admissibility maps ;
- Model output files ...



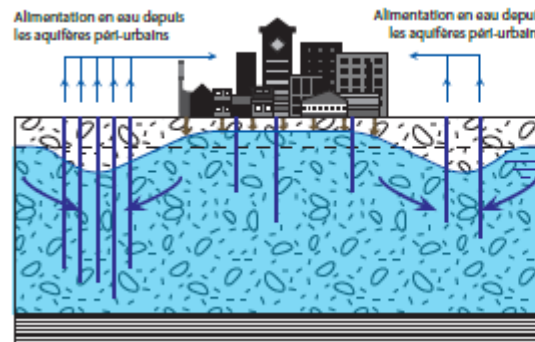
Assuming model uncertainties:

- ✓ Support technical / political decision.
- ✓ Determine best actions.



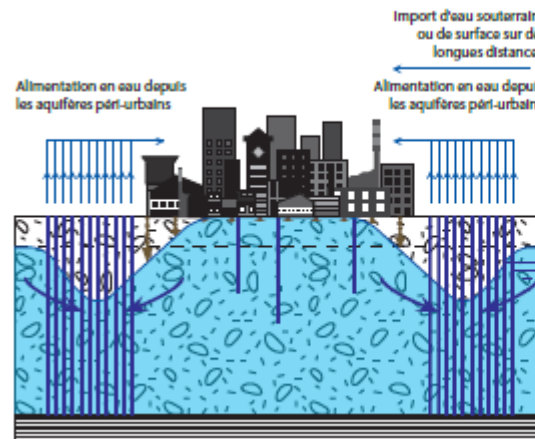
(a) Le village devient une ville

- Augmentation de la demande en eau des ménages et des industries.
- Baisse de la nappe phréatique, les puits sont construits plus profonds.
- Les eaux usées et de ruissellement s'infiltrent dans le sous-sol.
- Les nappes superficielles dans les centres des villes deviennent polluées.
- La subsidence peut se produire si les aquifères sont peu consolidés.



(b) La ville s'étend

- Les aquifères sous la ville sont abandonnés en raison de la pollution, pour lutter contre la subsidence ou parce que la demande a diminué avec la migration des industries vers la périphérie.
- Au centre, les eaux souterraines remontent en raison de la réduction des pompages et de l'augmentation de la recharge.
- Les eaux souterraines sont importées de la périphérie, le niveau des aquifères baisse en périphérie.
- La modification des gradients hydrauliques produit une circulation des eaux polluées du centre ville vers la périphérie.



(c) La ville s'étend plus loin

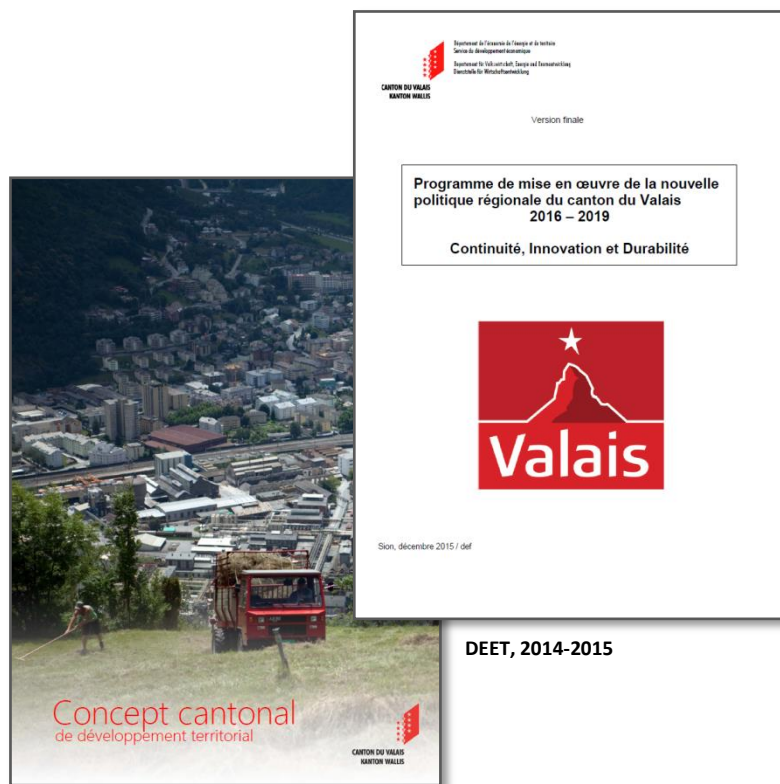
- La pression sur les aquifères péri-urbains augmente, la qualité de l'eau baisse en raison de la pollution urbaine.
- Pour répondre à l'ensemble des besoins, l'eau doit être importée sur des distances plus longues, entraînant une augmentation des coûts.
- La nappe phréatique monte au centre de la ville, inondant les infrastructures de sub-surface.
- Les possibilités d'infiltration des eaux pluviales sont réduites.
- Les réseaux d'eaux pluviales sont parasités par les eaux souterraines.

Advantages of a harmonised Rhone valley 3D model

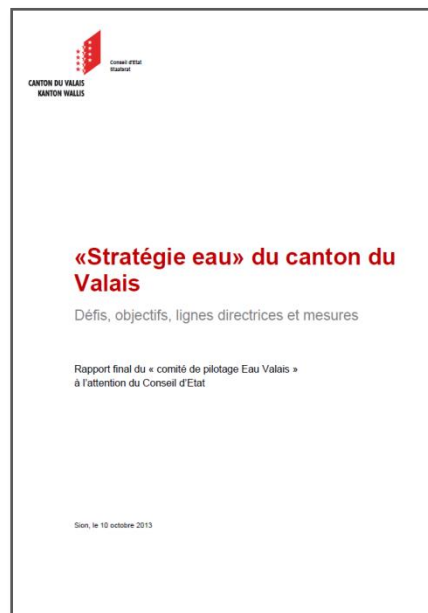


Implementation of Cantonal strategies

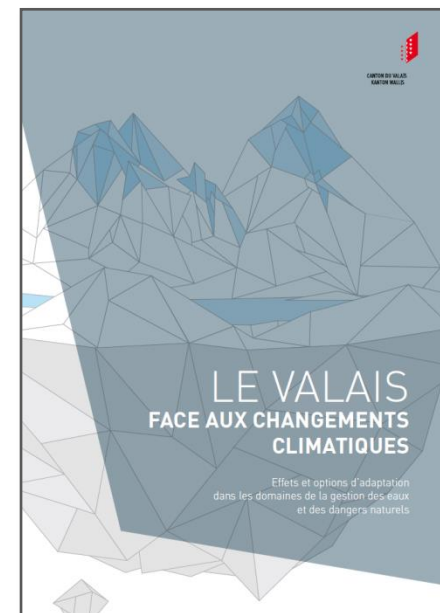
- **Urban & regional planning**, long-term management of **water resources**, wasted site **remediation**, anticipation to **climate change**, ...
- Development of a **sectorial energy plan** for the Rhone valley.



DEET, 2014-2015



CE, 2014



DMTE, 2016

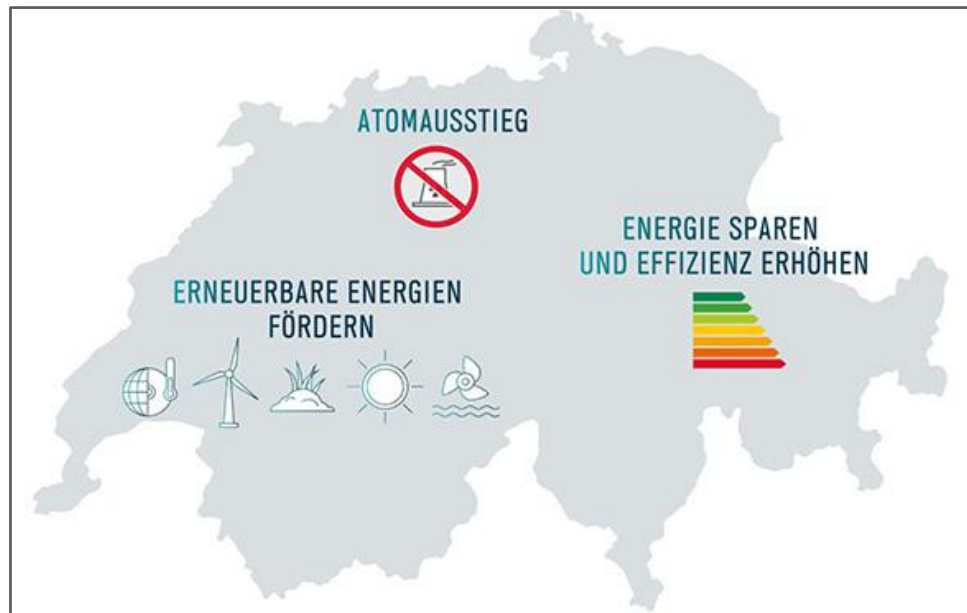
Advantages of a harmonised Rhone valley 3D model



Implementation of **Federal strategies**

➤ **Energy Strategy 2050** (accepted 21.05.2017)

→ Carry out a **total revision** of the Federal Energy Act and amend a variety of other laws and ordinances (among them the National Geology Ordinance).



OFEN, 2017

https://www.uvek.admin.ch/uvek/fr/home/energie/strategie-energetique-2050.html?_organization=801&_pageIndex=0

