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Priscilla Thébaux

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Bacteriological quality of well water consumed in St-Georges de l'Oyapock, French Guiana

Thébaux P., priscilla.thebaux@cnrs.fr
USR 3456 – LEEISA Cayenne

Context

In St-Georges de l'Oyapock, a municipality of French Guiana bordering the Brazilian state of Amapá, the use of **well water** is common, including for drinking, and is often not due to the absence of public water distribution and infrastructures. Yet private well water in France is **subject to strict norms and regulation**, including high standards of quality, when intended for human consumption.

Focusing on bacteriological quality and using the Savana district (Fig.1) as a case study, we **compare the perception inhabitants have of groundwater quality**, including the potential risks of contamination known to them, with the standards of potability quality demanded by public authorities.



Fig. 1 : St Georges de l'Oyapock and the Savana district



Fig. 3 : well n°4, a type of "Amazonian" well (dug), covered with cement and roof



Fig. 4 : well n°3, a type of "Amazonian" well (dug), covered with cleats



Fig. 5 : well n°8, a type of "artesian" well (drilled) with an individual filter

We chose to use an **interdisciplinary approach** for this study and focused specifically on the Savana district, which is not yet fully integrated into the public water distribution network. We combined both **anthropological and physico-chemical data**, including:

- 8 semi-structured interviews with well owners
- 6 months of ethnographic observations (November 2020-May 2021)
- 8 samples of well water collected at the site of consumption (analysed by the Pasteur Institute)
- 4 structured interviews with professionals responsible for water quality (a technical engineer, hydrogeologist, epidemiologist and doctor)

Material and methods

Results and discussion

Based on current regulations (*articles R. 1321-26 to R. 1321-30 of the public health code and the decree of 11/01/2007 relating to the limits and references of quality of raw water and water intended for human consumption*), results show that well water is **not always up to French bacteriological standards**, set at 0 bacterial colonies per 100 ml (Fig. 2).

Below are a subset of well owner responses to these results:

« No I'm pretty confident with water from my well, it's **filtered through the sand** anyway »

« We have a neighbour who has a well where the water comes out brown. But here, it's **filtered by the sand** so it's okay »,
Well n°1 owners

« Well water if you drink like that all the time, when it's winter, the water hurts! Because when the rain falls, **everything that passes on the road comes in**, on the sides. And it gets into the well with a **lot of germs** »,
Well n°5 owner

« Yes I understand, drinking natural water. The thing is that today it is almost impossible because we live in a totally **polluted world! People throw everything in the street** and everything is contaminated! So it's better to have treated water »,
Well n°2 owner

The presence of intestinal bacteria seems to vary according to the **type of well** and its **depth**, but two additional factors may also explain these results:

- Type of **well cover** (Fig. 3&4)
- Use of an **individual filter** that has not undergone regular maintenance (Fig. 5)

Bacterial contamination (by *E. coli* and *Intestinal enterococci*) seems mainly correlated with **individuals practices** rather than groundwater contamination per se. Yet users believe risks are independent of their practices and that responsibility lies externally (e.g. littering, rain, soil).

CODE	Type	Depth	Bacteriology	
			<i>E. Coli</i>	Intestinal enterococci
Well n°1	amazonian	3-4 m	< 1	40
Well n°2	artesian	8 m	< 1	< 1
Well n°3	amazonian	3-4 m	non-interp.	> 150
Well n°4	amazonian	-	< 1	< 1
Well n°5	amazonian	2-3 m	22	10
Well n°6	artesian	12 m	< 1	< 1
Well n°7	artesian	11 m	< 1	< 1
Well n°8	artesian	11 m	non-interp.	< 1

Fig. 2 : technical characteristics of wells and bacteriological analyses of their water samples

Furthermore, urban expansion that has occurred with development of the region (Davy and Fozzani 2021) may have various impacts on the everyday life of inhabitants :

- the contamination of groundwater, especially where sewage services are absent.
→ **How will inhabitants take this into consideration going forward?**
- the public "regularization" of the area not yet connected to various public services, including access to potable water.
→ **Will inhabitants abandon the use of wells in favor of the public network as a result?**